
THE CONSULTATIVE COUNCIL
ON OBSTETRIC AND PAEDIATRIC
MORTALITY AND MORBIDITY

ANNUAL REPORT FOR THE YEAR 2006

A stylized, dark purple illustration of a woman holding a baby, set within a circular frame. The woman is depicted in profile, looking down at the baby. The baby is lying in her arms. The entire illustration is rendered in a monochromatic purple color scheme.

INCORPORATING THE 45TH SURVEY
OF PERINATAL DEATHS IN VICTORIA

Annual Report for the Year 2006

Incorporating the 45th Survey
of Perinatal Deaths in Victoria

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

ACKNOWLEDGEMENTS

This report was made possible by the generous assistance of many individuals.

Members of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM), and of its sub-committees, have diverse areas of expertise, and their participation in confidential enquires into maternal, perinatal, infant and paediatric and adolescent deaths make an important contribution to this report.

Medical practitioners voluntarily provide confidential medical reports on perinatal deaths, and additional information on maternal, perinatal and paediatric deaths. The autopsies undertaken by anatomical and forensic pathologists are indispensable in the comprehensive consideration of these deaths.

The State Coroner's Office, and personnel from the Victorian Institute of Forensic Medicine, provide information to the Council on cases investigated by Coroners in Victoria, and this linkage has been recently (June 2004) formalised in the amendments to the Health Act (www.dms.dpc.vic.gov.au).

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 data on paediatric emergency transfers.

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

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

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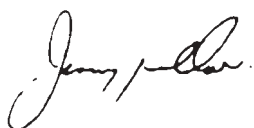
CHAIRMAN'S REPORT

This report marks the third change of Chairs of CCOPMM since its inception in 1962. The first Chair was the late Sir Lance Townsend who presided over the Council for 21 years until 1983; the second Professor Norman Beischer from 1984 to 1999 and the third Professor James King (2000–June 2007). Each brought his particular expertise to the workings and deliberations of the Council and its sub-committees. Professor King's particular strengths came from his epidemiological and public health expertise coupled with his years of specialist Obstetric experience. We are pleased that this expertise will still be accessible as he has agreed to continue to serve as the Obstetric Epidemiologist to Council.

To date the Council has concentrated particularly on mortality. It is of course charged with also considering, investigating and reporting on obstetric and paediatric morbidity. In concert with other related state and national organisations in both Australia and New Zealand we are, and will be, increasing our involvement in this sphere. One of the major challenges is to establish a national approach to classification, ascertainment and reporting so that each state and region can then benchmark their outcomes. This will also make significant demands on the resources currently available to the Council and on the time and expertise of the Council staff, and members of Council and its sub-committees.

One of the challenges for the providers of maternity and child health is to translate the recommendations for improvement of health services to the community that come from the deliberations of Council. The advent of the new Maternity Newborn Clinical Network should provide such a vehicle to aid the dissemination and uptake of these recommendations.

Professor King has paid tribute to the members of Council and its subcommittees and especially to the staff of CCOPMM and I wish to add my gratitude.



Jeremy J.N. Oats, MBBS, DM, FRCOG, FRANZCOG
Chairman (from July 2007)

PAST CHAIRMAN'S REPORT

It is with pleasure that I present this 45th consecutive report of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity, for the year 2006. This is the eighth and last report relating to my tenure of office (2000–2007). On July 1st 2007, the Chairmanship of Council was assumed by Professor Jeremy Oats. I extend to him and the new Council my very best wishes.

This report contains epidemiological analyses of maternal, perinatal and paediatric deaths which occurred in Victoria during the calendar year 2006, and contains a summary of the clinical and public health implications resulting from the confidential enquiries conducted by the Council.

The traditional public health indicators of maternal, perinatal, infant and paediatric mortality indicate overall high standards of health and health care, for mothers and children in both institutional and community settings in Victoria. The analyses for the 2006 cohort are summarised in the executive summary.

Despite these generally reassuring findings, in the Council's review of individual cases, it is not uncommon to identify preventable factors in the reports of maternal, perinatal and paediatric deaths, enabling consideration of ways in which the risk of death for mothers and children may be further reduced. By identifying patterns of such deficiencies or behaviours, Council reminds care providers that mortality and morbidity have not reached irreducible levels.

The Council expresses its gratitude to Victoria's medical practitioners, midwives, neonatal and paediatric nurses and other health professionals, and managers of health service institutions for providing confidential clinical information, which assists the Council's subcommittees in their deliberations. Practitioners and hospital managers can be reassured that compliance with requests from the Council is both legal and proper and does not breach privacy regulations. In return, the Council operates under a strict confidentiality code; information provided to the Council is privileged by legislation, and is not accessible by any third party, including the Courts.

I would like to sincerely thank the Council members and the members of the subcommittees for their generous support during the seven years of my Chairmanship, in responding to requests for advice, assisting with the complexities of the Council's broad remit, and in particular for regular attendance at the frequent meetings of the Council and its sub-committees.

The invaluable contribution made by the two part time epidemiologists to the Council, Dr Sophie Treleaven (paediatric) and Mary-Ann Davey (maternal/perinatal), is gratefully acknowledged, as is the assistance of Dr Cathie Rose with consideration and coding of paediatric and malformation cases. I also acknowledge the support provided by the Council's part-time administrative assistant, Amanda Robertson.

Rosemary Warren, MPH, research officer to the Council, oversees the overall functioning of the Council and its sub-committees and has been instrumental in the production of this, and the last seven reports. Council is most appreciative of her skilful and meticulous work, and is with pleasure that I pay personal tribute to her dedication, scholarship and collegiality in all aspects of the work of the Council.

I hope that readers will find the contents of this report informative and useful, and Council welcomes comments on any aspect of its contents.

Respectfully submitted,

A handwritten signature in black ink, reading "James Forrester King" with a period at the end. The script is cursive and fluid.

James Forrester King, MB, MPH, FRCSC, FRCOG, FRANZCOG
Chairman, Feb 2000-June 2007.

EXECUTIVE SUMMARY

MATERNAL DEATHS

- In Victoria in 2006, there were 68,547 confinements. There were 1 direct, 5 indirect and 1 incidental maternal deaths. In addition, one maternal death is yet to be classified. The maternal mortality ratio (direct and indirect deaths) was 8.8 per 100,000 confinements, compared with 10.5 for 2005.

PERINATAL DEATHS

- Of the 69,836 births, 607 infants were stillborn and 227 infants died within the first 28 days of life. The perinatal mortality rate in 2006 was 11.9 per 1,000 births, compared with 12.7 for 2005. One out of approximately every 84 babies with a gestation of ≥ 20 weeks or birthweight ≥ 400 g, was either stillborn or died in the first 28 days of life.
- The stillbirth rate was 8.7 per 1,000 births (9.0 in 2005). Terminations of pregnancy for psychosocial indications comprised 25% of stillbirths. More than half of these procedures were performed on women not residing in Victoria. When adjusted for these terminations, the stillbirth rate was stable at 6.6 per 1,000 births. The other leading causes of stillbirth were terminations for congenital malformations (17% of stillbirths) and unexplained stillbirth (15% of stillbirths). Many of the 'unexplained' stillbirths were under-investigated.
- The neonatal death rate was 3.3 per 1,000 live births (3.7 in 2005). The leading causes of neonatal death were congenital abnormalities (36%) and spontaneous preterm birth (29%). Forty two of the 82 neonatal deaths attributed to congenital abnormalities were as a result of terminations of pregnancy.
- The adjusted perinatal mortality rate for multiple births was 4.1 times higher than that of singletons (36.1 per 1,000 births for multiple births compared with 8.8 per 1,000 singleton births). The neonatal mortality rate for multiple births was 6 times higher than for singleton births (16.2 per 1,000 multiple livebirths compared to 2.7 per 1,000 singleton livebirths).
- The adjusted perinatal mortality rate for 2000-2006 for the Indigenous population (women who gave birth and who identified as Aboriginal or Torres Strait Islander) was just over 2.1 times higher than that for the non-Indigenous population (20.4 per 1,000 Indigenous births compared with 9.7 per 1,000 non-Indigenous births). The neonatal mortality rate for Indigenous births was 2.9 times higher than for non-Indigenous births (10.0 per 1,000 Indigenous livebirths compared to 3.4 per 1,000 non-Indigenous livebirths).

DEATHS OF POSTNEONATAL INFANTS AND CHILDREN

- The infant mortality rate was 3.9 per 1,000 live births (4.4 in 2005). Three hundred and eleven infants died in the first year of life: 227 of these infant deaths occurred before 28 days of life, and 84 between 28 days of age and the first birthday. The commonest causes of death in postneonatal infants were birth defects and genetic conditions, followed by conditions determined at birth (eg prematurity, birth asphyxia).
- Nineteen infant deaths (including three neonatal deaths) were attributed to Sudden Infant Death Syndrome (SIDS). The number of deaths from SIDS has fallen from 128 in 1985 to 19 in 2006.
- Thirty-five children aged 1 to 4 years died. The death rate for children aged 1–4 years was 14.4 per 100,000 population. The leading causes of death for this age group were birth defects and genetic conditions, followed by deaths due to malignancies.
- Twenty-seven children aged 5 to 9 years died. The death rate for children aged 5–9 years was 8.6 per 100,000 population. The leading causes of death for this age group were birth defects and genetic conditions, malignancy and drowning.
- Twenty-eight children aged 10 to 14 years died. The death rate for children aged 10–14 years was 8.5 per 100,000 population. The leading causes of death for this age group were malignancy, motor vehicle accidents and other conditions determined at birth (e.g. prematurity, birth asphyxia), birth defects and genetic conditions and suicide.
- Forty-eight adolescents aged 15 to 17 years died. This is the second year that Council has reported on this age group. The death rate for children aged 15–17 years was 23.8 per 100,000 population. The leading causes of death for this age group were motor vehicle accidents, followed by malignancy and suicide.
- Six postneonatal infants and 4 children (aged ≥ 28 days–17 years) died as a result of infection.
- Twenty nine children (aged 1–17 years) died as a result of motor vehicle accidents (9 children aged 1–14 years and 20 adolescents aged 15–17 years). There were no motor vehicle deaths in postneonatal infants (aged ≥ 28 days–364 days). This is the first year since reports began in 1985 where there have been fewer than 10 deaths from motor vehicle accidents in the age group <15 years.
- One infant and seven children (aged ≥ 28 days–17 years) died as the result of drowning. Three children drowned in domestic swimming pools.
- 12 young people aged 13–17 years died as a result of suicide.

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PERINATAL DATA COLLECTION UNIT, BIRTH DEFECTS REGISTER

The Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) was established in 1962 under the *Health Act 1958*, and is the advisory body to the Minister for Health on maternal, perinatal and paediatric mortality and morbidity. The Victorian Perinatal Data Collection Unit (PDCU) was established in 1982, by an amendment to the Health Act under the auspices of CCOPMM. The Birth Defects Register (BDR) was established in 1984, also under the auspices of CCOPMM and has collected information on all infants born since January 1, 1982, diagnosed with one or more birth defects.

THE VICTORIAN PERINATAL DATA COLLECTION UNIT (PDCU)

The Victorian Perinatal Data Collection Unit (PDCU) has collated data on all Victorian births under a legislated reporting system since 1982, and sits within CCOPMM.

For details of all birth data, refer to publications from the PDCU: www.health.vic.gov.au/perinatal or contact the PDCU on (03) 9096 2696.

BIRTH DEFECTS REGISTER

Under the legislation by which it is constituted, CCOPMM is required to maintain a register of birth defects, and to provide information to the medical profession and others about these disorders. The Birth Defects Register is maintained by staff of the PDCU, with advice from Associate Professor Jane Halliday, consultant epidemiologist to the BDR.

For details of birth defects data, refer to publications from the PDCU: www.health.vic.gov.au/perinatal or contact the Births Defects Register on (03) 9096 2696.

IMPORTANCE OF BIRTH DEFECTS NOTIFICATION

CCOPMM wishes to emphasise the importance of reporting cases of suspected or proven birth defects, regardless of whether they may 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) 9096 2696 or 1300 858 505.

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

PROVISION OF DATA FOR STATISTICAL AND RESEARCH PURPOSES

Under the auspices of the CCOPMM the Perinatal Data Collection Unit (PDCU) has since 1982 collated information on all births in Victoria of at least 20 weeks gestation. CCOPMM also maintains collections on perinatal, infant, child deaths (up to, but not including, their 18th birthday), and maternal mortality. *CCOPMM readily provides data requested by health professionals; however, careful consideration is given to assure that the privacy of individuals is protected.*

The CCOPMM Chair reviews all requests for information from PDCU. If access to individual case records is requested, stringent conditions apply to safeguard the security and confidentiality of any data released. Formal research proposals must conform to the National Health and Medical Research Council's *National Statement on Ethical Conduct in Research Involving Humans 1999*. Before any research project can access PDCU data, a properly constituted Humans Research Ethics Committee must have approved it.

All correspondence should be addressed to:

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CCOPMM encourages the use of information within this and other CCOPMM reports, providing appropriate acknowledgement of the source is made.

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Mr Michael Batchelor (to 2008)
Mrs Anne-Maree Szauer (from 2008)
Ms Sofia Mercer (to 2006)
Mrs Gemma Wills (from 2007)
Mrs Sonia Palma
Ms Sara Scalzo (from 2006)
Ms Mary-Louise Sloan (to 2006)
Mrs Odette Taylor (to 2008)
Mrs Debbie Arnold
Mrs Linda Botham
Mrs Marina Forte
Mrs Jillian Wheatley
Dr Catherine Rose
Mrs Marilyn Riley
Associate Professor Jane Halliday

Manager
Acting Manager
Research Midwife
Research Midwife
Health Information Manager
Health Information Manager
Health Information Manager
Health Information Manager
Information Officer
Information Officer
Information Officer
Information Officer
Consultant Medical Officer
Research Officer, Births Defects Registry
Consultant Epidemiologist, Birth Defects Registry

PERINATAL MORTALITY REVIEW 2006

INTRODUCTION

This report is the 45th consecutive Survey of Perinatal Deaths in Victoria.

Data are primarily presented (since 2000) on perinatal deaths of infants of gestation ≥ 20 weeks or if gestation is unknown of birthweight ≥ 400 g. Using this ≥ 20 weeks/ ≥ 400 g definition, there were 834 perinatal deaths in Victoria in 2006, giving a perinatal mortality rate (PMR) of 11.9 per 1,000 total births. The stillbirth rate was 8.7 per 1,000 total births, and the neonatal death rate was 3.3 per 1,000 live births. In Victoria terminations of pregnancy ≥ 20 gestation for maternal psychosocial indications (in the absence of fetal abnormality) comprise a significant proportion of perinatal deaths. This obviously affects the interpretability of the perinatal mortality rate as a public health indicator and therefore the perinatal mortality tables are presented with these cases included, and also with them excluded. When terminations of pregnancy for maternal psychosocial indications are excluded, the adjusted stillbirth rate in 2006 was 6.6 per 1,000 total births and the adjusted perinatal mortality rate was 9.8 per 1,000 births.

CCOPMM also reports on perinatal deaths of infants with a birthweight of ≥ 500 g, or if the birthweight is unknown, infants of ≥ 22 weeks gestation. This definition has certain advantages because it excludes from the calculation those mostly pre-viable live births of < 500 g and also the majority of cases where the pregnancy was terminated for fetal or maternal indications.

Using the ≥ 500 g/ ≥ 22 weeks definition, there were 423 perinatal deaths in Victoria in 2006, giving a perinatal mortality rate (PMR₅₀₀) of 6.1 per 1,000 births. The stillbirth rate (SBR₅₀₀) was 3.8 per 1,000 total births, and the neonatal death rate (NMR₅₀₀) 2.3 per 1,000 live births.

Process for the CCOPMM's review of perinatal deaths

CCOPMM compiles a case file on each perinatal death and the case material is considered by the Chair of the Council, the Medical Consultant and the Research Officer, and selected cases are referred to the sub-committees if preventable factors are suspected (e.g. term perinatal death from intrapartum asphyxia) or if other specific concerns are identified. Those deaths which are considered likely to be unavoidable (eg lethal congenital abnormalities or death following spontaneous birth of extremely preterm infants) are not usually referred to the sub-committees. All cases were considered, classified and coded according to the classifications of the Perinatal Society of Australia and New Zealand (perinatal death classification and neonatal death classification) by James King and Rosemary Warren.

VICTORIAN BIRTH RATES AND FERTILITY RATES

In 2006, the number of livebirths was 69,155 ($\geq 500\text{g}$ or ≥ 22 weeks gestation). The livebirth rate is the number of livebirths per 1,000 of the estimated resident population for the year indicated. In 2006, the estimated resident population for Victoria was 4,932,422 giving the livebirth rate of 14.0 per 1,000. In the mid sixties the live birth rate was about 20 per 1,000 estimated resident population.

The fertility rate is the number of livebirths ($\geq 400\text{g}$ or ≥ 20 weeks gestation) per 1,000 of the estimated female resident population aged 15 to 44 years. In 2006 the number of livebirths ($\geq 400\text{g}$ or ≥ 20 weeks gestation), was 69,229, while the female resident population aged 15 to 44 years in Victoria was 1,056,330 giving a fertility rate of 65.6 per 1,000, the highest fertility rate since 1992.

Table 1 Live births in Victoria 1992–2006^a (live birth rate and fertility rate)

Year	Livebirths	Estimated resident population	Livebirth rate	Fertility rate ^b
1992	65,815	4,444,818	14.8	55.6
1993	64,284	4,465,200	14.4	54.5
1994	64,376	4,475,500	14.5	54.7
1995	63,214	4,501,000	14.0	53.6
1996	62,429	4,561,817	13.7	52.4
1997	62,429	4,605,148	13.5	51.7
1998	61,634	4,689,776	13.1	51.2
1999	62,149	4,707,590	13.2	59.8
2000	62,092	4,765,856	13.0	59.4
2001	61,623	4,854,100	12.7	58.5
2002	62,622	4,872,500	12.9	59.1
2003	62,937	4,917,311	12.8	58.9
2004	63,019	4,972,779	12.7	58.8
2005	65,948	5,022,346	13.1	60.9
2006	69,155	4,932,422	14.0	65.6

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

b Fertility rates calculated on all livebirths $\geq 400\text{g}$, or ≥ 20 weeks' gestation. Note figures for 1992–1998 (obtained from VPDCU) calculated on estimated female resident population aged 15 to 49 years, while rates since 1999 are calculated on estimated female resident population aged 15 to 44 years

PERINATAL MORTALITY 2006

Perinatal mortality rate: gestation ≥ 20 weeks, or if gestation unknown, of birthweight ≥ 400 g

Unless otherwise specified, the numerator used by CCOPMM for calculating the perinatal mortality rate is the sum of the numbers of stillbirths and neonatal deaths with a gestational age of at least 20 weeks, or if gestation is unknown, of a birthweight of at least 400g, occurring over a defined time period. The denominator for the perinatal mortality rate is the number of total births in Victoria of a gestational age of at least 20 weeks or, if gestation is unknown, of a birthweight of at least 400g, occurring over the same time period. In 2006 there were 69,836 births, 607 stillbirths and 227 neonatal deaths, giving a total of 834 perinatal deaths and a perinatal mortality rate of 11.9 per 1,000 births (Table 2). The 152 perinatal deaths that occurred ≥ 20 weeks gestation but with birthweight less than 400g, which are included in the total perinatal deaths (n=834), are separately reported in Tables 22 and 23. Terminations of pregnancy ≥ 20 weeks for suspected fetal anomalies or for maternal psychosocial indications comprise a significant proportion of perinatal deaths in Victoria. Perinatal death numbers and PMR adjusted for terminations for maternal psychosocial indications are also presented below in Table 2.

Table 2 Perinatal deaths and crude and adjusted mortality rates in Victoria, 2000–2006

	2000	2001	2002	2003	2004	2005	2006
Number							
Livebirths	62,148	61,705	62,688	63,028	63,082	66,041	69,229
Stillbirths	408	444	445	521	610	599	607
Neonatal deaths	182	204	227	237	207	247	227
Perinatal deaths	590	648	672	758	817	846	834
Rate per 1,000 births^a							
Stillbirth	6.5	7.1	7.1	8.2	9.6	9.0	8.7
Neonatal	2.9	3.3	3.3	3.8	3.3	3.7	3.3
Perinatal	9.4	10.4	10.4	11.9	12.8	12.7	11.9
Number (adjusted for terminations of pregnancy for maternal psychosocial indications)							
Livebirths	62,148	61,705	62,688	63,028	63,082	66,039	69,229
Stillbirths	394	399	385	418	413	421	457
Neonatal deaths	182	204	227	237	207	245	227
Perinatal deaths	576	601	612	655	620	666	684
Rate per 1,000 births^a (adjusted for terminations of pregnancy for maternal psychosocial indications)							
Stillbirth	6.3	6.4	6.1	6.6	6.5	6.3	6.6
Neonatal	2.9	3.3	3.6	3.8	3.3	3.7	3.3
Perinatal	9.2	9.7	9.8	10.3	9.8	10.0	9.8

a Stillbirth and perinatal death rates were calculated using total births (livebirths and stillbirths) as the denominator. Neonatal death rates were calculated using total live births as the denominator

Figure 1 Perinatal mortality rates in Victoria 2000–2006

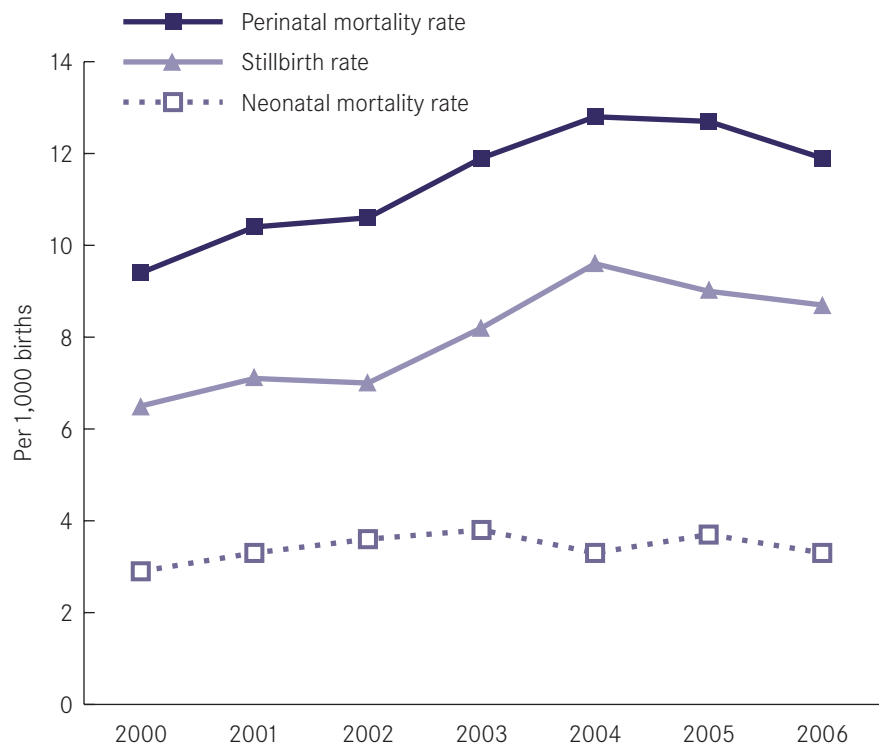
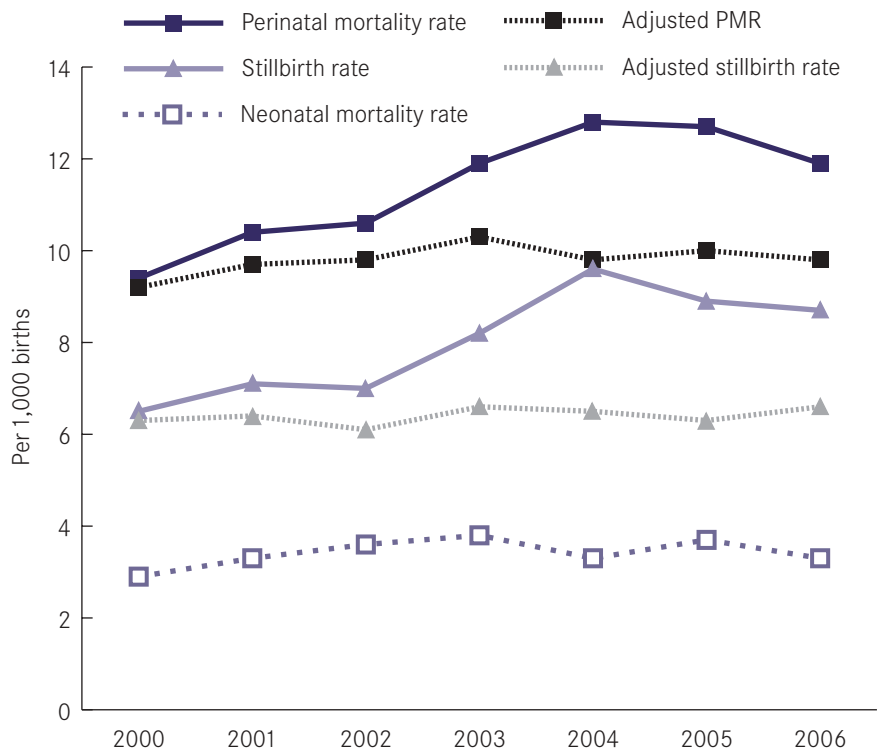


Figure 2 Perinatal mortality rates in Victoria 2000-2006 (crude and adjusted)



PERINATAL MORTALITY RATE

Birthweight ≥500g or ≥22 weeks if birthweight unknown

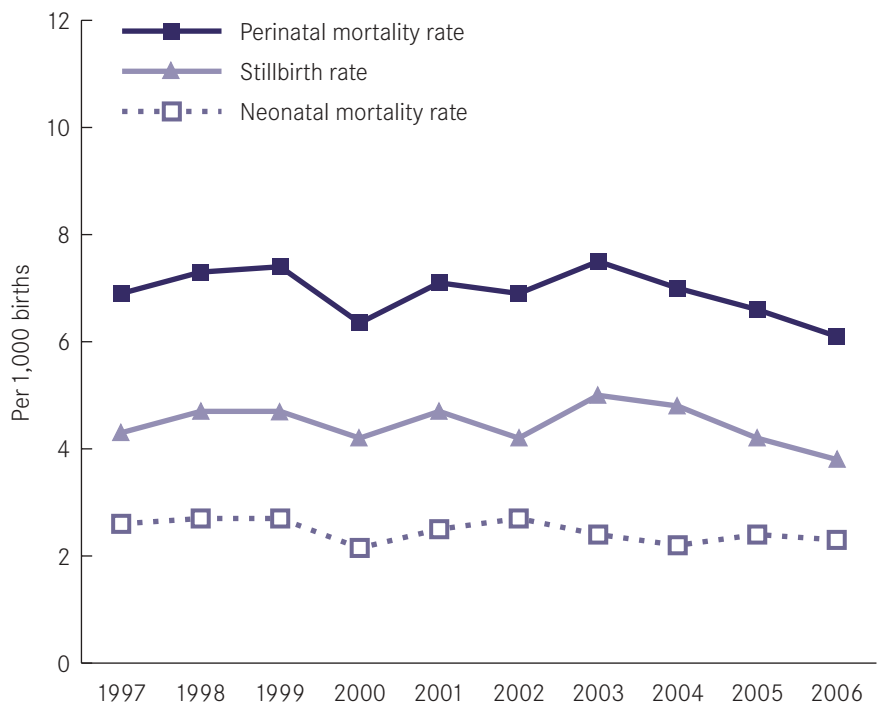
The numerator used by CCOPMM for calculating the perinatal mortality rate (PMR₅₀₀) is the sum of the numbers of stillbirths and neonatal deaths with a birthweight of at least 500g or gestational age of at least 22 weeks if birthweight is unknown, over a defined time period. The denominator uses total births (69,421) of birthweight ≥500g or ≥22 weeks if birthweight is unknown). In 2006 there were 266 stillbirths and 157 neonatal deaths fulfilling the criteria for this definition, giving a total of 423 deaths and a perinatal mortality rate (PMR 500) of 6.1 per 1,000 births (Table 3), the lowest recorded by CCOPMM since reporting perinatal mortality in Victoria since 1982.

Table 3 Perinatal deaths in Victoria 1997–2006 (birthweight ≥500g)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number										
Livebirths	61,815	61,634	62,149	62,092	61,623	62,622	62,937	63,019	65,948	69,155
Stillbirths	269	290	293	262	287	267	319	303	278	266
Neonatal deaths	160	164	171	134	154	170	154	138	159	157
Perinatal deaths	429	454	464	396	441	437	473	441	437	423
Rate per 1,000 births^a										
Stillbirth	4.3	4.7	4.7	4.2	4.6	4.2	5.0	4.8	4.2	3.8
Neonatal	2.6	2.7	2.7	2.2	2.5	2.7	2.4	2.2	2.4	2.3
Perinatal	6.9	7.3	7.4	6.4	7.1	6.9	7.5	7.0	6.6	6.1

a Stillbirth and perinatal death rates were calculated using total births (livebirths and stillbirths) as the denominator.
Neonatal death rates were calculated using total livebirths as the denominator.

Figure 3 Perinatal mortality rates in Victoria 1997–2006 (birthweight $\geq 500\text{g}$)



CAUSES OF PERINATAL DEATHS, 2006

Perinatal deaths are classified according to the perinatal classification systems developed by the perinatal mortality classification working party of the Perinatal Society of Australia and New Zealand (PSANZ), the PSANZ perinatal death classification (PDC) and the PSANZ neonatal death classification (NDC)—November 2004 version. These classifications are now being used by most States and Territories in Australia. Guidelines for classifications can be accessed through www.psanz.org.au

Perinatal deaths by PSANZ PDC

Table 4 shows the number, percentages and rates for stillbirths, neonatal deaths and perinatal deaths by PSANZ PDC (major categories).

Table 4 Perinatal deaths, Victoria 2006, by PSANZ PDC major categories and type

Cause of death PSANZ PDC	Type of perinatal death								
	Stillbirths (Fetal death)			Neonatal death			Total		
	n	%	Rate ^c	n	%	Rate ^c	n	%	Rate ^c
Congenital abnormality ^a	136	22.4	1.9	82	36.1	1.2	218	26.1	3.1
Infection	9	1.5	0.1	2	0.9	<0.1	11	1.3	0.2
Hypertension	17	2.8	0.2	6	2.6	<0.1	23	2.8	0.3
Antepartum haemorrhage	44	7.2	0.6	18	7.9	0.3	62	7.4	0.9
Maternal conditions ^b	162	26.7	2.3	4	1.8	<0.1	166	19.9	2.4
Specific perinatal conditions	39	6.4	0.6	25	11.0	0.4	64	7.7	0.9
Hypoxic peripartum death	6	1.0	<0.1	14	6.2	0.2	20	2.4	0.3
Fetal growth restriction (FGR)	39	6.4	0.6	4	1.8	<0.1	43	5.2	0.6
Spontaneous preterm	64	10.5	0.9	66	29.1	1.0	130	15.6	1.9
Unexplained antepartum death	91	15.0	1.3	–	–	–	91	10.9	1.3
No obstetric antecedent	–	–	–	6	2.6	<0.1	6	0.7	<0.1
Total	607	100	8.7	227	100	3.3	834	100	11.9

a Congenital abnormality includes terminations ≥ 20 wks (106 stillbirths & 42 neonatal deaths).

b Maternal conditions includes terminations ≥ 20 wks for psychosocial indications (150 stillbirths).

c Stillbirth and perinatal death rates were calculated using all births (livebirths and stillbirths). Neonatal death rates were calculated using all live births

Stillbirths, neonatal deaths and perinatal deaths in Victoria for 2006 by PSANZ PDC sub categories are presented in Table 5.

Table 5 Perinatal deaths, Victoria 2006, by PSANZ PDC expanded categories and type

Cause of death PSANZ PDC		Stillbirths (Fetal death)		Neonatal death		Total	
		n	%	n	%	n	%
1. CONGENITAL ABNORMALITY^a		136	22.4	82	36.1	218	26.1
1.1 Central nervous system abnormalities		2	0.3	4	1.8	6	0.7
TOP Central nervous system abnormalities		32	5.3	14	6.2	46	5.5
1.2 Cardiovascular system		4	0.7	5	2.2	9	1.1
TOP Cardiovascular system		10	1.6	4	1.8	14	1.7
1.3 Urinary Tract		-	-	2	0.9	2	0.2
TOP Urinary Tract		7	1.2	6	2.6	13	1.6
1.4 Gastrointestinal		1	0.2	2	0.9	3	0.4
1.5 Chromosomal		14	2.3	8	3.5	22	2.6
TOP Chromosomal		30	4.9	6	2.6	36	4.3
1.6 Metabolic		-	-	5	2.2	5	0.6
1.7 Multiple		3	0.5	6	2.6	9	1.1
TOP Multiple		15	2.5	7	3.1	22	2.6
1.81 Musculoskeletal		3	0.5	1	0.4	4	0.5
TOP Musculoskeletal		6	1.0	2	0.9	8	0.8
1.82 Respiratory		-	-	2	0.9	2	0.2
TOP Respiratory		1	0.2	-	-	1	0.1
1.83 Diaphragmatic hernia		1	0.2	2	0.9	3	0.4
TOP Diaphragmatic hernia		-	-	1	0.4	1	0.1
1.85 Tumours		2	0.3	2	0.9	4	0.5
TOP Tumours		1	0.2	1	0.4	2	0.2
1.88 Other specified congenital abnormality		-	-	1	0.4	1	0.1
TOP Other specified congenital abnormality		2	0.3	1	0.4	3	0.4
1.9 Unspecified congenital abnormality		-	-	-	-	-	-
TOP Other specified congenital abnormality		2	0.3	-	-	2	0.2
2. INFECTION		9	1.5	2	0.9	11	1.3
2.11 Group B Streptococcus		2	0.3	1	0.4	3	0.4
2.12 E coli		2	0.3	-	-	2	0.2
2.18 Other bacterial		1	0.2	-	-	1	0.1
2.21 Cytomegalovirus		2	0.3	-	-	2	0.2
2.22 Parvovirus		2	0.3	-	-	2	0.2
2.28 Other viral		-	-	1	0.4	1	0.1

Table 5 Perinatal deaths, Victoria 2006, by PSANZ PDC expanded categories and type (continued)

Cause of death PSANZ PDC	Stillbirths (Fetal death)		Neonatal death		Total	
	n	%	n	%	n	%
3. HYPERTENSION	17	2.8	6	2.6	23	2.8
3.1 Chronic hypertension: essential	2	0.3	-	-	2	0.2
3.4 Gestational hypertension	5	0.8	-	-	5	0.6
3.5 Pre-eclampsia	8	1.3	5	2.2	13	1.5
3.6 Pre-eclampsia superimposed on hypertension	1	0.2	1	0.4	2	0.2
3.9 Unspecified hypertension	1	0.2	-	-	1	0.1
4. ANTEPARTUM HAEMORRHAGE	44	7.2	18	7.9	62	7.4
4.1 Placental abruption	43	7.1	16	7.0	59	7.0
4.2 Placenta praevia	1	0.2	2	0.9	3	0.4
5. MATERNAL CONDITIONS^b	162	26.7	4	1.8	166	19.9
5.1 TOP maternal psychosocial indications	150	24.7	-	-	150	18.0
5.2 Diabetes/gestational diabetes	6	1.0	-	-	6	0.7
5.31 Maternal injury (accidental)	1	0.2	-	-	1	0.1
5.4 Maternal sepsis	1	0.2	-	-	1	0.1
5.5 Lupus obstetric syndrome	1	0.2	-	-	1	0.1
5.8 Other specified maternal conditions	3	0.5	4	1.8	7	0.8
6. SPECIFIC PERINATAL CONDITIONS	39	6.4	25	11.0	64	7.7
6.1 Twin-twin transfusion	13	2.1	16	7.0	29	3.5
6.2 Fetomaternal haemorrhage	4	0.7	1	0.4	5	0.6
6.3 Antepartum cord complications	9	1.5	-	-	9	1.1
6.4 Uterine abnormalities	9	1.5	4	1.8	13	1.6
6.5 Birth trauma	-	-	1	0.4	1	0.1
6.6 Alloimmune disease	1	0.2	-	-	1	0.1
6.7 Idiopathic hydrops	1	0.2	2	0.9	3	0.4
6.8 Other specific perinatal conditions	2	0.3	1	0.4	3	0.4
7. HYPOXIC PERIPARTUM DEATH	6	1.0	14	6.2	20	2.4
7.11 Uterine rupture	1	0.2	1	0.4	2	0.2
7.12 Cord prolapse	-	-	1	0.4	1	0.1
7.13 Shoulder dystocia	-	-	1	0.4	1	0.1
7.18 Other intrapartum complication	1	0.2	3	1.3	4	0.5
7.2 No intrapartum complication (evidence of non-reassuring fetal status)	2	0.3	7	3.1	9	1.1
7.3 No intrapartum complication (no evidence of non-reassuring fetal status)	1	0.2	-	-	1	0.1
7.9 Unspecified hypoxic peripartum death	1	0.2	1	0.4	2	0.2

Table 5 Perinatal deaths, Victoria 2006, by PSANZ PDC expanded categories and type (continued)

Cause of death PSANZ PDC	Stillbirths (Fetal death)		Neonatal death		Total	
	n	%	n	%	n	%
8. FETAL GROWTH RESTRICTION (FGR)	39	6.4	4	1.8	43	5.2
8.1 Evidence of uteroplacental insufficiency	17	2.8	2	0.9	19	2.3
8.2 With chronic villitis	2	0.3	-	-	2	0.2
8.3 No placental pathology	6	1.0	1	0.4	7	0.8
8.4 No examination of placenta	2	0.3	-	-	2	0.2
8.8 Other specified placental pathology	6	1.0	-	-	6	0.7
8.9 Unspecified or not known whether placenta examined	6	1.0	1	0.4	7	0.8
9. SPONTANEOUS PRETERM	64	10.5	66	29.1	130	15.6
9.1 Spontaneous preterm with intact membranes or membrane rupture less than 24 hours before delivery						
9.11 Chorioamnionitis (placental histology)	7	1.2	5	2.2	12	1.4
9.12 No chorioamnionitis (placental histology)	3	0.5	5	2.2	8	1.0
9.13 With clinical evidence of chorioamnionitis, no examination of placenta	1	0.2	2	0.9	3	0.4
9.17 No clinical signs of chorioamnionitis, no examination of placenta	1	0.2	-	-	1	0.1
9.19 Unspecified or not known whether placenta examined	8	1.3	9	4.0	17	2.0
9.2 Spontaneous preterm with membrane rupture ≥ 24 hours before delivery						
9.21 Chorioamnionitis (placental histology)	12	2.0	9	4.0	21	2.5
9.22 No chorioamnionitis (placental histology)	6	1.0	2	0.9	8	1.0
9.23 With clinical evidence of chorioamnionitis, no examination of placenta	3	0.5	4	1.8	7	0.8
9.29 Unspecified or not known whether placenta examined	13	2.1	2	0.9	15	1.8
9.3 Spontaneous preterm with membrane rupture of unknown duration before delivery						
9.31 Chorioamnionitis (placental histology)	2	0.3	6	2.6	8	1.0
9.32 No chorioamnionitis (placental histology)	1	0.2	2	0.9	3	0.4
9.33 With clinical evidence of chorioamnionitis, no examination of placenta	-	-	1	0.4	1	0.1
9.39 Unspecified or not known whether placenta examined	7		19	8.4	26	

Table 5 Perinatal deaths, Victoria 2006, by PSANZ PDC expanded categories and type (continued)

Cause of death PSANZ PDC	Stillbirths (Fetal death)		Neonatal death		Total	
	n	%	n	%	n	%
10. UNEXPLAINED ANTEPARTUM DEATH	91	15.0	-	-	91	10.9
10.1 Evidence of uteroplacental insufficiency	7	1.2	-	-	7	0.8
10.3 No placental pathology	35	5.8	-	-	35	4.2
10.7 No examination of placenta	3	0.5	-	-	3	0.4
10.8 Other specified placental pathology	10	1.6	-	-	10	1.2
10.9 Unspecified or not known whether placenta examined	36	5.9	-	-	36	4.3
11. NO OBSTETRIC ANTECEDENT	-	-	6	2.6	6	0.7
11.13 SIDS Category II	-	-	3	1.3	3	0.4
11.2 Postnatally acquired infection	-	-	1	0.4	1	0.1
11.3 Accidental asphyxiation	-	-	1	0.4	1	0.1
11.9 Unknown/Undetermined	-	-	1	0.4	1	0.1
Total	607	100	227	100.0	834	100.0

a Congenital abnormality includes terminations ≥ 20 wks (106 stillbirths & 42 neonatal deaths).

b Maternal conditions includes terminations ≥ 20 wks for psychosocial indications (150 stillbirths).

There were 218 perinatal deaths due to congenital abnormalities (Table 20) in infants who were ≥ 20 weeks gestation (26.1% of all perinatal deaths).

Chromosomal abnormalities accounted for 58 deaths, central nervous system abnormalities for 52 deaths, multiple abnormalities 31 deaths and cardiovascular abnormalities for 23 deaths. Of the 218 perinatal deaths of infants with a congenital abnormality the pregnancy was terminated in 148 cases (67.9%).

Perinatal deaths from termination of pregnancy

As a result of increasing uptake of prenatal ultrasound and diagnostic procedures, congenital abnormalities are now frequently being diagnosed in mid trimester pregnancies leading on to terminations of pregnancy (TOP). When the termination procedure occurs at or beyond 20 weeks gestation, regardless of the method of termination, it is a legal requirement that these cases be recorded as births and perinatal deaths. In 2006 there were 106 stillbirths and 42 neonatal deaths in this category, 17.7% of perinatal deaths. TOP procedures undertaken for maternal psychosocial indications only at or beyond 20 weeks gestation also require registration as births and perinatal deaths (in 2006 there were 150 stillbirths in this category, which comprised 18.0% of perinatal deaths). 60% of TOPs ≥ 20 weeks for maternal psychosocial indications were undertaken for women whose place of residence was outside Victoria.

Table 6 Perinatal deaths from late terminations of pregnancy (≥ 20 wks gestation), Victoria, 2006, by PSANZ PDC and type

Cause of death PSANZ PDC	Type of perinatal death		Total
	Stillbirths (Fetal death)	Neonatal death	
	n	n	n
Termination for congenital abnormality	106	42	148
Terminations for psychosocial indications	150	-	150
Total	256	42	298

Table 7 (below) shows trends in late terminations of pregnancy in Victoria over the seven year period 2000–2006.

Table 7 Trends in perinatal deaths from late terminations of pregnancy (≥ 20 wks gestation), Victoria, 2000–2006

	Terminations of pregnancy													
	2000		2001		2002		2003		2004		2005		2006	
	CA	PS	CA	PS	CA	PS	CA	PS	CA	PS	CA	PS	CA	PS
Gestation														
20–22 weeks	72	4	80	18	74	18	87	25	101	86	105	67	122	52
23–27 weeks	18	10	21	27	23	42	25	76	26	104	23	108	22	98
≥ 28 weeks	8	-	5	-	6	-	4	2	3	7	1	4	4	-
Unknown	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Maternal age														
<20 years	4	1	2	19	2	22	1	40	4	76	4	58	6	50
20–24 years	14	7	19	12	11	19	15	30	16	56	13	61	26	41
25–29 years	35	1	29	11	29	8	36	13	36	28	29	26	34	23
30–34 years	23	4	28	2	37	8	39	9	37	19	40	18	48	18
35–39 years	18	-	25	1	23	1	18	7	27	11	28	6	27	7
≥ 40 years	4	1	3	-	1	2	7	4	8	3	13	8	7	10
Unknown	-	-	-	-	-	-	-	-	2	4	2	3	-	1
Place of residence														
Victoria	98	11	102	27	99	32	110	50	115	105	120	76	140	60
Interstate	-	3	4	18	4	23	6	49	15	82	9	86	6	70
Overseas	-	-	-	-	-	5	-	4	-	9	-	18	1	20
Unknown	-	-	-	-	-	-	-	-	-	1	-	-	1	-
Type of hospital														
Public hospital	80	2	93	1	90	1	94	-	103	-	79	2	113	-
Private hospital/clinic	13	12	13	44	13	59	22	103	27	197	50	178	35	150
Subtotal	98	14	106	45	103	60	116	103	130	197	129	180	148	150
TOTAL	112		151		163		219		327		309		298	

CA Late termination of pregnancy for congenital abnormality

PS Late termination of pregnancy for maternal psychosocial indications (no fetal abnormality)

Table 8a Perinatal deaths, Victoria 2006, by PSANZ PDC and gestational age

Cause of death PSANZ PDC	Gestational age									
	20–27 weeks		28–31 weeks		32–36 weeks		37+ weeks		Total	
	n	%	n	%	n	%	n	%	n	%
Congenital abnormality ^a	157	28.3	13	22.4	25	27.5	23	17.7	218	26.1
Infection	5	0.9	1	1.7	2	2.2	3	2.3	11	1.3
Hypertension	9	1.6	5	8.6	6	6.6	3	2.3	23	2.8
Antepartum haemorrhage	32	5.8	8	13.8	11	12.1	11	8.5	62	7.4
Maternal conditions ^b	156	28.1	2	3.4	4	4.4	4	3.1	166	19.9
Specific perinatal conditions	35	6.3	11	19.0	10	11.0	8	6.2	64	7.7
Hypoxic peripartum death	–	–	1	1.7	2	2.2	17	13.1	20	2.4
Fetal growth restriction	12	2.2	5	8.6	10	11.0	16	12.3	43	5.2
Spontaneous preterm	126	22.7	3	5.2	1	1.1	–	–	130	15.6
Unexplained antepartum death	23	4.1	9	15.5	19	20.9	40	30.8	91	10.9
No obstetric antecedent	–	–	–	–	1	1.1	5	3.8	6	0.7
Total	555	100.0	58	100.0	91	100.0	130	100.0	834	100

a Congenital abnormality includes terminations ≥20 wks (106 stillbirths & 42 neonatal deaths)

b Maternal conditions includes terminations ≥20 wks for psychosocial indications (150 stillbirths)

**Table 8b Perinatal deaths, Victoria 2006, by PSANZ PDC and gestational age
(adjusted: excludes late TOPs for maternal psychosocial indications)**

Cause of death PSANZ PDC	Gestational age									
	20–27 weeks		28–31 weeks		32–36 weeks		37+ weeks		Total	
	n	%	n	%	n	%	n	%	n	%
Congenital abnormality ^a	157	38.8	13	22.4	25	27.5	23	17.7	218	31.9
Infection	5	1.2	1	1.7	2	2.2	3	2.3	11	1.6
Hypertension	9	2.2	5	8.6	6	6.6	3	2.3	23	3.4
Antepartum haemorrhage	32	7.9	8	13.8	11	12.1	11	8.5	62	9.1
Maternal conditions ^b	6	1.5	2	3.4	4	4.4	4	3.1	16	2.3
Specific perinatal conditions	35	8.6	11	19.0	10	11.0	8	6.2	64	9.4
Hypoxic peripartum death	–	–	1	1.7	2	2.2	17	13.1	20	2.9
Fetal growth restriction	12	3.0	5	8.6	10	11.0	16	12.3	43	6.3
Spontaneous preterm	126	31.1	3	5.2	1	1.1	–	–	130	19.0
Unexplained antepartum death	23	5.7	9	15.5	19	20.9	40	30.8	91	13.3
No obstetric antecedent	–	–	–	–	1	1.1	5	3.8	6	1.5
Total	405	100.0	58	100.0	91	100.0	130	100.0	684	100

a Congenital abnormality includes terminations ≥20 wks (106 stillbirths & 42 neonatal deaths)

b Maternal conditions excludes terminations ≥20 wks for psychosocial indications (150 stillbirths)

Following adjustment for late terminations of pregnancies for maternal psychosocial indications, 81% of perinatal deaths in 2006 were born before 37 weeks gestation: 59% were less than 28 weeks gestation. The most common causes of perinatal death by PSANZ PDC were congenital abnormality (31.9%), followed by spontaneous preterm (19.0%) and unexplained antepartum death (13.3%).

Figure 4 Causes of perinatal deaths, PSANZ PDC, Victoria, 2006

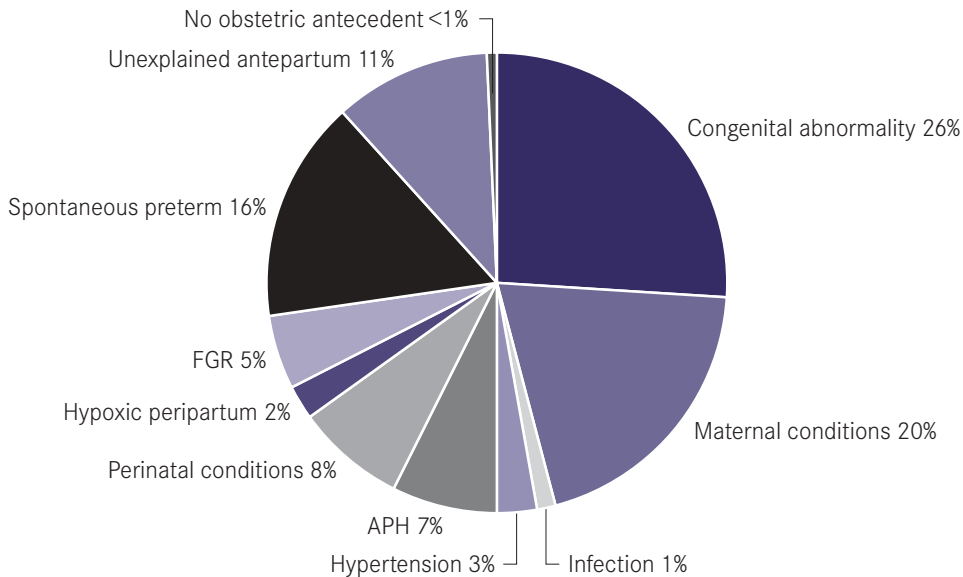
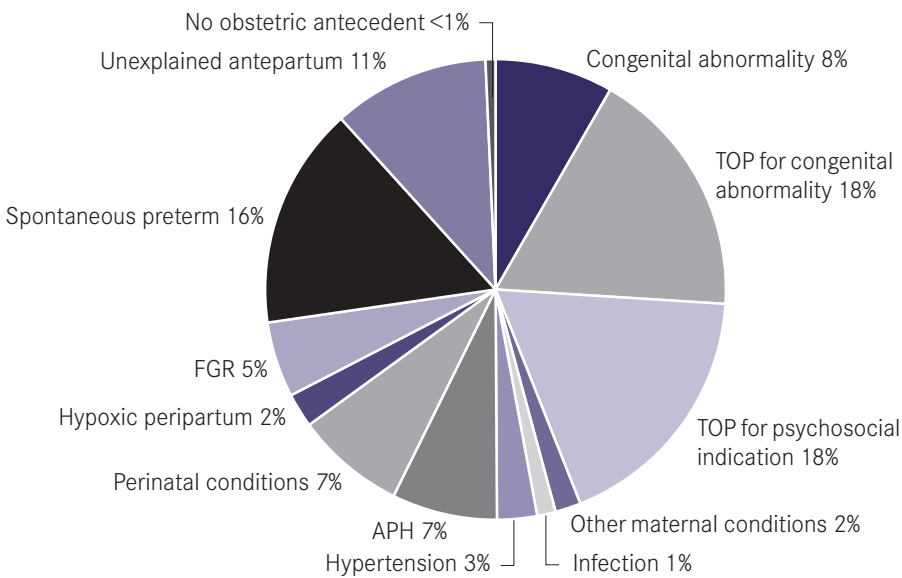


Figure 5 Causes of perinatal deaths, PSANZ PDC, Victoria, 2006 (indicating late terminations of pregnancy)



Stillbirths by PSANZ PDC

Table 9a Stillbirths (fetal deaths), Victoria 2006, by PSANZ PDC and gestational age

Cause of death PSANZ PDC	Gestational age									
	20–27 weeks		28–31 weeks		32–36 weeks		37+ weeks		Total	
	n	%	n	%	n	%	n	%	n	%
Congenital abnormality ^a	113	27.7	7	17.5	9	13.8	7	7.4	136	22.4
Infection	5	1.2	–	–	2	3.1	2	2.1	9	1.5
Hypertension	6	1.5	3	7.5	5	7.7	3	3.2	17	2.8
Antepartum haemorrhage	19	4.7	6	15.0	9	13.8	10	10.6	44	7.2
Maternal conditions ^b	153	37.5	2	5.0	3	4.6	4	4.3	162	26.7
Specific perinatal conditions	20	4.9	5	12.5	7	10.8	7	7.4	39	6.4
Hypoxic peripartum death	–	–	1	2.5	–	–	5	5.3	6	1.0
Fetal growth restriction	9	2.2	4	10.0	10	15.4	16	17.0	39	6.4
Spontaneous preterm	60	14.7	3	7.5	1	1.5	–	–	64	10.5
Unexplained antepartum death	23	5.6	9	22.5	19	29.2	40	42.6	91	15.0
No obstetric antecedent	–	–	–	–	–	–	–	–	–	–
Total	408	100.0	40	100.0	65	100.0	94	100.0	607	100

a Congenital abnormality includes terminations ≥ 20 weeks (n = 106 stillbirths)

b Maternal conditions includes terminations ≥ 20 weeks for psychosocial indications (n = 150 stillbirths)

Table 9b Stillbirths (fetal deaths), Victoria 2006, by PSANZ PDC and gestational age
(adjusted: excludes late TOPs for maternal psychosocial indications)

Cause of death PSANZ PDC	Gestational age									
	20–27 weeks		28–31 weeks		32–36 weeks		37+ weeks		Total	
	n	%	n	%	n	%	n	%	n	%
Congenital abnormality ^a	113	43.8	7	17.5	9	13.8	7	7.4	136	29.8
Infection	5	1.9	–	–	2	3.1	2	2.1	9	2.0
Hypertension	6	2.3	3	7.5	5	7.7	3	3.2	17	3.7
Antepartum haemorrhage	19	7.4	6	15.0	9	13.8	10	10.6	44	9.6
Maternal conditions ^b	3	1.1	2	5.0	3	4.6	4	4.3	12	2.6
Specific perinatal conditions	20	7.8	5	12.5	7	10.8	7	7.4	39	8.5
Hypoxic peripartum death	–	–	1	2.5	–	–	5	5.3	6	1.3
Fetal growth restriction	9	3.5	4	10.0	10	15.4	16	17.0	39	8.5
Spontaneous preterm	60	23.3	3	7.5	1	1.5	–	–	64	14.0
Unexplained antepartum death	23	8.9	9	22.5	19	29.2	40	42.6	91	19.9
No obstetric antecedent	–	–	–	–	–	–	–	–	–	–
Total	258	100.0	40	100.0	65	100.0	94	100.0	457	100

a Congenital abnormality includes terminations ≥ 20 weeks (n = 106 stillbirths)

b Maternal conditions excludes terminations ≥ 20 weeks for psychosocial indications (n = 150 stillbirths)

Following adjustment for late terminations of pregnancies for maternal psychosocial indications, 79% of stillbirths in 2006 were born at less than 37 weeks gestation: 56.4% were less than 28 weeks gestation. The most common causes of stillbirth by PSANZ PDC were congenital abnormality (29.8%), followed by unexplained antepartum death (19.9%) and spontaneous preterm (14.0%).

In 2006 the most common cause of fetal death in term infants (≥ 37 weeks) was unexplained antepartum death, accounting for 40 deaths (42.6%). There were 5 cases of fetal death in term infants where the death was ascribed to peripartum hypoxia. In several of these cases, deficiencies were identified in intrapartum management. This may represent a sub set of a larger population of infants who survive but who sustain long term morbidity. These cases require comprehensive multidisciplinary assessment at the hospital of birth.

Figure 6 Causes of stillbirth (fetal death), PSANZ PDC, Victoria, 2006

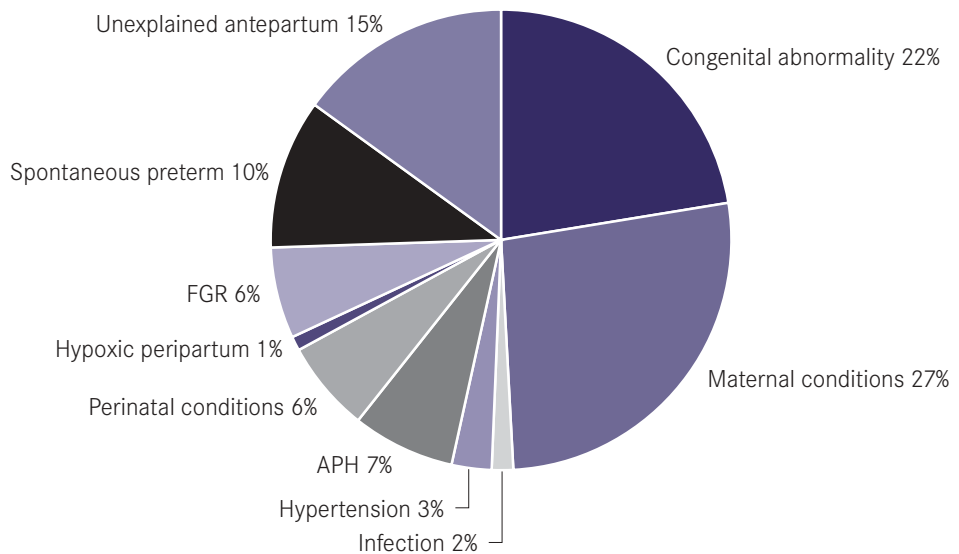
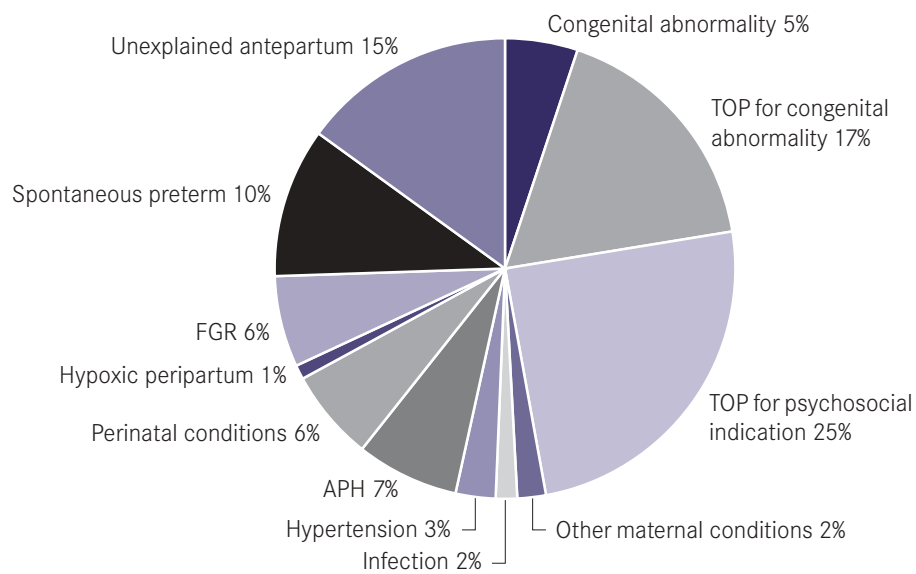


Figure 7 Causes of stillbirth (fetal death), PSANZ PDC, Victoria, 2006 (indicating late terminations of pregnancy)



Neonatal deaths by PSANZ PDC

Table 10 Neonatal deaths, Victoria 2006, by PSANZ PDC and gestational age

Cause of death PSANZ PDC	Gestational age									
	20–27 weeks		28–31 weeks		32–36 weeks		37+ weeks		Total	
	n	%	n	%	n	%	n	%	n	%
Congenital abnormality ^a	44	29.9	6	33.3	16	61.5	16	44.4	82	36.1
Infection	–	–	1	5.6	–	–	1	2.8	2	0.9
Hypertension	3	2.0	2	11.1	1	3.8	–	–	6	2.6
Antepartum haemorrhage	13	8.8	2	11.1	2	7.7	1	2.8	18	7.9
Maternal conditions	3	2.0	–	–	1	3.8	–	–	4	1.8
Specific perinatal conditions	15	10.2	6	33.3	3	11.5	1	2.8	25	11.0
Hypoxic peripartum death	–	–	–	–	2	7.7	12	33.3	14	6.2
Fetal growth restriction	3	2.0	1	5.6	–	–	–	–	4	1.8
Spontaneous preterm	66	44.9	–	–	–	–	–	–	66	29.1
Unexplained antepartum death	–	–	–	–	–	–	–	–	–	–
No obstetric antecedent	–	–	–	–	1	3.8	5	13.9	6	2.6
Total	147	100.0	18	100.0	26	100.0	36	100.0	227	100

a Congenital abnormality includes terminations ≥ 20 wks (42 neonatal deaths)

84% of neonatal deaths in 2006 were born at less than 37 weeks gestation: 65% were less than 28 weeks gestation. The most common causes of neonatal deaths by PSANZ PDC were congenital abnormality (36.1%), followed by spontaneous preterm (29.1%) and specific perinatal conditions (11.0%).

There were 12 cases of neonatal death in term infants (≥ 37 weeks) without congenital abnormalities, where the death was ascribed to peripartum hypoxia. In several of these cases, deficiencies were identified in intrapartum management and/or neonatal resuscitation. This may represent a sub-set of a larger population of infants who survive but who sustain long term morbidity. Such cases always warrant careful review at the institution where the birth occurred, **and consideration should be given in each case regarding referral for coronial investigation.**

Figure 8 Causes of neonatal deaths, PSANZ PDC, Victoria, 2006

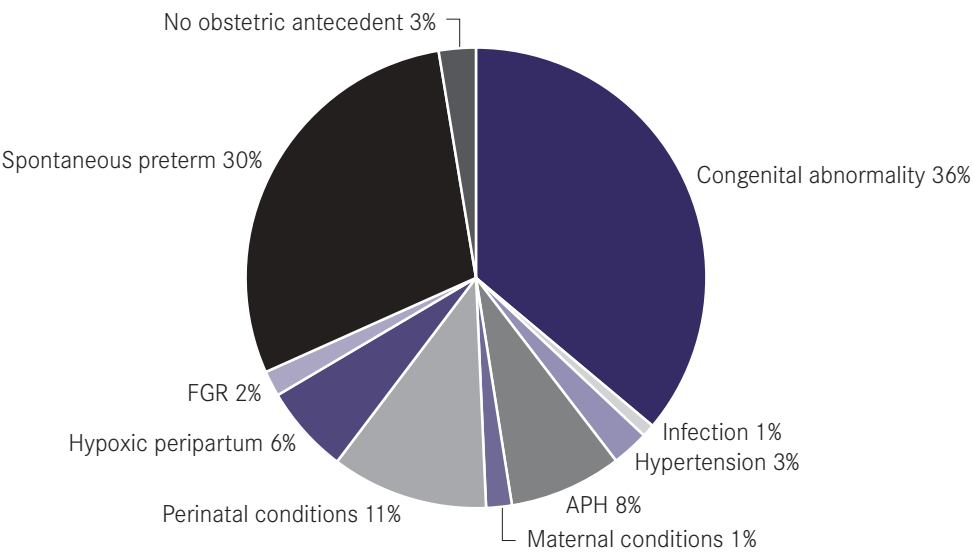
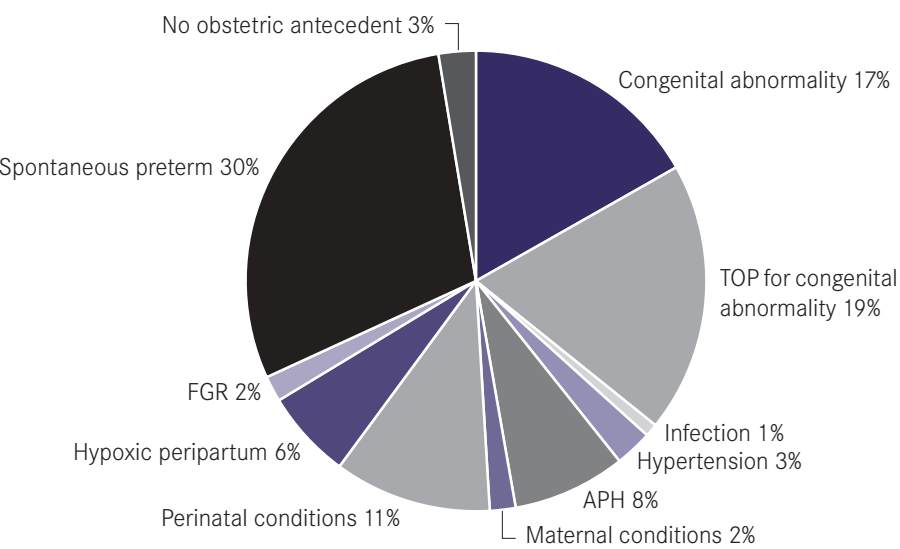


Figure 9 Causes of neonatal deaths, PSANZ PDC, Victoria, 2006 (indicating late terminations of pregnancy for congenital abnormality)



Neonatal deaths by PSANZ NDC

Neonatal deaths were also classified using the PSANZ neonatal death classification (NDC) which identifies the major medical condition from which the neonate died, rather than the maternal/fetal antecedent (PSANZ PDC classification). Table 11 shows neonatal deaths by PSANZ NDC (expanded categories) and gestational age categories.

Table 11 Neonatal deaths, Victoria 2006, by PSANZ NDC expanded categories and gestational age

Cause of death PSANZ NDC	Gestational age									
	20–27 weeks		28–31 weeks		32–36 weeks		37+ weeks		Total	
	n	%	n	%	n	%	n	%	n	%
Congenital abnormality^a	44	29.9	6	33.3	16	61.5	16	44.4	82	36.1
Extreme prematurity	69	46.9	-	-	-	-	-	-	69	32.6
Cardio-respiratory disease	25	17.0	8	44.4	1	3.8	-	-	34	15.0
Hyaline membrane disease/										
Respiratory distress syndrome	24	16.3	1	5.6	-	-	-	-	25	11.0
Pulmonary hypoplasia	-	-	1	5.6	-	-	-	-	1	0.4
Other cardio-respiratory	1	0.7	6	33.3	1	3.8	-	-	9	4.0
Infection	1	0.7	1	5.6	1	3.8	2	5.6	5	2.2
Congenital bacterial	1	0.7	-	-	-	-	1	2.8	2	0.9
Congenital viral	-	-	1	5.6	-	-	-	-	1	0.4
Acquired viral	-	-	-	-	-	-	1	2.8	1	0.4
Other					1	3.8	-	-	1	0.4
Neurological	1	0.7	3	16.7	7	26.9	15	41.7	26	11.5
Hypoxic ischaemic encephalopathy										
/perinatal asphyxia	1	0.7	1	5.6	5	19.2	13	36.1	20	8.8
Intracranial haemorrhage	-	-	1	5.6	-	-	1	2.8	2	0.9
Other neurological	-	-	1	5.6	2	7.7	1	2.8	4	1.8
Gastrointestinal	7	4.8	-	-	-	-	-	-	7	3.1
Necrotising enterocolitis	7	4.8	-	-	-	-	-	-	7	3.1
Other	-	-	-	-	1	3.8	3	8.3	4	1.8
SIDS	-	-	-	-	-	-	-	-	-	-
Trauma	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	1	2.8	1	0.4
Unknown	-	-	-	-	1	3.8	2	5.6	3	1.3
Total	147	100.0	18	100.0	26	100.0	36	100.0	227	100.0

a Congenital abnormality includes terminations ≥ 20 wks (42 neonatal deaths)

The most common causes of neonatal deaths by PSANZ NDC were congenital abnormality (36.1%), followed by extreme prematurity (typically infants of less than 24 weeks gestation or less than 600g birthweight) (32.6%) and cardio-respiratory disease (15.0%).

Figure 10 Causes of neonatal deaths, PSANZ NDC Victoria, 2006

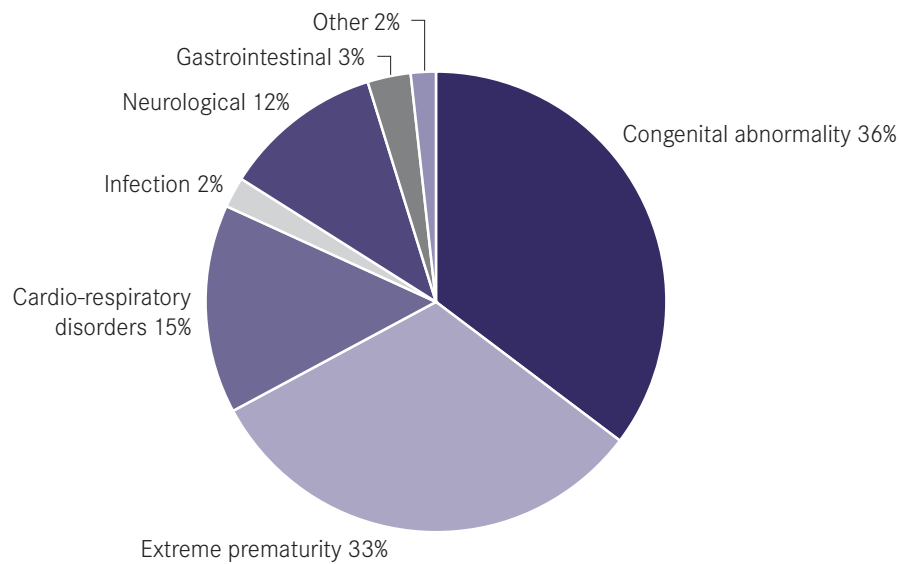
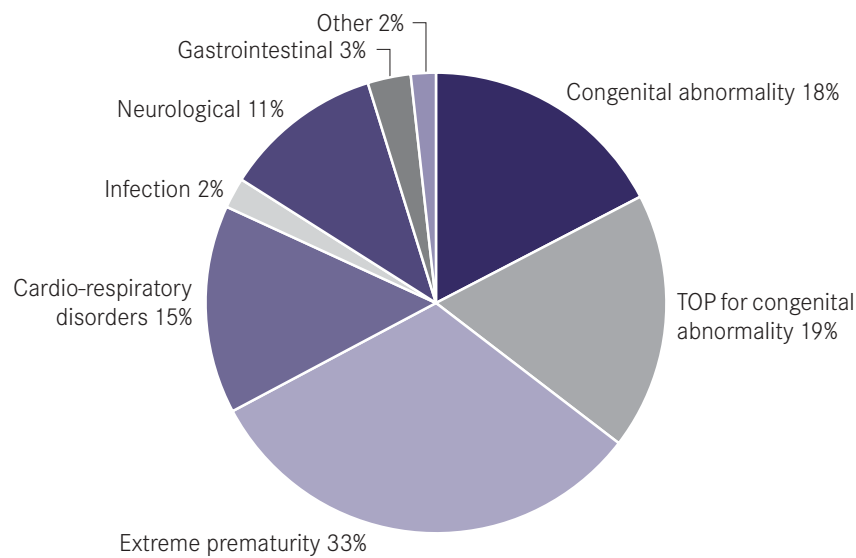


Figure 11 Causes of neonatal deaths, PSANZ NDC Victoria, 2006 (indicating late terminations of pregnancy for congenital abnormality)



Gestational age and adjusted perinatal mortality

Table 12 presents data for stillbirths and neonatal deaths in gestational age categories. Gestational age specific neonatal mortality rates are calculated by dividing the number of infants who die in the first 28 days of life by the total number of live births in that gestational age category. For stillbirths, the risk of death is calculated by dividing the number of infants born dead in that gestational age category by the number of all infants in that and subsequent categories (ie, in ongoing pregnancies). Terminations of pregnancy performed ≥ 20 weeks for maternal psychosocial indications are excluded from these calculations as they are the result of direct medical procedures, and including these affects the interpretability of the risk estimation.

Table 12 Gestational age and adjusted perinatal mortality, Victoria 2006

Gestational age	Births		Stillbirths		Stillbirth risk ^a	Neonatal death		Neonatal mortality rate ^b
	n	%	n	%		n	%	
20–21 weeks	165	0.2	117	25.6	1.7	48	21.1	1,000.0
22–23 weeks	143	0.2	84	18.4	1.2	57	25.1	966.1
24–25 weeks	119	0.2	36	7.9	0.5	30	13.2	361.4
26–27 weeks	153	0.2	21	4.6	0.3	12	5.3	90.9
28–31 weeks	561	0.8	40	8.8	0.6	18	7.9	34.5
32–36 weeks	4,395	6.3	65	14.2	0.9	26	11.5	6.0
37–41 weeks	63,185	90.5	94	20.6	1.5	35	15.4	0.6
>41 weeks	963	1.4	–	–	–	1	0.4	1.0
Not known	2	–	–	–	–	–	–	–
Total	69,686	100.0	457	100.0	6.5	227	100.0	3.3

a Stillbirth risk: per 1,000 fetuses remaining in utero

b Neonatal death rate per 1,000 livebirths in each category

Terminations performed ≥ 20 wks for psychosocial indications, no fetal abnormality) were excluded from table (150 stillbirths)
Birth denominator data obtained from PDCU.

Neonatal mortality by hospital of birth

CCOPMM data demonstrate that **infants of gestation <28 weeks have better prospects for survival if delivered in a Level III centre** (a hospital with maternal-fetal and neonatal specialists and a neonatal intensive care unit). The mortality at such centres compared to all other hospitals, for each gestational age category, is shown in Table 13. It is acknowledged that those infants <28 weeks delivering at Level III hospitals might not be clinically comparable (in terms of risk) to those delivering at Level I or Level II hospitals. Infants with congenital abnormalities and terminations of pregnancies for congenital abnormalities are excluded from these calculations. In 2006, 84% of live births of infants 24–27 weeks gestation were born in Level III hospitals, compared to 86% in 2005 and 79% in 2004.

Table 13 Gestational age (24–27 weeks) adjusted neonatal mortality rate^a, by hospital level at delivery, Victoria, 2004–2006

Hospital	2004	2005	2006
	24–27 weeks gestation (n)	24–27 weeks gestation (n)	24–27 weeks gestation (n)
Level III hospital births ^b			
Surviving >28 days ^c	145	164	147
Neonatal death	23	22	30
Live births	168	186	177
Neonatal mortality rate^a	136.9	118.3	169.5
Level I and II hospital births			
Surviving >28 days ^c	15	21	26
Neonatal death	8	9	7
Live births	23	30	33
Neonatal mortality rate^a	347.8	300.0	212.1

a Adjusted neonatal mortality: Infants with congenital abnormalities and terminations of pregnancy for congenital abnormality have been excluded from this table.

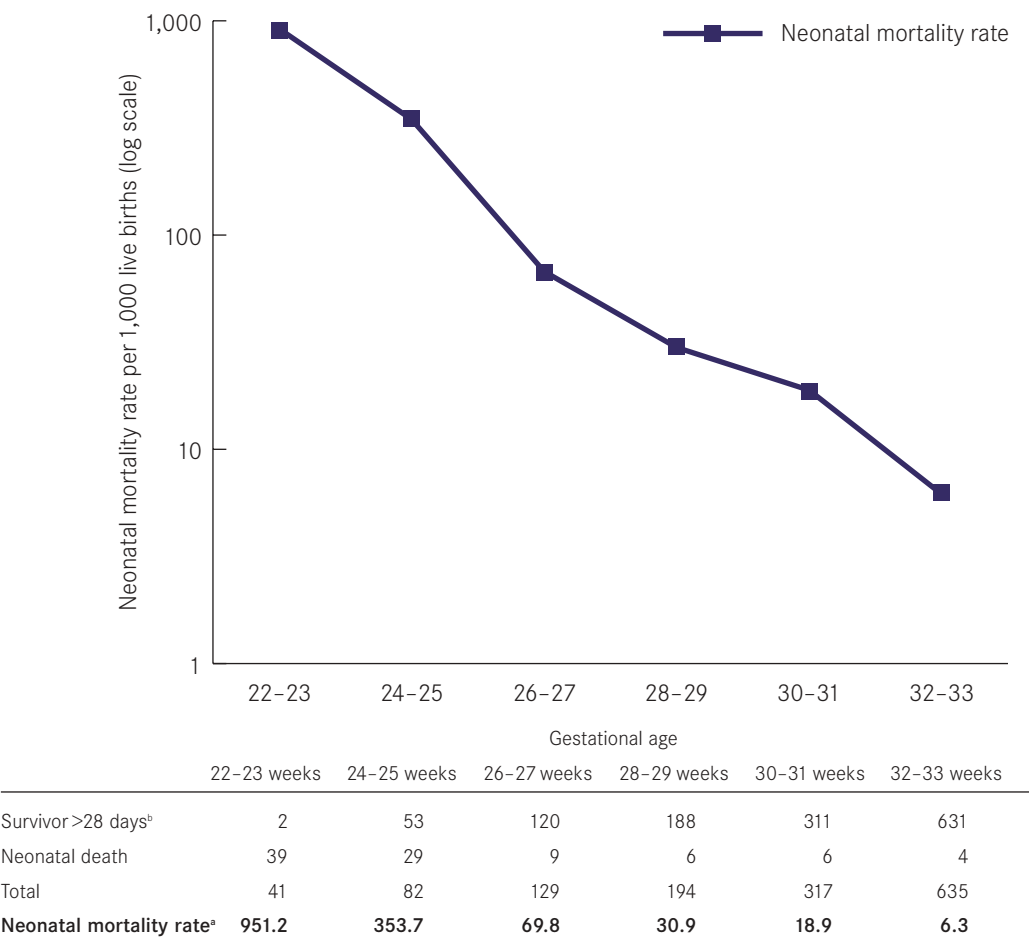
b Note that two private hospitals affiliated with Level III hospitals have been classified as Level III for this table

c Survivor data is provided by PDCU.

Neonatal mortality rates, 22–33 weeks gestation

Figure 12 shows the neonatal mortality rates (per 1,000 live births) for the gestational age range of 22 to 33 weeks. Infants with congenital abnormalities and terminations of pregnancies for congenital abnormalities are excluded from these calculations.

Figure 12 Adjusted neonatal mortality rates, 22–33 weeks gestation, Victoria 2006



a Adjusted neonatal mortality: Infants with congenital abnormalities have been excluded from these calculations.

b Source of survivor data: PDCU.

Multiple births and perinatal mortality

In 2006, there were 2,580 infants born from multiple pregnancies (1,247 sets of twins and 26 sets of triplets, 2 sets of quadruplets). Infants from multiple births comprised 3.7 per cent of all infants born with a birthweight ≥ 400 g, but contributed 11.4 per cent of perinatal deaths. When terminations of pregnancy for maternal psychosocial indications are excluded the adjusted perinatal mortality rate for multiple births was 36.1 per 1,000 multiple births compared with 8.8 per 1,000 singleton births, 4 times higher than for singleton births. The fetal death rate for multiple births was 2.6 times that of singleton births (16.1 vs 6.2) and the neonatal mortality rate was 6 times higher for multiple livebirths compared with singleton livebirths (16.2 per 1,000 multiple livebirths compared with 2.7 per 1,000 singleton livebirths). Table 14 shows the adjusted mortality rates for singleton and multiple births.

Table 14 Adjusted mortality rates^a in singleton and multiple births, Victoria, 2006

	Total births ^b	Stillbirths ^c	Neonatal deaths	Stillbirth rate	Neonatal mortality rate	Perinatal mortality rate
Singleton births	67,105	414	177	6.2	2.7	8.8
Twin births	2,492	40	41	16.1	16.7	32.5
Triplet births	78	3	9	38.5	120.0	153.8
Quadruplet births	8	0	0	0	0	0
<i>(All Multiple births)</i>	<i>(2,578)</i>	<i>(43)</i>	<i>(50)</i>	<i>16.7</i>	<i>16.2</i>	<i>36.1</i>
Total births	69,686	457	227	6.6	3.3	9.8

a Terminations of pregnancy for maternal psychosocial indications have been excluded from these calculations

b Source of total births denominator data: PDCU.

c 7 stillbirths were excluded from multiple births as fetal death occurred prior to 20 weeks gestation

Table 15 shows perinatal deaths and perinatal mortality rates for singletons, twins and other multiple births in Victoria over the seven years from 2000–2006, adjusted for terminations of pregnancy for maternal psychosocial indications.

Table 15 Stillbirth, neonatal and perinatal deaths, by plurality, Victoria, 2000–2006

Year	Singletons		Twins		Other multiple births		Total	
	Number	Rate ^a	Number	Rate ^a	Number	Rate ^a	Number	Rate ^a
Stillbirths^b								
2000	342	5.6	47	24.7	5	82.0	394	6.3
2001	352	5.9	43	21.9	4	50.0	399	6.4
2002	347	5.7	37	17.3	–	–	384	6.1
2003	371	6.1	45	20.4	2	37.0	418	6.6
2004	378	6.2	33	14.7	2	34.5	413	6.5
2005	374	5.8	44	18.5	3	65.2	421	6.3
2006	414	6.2	40	16.1	3	38.5	457	6.6
Neonatal deaths								
2000	157	2.6	23	12.4	2	35.7	182	2.9
2001	171	2.9	32	16.6	1	13.2	204	3.3
2002	185	3.1	40	19.0	2	35.1	227	3.3
2003	179	2.9	57	26.4	1	17.9	237	3.8
2004	183	3.0	23	10.4	1	21.7	207	3.3
2005	195	3.1	48	20.6	2	46.5	245	3.7
2006	177	2.7	41	16.7	9	120.0	227	3.3
Perinatal deaths								
2000	499	8.2	70	36.9	7	114.8	576	9.2
2001	523	8.7	75	38.2	5	62.5	598	9.6
2002	532	8.7	77	35.9	2	35.1	611	9.7
2003	550	9.0	102	46.3	3	51.7	655	10.3
2004	561	9.2	56	25.0	3	62.5	620	9.8
2005	569	8.9	92	38.7	5	108.7	666	10.0
2006	591	8.8	81	32.5	12	153.8	684	9.8

a Stillbirth and perinatal death rates were calculated using all births (livebirths and stillbirths). Neonatal death rates were calculated using all live births

b Excludes terminations of pregnancy for maternal psychosocial indications.

Source of total births denominator data: PDCU.

Table 16 Perinatal deaths in singleton and multiple births, by cause (PSANZ PDC) and type Victoria, 2006

Cause of death PSANZ PDC	Type of perinatal death				Total	
	Singleton		Multiple			
	n	%	n	%	n	%
Congenital abnormality	66	11.2	5	5.4	71	10.4
Congenital abnormality (termination)	147	24.9	-	-	147	21.5
Infection	11	1.9	-	-	11	1.6
Hypertension	19	3.2	4	4.3	23	3.4
Antepartum haemorrhage	61	10.3	1	1.1	62	9.1
Maternal conditions ^a	15	2.5	1	1.1	16	2.3
Specific perinatal conditions	31	5.2	33	35.5	64	9.4
Hypoxic peripartum death	18	3.0	2	2.2	20	2.9
Fetal growth restriction (FGR)	41	6.9	2	2.2	43	6.3
Spontaneous preterm	89	15.1	40	43.0	129	18.9
Unexplained antepartum death	87	14.7	5	5.4	92	13.5
No obstetric antecedent	6	1.0	-	-	6	0.9
Total	591	100.0	93	100.0	684	100.0

a Maternal conditions: terminations ≥ 20 wks for psychosocial indications (150 stillbirths) have been excluded from this table

The main causes of perinatal deaths in singleton births were terminations of pregnancy for congenital abnormalities (25.0%), followed by spontaneous preterm (15.2%) and unexplained antepartum death (14.7%). The main causes of perinatal deaths in multiple births were spontaneous preterm (43.0%) and specific perinatal conditions, mainly twin-twin transfusion (35.5%).

Indigenous status and perinatal mortality

In the seven years, 2000–2006, there were 3,137 infants born to Indigenous women (women who identified themselves as Aboriginal or Torres Strait Islander descent), contributing 0.7% of total births. When terminations of pregnancy for maternal psychosocial indications are excluded the adjusted perinatal mortality rate for the Indigenous population was 2.1 times higher than the non-Indigenous population (20.4 per 1,000 Indigenous births, compared to 9.7 per 1,000 non-Indigenous births), however the neonatal mortality rate was 2.9 times higher compared to the non-Indigenous population (10.0 per 1,000 Indigenous livebirths, compared with 3.4 per 1,000 non-Indigenous livebirths). Table 17 shows pooled perinatal mortality rates for Victoria for the seven years 2000–2006 by Indigenous status. Because of small numbers, these rates need to be interpreted with caution.

Table 17 Indigenous status and adjusted mortality rates, Victoria, 2000–2006

	Total births ^a	Stillbirths ^b	Neonatal deaths	Stillbirth rate	Neonatal mortality rate	Perinatal mortality rate
Indigenous	3,137	33	31	10.5	10.0	20.4
Non Indigenous	447,652	2,844	1,493	6.4	3.4	9.7
Total	450,789	2,877	1,524	6.4	3.4	9.8

a Source of total births denominator data: PDCU.

b Excludes late terminations of pregnancy ≥ 20 wks for maternal psychosocial indications (n=749), and 16 perinatal deaths in which indigenous status was unknown.

Table 18 Perinatal deaths by PSANZ PDC and indigenous status, Victoria 2000–2006

Cause of perinatal death PSANZ PDC	Indigenous			Non-Indigenous			Total		
	n	%	rate	n	%	rate	n	%	rate
Congenital abnormality	8	12.5	2.6	1,248	28.8	2.8	1,256	28.5	2.8
Infection	3	4.7	1.0	84	1.9	0.2	87	2.0	0.2
Hypertension	3	4.7	1.0	146	3.4	0.3	149	3.4	0.3
Antepartum haemorrhage	5	7.8	1.6	320	7.4	0.7	325	7.4	0.7
Maternal conditions ^a	2	3.1	0.6	135	3.1	0.3	137	3.1	0.3
Specific perinatal conditions	2	3.1	0.6	371	8.6	0.8	373	8.5	0.8
Hypoxic peripartum death	3	4.7	1.0	142	3.3	0.3	145	3.3	0.3
Fetal growth restriction (FGR)	4	6.3	1.3	269	6.2	0.6	273	6.2	0.6
Spontaneous preterm	27	42.2	8.6	937	19.3	1.9	864	19.6	1.9
Unexplained antepartum death	6	9.4	1.9	738	17.0	1.6	744	16.9	1.7
No obstetric antecedent	1	1.6	0.3	47	1.1	0.1	48	1.1	0.1
Total	64	100.0	20.4	4,337	100.0	9.7	4,401	100.0	9.7

a This table excludes late terminations of pregnancy ≥ 20 wks for maternal psychosocial indications (n=749), and 16 perinatal deaths in which indigenous status was unknown.

In the seven years, 2000–2006, there were 4,401 perinatal deaths, of which 64 were the infants of indigenous mothers and 4,337 were the infants of non-indigenous mothers (Table 18). The most common causes of perinatal death in infants of Indigenous mothers were spontaneous preterm (42.2%), followed by congenital abnormality (12.5%) and unexplained antepartum death (9.4%). The rate of perinatal death attributed to spontaneous preterm birth (as distinct from preterm birth from medical or obstetric conditions or their management) was 4.5 times higher in the indigenous population compared to the non-indigenous population (8.6 deaths per 1,000 indigenous births, compared with 1.9 deaths per 1,000 non-indigenous births). Perinatal deaths in infants of non-indigenous mothers were mostly due to congenital abnormality (28.8%), followed by spontaneous preterm (19.3%) and unexplained antepartum deaths (17.0%)

Time of fetal death in stillbirths

Table 19 shows time of fetal death in stillbirths by gestational age in Victoria in 2006. All terminations of pregnancy have been excluded from this table. Death occurred during labour in 14.8 per cent of stillbirths (birthweight ≥400g or ≥20 weeks gestation) in 2006. Of 94 stillbirths with ≥37 weeks gestation, 9 (9.6%) were intrapartum deaths. Many of these have avoidable factors related to intrapartum management; in some cases post-mortem examination and/or magnetic resonance imaging were able to establish that the asphyxial injury occurred prior to the onset of labour.

Table 19 Time of fetal death in stillbirths (by gestational age), Victoria, 2006

Gestation (wks)	Prior to labour		During labour		Unknown before or during labour		Total ^{a,b}	
	n	%	n	%	n	%	n	%
20–21	15	5.9	20	38.5	21	45.7	56	16.0
22–23	29	11.5	11	21.2	10	21.7	50	14.2
24–25	22	8.7	5	9.6	6	13.0	33	9.4
26–27	15	5.9	2	3.8	–	–	17	4.8
28–31	35	13.8	1	1.9	2	4.3	38	10.8
32–36	58	22.9	4	7.7	1	2.2	63	17.9
37+	79	31.2	9	17.3	6	13.0	94	26.8
Total	253		52		46		351	
(%)	71.9		14.8		13.3			

a Note there were 69 stillbirths born at ≥20 weeks gestation whose birthweight was less than 400g.

b Terminations of pregnancy have been excluded from these calculations.

Time of neonatal death

Age at time of death for neonates is shown in Table 20. Neonatal deaths that were the result of terminations of pregnancy have been excluded from this table. Fifty six per cent of neonatal deaths occurred within 24 hours of birth (43% within the first 6 hours).

Table 20 Age at time of death for neonates, Victoria, 2006

Gestation (wks)	<6 hours	6-11 hours	12-23 hours	2nd-3rd day	4th-7th day	1-<2 weeks	2-<3 weeks	3-<4 weeks	Total ^{a,b}
20-21	26	-	-	-	-	-	-	-	26
22-23	31	-	4	-	1	2	1	-	39
24-25	9	-	1	7	6	2	1	3	29
26-27	3	-	1	3	-	4	-	-	11
28-31	3	3	3	6	3	-	-	-	18
32-36	4	2	3	4	6	2	3	2	26
37+	4	2	4	8	4	8	3	3	36
Total	80	7	16	28	20	18	8	8	185
(%)	43.2	3.8	8.6	15.1	10.8	9.7	4.3	4.3	

a Note there were 20 neonates born at ≥ 20 weeks gestation whose birthweight was less than 400g.

b Terminations of pregnancy have been excluded from these calculations.

COMPARISON OF CCOPMM 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 perinatal 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

Since 2000, CCOPMM complies with national reporting practices by including those fetuses and newborns whose gestation at birth was at least 20 weeks gestation or birthweight was $\geq 400\text{g}$ if gestation was unknown. To enable consistency for trend analysis, CCOPMM continues to present data according to the ' $\geq 500\text{g}$ ' definition used since 1980.

It is also noted that there are increasing registrations of neonatal deaths of pre-viable infants (20–22 weeks gestation) who exhibit transient signs of life after birth following terminations of pregnancy for congenital abnormalities using vaginal misoprostol. These cases are included in the mortality statistics.

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

From 1982, the year of inception of the Victorian Perinatal Data Collection Unit, CCOPMM 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.

3. Infants born in Victoria

The CCOPMM's perinatal mortality data refer only to deaths of infants born in Victoria, whereas the Australian Bureau of Statistics refers 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, the World Health Organisation (WHO) also recommends publication of mortality rates in which the 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.

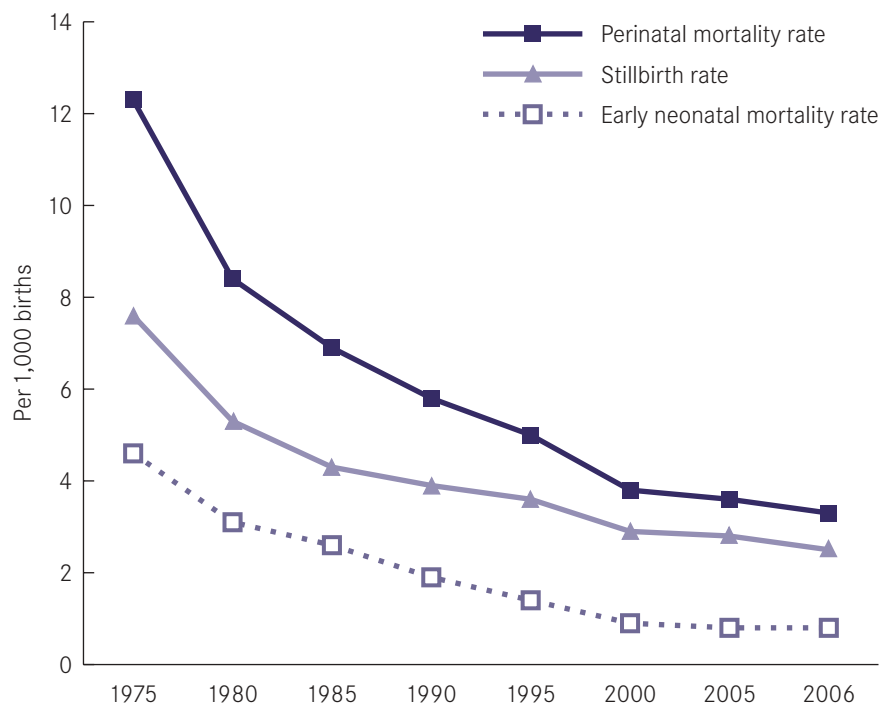
Table 21 Perinatal mortality rates for international comparison, Victoria, 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Stillbirth rate	3.1	3.3	3.4	2.9	3.1	2.4	3.0	2.6	2.8	2.5
Early neonatal mortality rate	1.3	1.1	1.3	0.9	1.0	0.8	0.9	0.8	0.8	0.8
Perinatal mortality rate	4.3	4.4	4.6	3.8	4.1	3.2	3.9	3.3	3.6	3.3

a Stillbirth and perinatal death rates were calculated using all births (livebirths and stillbirths). Neonatal death rates were calculated using all live births. Rate per 1,000 births (birthweight ≥1,000g or gestation ≥28 weeks).
Neonatal deaths within seven days of birth.

Figure 13 below shows the trends in perinatal mortality rates for international comparison from 1975 to 2006. In 1975 the perinatal mortality rate (birthweight 1,000g or if birthweight unknown, gestation at least 28 weeks) was 12.3 per 1,000 births compared to 3.3 per 1,000 births in 2006.

Figure 13 Trends in perinatal mortality rates^a for international comparison (WHO definition), Victoria, 1975–2006



a Stillbirth and perinatal death rates were calculated using all births (livebirths and stillbirths). Neonatal death rates were calculated using all live births. Rate per 1,000 births (birthweight $\geq 1,000\text{g}$ or gestation ≥ 28 weeks). Neonatal deaths within seven days of birth.

PERINATAL DEATHS UNDER 400 GRAMS

There were 152 perinatal deaths legally required to be registered in Victoria in 2006, which had a birthweight under 400g but were born at ≥ 20 weeks gestation. These are included in all mortality data in this Report. There were 117 stillbirths and 35 neonatal deaths in this category (see Table 22).

Table 22 Perinatal deaths of infants of birthweight under 400g, Victoria, 2006

Cause of death	Birthweight (g)						Total
	<200		200–299		300–399		
	SB	NND	SB	NND	SB	NND	
Total	15	0	32	7	70	28	152

There were 4 stillbirths and 5 neonates which are not included in Table 22 that were delivered at or beyond 20 weeks gestation but whose birthweight is unknown. Information on the 152 infants born at ≥ 20 weeks gestation whose birthweight was <400g is presented in Table 23. Seventy of these infants (46%) had congenital abnormalities and the pregnancy was terminated in all but seven of these cases.

Table 23 Perinatal deaths, by PSANZ PDC and type (birthweight <400g), Victoria, 2006

Cause of death PSANZ PDC	Type of perinatal death				Total	
	Stillbirths (fetal death)		Neonatal death		n	%
	n	%	n	%		
Termination for congenital abnormality	48	41.0	15	42.85	63	41.4
Spontaneous preterm	23	19.6	12	34.3	35	23.0
Specific perinatal conditions	7	6.0	5	14.3	12	7.9
Unexplained antepartum death	12	10.2	–	–	12	7.9
Fetal growth restriction	7	6.0	2	5.7	9	5.9
Congenital abnormality	7	6.0	–	–	7	4.6
Antepartum haemorrhage	5	4.3	1	2.9	6	3.9
Hypertension	3	2.6	–	–	3	2.0
Perinatal Infection	3	2.6	–	–	3	2.0
Maternal conditions	2	1.7	–	–	2	1.3
Total	117	100.0	35	100.0	152	100.0

PERINATAL DEATHS EXCLUDED FROM SURVEY

The following 18 infants were excluded from the statistical calculations:

- One neonatal death of an infant who was born interstate and referred to Victoria for treatment: congenital cardiac abnormalities.
- 17 were 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. Six infants had been spontaneous preterm births, four infants had been delivered as a result of antepartum haemorrhage and three infants had specific perinatal conditions [cervical incompetence (2); twin-twin transfusion syndrome (1)]. Four infants had congenital abnormalities and the pregnancy was terminated in all cases.

SOURCES OF INFORMATION

CCOPMM relies on the co-operation of obstetricians, neonatologists, paediatricians, midwives, general practitioners and medical records personnel to assist with providing the relevant information on each case. One of the most important documents is the Confidential Medical Report on Perinatal Death (CMR). CCOPMM 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.

CCOPMM 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 supervised by the most senior clinician involved.

Council advises practitioners that all information provided to the CCOPMM is handled with strict confidentiality, and is not able to be accessed by any third party, including the courts. The CCOPMM does not reveal in any of its reports the identity of any individual person or practitioner. **Provision of information to Council does not breach *Privacy Act* regulations. See 2004 Amendment to *Health Act*: http://www.health.vic.gov.au/perinatal/legislation.htm#Legislation_changes**

Institutions should ensure that they are using current versions of the 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).

REQUIREMENTS FOR REGISTRATION OF PERINATAL DEATHS

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

For the purpose of Registration, the *Registration of Births, Deaths and Marriages Act*, states 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.

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. If death subsequently occurs within 28 days, a Perinatal Death Certificate is required. However for statistical purposes, infants <20weeks gestation are not included in perinatal mortality calculations for CCOPMM.

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. Such examinations are best performed in the tertiary perinatal referral institutions (Royal Women's Hospital, Mercy Hospital for Women, Monash Medical Centre and the Royal Children's Hospital).

In neonatal deaths, where circumstances are suspicious or where there are suspected serious deficiencies in care, the Coroner should be notified.

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 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

<http://www.health.vic.gov.au/humantissue/postmortem.htm>

Subsidised autopsy service

It is vital to the accuracy of the CCOPMM's surveys that full advantage be taken of the autopsy service available for perinatal deaths occurring in Victoria which is subsidised by DHS. To use the service, the attending doctor, following the obtaining of consent, should contact the pathology department of the nearest **tertiary** hospital and arrange with a funeral director to transport the infant and the placenta to the pathology centre. CCOPMM 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:

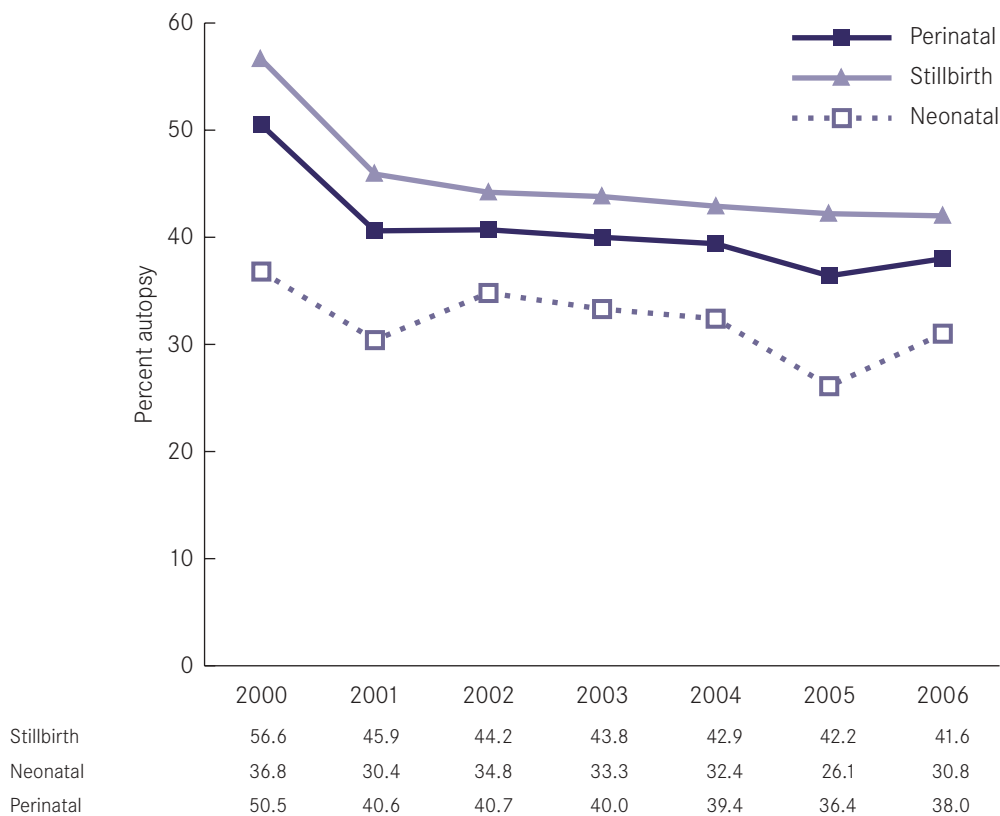
Executive Support Officer
Consultative Council on Obstetric and Paediatric Mortality and Morbidity
GPO Box 4923
Melbourne 3001

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

In 2006, an autopsy was performed on 31.3% (190 of 607) of stillbirths, and on 30.8% (70 of 227) of neonatal deaths. The perinatal autopsy rate for infants ($n=834$) with a birthweight $\geq 400\text{g}$ or ≥ 20 weeks gestation was 31.2% in 2006, compared to 28.6% in 2005, 29.9% in 2004, 34.6% in 2003, 37.1% in 2002, 37.8% in 2001 and 50.2% in 2000. If terminations of pregnancy for psychosocial indications are excluded, in 2006 an autopsy was performed on 41.6% (190 of 457) of stillbirths, and on 30.8% (70 of 227) of neonatal deaths of infants, giving a perinatal autopsy rate of 38.0%.

The perinatal autopsy rate for infants with a birthweight $\geq 400\text{g}$ or ≥ 20 weeks gestation (excluding terminations of pregnancy for maternal psychosocial indications) was 38.0% in 2006 compared to 36.4% in 2005, 39.4% in 2004, 40.0% in 2003, 40.7% in 2002, 40.6% in 2001 and 50.5% in 2000. The proportion of perinatal deaths that have had an autopsy over the past seven years is shown in Figure 14, which illustrates that there is a progressive decline in the perinatal autopsy rate from 50.5% in 2000 to 38.0% in 2006. This declining rate of perinatal autopsy means that an increasing proportion of parents who experience perinatal death are denied the benefit of the information which can often assist them in understanding the cause of death.

Figure 14 Perinatal autopsy rates, Victoria, 2000–2006



Note: perinatal deaths as a result of terminations of pregnancy for maternal psychosocial indications have been excluded from these calculations.

Placental Pathology

Following a stillbirth, neonatal death in the delivery room or birth of a high risk infant, the placenta should be sent for examination by the perinatal/paediatric pathologist regardless of whether consent for an autopsy has been gained (PSANZ Clinical Practice Guideline for Perinatal Mortality Audit, p.72: www.psanz.org.au).

The placenta should preferably be chilled and then promptly sent unfixed to the pathology service to enable microbiological cultures and when necessary, chromosomal cultures to be performed. If a delay is likely, 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:

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

CONTRIBUTING FACTORS IN PERINATAL DEATHS

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

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

In the majority of cases (86%) no contributing factors were identified. Perinatal deaths a result of terminations of pregnancy performed for maternal psychosocial indications have been excluded from these calculations.

Stillbirths: After consideration, of 266 cases (birthweight $\geq 500\text{g}$ or ≥ 22 weeks gestation), 32 cases (12.1%) were classified as having contributing factors.

Inadequate antenatal identification and management of the growth restricted fetus was identified as a contributing factor in 12 stillbirths and one neonatal death in 2006.

Neonatal deaths: Of the 157 cases (birthweight $\geq 500\text{g}$ or ≥ 22 weeks gestation), there were 27 cases (17.2%) in which one or more contributing factors were identified.

Inadequate resuscitation was identified as a contributing factor in eight neonatal deaths in 2006.

The Australian Resuscitation Council guidelines (February 2006) recommend resuscitation training for all staff attending births. These guidelines can be found at www.resus.org.au. A booklet on neonatal resuscitation guidelines can be purchased through the Australian Resuscitation Council: phone (03) 9249 1214. NETS Education runs a comprehensive 6 hour program on Resuscitation of the Newborn that has been updated to conform with the new guidelines. Information and bookings for educational sessions may be made by telephoning 1300 662 434 or (03) 9344 2419; or found at www.nets.org.au

With respect to standards for routine antenatal care for women with low-risk pregnancies, practitioners are reminded of the guidelines for **low risk pregnancies** developed by the three tertiary centres in Melbourne, *The Three Centres Guidelines for Antenatal Care*, available at www.3centres.com.au

Contributing factors in perinatal deaths in Victoria, 2006 are shown in Table 24 (next page).

The main categories of contributing factors were identified:

Obstetric factors

- Inadequate identification and management of the growth restricted fetus
- Inadequate intrapartum monitoring
- Patient ignorance: eg failure to attend follow-up appointments, no antenatal care
- Inadequate management of hypertension/pre eclampsia
- Maternal drug use/smoking
- Failure to expedite delivery

Paediatric factors

- Inadequate resuscitation
- Inadequate paediatric management
- Delay in the recognition and severity of illness

Table 24 Contributing factors in perinatal deaths (birthweight $\geq 500\text{g}$), Victoria, 2006

Suspected contributing factor	Number*		Total
	SB	NND	
Obstetric factors			
Antenatal care:			
Insufficient antenatal care	-	3	3
Delay/no consultation in high-risk pregnancy	1	1	2
Consequences of amniocentesis	1	-	1
Failure to diagnose fetal abnormality	1	-	1
Inadequate antenatal management of:			
Diabetes	3	-	3
Growth restricted fetus	12	1	13
Prolonged pregnancy	1	-	1
Inadequate management of:			
Twin-twin transfusion syndrome	1	1	2
Hypertension/pre-eclampsia/eclampsia	5	1	6
Multiple pregnancy	1	-	1
Decreased fetal movements	1	-	1
Patient ignorance: eg failure to attend follow-up appointment;	4	2	6
Failure to recognise severity of fetal cardiac compromise	1	-	1
Inappropriate maternal drugs	2	1	3
Maternal smoking	3	1	4
Maternal obesity	1	-	1
Inadequate antenatal monitoring:			
Misinterpretation of/undue reliance on tests	-	1	1
Clinical need for test apparent	1	1	2
Intrapartum care:			
Caesarean section performed too late	1	1	2
Failure to perform a Caesarean section	1	-	1
Failure to expedite delivery	1	2	3
Inadequate intrapartum monitoring	3	6	9
Unsuitable hospital for delivery	2	-	2
Delay in getting anaesthetist	1	-	1
Inadequate management of fetal distress	-	1	1
Inadequate management of fetal distress	-	1	1
Inadequate management of prolonged second stage	-	1	1
Inappropriate birth plan	-	1	1
Substandard management of prostin induction and dosage	1	-	1
Inappropriate induction method (oxytocin augmentation in a multipara)	1	-	1
Paediatric factors			
Inadequate paediatric management	-	2	2
Inadequate management of sepsis	-	1	1
Family neglect or ignorance	-	1	1
Inadequate resuscitation	-	8	8
Delay in recognition and severity or illness (by parents/staff)	-	3	3
Failure to identify and act on failure to thrive	-	1	1
Senior paediatrician not present at emergency Caesarean section in a high risk patient	-	1	1
TOTAL number of contributing factors identified	50	43	93
Total number of cases	32	27	59

* Some cases had more than one contributing factor identified.

Clinical recommendations

Clinicians are reminded about the importance of advising women to report decreased fetal movements.

Consideration should be given to ultrasound assessment of fetal growth and wellbeing in women who are significantly overweight in early and mid 3rd trimester.

Consider suitably experienced personnel in neonatal resuscitation to be present when an instrumental delivery is being performed for non-reassuring fetal status.

Caution should be exercised in using beta blocker treatment for hypertension in late pregnancy because of its association with fetal growth restriction.

In cases of multiple pregnancies, consultant involvement should be sought including for their intrapartum management. Timely transfer to tertiary units should be considered if birth <33 weeks is anticipated. Early referral to feto-maternal specialist units should be made for monozygotic multiple pregnancy.

Any infant which fails to pass meconium within 24 hours of birth requires paediatric consultation and assessment for bowel obstruction.

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, immediate consultation with the Newborn Emergency Transport Service (NETS) before delivery 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.

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

Neurological irritability in a neonate is an ominous sign. Sedation of such infants may produce severe cardio-respiratory depression.

As early onset GBS neonatal sepsis is considered to be largely a preventable disease maternity units should have a written protocol outlining the institution's approach to prevent GBS infection (see The 3 Centres Guidelines for Antenatal Care). Maternity units should also have a separate protocol for the management of the newborn at risk of developing early onset sepsis.

Recommended guidelines

The '*Clinical Practice Guideline for Perinatal Mortality Audit (incorporating Psychological and Social Aspects of Perinatal Bereavement)*' was developed by the Perinatal Society of Australia and New Zealand Perinatal Mortality Special interest Group (PNM-SIG), and can be assessed through: www.psanz.org.au The main objective of the guideline is to assist clinicians in the investigation and audit of perinatal deaths, including communication with the parents, to enable a systematic approach to perinatal mortality audit.

The RCOG guidelines for induction of labour can be found at www.rcog.org.uk

The Australian Resuscitation Council Neonatal Guidelines (February 2006) recommend resuscitation training for all staff attending births. These guidelines can be found at www.resus.org.au A booklet on neonatal resuscitation guidelines can be purchased through the Australian Resuscitation Council: phone (03) 9249 1214.

NETS Education is a key participant in the implementation at state level of the Australian Resuscitation Council Neonatal Guidelines, February 2006. NETS Education runs a comprehensive 6 hour program on Resuscitation of the Newborn that has been updated to conform with the new guidelines. Information and bookings for educational sessions may be made by telephoning 1300 662 434 or (03) 93442419; or found at www.nets.org.au

The recommendations from the Australasian Society for the Study of Hypertension in Pregnancy (ASSHP), '*The detection, investigation and management of hypertension in pregnancy: executive summary*' can be found at www.racp.edu.au/asshp or at www.somaz.org

The RANZCOG guidelines for intrapartum fetal surveillance can be found at www.ranzcog.edu.au

Health care professionals are reminded of guidelines which detail the initial assessment and management of many conditions encountered in the newborn period. The NETS Neonatal Handbook is available at www.nets.org.au/nets/handbook.

The Royal Australasian College of Paediatricians guidelines on the examination of the newborn is available at: www.racp.edu.au/hpu/paed/examination

POSTNEONATAL INFANT, CHILD AND ADOLESCENT DEATH REVIEW 2006

This section reports on postneonatal infant deaths, child and adolescent deaths that occurred during the 2006 calendar year. CCOPMM wishes to thank medical practitioners, health professionals and the State Coroner's Office who provided additional information on infant and child deaths, and stresses the importance of accurate information in these age groups. Such assistance with data provision is greatly appreciated.

RECOMMENDATIONS FROM CCOPMM ON INFANT, CHILD AND ADOLESCENT DEATHS

- ***Transfer of sick children***

CCCOPMM recommends that tertiary hospitals have a policy that if a request for transfer has been made, a senior doctor is consulted, and that if the transfer is declined, that the referring doctor be encouraged to re-contact the tertiary centre if further consultation is warranted and/or the medical condition of the child deteriorates.

A single telephone line (03 9345 7007) is now operating for the management and transfers of sick neonates and children, which emphasises the need for involvement of a senior doctor.

The line provides information and access to:

Paediatric Emergency Transport service (PETS);

Neonatal Emergency Transport Service (NETS);

Transfers to Royal Children's Hospital (RCH) & Monash Medical Centre (MMC)

Emergency Departments

Royal Children's Hospital Clinical Practice Guidelines

Advanced Paediatric life Support Courses

Signs of severe illness in infants

Symptoms and signs suggesting that infants less than 6 months old may need admission to hospital (*Archives of Diseases in Childhood* 1990;65:750–56) can be remembered as ABC—Uncommon:

Activity

- 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

Breathing

- Retraction—moderate or severe chest retraction

Circulation

- Pallor—sudden onset of persistent generalised pallor

Uncommon

- Bilious vomiting, grunting, apnoea, fits

Recognising serious illness in babies

The **Child Health Record** is given to 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 were not 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).

Guide to paediatric resuscitation

Table 25 Guide to paediatric resuscitation

	Expected weight	Minimum systolic BP	Heart Rate	Respiratory Rate
Age	kg	mmHg	bpm	bpm
Term	3.5	50	100–170	40–60
3m	6	50	100–170	30–50
6m	8	60	100–170	30–50
1y	10	65	100–170	30–40
2y	13	65	100–160	20–30
4y	15	70	80–130	20
6y	20	75	70–115	16
8y	25	80	70–110	16
10y	30	85	60–105	16
12y	40	90	60–100	16
14y	50	90	60–100	16
17+	70	90	60–100	16

This table and a simple guide to paediatric resuscitation (presented in a small format suitable to attach to an ID badge or keep in a wallet) can be downloaded from the web at:

www.rch.org.au/clinicalguide/pages/resus.php

Follow the link to “ID badge size Resuscitation Card”

Guidelines for the management of many acute illnesses in babies and children can be found at the RCH Clinical Practice Guideline Website at:

www.rch.org.au/clinicalguide

REVIEW OF POSTNEONATAL INFANT, CHILD AND ADOLESCENT DEATHS, 2006

This is the second year that CCOPMM has reported on the deaths of adolescents aged 15 to 17 years, as a result of an amendment made to the *Health Act* in June 2004.

CCOPMM was notified of the deaths of 232 children aged ≥ 28 days to <18 years of age that occurred in Victoria in 2006. Of these 232 children, 222 resided in Victoria. Of the ten children who did not reside in Victoria the place of residence on the death certificate was: New South Wales (3), Queensland (3), Northern Territory (1), Tasmania (2) and Philippines (1). The cause of death for these children was: congenital abnormality (5), motor vehicle accident (3), malignancy (1) and prematurity (1). As in the past CCOPMM only reports on deaths of children who were residents in Victoria and who died in Victoria. CCOPMM was also notified of two deaths of Victorian children from motor vehicle accidents who did not die in Victoria: one male died overseas; one female died interstate.

Table 26 provides an overview of all deaths of children and adolescents aged less than 18 years. Details of neonatal deaths (<28 days of age) are included in the perinatal mortality review section in this report. Population denominators for 2006 rates used in Table 26 and subsequent tables were obtained from the Australian Bureau of Statistics 2006 Census of Population and Housing: 2006 Census Community Profile Series, Basic Community Profile.

Table 26 Child and adolescent deaths, Victoria, 2006: age at death by gender

Age at death	Females		Males		Total	
	Number	per cent	Number	per cent	Number	per cent
Under 1 year						
Less than 28 days ^a	90	48.9	95	42.6	185	45.5
≥ 28 days to <1 year	35	19.0	49	22.0	84	20.6
Subtotal <1 year	125	67.9	144	64.6	269	66.1
1 to 4 years	16	8.7	19	8.5	35	8.6
5 to 9 years	16	8.7	11	4.9	27	6.6
10 to 14 years	6	3.3	22	9.9	28	6.9
15 to 17 years	21	11.4	27	12.1	48	11.8
Subtotal 1–17 years	59	32.1	79	35.4	138	33.9
Total: 0–17 years	184	100.0	223	100	407	100.0

a 42 neonatal deaths that were the result of terminations of pregnancy have been excluded from these calculations.

More males than females died overall, and in each age group with the exception of those aged 5 to 9 years (Table 26). The sex imbalance was most marked in children aged 10 to 14 years. Of all child and adolescent deaths in 2006, 45% were neonates (<28 days, $N=185$) and 55% were infants and children (≥ 28 days– <18 years, $N=222$). In 2006, two thirds of the 407 children who died were less than 12 months of age ($n=269$, 66.1%), and these children had a death rate of 425.6 deaths per 100,000 population. The death rate for children and adolescents 0 to 17 years is 35.3 deaths per 100,000 population. Among the other age groups, young people aged 15–17 years showed the highest rates of death (see Table 27).

Table 27 Child and adolescent deaths, Victoria 2006: death rates for age categories by gender

Child death Age category	Females		Males		Total	
	Number	Rate per 100,000 ^a	Number	Rate per 100,000 ^a	Number	Rate per 100,000 ^a
< 1 year ^b	125	404.3	144	446.0	269	425.6
1 to 4 years	16	13.5	19	15.3	35	14.4
5 to 9 years	16	10.4	11	6.8	27	8.6
10 to 14 years	6	3.7	22	13.0	28	8.5
15 to 17 years	21	21.3	27	26.1	48	23.8
Total: 0–17 years	184	32.8	223	37.7	407	35.3

a Denominators were obtained from the Australian Bureau of Statistics (ABS) 2006 Census of Population and Housing: 2006 Census Community Profile Series. Basic Community Profile, version 1 (table B04), and are age and sex specific.

b 42 neonatal deaths that were the result of terminations of pregnancy have been excluded from these calculations.

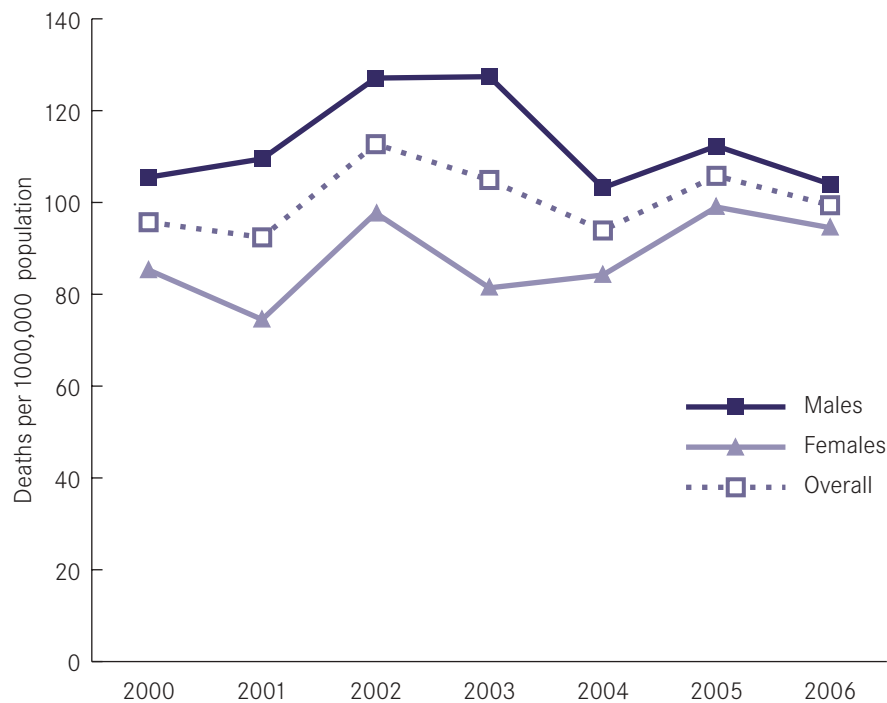
Trends in death rates for children aged <5 years

Table 28 and Figure 15 show the trends in death rates for Victorian children aged <5 years over the last seven years (2000–2006). Across the years more males than females died. In 2006 the death rate for male children <5 years is 104.0 deaths per 100,000 population, compared to the female death rate of 94.5 per 100, 000 population. The overall death rate for children aged less than 5 years is 99.4 per 100,000 population.

Table 28 Trends in death rates for children <5 years, Victoria 2000–2006

	2000	2001	2002	2003	2004	2005	2006
Females	85.3	74.5	97.7	81.4	84.2	99.0	94.5
Males	105.5	109.5	127.1	127.4	103.2	112.3	104.0
Total	95.7	92.4	112.7	104.9	93.9	105.8	99.4

Figure 15 Trends in death rates for children <5 years, Victoria, 2000–2006



INFANT MORTALITY RATE

The infant mortality rate for Victorian infants 2000–2006 is shown in Table 29. The infant mortality rate is calculated as the number of infant deaths divided by the number of total livebirths for the index year (rate per 1,000). Deaths during the neonatal period of infants born as the result of terminations of pregnancy have been excluded from the calculations in Table 29 and in Figure 16.

Table 29 Infant mortality rates, Victoria 2000–2006

	2000	2001	2002	2003	2004	2005	2006 ^c
Number							
Livebirths	62,127	61,670	62,638	62,987	63,047	65,994	69,187
Neonatal deaths ^a	154	169	197	196	172	207	185
Postneonatal deaths	73	88	80	60	75	88	88
Total infant deaths ^b	227	257	277	256	247	295	273
Mortality rate per 1,000 live births							
Neonatal	2.5	2.7	3.1	3.1	2.7	3.1	2.7
Postneonatal	1.2	1.4	1.3	1.0	1.2	1.3	1.3
Infant mortality rate	3.7	4.2	4.4	4.1	3.9	4.4	3.9

a Neonatal deaths that were the result of terminations of pregnancy have been excluded from these calculations.
b Neonatal and postneonatal infant deaths.
c Provisional data: There were 88 infants born in 2006 who died: 57 infants died in 2006, and 31 died in 2007. Details of these 31 infants who died in 2007 will be included in 2007 Annual Report.

Figure 16 Infant mortality rates, Victoria 2000–2006

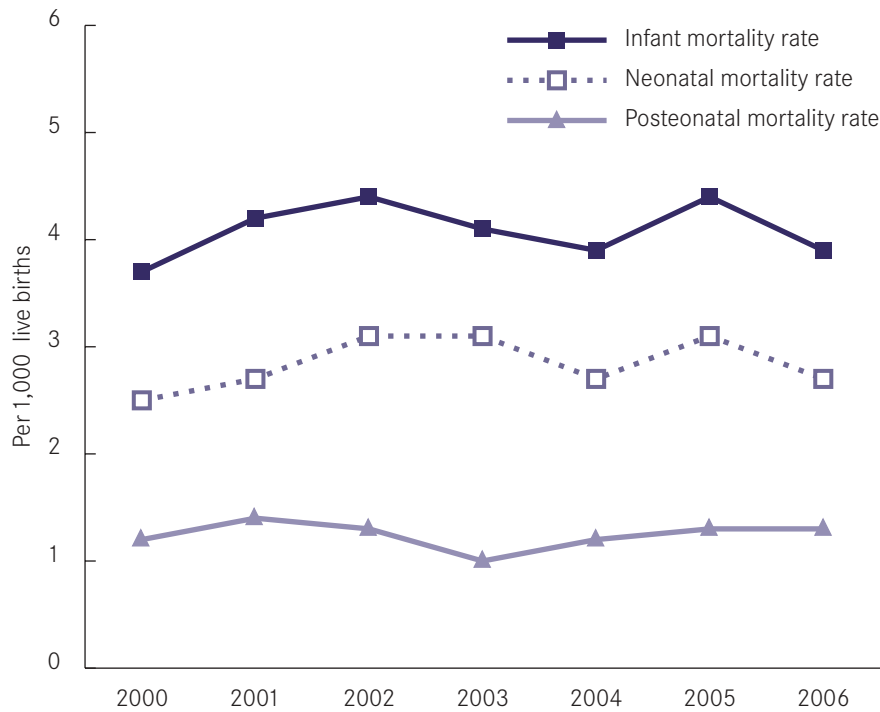


Table 30 shows the infant mortality rate for Victoria compared to the infant mortality rate for Australia, New Zealand, Canada and the United Kingdom.

Table 30 Comparisons of Victorian infant mortality rates with selected OECD countries^c: 2000–2006

	2000	2001	2002	2003	2004	2005	2006 ^a
Victoria ^b	3.8	4.2	4.4	4.1	3.9	4.4	3.9
Australia	5.2	5.3	5.0	4.8	4.7	5.0	
New Zealand	6.1	5.3	5.6	4.9	5.6	5.1	
Canada	5.3	5.2	5.4	5.3	5.3	–	
United Kingdom	5.6	5.5	5.2	5.3	5.0	5.1	

a Provisional data for 2006

b Note that for Victorian data: neonatal deaths that were the result of terminations of pregnancy have been excluded from these calculations

c Source of data on OECD countries: OECD HEALTH DATA 2007, November 2007 (www.oecd.org/)

MOST COMMON CAUSE OF DEATH BY AGE AT DEATH

Postneonatal infants

Birth defects and genetic conditions accounted for 34 deaths (40%) of infants aged 1 month to 12 months, followed by conditions determined at birth (e.g. prematurity, birth asphyxia) with 20 deaths and then SIDS with 16 deaths. Combined, these three leading causes of death accounted for 70 deaths in postneonatal infants (83%). Infections formed the next largest group of deaths (6 deaths).

Table 31 Most common cause of death, Victoria, 2006, by age at death: postneonatal infants (28 days to <12 months)

Rank	Cause of death	Number	Per cent	Rate per 100,000 ^a
1	Birth defects and genetic conditions	34	40.5	53.8
2	Conditions determined at birth	20	23.8	31.6
3	Sudden infant death syndrome (SIDS IB, SIDS II)	16	19.0	25.3
4	Infection	6	7.1	9.5
5	Asphyxia	2	2.4	3.2
(6)	Malignancy	1	1.2	1.6
(6)	Intentional trauma	1	1.2	1.6
(6)	Fire	1	1.2	1.6
(6)	Other disease	1	1.2	1.6
(6)	Unclassified sudden infant death (no PM)	1	1.2	1.6
(6)	Drowning	1	1.2	1.6
Total		84	100.0	132.9

a Denominator includes all infants up to 12 months of age; while the nominator includes infants aged 28 days of age up to 12 months of age.

Children aged 1 to 4 years

The leading cause of death for one to four year olds was birth defects and genetic conditions (15 deaths; 43%). The next most common cause of death was malignancy (5 deaths), followed by deaths due to infection (3 deaths) and deaths due to drowning (3 deaths).

Table 32 Most common cause of death, Victoria, 2006, by age at death: 1 to 4 years

Rank	Cause of death	Number	Per cent	Rate per 100,000 ^a
1	Birth defects and genetic conditions	15	42.9	6.2
2	Malignancy	5	14.3	2.1
(3)	Infection	3	8.6	1.2
(3)	Drowning	3	8.6	1.2
(5)	Motor vehicle accident	2	5.7	0.8
(5)	Other acquired disease	2	5.7	0.8
(7)	Other accidental injury	1	2.9	0.4
(7)	Other conditions determined at birth	1	2.9	0.4
(7)	Fire	1	2.9	0.4
(7)	Asphyxiation	1	2.9	0.4
(7)	Intentional injury	1	2.9	0.4
Total		35	100.0	14.4

a Denominator includes all children aged 1–4 years of age.

Children aged 5 to 9 years

For 5 to 9 year olds, the leading cause of deaths were birth defects and genetic conditions (8 deaths, 30%), followed by malignancy (6 deaths), deaths attributed to drowning (4 deaths) and other conditions determined at birth (3 deaths).

Table 33 Most common cause of death, Victoria, 2006, by age at death: 5 to 9 years

Rank	Cause of death	Number	Per cent	Rate per 100,000 ^a
1	Birth defects and genetic conditions	8	29.6	2.5
2	Malignancy	6	22.2	1.9
3	Drowning	4	14.8	1.3
4	Other conditions determined at birth	3	11.1	1.0
5	Motor vehicle accident	2	7.4	0.6
(6)	Other acquired disease	1	3.7	0.3
(6)	Infection	1	3.7	0.3
(6)	Intentional injury	1	3.7	0.3
(6)	Undetermined	1	3.7	0.3
Total		27	100.0	8.6

a Denominator includes all children aged 5–9 years of age.

Children aged 10 to 14 years

The leading causes of death for 10 to 14 year olds were malignancy and motor vehicle accidents (both 5 deaths), followed by other conditions determined at birth, birth defects and genetic conditions and deaths due to suicides (all 4 deaths).

Table 34 Most common cause of death, Victoria, 2006, by age at death: 10 to 14 years

Rank	Cause of death	Number	Per cent	Rate per 100,000 ^a
(1)	Malignancy	5	17.9	1.5
(1)	Motor vehicle accident	5	17.9	1.5
(3)	Other conditions determined at birth	4	14.3	1.2
(3)	Birth defects and genetic conditions	4	14.3	1.2
(3)	Suicide	4	14.3	1.2
(6)	Other acquired disease	2	7.1	0.6
(6)	Other accidental injury	2	7.1	0.6
(8)	Fire	1	3.6	0.3
(8)	Asphyxiation	1	3.6	0.3
Total		28	100.0	8.5

a Denominator includes all children aged 10–14 years of age.

Adolescents aged 15 to 17 years

The leading causes of death for 15 to 17 year olds motor vehicle accidents (20 deaths, 42%), followed by malignancy and suicide (both 8 deaths). Combined, these three leading causes of death accounted for 36 deaths in 15 to 17 year olds (75%).

Table 35 Most common cause of death, Victoria, 2006, by age at death: 15 to 17 years

Rank	Cause of death	Number	Per cent	Rate per 100,000 ^a
1	Motor vehicle accident	20	41.7	9.9
(2)	Malignancy	8	16.7	4.0
(2)	Suicide	8	16.7	4.0
4	Birth defects and genetic conditions	5	10.4	2.5
(5)	Other acquired disease	2	4.2	1.0
(5)	Undetermined	2	4.2	1.0
(7)	Other conditions determined at birth	1	2.1	0.5
(7)	Other accidental injury	1	2.1	0.5
(7)	Intentional injury	1	2.1	0.5
Total		48	100.0	23.8

a Denominator includes all adolescents aged 15–17 years of age.

CAUSE OF DEATH IN POSTNEONATAL INFANTS, CHILDREN AND ADLOESCENTS, VICTORIA, 2006

Table 36 Cause of death by age group, Victoria, 2006

Category	Age group					Total (%)
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Determined at birth						
Birth hypoxia/asphyxia	2	1	–	3	1	7
Malformation/birth defect	34	15	8	4	5	66
Prematurity	18	–	2	–	–	20
Other	–	–	1	1	–	2
Subtotal	54	16	11	8	6	95 (42.8%)
Sudden infant death syndrome^a						
Category 1B SIDS	1	–	–	–	–	1
Category II SIDS	15	–	–	–	–	15
Unclassified sudden infant death	1	–	–	–	–	1
Subtotal	17	–	–	–	–	17 (7.7%)
Unintentional injuries						
Motor vehicle	–	2	2	5	20	29
Drowning	1	3	4	–	–	8
Fire	1	1	–	1	–	3
Train	–	–	–	–	–	–
Asphyxiation	2	1	–	1	–	4
Other	–	1	–	2	1	4
Subtotal	4	8	6	9	21	48 (21.6%)
Acquired disease						
Infection	6	3	1	–	–	10
Malignancy	1	5	6	5	8	25
Other acquired	1	2	1	2	2	8
Subtotal	8	10	8	7	10	43 (19.4%)
Undetermined^b						
Undetermined	–	–	1	–	2	3
Subtotal	–	–	1	–	2	3 (1.4%)
Intentional injury						
Intentional trauma	1	1	1	–	1	4
Suicide	–	–	–	4	8	12
Subtotal	1	1	1	4	9	16 (7.2%)
Total	84	35	27	28	48	222 (100.0%)

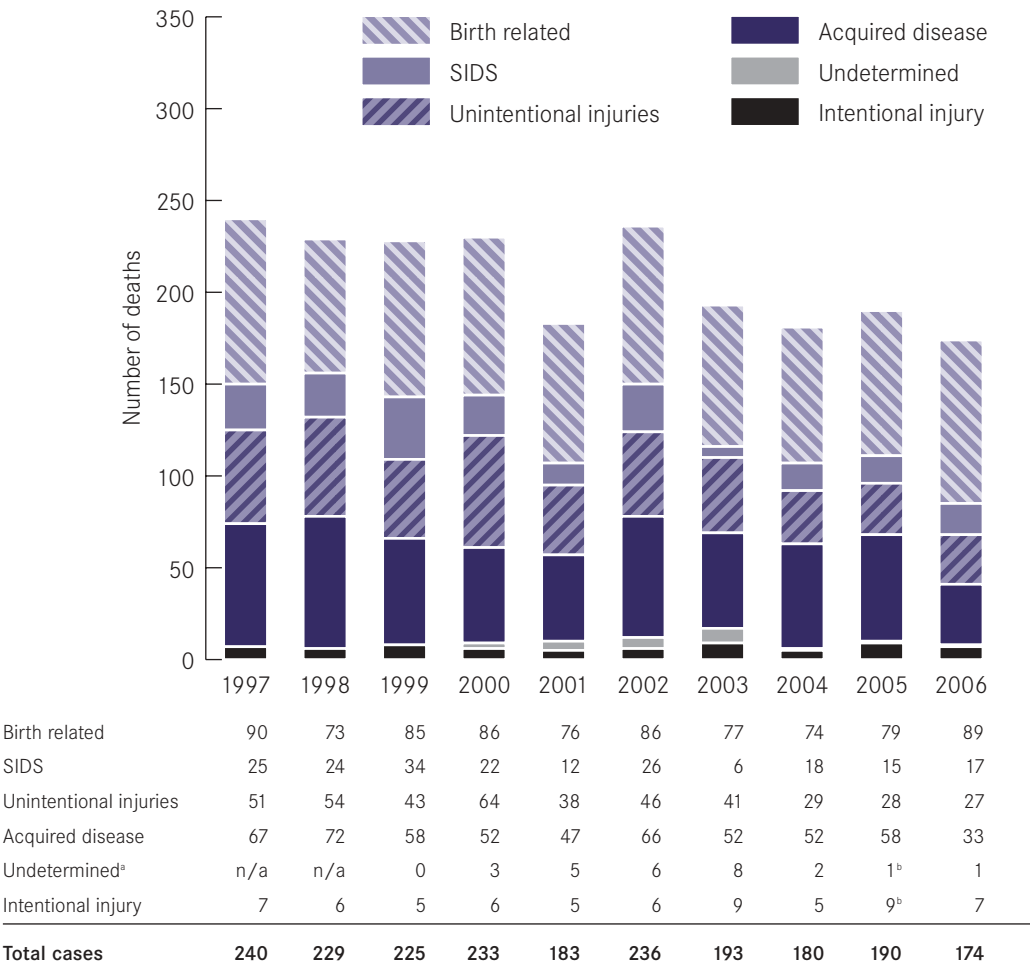
a There was an infant whose death was coded as “unclassified sudden infant death” because no autopsy was performed. There were three neonatal infants (<28 days of age) who were classified as SIDS Category II and one neonate with USID who are not included in this table.

b There were three child deaths whose cause of death was undetermined after autopsy.

MAJOR CAUSE OF POSTNEONATAL INFANT, CHILD AND ADOLESCENT DEATHS, VICTORIA, 1997–2006

Postneonatal infant and child deaths (aged ≥ 28 days to <15 years) from 1997 to 2006 are shown by category of death in Figure 17a.

Figure 17a Postneonatal infant and child deaths (≥ 28 days to <15 years) by major cause, Victoria, 1997–2006

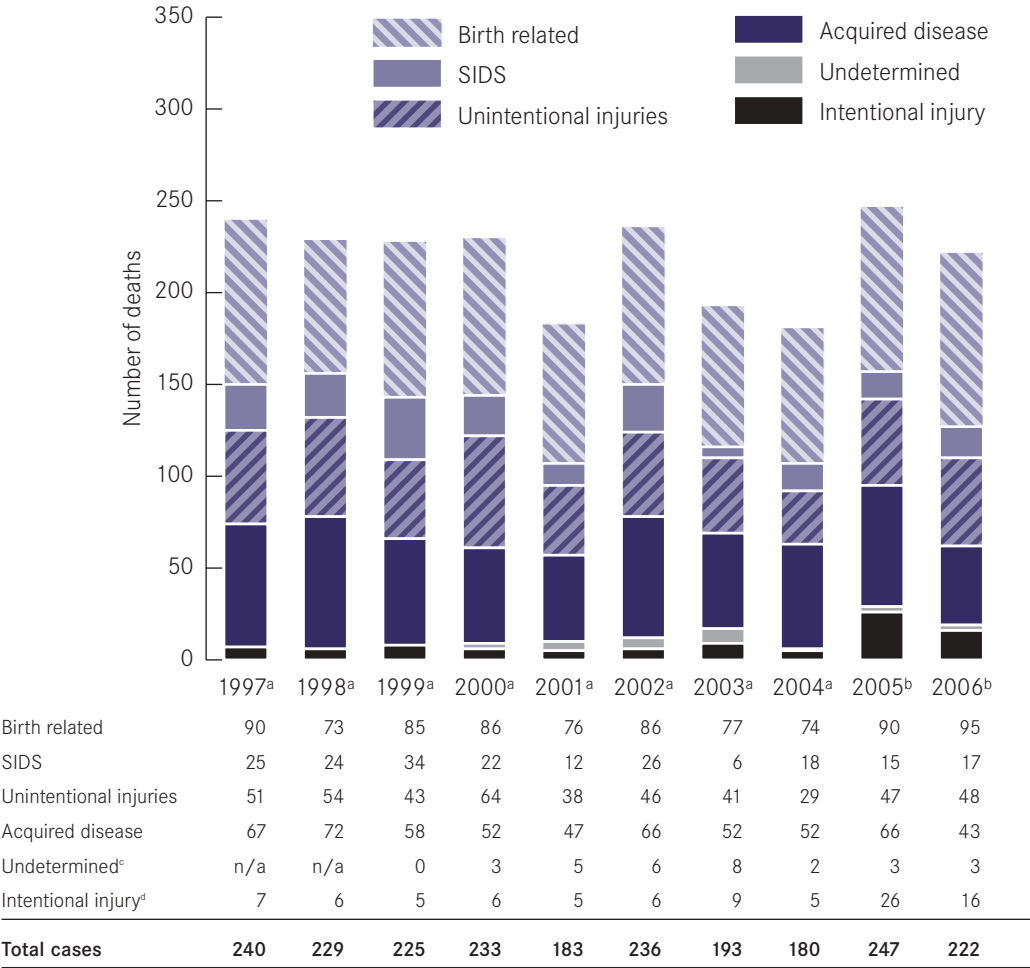


a In reports prior to 1999 where a cause of death was not identified or had been classified as unascertained it was included in Acquired disease, under subcategory 'other acquired'. Since 1999 these deaths have been classified under the category 'Undetermined'.

b Three child deaths in 2005 have been reclassified as intentional injury deaths.

Figure 17b shows trends in postneonatal infant and child deaths (aged ≥ 28 days to <15 years of age) from 1997 to 2004, and postneonatal infant, child and adolescent deaths (aged ≥ 28 days to <18 years of age) for 2005 and 2006 by category of death.

Figure 17b Postneonatal infant, child and adolescent deaths^{a,b} (≥ 28 days– <18 years) by major cause, Victoria, 1997–2006

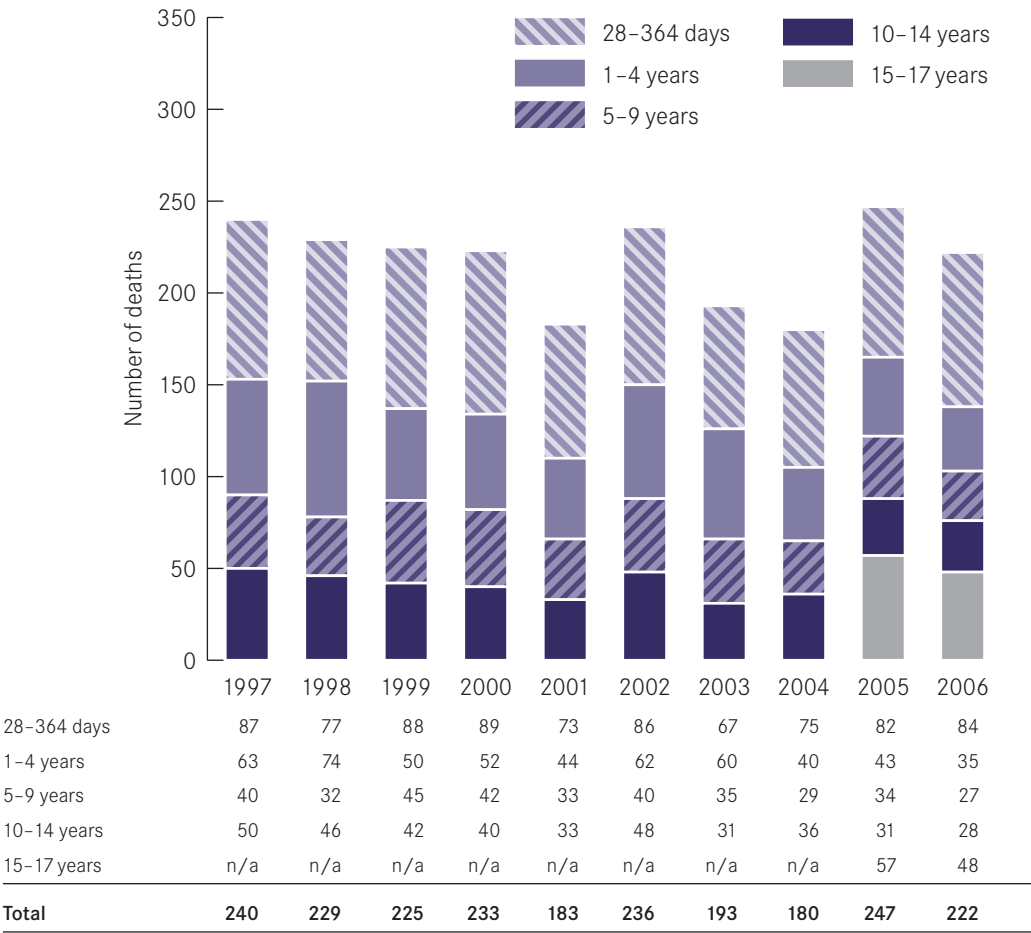


a 1997–2004 children aged ≥ 28 days to <15 years of age.
b 2005 and 2006 children aged ≥ 28 days to <18 years of age.
c In reports prior to 1999 where a cause of death was not identified or had been classified as unascertained it was included in Acquired disease, under subcategory ‘other acquired’. Since 1999 these deaths have been classified under the category ‘Undetermined’.
d Three child deaths in 2005 that were classified as undetermined in the 2005 Annual Report have been reclassified as intentional injury deaths.

POSTNEONATAL INFANT, CHILD AND ADOLESCENT DEATHS BY AGE GROUP, VICTORIA, 1997–2006

Postneonatal infant, child and adolescent deaths from 1997 to 2006 are shown by age at death in Figure 18. Postneonatal infant and child deaths from 1997 to 2004 are shown by age at death (≥ 28 days to <15 years of age), and postneonatal infant and child deaths for 2005 and 2006 are shown by age at death (≥ 28 days to <18 years).

Figure 18 Postneonatal infant, child and adolescent deaths by age group, Victoria, 1997–2006



CAUSES OF POSTNEONATAL INFANT, CHILD AND ADOLESCENT DEATH DETERMINED AT BIRTH

In 2006 there were 95 deaths in postneonatal infants, children and adolescents from perinatally acquired hypoxia/asphyxia, birth defects, prematurity or other conditions arising from the perinatal period. Figure 19 shows the causes of death determined at birth for the years 1997–2006.

Figure 19a Causes of death determined at birth: postneonatal infants and children (≥28 days–<15 years), Victoria, 1997–2006

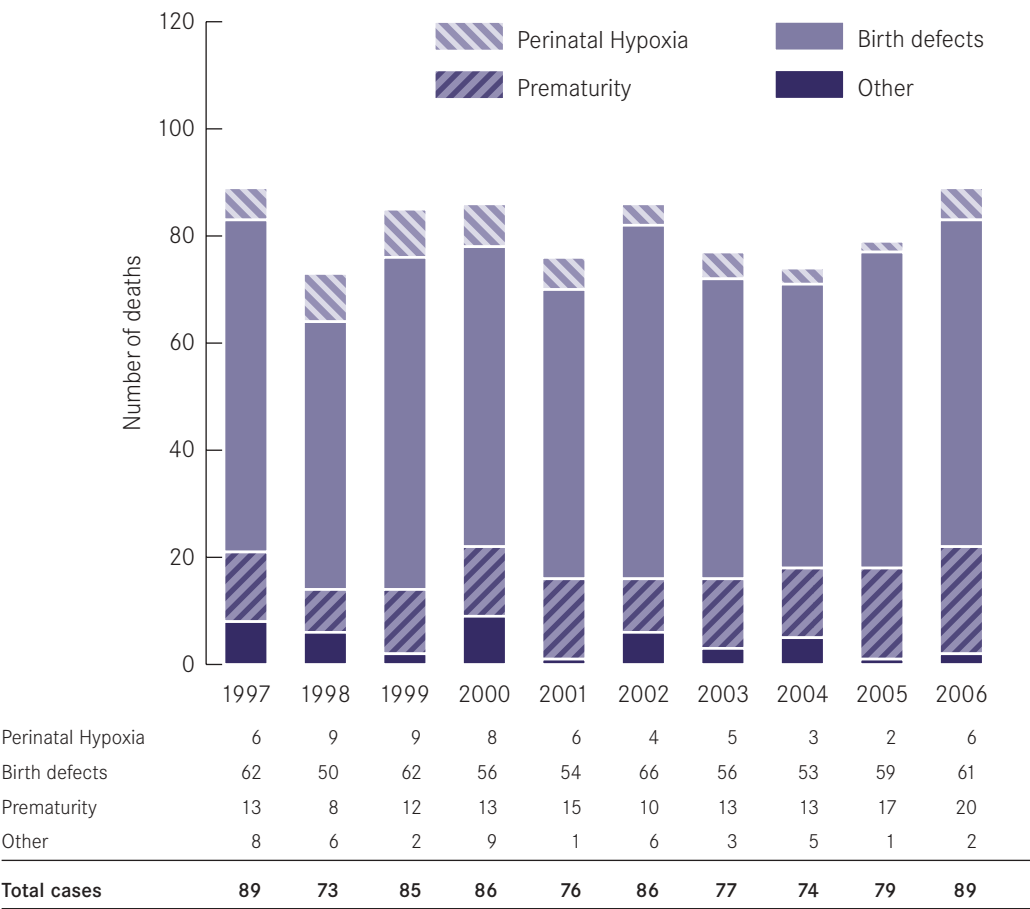
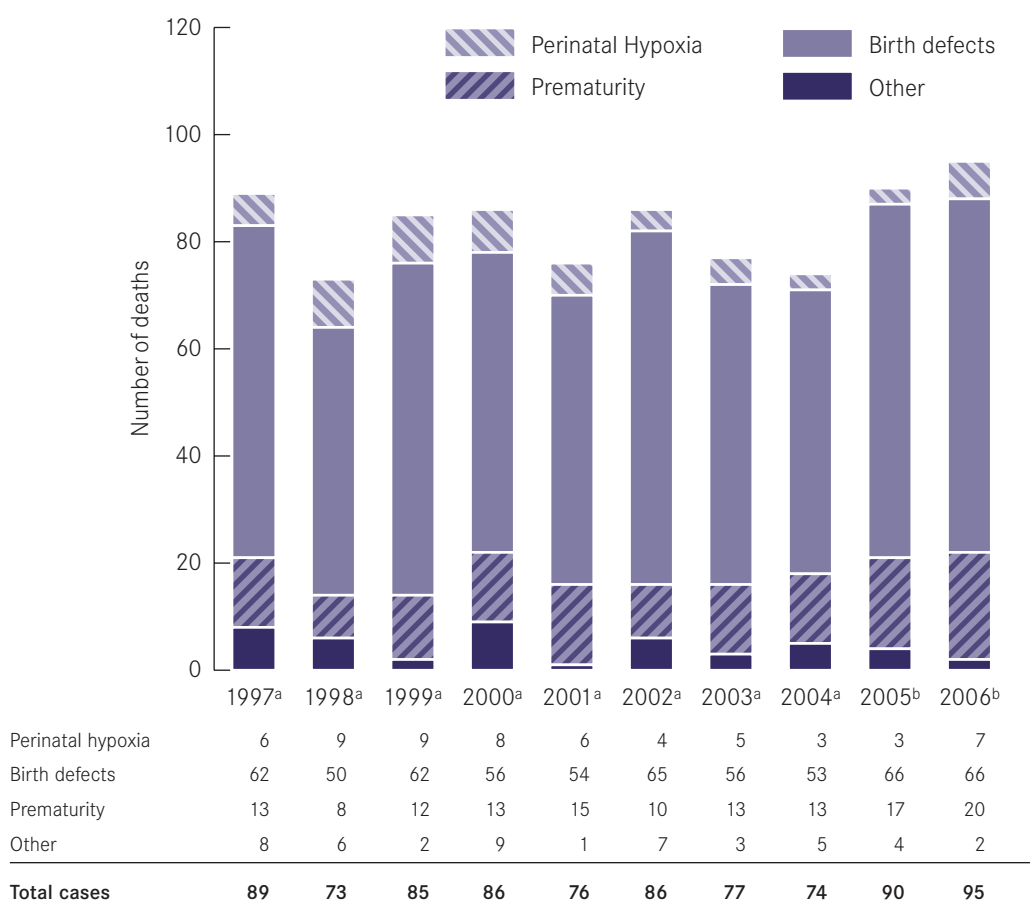


Figure 19b Causes of death determined at birth: postneonatal infants, children and adolescents (≥28 days–<18 years), Victoria, 1997–2006^{a,b}



a 1997–2004 children aged ≥28 days to <15 years of age.

b 2005 and 2006 children aged ≥28 days to <18 years of age.

Perinately acquired hypoxia/asphyxia

There were two postneonatal infant deaths and five child deaths resulting from severe perinatal hypoxia.

Birth defects and genetically determined causes

There were 66 postneonatal infant, child and adolescent deaths due to birth defects (Table 37). Birth defects are the major cause of postneonatal infant death, accounting for 40% of deaths in this age group. Cardiovascular system defects were the largest group for postneonatal infant, child and adolescent deaths due to birth defects with 11 cases, followed by metabolic disorders (10 cases).

Table 37 Deaths from birth defects and genetic conditions by age groups, Victoria, 2006

Type of birth defect	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Cardiovascular	9			1	1	11
– Hypoplastic left heart syndrome	5					
– Tetralogy of Fallot	1					
– Endocardial fibroelastosis	1					
– Right sided cardiac abnormality	1					
– Complex congenital heart disease	1			1		
– Bicuspid aortic valve					1	
Arteriovenous (AV)		1	2	1		4
– Cerebral AV malformation			2	1		
– Haemangiomas disorder		1				
Neurological	2	1	1	1		5
– Spina bifida				1		
– Microcephaly and hydrocephalus			1			
– Hydrocephalus	1					
– Arnold Chiari		1				
– Rhabdoid tumour of post cranial fossa	1					
Respiratory	1					1
– Laryngeal cleft, bronchomalacia	1					
Diaphragmatic hernia	2					2
– Diaphragmatic hernia	2					
Gastrointestinal	3	2				5
– Biliary atresia		2				
– Duodenal atresia	1					
– Oesophageal atresia	1					
– Tracheo-oesophageal fistula and duodenal atresia	1					
Renal					1	1
– Posterior urethral valves					1	

**Table 37 Deaths from birth defects and genetic conditions by age groups, Victoria, 2006
(continued)**

Type of birth defect	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
GENETIC						
Chromosomal	2	2				4
– Down Syndrome	1	1				
– 18p deletion	1					
– 22q11 deletion (Di George)		1				
Metabolic	6	2	1		1	10
– Citrin deficiency	1					
– Type 1a Glycosylation disorder	1					
– Undiagnosed	2	1				
– Smith Lemli Opitz	1					
– Hypophosphatasia	1					
– Tay Sachs		1				
– Gaucher			1			
– Wilson disease					1	
Undiagnosed neurological genetic disorder		1	1			2
– Undiagnosed neurological genetic disorder		1	1			
Degenerative CNS disease			2	1		3
– Seitelberger disease			1			
– Leigh disease			1			
– Undiagnosed				1		
Neuromuscular disorder	3	1			1	5
– Spinal muscular atrophy	2	1				
– Duchenne muscular dystrophy					1	
– Myotubular myopathy	1					
Mitochondrial disorder	2					2
– Probable (undiagnosed)	2					
Other syndromes/conditions	4	5	1		1	11
– Chondrodysplasia punctata	1					1
– Rett syndrome			1			1
– Alagille syndrome	1					1
– Vacterl abnormality	2					2
– Chronic granulomatous disease		1				1
– Joubert syndrome		1				1
– CHARGE association		1				1
– Lennox Gestaut syndrome		1				1
– Noonan syndrome		1				1
– Creutzfeldt-Jakob disease					1	1
Total	34	15	8	4	5	66

Prematurity

There were eighteen postneonatal infant deaths and two child deaths in 2006 due to consequences of prematurity (compared to 16 in 2006). Of the 20 deaths, 16 had a birthweight $\leq 1,000\text{g}$. Nine died from chronic lung disease, six from necrotising enterocolitis, two deaths from infection, one from neonatal cerebral leukomalacia, one from aspiration pneumonia and one from intracranial haemorrhage.

Other causes determined at birth

There were two child deaths in this category. One child was born overseas and the other child was born interstate, both dying from the complications of cerebral palsy and epilepsy, where there is no information available regarding the perinatal or early childhood period.

**SUDDEN UNEXPECTED DEATH IN INFANCY
(INCLUDING SUDDEN INFANT DEATH SYNDROME)**

This group of deaths includes all infants (under 1 year of age) who die suddenly and unexpectedly after they are placed to sleep. Deaths where a cause of death is identified (usually at autopsy) are included in this category under ‘Explained’, but are also included within other appropriate categories (eg congenital anomaly, infection) elsewhere in this report.

It is important to see Sudden Infant Death syndrome (SIDS) as a sub-group within the 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. All such cases are considered and reported on by Council.

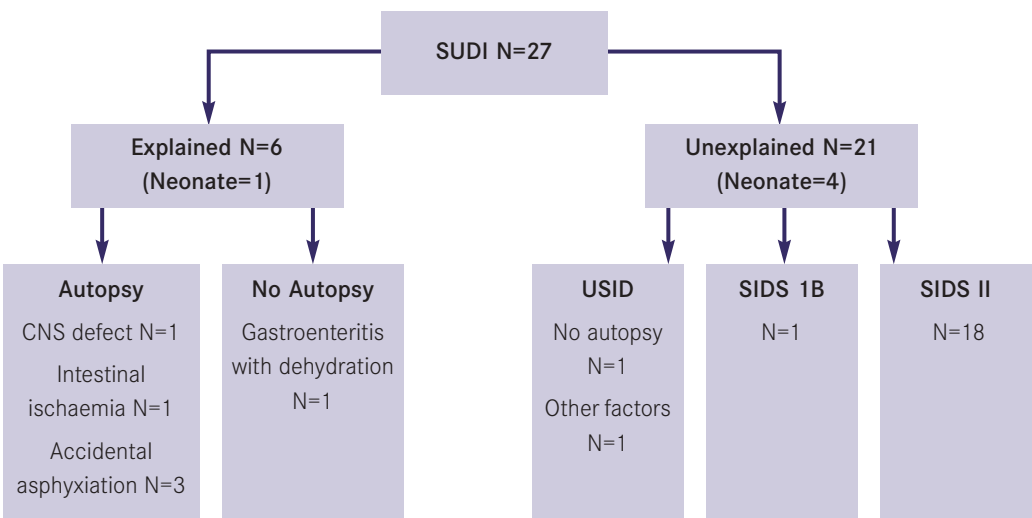
The causes of death for Sudden Unexpected Deaths in Infancy (SUDI) can include:

- Unexplained
 - Sudden Infant Death syndrome (SIDS)
 - Unclassified sudden infant death (USID), with or without autopsy
- Explained
 - Suffocation whilst sleeping (including asphyxiation by bedclothes and overlaying)
 - Infection, metabolic disorders, genetic disorder, etc
 - Other—Non accidental injury, homicide

Details of the sudden unexpected deaths of infants (SUDI deaths, <12 months of age)

There were 27 unexpected deaths in infants younger than 12 months in 2006. There were five neonates (2–16 days of age) and 22 postneonatal infants ranging in age from ≥28 days to 10 months. Twenty-five of the 27 infants had autopsies, with two postneonatal infants not having autopsy.

Figure 20 Sudden unexpected deaths of infants, Victoria 2006



Explained SUDI

Six infants (including one neonate) died from explained causes: one with infection (no autopsy), one with a central nervous system defect, one from acute intestinal ischaemia and three from accidental asphyxiation (including one neonate). Two of the six infants who died of explained causes were co-sleeping with both parents in the parental bed and one neonate who died from mechanical asphyxia was co-sleeping with mother. Explained SUDI deaths are listed elsewhere in this report under the relevant cause of death.

Unexplained SUDI

There were 21 unexplained SUDI deaths, 20 with autopsies performed (Figure 20). CCOPMM has classified unexplained sudden unexpected infant deaths according to the classification system devised by Krous et al ('Sudden Infant Death Syndrome and Unclassified Sudden Infant Deaths: A definitional and diagnostic approach'. *Pediatrics* 2004;114 (1):234–238) (see Appendix B for full definition). This system has four main categories:

- Category IA SIDS—Classic features of SIDS present and completely documented.
- Category IB SIDS—Classic features of SIDS present but incompletely documented
- Category II SIDS—Infants meeting Category I except for ≥ 1 factors.
- Unclassified sudden infant death (USID)

Among the 20 previously unexplained SUDI deaths with autopsies performed (Table 38) there were no cases of SIDS IA, because no case had the classic features of SIDS present and completely documented. Most often the missing information related to a lack of examination of the vitreous humour (a test not easily performed, especially in young infants and results which can be difficult to interpret), event scene or other investigation.

One case was coded to SIDS Category IB, because of incomplete investigations, where examination of the vitreous humour had not been performed.

Eighteen infants (including three neonates) were coded to SIDS category II. Ten occurred in circumstances where mechanical asphyxia or overlaying could not be ruled out. Five occurred in infants born before 37 weeks' gestation.

There were two unexplained unclassified sudden infant deaths. One was an infant case where an autopsy had not been performed, and the other case was a neonate where, despite an autopsy being performed, there are significant gaps in the understanding of the case. (see Table 38),

Table 38 SUDI deaths: Cause of death, Victoria, 2004–2006

		2004	2005	2006
Unexplained deaths				
R95	Sudden infant death syndrome (Category SIDS IB)	4	2	1
R95	Sudden infant death syndrome (Category SIDS II)	16	13	18
R99	Unclassified sudden infant death (USID)	2	1	2
Explained deaths				
	Congenital malformation	2	1	1
	Asphyxiation,	1	1	3
	Infection	5	5	1
	Intentional injury	–	2	–
	Aspiration pneumonia	–	1	–
	Intestinal ischaemia	–	–	1
TOTAL		30	26	27

In 10 of the 21 unexplained SUDI cases, the infant was co-sleeping with parent(s):

- Five with both parents in the parental bed
- Three with one parent in the parental bed;
- One with one parent on a couch
- One with one parent on a mattress on the floor.

Note that in another case the infant was brought into the parents' bed and therefore thought to be co-sleeping, but it is of the opinion of the Council that this child was already deceased when brought into the parental bed (and hence not co-sleeping), so this infant is excluded from the co-sleeping total.

Event scene investigation (ESI) was performed on 13 of the 21 cases of unexplained sudden infant death. Of the 13 ESIs, there were a number where information was incomplete or not collected: where the sleeping site where the infant was found had been packed up/put away; where the ESI was done at another site to the place of death; or where information on the ESI was not completely collected.

From the 13 ESIs, a history of smoking by one or both parents was found in 10/12 where information was collected and a history of alcohol use in 2/10 cases where information was collected. A history of drug use was documented in 3/10 cases where information was collected.

Of the ten co-sleeping unexplained sudden infant deaths, ESIs were performed in seven cases: a history of smoking was documented in 5/6 cases where information was collected, a history of alcohol use in 2/6 cases where information was collected and a history of drug use in 1/5 cases where information was collected.

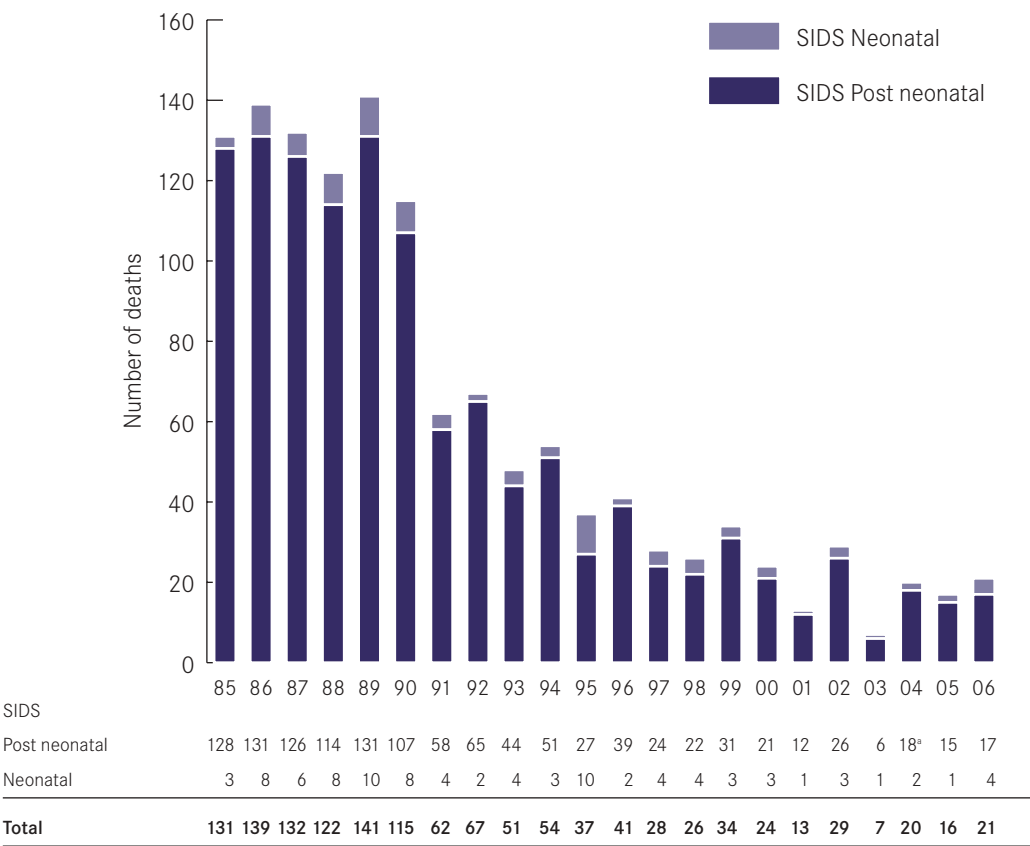
Age and sex of infants with unexplained SUDI

The age range of the 21 infants who died from SIDS/USID was from 9 days to 10 months of age. There were 9 females and 12 males.

Table 39 SIDS by sex and age at death, Victoria, 2006

Age at death	Females (n)	Males (n)	Total (n)
< 1 month	2	3	5
1 month	1	3	4
2 months	3	1	4
3 months	–	2	2
4 months	1	2	3
6 months	1	1	2
10 months	1	–	1
Total	9	12	21

Figure 21 SIDS, infants, Victoria, 1985–2006



a New classification of SIDS applied from 2004

There has been 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 (now SIDS and Kids). The campaign highlighted the association between face down sleeping and SIDS.

CCOPMM endorses the recommendations of SIDS and Kids. It is suggested that the following measures are likely to reduce the risk of SIDS and sleep accidents:

1. *Put baby on back from birth and not on the tummy or side*
2. *Sleep baby with face uncovered*
3. *Avoid exposing infants to cigarette smoke before birth and after*
4. *Sleep baby in its own safe sleeping environment next to the parents' bed for the first six to twelve months of life*

"SIDS and Kids recommends sleeping a baby in a cot next to the parents' bed for the first six to twelve months as this has been shown to lower the risk of SIDS and fatal sleeping accidents".

SIDS and Kids. 'Information Statement—sleeping with a baby'. SIDS and Kids, Melbourne, September 2007.

Further information can be obtained from SIDS organisations in each state. Visit the SIDS and Kids website: www.sidsandkids.org The SIDS and Kids website has useful information including a list of Frequently Asked Questions (FAQs) <http://www.sidsandkids.org/faqs.html> (accessed May 19, 2008). With respect to co-sleeping (Section 15) the following information is listed:

Do not share a sleep surface with a baby if:

You are a smoker

You are under the influence of alcohol or drugs that cause sedation

You are excessively tired.

Other children are sharing the bed with a baby

The baby could slip under bedding e.g. pillows and duvets or doonas

The bed is a waterbed or if the mattress is too soft

The sleep surface is a sofa or chair

Baby could become trapped between the bed and the wall or the bed rails

Baby may fall off the bed

UNINTENTIONAL INJURY DEATHS

There were 48 postneonatal infant, child and adolescent deaths due to unintentional injury in 2006, twenty one of these deaths (44%) occurred in 15–17 years olds. Unintentional injury categories include deaths attributed to motor vehicle accidents, drownings, fires, accidental asphyxial deaths and train accidents, as well as other unintentional injuries. Figure 22a shows trends in death attributed to unintentional injuries since 1997 in children aged <15 years. Figure 22b includes children and adolescents aged <18 years for the years 2005 and 2006.

Figure 22a Unintentional injury deaths: postneonatal infants and children (≥28 days–<15 years), Victoria, 1997–2006

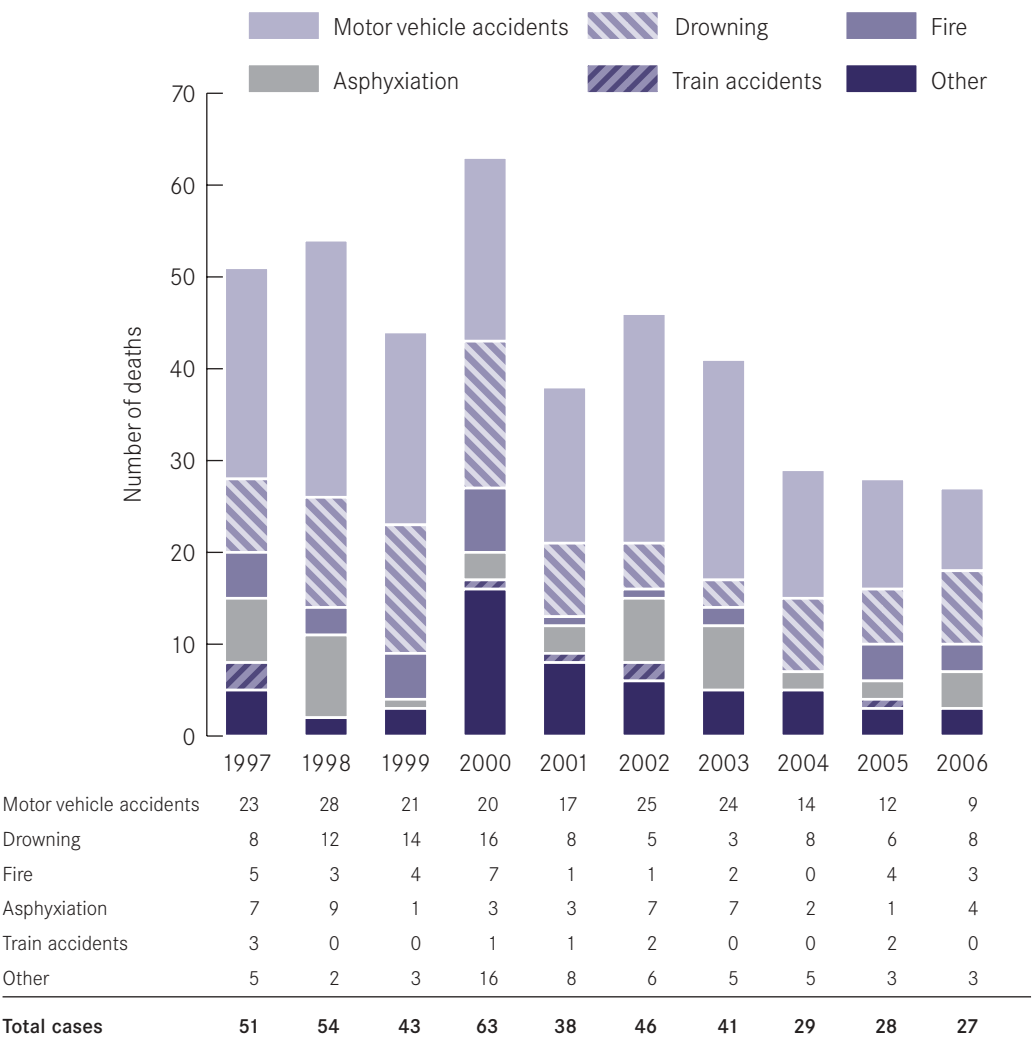
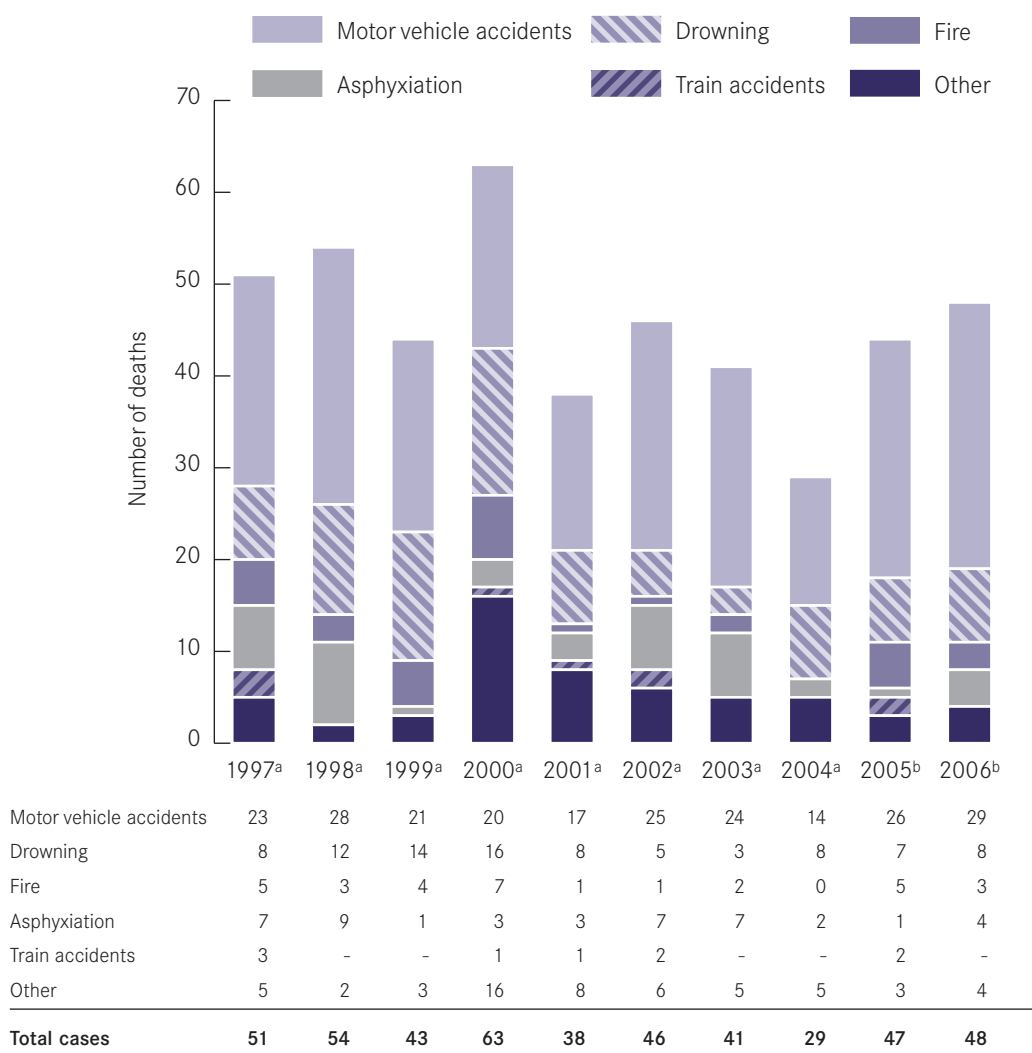


Figure 22b Unintentional injury deaths: postneonatal infants, children and adolescents^{a,b}
 (≥28 days–<18 years), Victoria, 1997–2006



a 1997–2004 children aged ≥28 days to <15 years of age.

b 2005 and 2006 children aged ≥28 days to <18 years of age.

Motor Vehicle Accidents

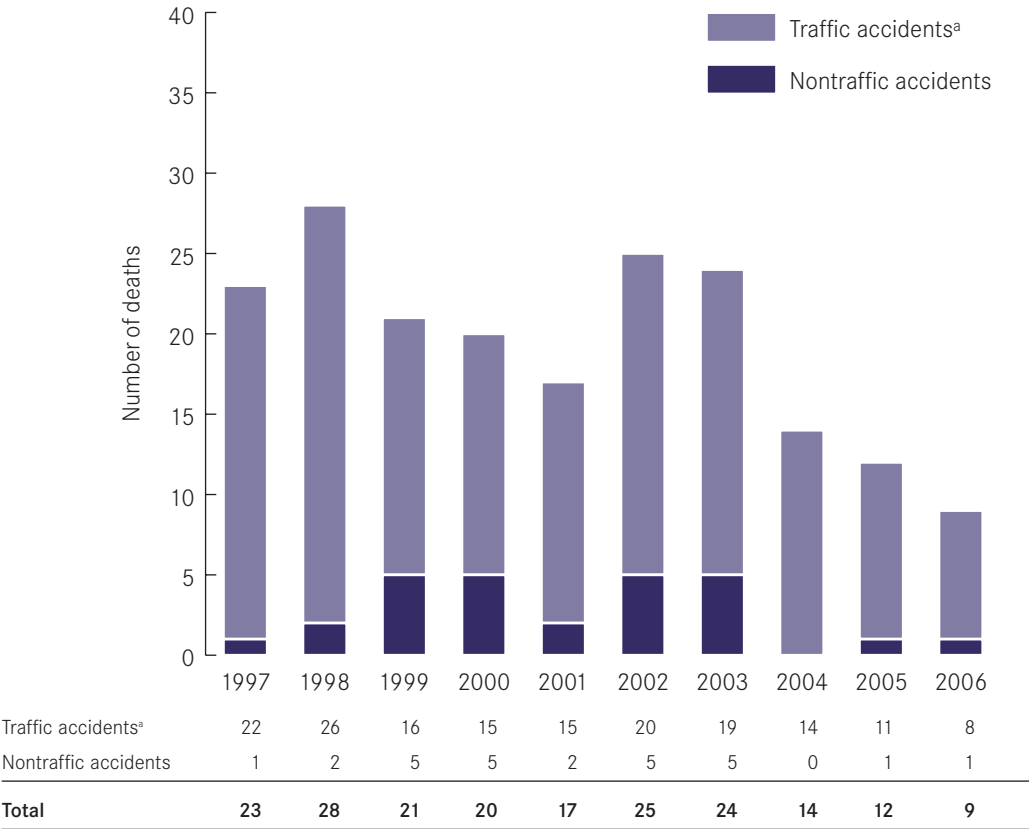
In 2006 there were 29 deaths due to motor vehicle accidents. The age range of the 29 children and adolescents was from 17 months to 17 years, of which 20 deaths were in adolescents aged 15 to 17 years (9 males, 11 females). There were no motor vehicle deaths in postneonatal infants (aged ≥28 days–364 days). This is the first year since reports began in 1985 where there have been fewer than 10 deaths from motor vehicle accidents in the age group <15 years. Most cases had preventable factors identified. The mode of travel is listed in Table 40.

Table 40 Mode of travel in motor vehicle fatalities by age groups, Victoria, 2006

Mode of travel	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Passenger in motor vehicle	–	–	1	2	11	14
Driver in motor vehicle	–	–	–	–	1	1
Pedestrian	–	2	–	–	7	9
Bicycle rider	–	–	–	2	–	2
Motorcycle rider	–	–	–	1	–	1
Motorcycle pillion passenger	–	–	–	–	1	1
To be determined	–	–	1	–	–	1
Total	0	2	2	5	20	29

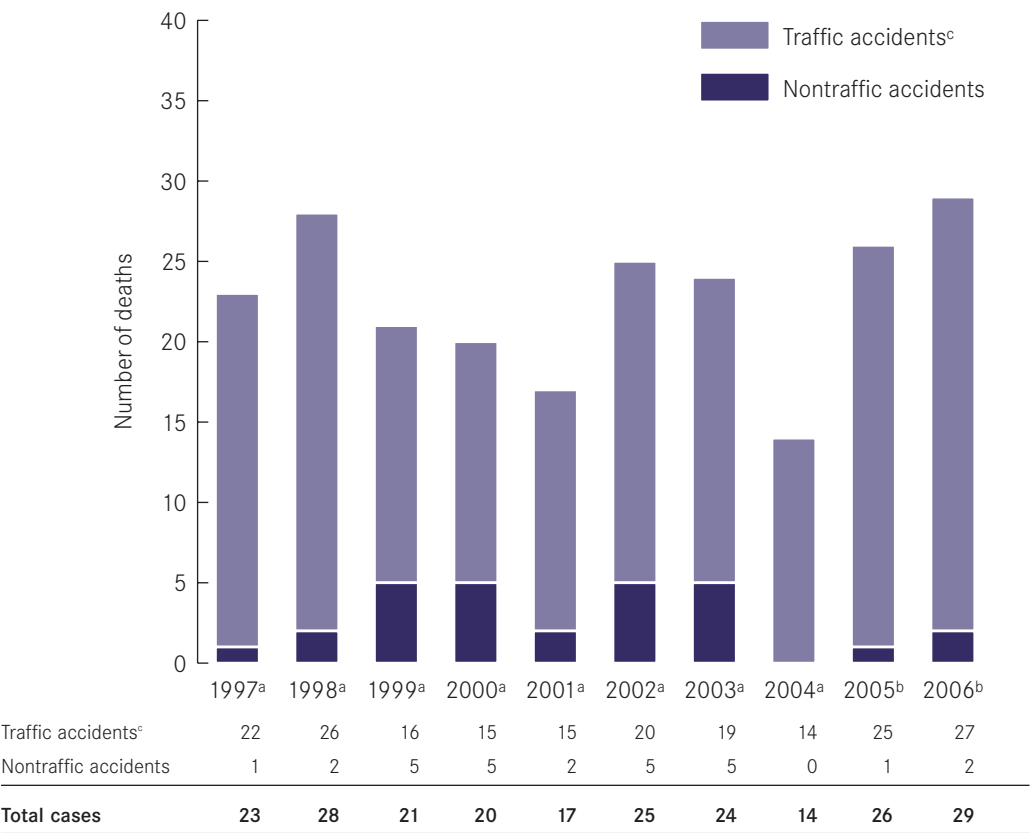
Fourteen of the 29 children and adolescents (48%) who died were passengers in motor vehicle accidents, and a learner driver under parental supervision died after a collision with another motor vehicle. The circumstances of one child’s death have yet to be determined, however the child was found on a roadway. Nine children died as pedestrians: five adolescents were struck by a car in a single incident. Note that another adolescent Victorian resident died in this incident, but the death occurred in another state, so is not counted in this report. Two adolescents were struck by cars while walking in separate incidents. Two young children ran or wandered onto roads. A motorcycle rider died on private property, and a pillion passenger died after a collision between two motorbikes.

Figure 23a Motor vehicle fatalities: postneonatal infants and children (≥ 28 days– <15 years), Victoria, 1997–2006



a Note a traffic accident is defined (ICD10) as a vehicle accident occurring on the public highway (originating on, terminating on or involving a vehicle partly on the highway), whereas a non-traffic accident is defined as any vehicle accident that occurs entirely in any place other than a public highway (e.g. a private property)

Figure 23b Motor vehicle fatalities: postneonatal infants, children and adolescents^{a,b}
 (≥28 days–<18 years), Victoria, 1997–2006



a 1997–2004 children aged ≥28 days to <15 years of age.
 b 2005 and 2006 children aged ≥28 days to <18 years of age.
 c Note a traffic accident is defined (ICD10) as a vehicle accident occurring on the public highway (originating on, terminating on or involving a vehicle partly on the highway), whereas a non-traffic accident is defined as any vehicle accident that occurs entirely in any place other than a public highway (e.g. a private property)

Drowning

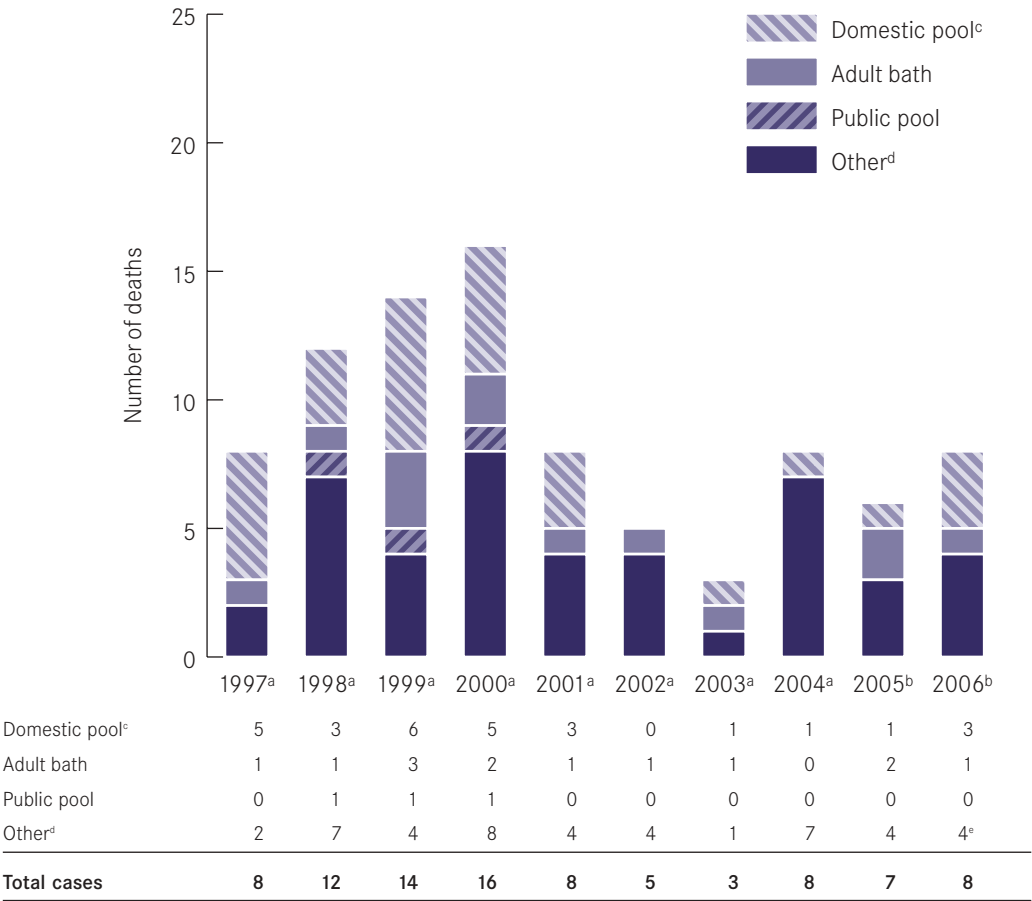
There were 8 deaths due to drowning (all in separate incidents) in 2006 compared to 7 deaths in 2005 and 8 deaths in 2004. All cases had preventable factors identified.

Table 41 Location of drowning fatalities by age groups, Victoria, 2006

Location of drowning	Age group					Total
	28-364 days	1-4 years	5-9 years	10-14 years	15-17 years	
Domestic pool	-	2	1	-	-	3
Dam	-	1	1	-	-	2
Beach	-	-	2	-	-	2
Adult bath	1	-	-	-	-	1
Total	1	3	4	-	-	8

One infant drowned in an adult bath. Three children died in fenced domestic swimming pools. Two children drowned at the beach and two children drowned in dams.

Figure 24 Drowning fatalities: postneonatal infants, children and adolescents, (≥28 days–<18 years), Victoria, 1997–2006



a 1997–2004 children aged ≥28 days to >15 years of age.
b 2005 and 2006 children aged ≥28 days to <18 years of age.
c ‘Domestic Pool’ includes spa, wading pool.
d ‘Other’ includes river, sea, dam, irrigation channel, reservoir, storm drain, creek, river, lake.
e In 2006 two children drowned in dams, and two children drowned at the beach, all in separate incidents.

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 CCOPMM 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. The progressive fall in the number of deaths from drowning in domestic pools can be attributed, at least in part, to this legislation and public awareness of the requirement to supervise children while swimming.

Life jackets and other personal flotation devices can prevent drowning, and CCOPMM endorses 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.

A 2003 survey by the Victorian Injury Surveillance and Applied Research (VISAR) was published in *Hazard* (Edition 55). The survey entitled, 'Local government enforcement of private pool safety regulations—Survey of council building surveyors/inspectors', investigated the extent of private pool data collection by councils, council enforcement of regulations including their inspection processes, and barriers to enforcement. The report can be assessed on the VISAR website:

<http://www.general.monash.edu.au/muarc/visar>

Fire

There were three deaths attributed to fires in 2006 (Table 42). Two siblings died in a house fire, while one child died in a bushfire.

Table 42 Deaths due to fire by age groups, Victoria, 2006

Type of fire	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
House fire	1	1	–	–	–	2
Bush fire	–	–	–	1	–	1
Total	1	1	–	1	–	3

Asphyxiation

There were four deaths in 2006 due to non-intentional (accidental) asphyxiation (Table 43). An infant was asphyxiated after being wedged between the mattress and cot railing, and another infant was asphyxiated after rolling into a pillow (aspiration of gastric contents). A young child choked on a sandwich, and another child choked on a rubber ball.

Table 43 Deaths due to accidental asphyxiation by age groups, Victoria, 2006

Type of asphyxiation	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Bedding	1	–	–	–	–	1
Aspiration of gastric contents	1	–	–	–	–	1
Food	–	1	–	–	–	1
Foreign body	–	–	–	1	–	1
Total	2	1	–	1	–	4

Other causes of unintentional injury death

There were 4 child deaths from other types of injuries in 2006 (Table 44). A child died after ingesting liquid weed killer. An adolescent died as the result of butane toxicity, and a child died after sniffing petrol. One child died in an aviation accident.

Table 44 Deaths due to other types of unintentional injuries by age groups, Victoria, 2006

Type of injury	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Poisoning	–	1	–	–	–	1
Petrol sniffing	–	–	–	1	–	1
Butane toxicity	–	–	–	–	1	1
Aviation accident	–	–	–	1	–	1
Total	–	1	–	2	1	4

Preventable factors in fatal injuries

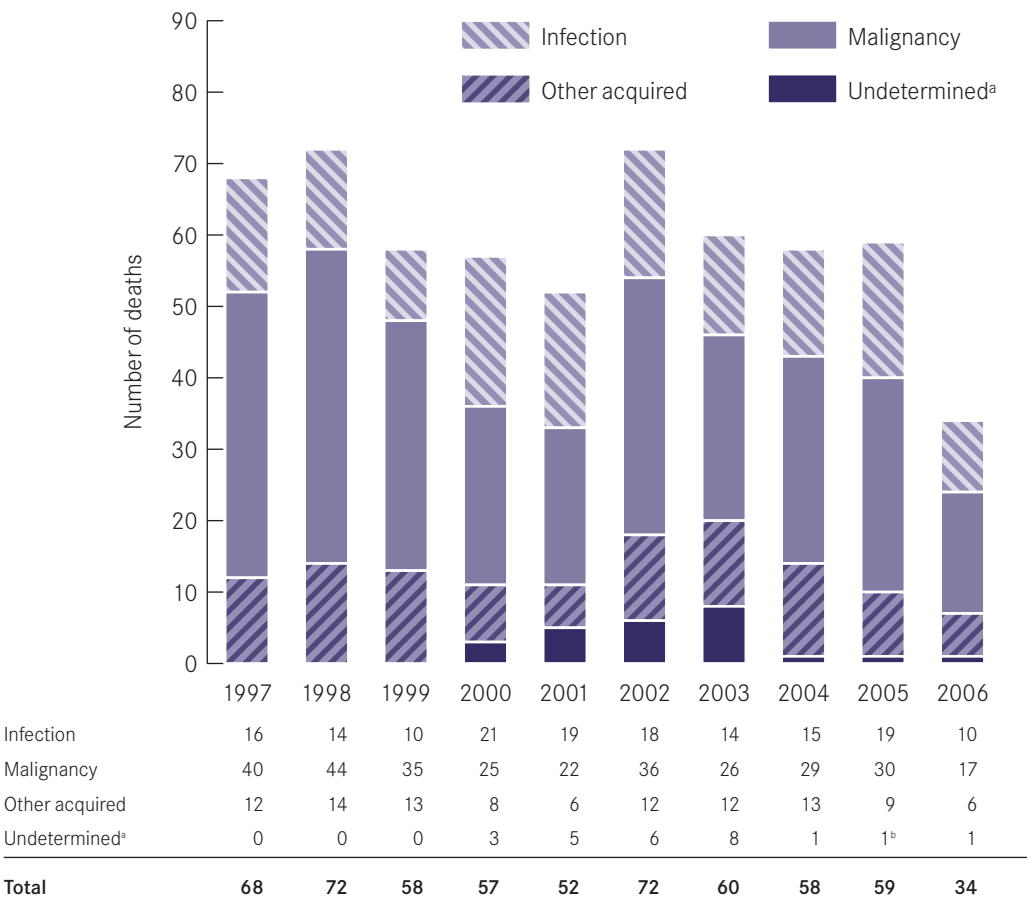
CCOPMM considered that at least some unintentional/accidental injury deaths were potentially preventable. This opinion is based on evidence provided in Coroner's, police and autopsy reports. In a number of cases CCOPMM is awaiting Coronial investigation findings, so the number of preventable factors for incomplete cases has not been finalised. Of the completed cases there was sometimes more than one preventable/contributing factor present.

The full list of preventable factors identified in unintentional injury deaths of postneonatal infants, children and adolescents in Victoria in 2006 will be in the next annual report.

ACQUIRED DISEASE DEATHS

There were 46 postneonatal infant, child and adolescent deaths due to acquired diseases in 2006. Acquired disease category includes deaths attributed to infection, malignancy and other diseases, as well as undetermined causes of death. Figure 25 shows trends in acquired conditions since 1997.

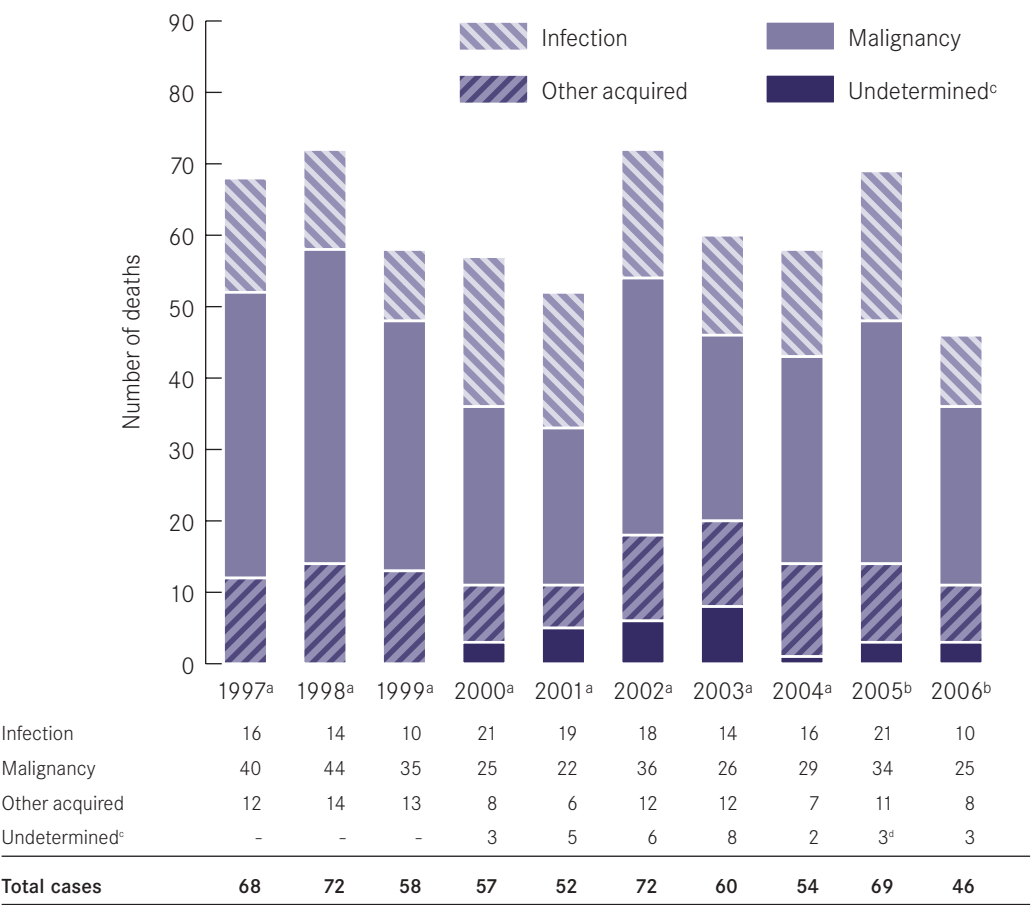
Figure 25a Acquired conditions: postneonatal infants and children (≥ 28 days–<15 years), Victoria, 1997–2006



a Undetermined category. In reports prior 2000, where a cause of death was not identified or had been classified as unascertained/undetermined it was included in 'other acquired'.

b Three child deaths in 2005 have been reclassified as intentional injury deaths (from undetermined) since the 2005 Report was published.

Figure 25b Acquired conditions: postneonatal infants, children and adolescents^{a,b}
 (≥28 days–<18 years), Victoria, 1997-2006



a 1997–2004 children aged ≥28 days to <15 years of age.
 b 2005 and 2006 children aged ≥28 days to <18 years of age.
 c Undetermined category. In reports prior 2000, where a cause of death was not identified or had been classified as unascertained/undetermined it was included in 'other acquired'.
 d Three child deaths in 2005 have been reclassified as intentional injury deaths (from undetermined) since the 2005 Report was published.

ACQUIRED DISEASE DEATHS

Infection

There were 10 postneonatal infant and child deaths due to infection in 2006, compared with 26 in 2005. The type of infection deaths by age group are outlined in Table 45.

Table 45 Infections resulting in deaths by age groups, Victoria, 2006

Type of infection	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Septicaemia: <i>N meningitidis</i>	1	1	–	–	–	2
Septicaemia: <i>Group A streptococcus</i>	–	1	–	–	–	1
Septicaemia and meningitis: <i>GBS</i>	1	–	–	–	–	1
Meningitis: <i>Str. pneumoniae</i>	1	–	–	–	–	1
Pneumonia: <i>Str. pneumoniae</i>	1	1	–	–	–	2
Influenza A	1	–	–	–	–	1
Gastroenteritis	1	–	1	–	–	2
Total	6	3	1	–	–	10

There were two deaths due to meningococcal infection in 2006. One infant and a child (with a complex medical history) died from gastroenteritis.

Information on the current recommendations on immunisation is available from the Victorian Department of Human Services (www.health.vic.gov.au/immunisation/) and from the Immunisation Service at the Royal Children's Hospital (telephone 03 9345 6399 or through RCH switchboard 03 9345 5522).

The Immunise Australia Program (Australian Government Department of Health and Ageing) has information on the Australian Standard Vaccination Schedule (ASVS):
<http://www.immunise.health.gov.au/>

Malignancy

In 2006 there were 25 child and adolescent deaths due to malignancy, compared to 34 in 2005. The types of tumours by age group are listed in Table 46.

Table 46 Deaths from malignancies, by age groups, Victoria, 2006

Type of tumour	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Central nervous system						
Medulloblastoma	–	2	–	2	–	4
Glioma	–	–	1	–	2	3
Meningioma	–	–	1	–	–	1
Astrocytoma	–	1	–	–	–	1
Neuroblastoma	–	1	–	–	–	1
Leukaemia						
Acute lymphatic leukaemia	–	–	2	–	–	2
Myelo-monocytic leukaemia	–	–	–	–	2	2
Sarcoma						
Rhabdomyosarcoma	–	–	–	1	–	1
Osteosarcoma	–	–	1	–	1	2
Fibromyoid sarcoma	–	–	–	–	1	1
Fibro histosarcoma	–	–	–	–	1	1
Ewings sarcoma	–	–	–	–	1	1
Lymphoma						
Non-Hodgkin's lymphoma	–	–	–	1	–	1
Burkitt's lymphoma	–	–	–	1	–	1
Rhabdoid tumour (kidney)	1	–	–	–	–	1
Myoepithelioma (soft tissue, axilla)	–	1	–	–	–	1
Adrenal gland carcinoma	–	–	1	–	–	1
Total	1 ^a	5	6	5	8	25

a Note that one infant with Rhabdoid tumour of the posterior cranial fossa has been classified under Birth Defect as it was diagnosed soon after birth.

Other acquired diseases

There were 8 child and adolescent deaths due to other acquired diseases in 2006 (Table 47). Three children died from asthma. Other child deaths were due to chronic renal failure, cardiomyopathy, adrenal hypoplasia, cerebral oedema and acute intestinal ischaemia.

Table 47 Other acquired diseases by age groups, Victoria, 2006

	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Asthma	–	–	–	1	2	3
Chronic renal failure	–	–	1	–	–	1
Cardiomyopathy	–	1	–	–	–	1
Adrenal hypoplasia	–	1	–	–	–	1
Cerebral oedema	–	–	–	1	–	1
Acute intestinal ischaemia	1	–	–	–	–	1
Total	1	2	1	2	2	8

UNDETERMINED

In 2006 there were three child deaths where the cause of death was undetermined (Table 48).

Two adolescents died unexpectedly and an autopsy was performed but no cause of death was identified.

A child with a complex medical history died post elective surgery and no autopsy was performed, his death is one of natural causes, but unascertained.

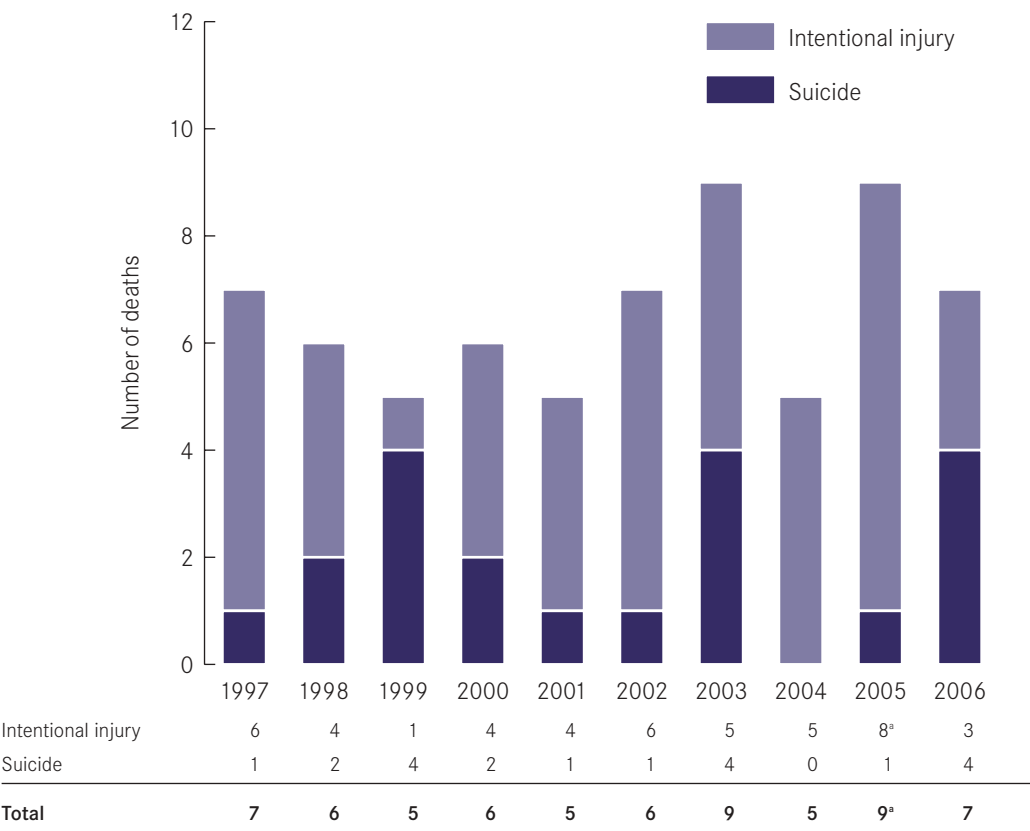
Table 48 Undetermined deaths by age groups, Victoria, 2006

	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Undetermined (autopsy performed)	–	–	–	–	2	2
Undetermined (no autopsy performed)	–	–	1	–	–	1
Total	–	–	1	–	2	3

INTENTIONAL INJURY

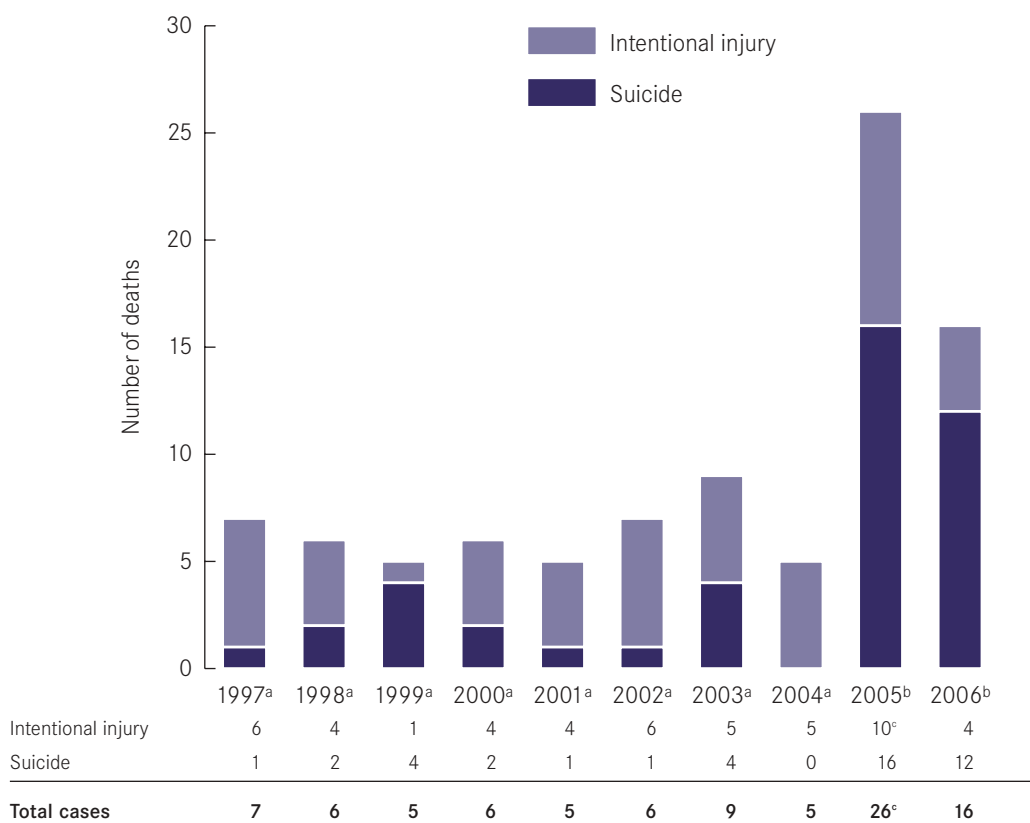
In 2006 there were 16 deaths as a result of abuse/intentional trauma (4 deaths) and suicide (12 deaths) in children aged less than 18 years of age. 2005 was the first year that CCOPMM has reported on the deaths of children aged 15 to 17 years of age. Figure 26a shows trends in deaths due to intentional injuries and suicides since 1997 in children less than 15 years of age, while Figure 26b shows deaths for children and adolescents aged less than 18 years of age for 2005 and 2006.

Figure 26a Intentional injuries and suicide: postneonatal infant and child deaths (≥28 days–<15 years), Victoria, 1997–2006



a Three child deaths in 2005 have been reclassified as intentional injury deaths (from undetermined) since the 2005 Report was published.

Figure 26b Intentional injuries and suicide: postneonatal infant, child and adolescent deaths (≥28 days–<18 years), Victoria, 1997–2006^{a,b}



a Prior to 2005 children aged ≥28 days to <15 years of age.

b From 2005 onwards children aged ≥28 days to <18 years of age.

c Three child deaths in 2005 have been reclassified as intentional injury deaths since the 2005 Report was published.

Intentional trauma

In 2006 there were four deaths as a result of abuse/intentional trauma (Table 49).

Table 49 Intentional trauma by age groups, Victoria, 2006

	Age group					Total
	28–364 days	1–4 years	5–9 years	10–14 years	15–17 years	
Intentional trauma/abuse	1	1	1	–	1	4

Suicide

There were 12 deaths of adolescents attributed to suicide in Victoria in 2006, with 8 between 15 and 17 years of age. Suicide was the third leading cause of death for those aged between 10 and 14 years (n=4) and accounted for 14% of all deaths in this age group. Suicide was the second leading cause of death for those aged between 15 and 17 years, and accounted for 17% of all deaths in this age group.

Age and sex

The age of the adolescents ranged from 13 years to 17 years, with 8 aged between 15 and 17 years of age. Of the 12 deaths attributed to suicide, two were females and ten were males (Table 50). The overall suicide rate in 2005 for 13–17 year olds was 3.6 deaths per 100,000 population (1.2 deaths per 100,000 female population and 5.8 deaths per 100,000 male population). Death rates for males were nearly 5 times higher than the death rate for females in 2006 for those aged 13–17 years and those aged 15–17 years. The overall suicide rate for 15–17 year olds was 4.0 deaths per 100,000 population, while the female suicide rate for this age group was 1.0 deaths per 100,000 female population compared to the male suicide rate of 6.8 deaths per 100,000 male population.

Table 50 Suicide deaths: age at death by sex, Victoria, 2006

Age at death	Females	Males	Total
13 years	-	1	1
14 years	1	2	3
15 years	1	3	4
16 years	-	1	1
17 years	-	3	3
Total	2	10	12
Rate ^a 13 to 17 years	1.2	5.8	3.6
Rate ^a 15 to 17 years	1.0	6.8	4.0

a Rate of death per 100,000 population in age and sex group specified.

Method of suicide

The method of suicide according to sex is shown in Table 51. Hanging was the most common method of suicide for both females and males, accounting for 7 deaths in total. Three males used firearms.

Table 51 Suicide deaths: method of death by sex, Victoria, 2006

Method of death	Females	Males	Total
Hanging, strangulation & suffocation	2	5	7
Firearm	-	3	3
Motor vehicle accident	-	1	1
Intentional self-poisoning	-	1	1
Total	2	10	12

CCOPMM is awaiting Coronial investigation findings on two suicide deaths. An overview of circumstances surrounding the death of the 12 adolescents on whom some information is available is presented below.

Alcohol and other drug use

Toxicology analysis reports were available for all children who committed suicide. One young person had a blood alcohol level (≥ 0.01 g/100mL) at the time of death, and another young person had cannabis in their system at time of death. Toxicology analysis revealed a high range level of prescription drugs in one case, while another had normal therapeutic level.

Informing others

Six of the young people left notes/letters to family and/or friends which were found after their death.

Previous suicidal behaviour

One young person had previously attempted suicide and in another case a rope had been found draped over a rafter several days prior to the suicide. Another young person had taken sleeping tablets a few days prior to the suicide which required medical advice: the intent of this episode is unknown.

Depression

Three young people were prescribed antidepressant medication however two had recently discarded/refused to take medication prior to the suicide.

Family history

Two children had a parent or sibling who had committed suicide.

Pivotal life events

The most common adverse life events experienced by this group of young people who committed suicide were interpersonal issues and conflicts. Where information is known six young people had recently experienced school-related difficulties including: losing interest in school, poor grades, truancy and absenteeism, discipline issues, and in one case, bullying. One male had been arrested twice in the past year for criminal damages. Three adolescents were receiving counselling from a psychologist or psychotherapist. In one case parental separation had impacted on the young person, while in another case there had been an argument with a parent.

Depression or suicidal thoughts

Although suicide in young people less than 15 years is less common, 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. These figures should therefore be viewed as an underestimate. In children, the diagnosis of depression should not be overlooked, and threats of suicide should not be ignored. Suspected depression should be taken seriously, with children subjected to bullying being particularly vulnerable. Threats of suicide usually indicate the need for referral for specialist mental health assessment.

Depression and threats of suicide both need to be taken seriously

IMMUNISATION AND VACCINE PREVENTABLE DISEASES

Immunisation program in Victoria, 2006

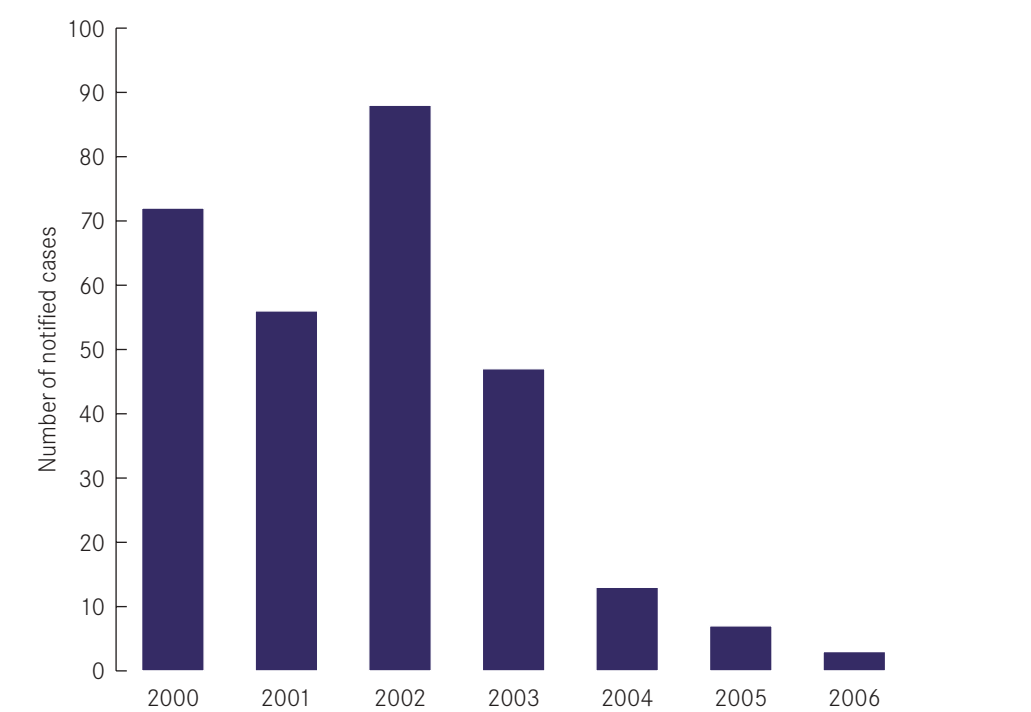
The Australian Childhood Immunisation Register (ACIR) reports full immunisation coverage quarterly. The December quarterly immunisation coverage for Victoria reached greater than 90 percent for all three measured cohorts (12 months, two years and six years). There was a four percent increase in six year old coverage to the end of 2006. Victoria is the first State or Territory in Australia to achieve over 90 percent coverage for full immunisation in six year old children and also have all three cohorts recording over 90 percent.

The expanded National Immunisation Program schedule was successfully implemented since its introduction on 1 November 2005. The expanded schedule saw the removal of oral polio vaccine (OPV) and in its place the introduction of inactivated polio vaccine (IPV) in a combination vaccine with diphtheria, tetanus and acellular pertussis antigens known as Infanrix IPV®. The expanded schedule also included varicella (chickenpox) vaccine known as Varilrix® at 18 months of age. A varicella vaccine catch-up program commenced early in 2006 for varicella non-immune children in Year 7 of secondary school. Natural immunity to varicella was reported in 45 percent of Year 7 students and 27 percent received Varilrix® vaccine.

A confirmed outbreak of measles (three notified cases aged 10, 11 and 13 years) in an Independent school where parents were generally anti-immunisation, reinforced the benefits of the requirement for a school entry immunisation certificate (SEIC) for enrolment into primary school. The SEIC played an important role in identifying children with documented evidence of receiving two doses of a measles containing vaccine. Measles, mumps and rubella (MMR) vaccine is scheduled at 12 months of age and the second dose is due at four years of age. Almost half of the children (250) enrolled in the school were excluded from the school for two weeks during the outbreak, as the children had no documentation of two measles containing vaccines.

The national meningococcal C vaccination program commenced in January 2003 and targeted children and adolescents between the ages of one and 19 years. The program ran for three and a half years and the catch-up component ceased on 30 June 2006. Meningococcal C vaccine (NeisVacC®) is scheduled at 12 months of age as part of the National Immunisation Program. Figure 27 shows the reduction in meningococcal C disease notifications in Victoria since the introduction of the meningococcal C vaccine in January 2003. No vaccinated child has contracted meningococcal C disease.

Figure 27 Notified cases of confirmed invasive meningococcal disease serogroup C, Victoria, 2000–2006



Information on the current recommendations on immunisation is available from the Department of Human Services web site at www.health.vic.gov.au/immunisation/ or on the Immunise Australia Program web site at <http://www.immunise.health.gov.au/>

MATERNAL DEATHS IN VICTORIA, 2006

There were eight maternal deaths in 2006 (1 direct death, 5 indirect deaths, 1 incidental death and 1 death yet to be classified). There were seven deaths in 2005 (3 direct deaths, 4 indirect deaths and 0 incidental deaths). The maternal mortality ratio for 2006 was 8.8 per 100,000 confinements. When the rates of rare events such as maternal deaths are compared on a year to year basis, fluctuations are inevitable but there has been no discernable trend noted over the last few years in the maternal mortality ratio in Victoria, nor has any pattern emerged from national maternal mortality reports (www.aihw.gov.au), although these lag several years behind the events.

Definitions

In ascertaining and reporting on maternal mortality, CCOPMM uses the definition of maternal death recommended by the 1998 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. This WHO definition is used in calculating the Maternal Mortality Ratio. CCOPMM also reviews those deaths which fall into the category of ‘late maternal death’, i.e. when death occurs after 42 days but within a year of the birth or termination of the pregnancy, when the death is from direct or indirect causes.

Because of varying definitions and ascertainment practices, it is difficult to make valid comparisons with international data. Variations in ascertainment occur within Australia, as no State or Territory has notification of maternal mortality as a legal requirement. CCOPMM has been 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 and the State Registrar of Births Deaths and Marriages. CCOPMM notes with approval the recent inclusion of a ‘pregnancy tick box’ on the revised Victorian adult death certificate, which will draw the attention of the certifying physician to the possibility that the case may be a maternal mortality. A similar data element is now included in the Australian and New Zealand Intensive Care Society database (ANZICS).

If, as appears to be the case in some 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 needs to be taken into account when interpreting trends.

The Report on Maternal Deaths in Australia 2003–2005 (Australian Institute of Health and Welfare) was released in early May 2008. In the triennium 2003–2005 there were 65 direct and indirect deaths, a decrease from 84 deaths in the previous triennium. The ratio for the 2003–2005 triennium was 8.4/100,000 confinements. The 2003–2005 National Maternal Mortality Report may be accessed through: www.aihw.gov.au

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 or pathological changes of pregnancy (for example, deterioration in pre-existing heart disease or diabetes). Deaths consequent on psychiatric disease are usually categorised as indirect, except for puerperal psychosis which is classified as direct.
- **Incidental** deaths, where death is considered unrelated to pregnancy (for example, passenger in motor vehicle accident).

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 may be difficult to determine whether a death from apparent suicide or from homicide is directly or indirectly related to the pregnancy or whether it is incidental. This is an important reason for including “incidental” deaths in maternal mortality reviews.

Maternal mortality ratio (confinements as a denominator)

The Maternal mortality ratio is defined as follows:

$$\text{Maternal mortality ratio} = \frac{\text{number of direct and indirect maternal deaths}}{(\text{total number of confinements})} \times 100,000$$

Confinements definition = The number of pregnancies of 20 weeks gestation or more resulting in livebirth or stillbirth (regardless of plurality).

Maternal Deaths in Victoria for 2006

There were 1 direct, 5 indirect and 1 incidental maternal deaths identified. In addition, one maternal death is yet to be classified.

Table 52 Maternal mortality ratios in Victoria 1988–2006 (per 100,000 confinements)

Year	Direct deaths	Indirect deaths	Confinements	Maternal mortality ratio ^a
1988	3	5	62,854	12.7
1989	2	3	63,419	7.9
1990	6	3	66,004	13.6
1991	1	3	64,338	6.2
1992	2	2	65,404	6.1
1993	3	–	63,795	4.7
1994	2	3	63,983	7.8
1995	4	3	62,734	11.2
1996	2	–	62,028	3.2
1997	2	2	61,312	6.5
1998	2	1	61,071	4.9
1999	2	2	61,588	4.6
2000	2	2	61,571	6.5
2001	1	4	61,108	8.2
2002	5	2	62,023	11.3
2003	–	3 ^b	62,403	4.8 ^b
2004	4	8 ^b	62,543	19.2 ^b
2005	3	4	65,429	10.5
2006 ^c	1	5	68,547	8.8

a Per 100,000 confinements. Ratio calculated using direct and indirect deaths

b Three incidental deaths (one in 2003 and two in 2004) have been reclassified as indirect deaths in line with national reporting and classification.

c There is one maternal death yet to be classified; this table will be revised in the 2007 report if appropriate.

The members of the maternal mortality committee agree that continued surveillance of these deaths is important, particularly given recent changes in specialist coverage of maternity institutions, early discharge and population trends such as older women giving birth and a marked increase in the caesarean section rate. The committee also agrees that the scope of the review should be broadened to include selected categories of severe morbidity. This work commenced in 2003, with a study of severe post partum haemorrhage and associated hysterectomy. These morbidity reports may be assessed:

www.health.vic.gov.au/perinatal

Table 53 Maternal mortality ratios by triennia, Victoria and Australia 1985–2005

Triennium	Direct deaths	Indirect deaths	Confinements	Victoria Maternal mortality ratio ^a	Australia Maternal mortality ratio ^b
1988–1990	11	11	192,277	11.4	9.3
1991–1993	6	5	193,537	5.7	6.2
1994–1996	8	6	188,745	7.4	9.1
1997–1999	6	5	183,971	6.0	8.4
2000–2002	8	8	184,702	8.7	11.1
2003–2005	7	15 ^c	190,375	11.6 ^c	8.4

a Per 100,000 confinements. Ratio calculated using direct and indirect deaths

b Source of Australian Mortality Ratios, *Maternal Deaths in Australia 2003–2005*.

c Three incidental deaths (one in 2003 and two in 2004) have been reclassified as indirect deaths in line with national reporting and classification.

There were 1 direct, 5 indirect and 1 incidental maternal deaths in 2006. In addition, one maternal death is yet to be classified. The cause of the direct death was pulmonary embolism (n=1). The causes of indirect deaths were suicide, drug overdose, subarachnoid haemorrhage, intracerebral haemorrhage and atrial-ventricular septal defect (Table 53).

Table 54 Causes of maternal deaths, Victoria 2006^a

	Total
Direct maternal deaths	
• Pulmonary embolism	1
Indirect maternal deaths	
• Suicide	1
• Drug overdose	1
• Subarachnoid haemorrhage	1
• Intracerebral haemorrhage	1
• Eisenmenger syndrome	1
Incidental maternal deaths	
• Motor vehicle accident	1
Total	7

a One maternal death is yet to be classified and will be included in the 2007 report.

Details of the maternal deaths, 2006

Direct deaths

- Primipara (BMI >40). Apparently uncomplicated pregnancy. At 26 weeks collapsed and brought to emergency department. On arrival noted to be asystolic and pupils were non-reactive. No output with CPR. Post-mortem performed: pulmonary thromboembolism, inferior vena cava and pelvic vein thrombosis.

Cause of death—Pulmonary embolism

Classification—Direct

Indirect deaths

- Primipara (BMI <20). Uncomplicated pregnancy: no history of cardiac problems. At 38 weeks gestation presented to Emergency Department complaining of shortness of breath for two hours. Oxygen saturation 65%. Transferred to Birth Suite. Oxygen saturation 66 %, and increased to 80% on 15L/O₂. Blood gases were acidotic. Chest xray revealed a very large heart. Emergency caesarean section performed: live born infant. Patient transferred to ICU. Postoperatively remained hypoxaemic. CT pulmonary angiogram showed severe pulmonary hypertension. Echocardiogram revealed ASD and a small VSD, severe right ventricular dilatation and dysfunction and increased pressure in both the right ventricle and right atrium, confirming Eisenmenger syndrome. Despite intensive resuscitative measures, including ECMO, continued to deteriorate and died one day postpartum. No post-mortem performed.

Cause of death—Eisenmenger syndrome

Classification—Indirect

- Multipara. At 26 weeks gestation collapsed at home. Transferred by ambulance to Emergency Department. Cardio-pulmonary resuscitation commenced and peri-mortem caesarean section performed: Live born infant (Neonatal death). CT brain showed massive subarachnoid haemorrhage. No post-mortem performed.

Cause of death—Subarachnoid haemorrhage

Classification—Indirect

- Primipara. At 36 weeks gestation sudden collapse at home. Taken to hospital: conscious, complaining of severe headache, general weakness and slurred speech. Condition deteriorated, transferred by ambulance to regional hospital. CT scan: intracerebellar haemorrhage. Caesarean section performed: live born infant. Medical intervention ceased. Post-mortem performed: intracerebellar haemorrhage, ruptured aneurysm of anterior-inferior cerebellar artery.

Cause of death—Intracerebral haemorrhage

Classification—Indirect

- Multipara: On methadone program, found deceased 10 days postpartum. PM: combined drug toxicity (heroin). Toxicology report: 6 monoacetyl morphine, methadone, alprazolam, codeine and methylenedioxy-methamphetamine.

Cause of death—Combined drug toxicity (heroin)

Classification—Indirect

- Multipara: 10 weeks pregnant. Suicide by hanging. Post-mortem performed.

Cause of death—Suicide by hanging

Classification—Indirect

Incidental maternal death

- Primipara: Less than 20 weeks pregnant. Passenger in motor vehicle accident. Post-mortem performed.

Cause of death—Multiple injuries

Classification—Incidental

Yet to be classified

One maternal death is yet to be determined and will be classified in the 2007 report.

Recommendation

Women who were born outside Australia may not have had access to early childhood screening for congenital abnormalities such as cardiac anomalies and merit careful assessment ideally pre pregnancy or otherwise when they first present when pregnant.

AT-RISK PREGNANCIES

While obstetric complications may occur in any pregnancy at any time, Council reminds practitioners that certain categories of patients are at increased risk of adverse maternal and perinatal death outcomes. 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

Women older than 34 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
Domestic violence

2. Maternal diseases

Cardiovascular disease, including hypertension
Diabetes mellitus (gestational)
Diabetes mellitus (pre-existing)
Anaemia (all types)
Chronic renal disease, including recurrent urinary infection
Past history of venous thrombosis and/or pulmonary embolism
Group B Streptococcus (GBS) carrier

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

PERINATAL EMERGENCY REFERRAL SERVICE (PERS)

For high risk in utero transfers direct communication at Consultant Obstetrician level, via the Perinatal Emergency Referral Service (PERS), is encouraged in order to ensure the transfer is appropriate and safe *for both the mother and baby*.

The Perinatal Emergency Referral Service (PERS) commenced operation as a full time (24 hour 7 day) statewide service on 28 November 2005. The service is a key component of the Victorian Government's 'Future Directions for Victoria's Maternity Services' and is supported by a Memorandum of Understanding between the Royal Women's Hospital, Southern Health and the Mercy Hospital for Women.

The main role of PERS is to provide clinical and logistical support and advice for staff managing high risk pregnancies in non-tertiary hospitals where in utero transfer may be required. PERS is co-located with the Newborn Emergency Transport Service (NETS). NETS has been expanded to provide a clinical coordination centre providing access to PERS or NETS via a single number **1300 137 650**.

NEWBORN EMERGENCY TRANSPORT SERVICE (NETS)

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, immediate consultation with the Newborn Emergency Transport Service (NETS) *before delivery* 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 birth of a high risk newborn.

NETS transfers 2006

During 2006 there were 2319 transfers, a slight decrease on the 2354 transfers undertaken the previous year (Table 54). The second full year of access to a helicopter dedicated for NETS use for 10 hours per day 7 days per week, saw 36 emergency retrievals undertaken using this resource. The Return Transport service continues to be very busy and now operates 7 days per week.

Table 55 Transfers by NETS, Victoria, 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Emergency—metropolitan	474	502	499	572	696	738	632	656	698	663
Emergency—Rural (road)	99	125	147	137	173	148	164	134	120	144
Emergency—Rural (air ambulance)	121	134	115	106	115	111	130	173	144	183
Emergency (Helicopter)						15	13	43	76	36
Return transfers	556	658	628	701	793	1059	1115	1164	1194	1178
Special investigations	17	14	16	21	34	58	104	102	122	115
Total	1267	1433	1405	1537	1811	2071	2145	2229	2354	2319

Selection of infants for transfer

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

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 consultative and, if necessary, retrieval resources of NETS are available to assist with possible transfers between Level 1 and Level 2 hospitals.

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

- **Respiratory distress**

An infant with an ongoing oxygen requirement of more than 30% 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. Infants requiring more than 40% oxygen should be discussed with a Neonatologist as most will require additional respiratory support and may need to be transferred to 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 as most require the resources of a neonatal intensive care unit.

- **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 detailing the level of care available in their institution for sick/premature infants.

See <http://www.health.vic.gov.au/neonatal/servicesguidelines.pdf> for further information about levels of care. Infants of birthweight less than 1,250 grams generally require an initial period of management in a neonatal intensive care unit.

- **Cardio respiratory depression**

Transfer to a 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 neonatal intensive care unit.

- **Other categories of infants requiring consideration for transfer:**

- Infants with seizures
- 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' 1300 137 650**

The call will be received by a clinical coordinator and immediately conferenced with the on duty NETS Consultant. Telephone discussions with NETS staff may help in deciding whether or not transfer is the best option in a particular case. Conferencing allows all parties to contribute to discussions about stabilisation and transfer arrangements. If transfer is required NETS activates the team, organises the transport platform (road, aeroplane, helicopter), sources an appropriate receiving unit and notifies the referring hospital of the team's ETA.

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

NETS have produced a book to assist 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.

This publication is currently under review. Copies of the latest edition will be available from:

NETS Education, 132 Grattan Street, Carlton, Victoria 3053.

NETS Education

NETS Education provides ongoing education programs in neonatal care for nursing and medical staff and allied health professionals in Melbourne metropolitan and country hospitals throughout Victoria. Over fourteen hundred people participated in programs in 2006.

In-service sessions are generally for staff from metropolitan hospitals; outreach study days and seminars involving local staff and NETS Education personnel can be arranged for staff working in either metropolitan or country hospitals.

NETS Education staff continue to coordinate the Continuing Education Program in Newborn Nursing Care in collaboration with staff from the four tertiary neonatal units. This 18 hour program is offered three times per year to midwives working in Level 1 and low Dependency Level 2 midwifery hospitals throughout Victoria.

NETS Education is developing professional development learning packages pertaining to care of the sick newborn. The "Neonatal Ventilation Learning Package" was published in October 2007, and the "Congenital Heart Disease Learning Package" will be released in 2008.

Videoconferencing was used for the first time by NETS education in 2005. This education mode has proved a popular and useful adjunct to face to face presentations with six programs being delivered using this modality in 2006.

NETS Education is a key participant in the implementation at state level of the Australian Resuscitation Council Neonatal Guidelines, February 2006 (<http://www.resus.org.au>). NETS Education runs a comprehensive 6 hour program on Resuscitation of the Newborn that has been updated to conform with the new guidelines. Frequently asked questions regarding the new guidelines can be found on the NETS website.

Information and bookings for educational sessions may be made by:

- telephoning 1300 662 434 or (03) 9344 2419
- visiting the NETS website: 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.

To contact the service, telephone PETS at the Royal Children's Hospital, (03) 9345 7007 and follow the prompts. Identify your call as a PETS call and ask to speak to a consultant or chief registrar.

Advice about what to do before PETS arrives is available at the PETS website: www.rchpets.org

A pamphlet on this topic can be obtained by contacting PETS on (03) 9345 5211, or by email: robert.henning@rch.org.au or alison.fleming@rch.org.au.

Advice about management of childhood illnesses is available from www.rch.org.au/clinicalguide

Telephone advice about resuscitation of a severely ill child is available by contacting PETS (03) 9345 7007

Table 56 Transfers by PETS, Victoria 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Injuries										
head injury	24	18	20	26	29	19	17	23	15	15
chest injury*				4	1	1	0	0	0	0
immersion	4	4	9	5	1	5	3	3	5	1
poisoning	6	6	4	13	10	9	13	15	3	11
other	7	7	25	13	15	12	10	16	14	6
Cardiovascular	1	3	1	6	5	3	8	6	14	11
Neurology:										
fits	22	42	36	34	22	22	37	54	43	31
meningitis	7	10	10	1	13	14	5	14	7	12
encephalitis*				5	–	3	2	5	5	3
other	8	6	9	23	16	10	5	12	8	8
Respiratory:										
asthma	30	33	37	45	48	37	57	52	52	36
bronchiolitis	8	9	17	10	24	25	24	25	22	42
croup	19	15	19	18	14	19	25	37	36	37
epiglottitis	1	1	–	1	–	–	–	–	–	0
other	14	16	16	20	35	42	38	35	35	36
Miscellaneous:										
septic shock	8	6	14	2	8	7	6	11	7	18
diabetic ketoacidosis ^a				3	5	3	4	7	7	3
other	10	10	20	27	39	18	47	40	43	26
Total	169	186	237	256	290	265	301	356	316	296

a denotes new category, first used in 2000 Report.

Common problems in the management of ill children

- **Acute upper airway obstruction**
 - 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**
 - Insufficiently aggressive medical treatment for asthma
 - Failure to provide 100 per cent oxygen
 - Ventilation too late
- **Brain injuries (drowning, trauma, convulsions)**
 - Too much fluid in children with meningitis
 - Use of fluids other than 0.9% saline
 - Failure to control seizures
 - Hypoventilation from seizures or anticonvulsants
 - Poor airway management
 - Failure to continue ventilation after resuscitation
 - Administration of O₂ via Laerdal-type bag to a spontaneously breathing patient
 - Hypotension from hypovolaemia or failure to use inotropic drugs
 - Failure to diagnose abdominal injuries after trauma
 - Failure to decompress the stomach by orogastric tube
 - Inappropriate lumbar puncture in very ill children with coma
 - Failure to recognise severity of brain injury in young infants
- **Septic and hypovolaemic shock**
 - Lack of adequate vascular access
 - Inadequate volume administration (0.9% saline or 4% albumen)
 - Failure to use inotropic drugs (noradrenaline/adrenaline/dopamine)
 - Failure to monitor blood pressure adequately
 - Uncorrected acidosis or anaemia
 - Uncorrected hypoxia or hypoventilation
 - Intubation and ventilation too late

APPENDIX A: DEFINITIONS

Live birth: The birth of an infant, regardless of maturity or birthweight, who breathes or shows any other signs of life after being born.

Live birth rate: The number of livebirths per 1,000 of the estimated resident population for the index year.

Fertility rate: The number of livebirths per 1,000 of the estimated female resident aged 15 to 44 years for the index year.

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

Neonatal death: The death of a liveborn infant, less than 28 days after birth, of at least 20 weeks gestation or if gestation is unknown weighing at least 400g.

Perinatal death: A stillbirth or neonatal death

Infant death: The death of an infant occurring within one year of birth.

Postneonatal infant death: The death of an infant between 28 and 364 days.

Child death: The death of a child occurring after and including the first birthday and up to, but not including, the 18th birthday.

Maternal death: The death of a woman while pregnant or within 42 days of the termination of pregnancy irrespective of the cause of death.

Direct maternal death: A maternal death, where the death is considered to be due to a complication of the pregnancy itself (for example, haemorrhage from placenta praevia).

Indirect maternal death: A maternal death where the death is considered to be due to a pre-existing condition aggravated by the physiological or pathological changes of pregnancy (for example, deterioration in pre-existing heart disease or diabetes). Deaths consequent on psychiatric disease are usually categorised as indirect, except for puerperal psychosis.

Incidental maternal death: A maternal death where the death is considered unrelated to pregnancy (for example, motor vehicle accident).

Mortality Rates and ratios

Stillbirth rate (per 1,000 total births)

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

Neonatal mortality rate (per 1,000 livebirths)

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

Perinatal mortality rate (PMR) (per 1,000 total births)

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

Note: For CCOPMM statistics, the rate refers to all births of at least 20 weeks gestation, or if gestation is unknown of birthweight of at least 400g. However, for purposes of continuity, PMR of infants of ≥ 500 g or when the birthweight is unknown, of at least 22 weeks gestation is also presented.

For international comparisons, the rate refers to all births of at least 1000g birthweight or when the birthweight is unknown, of at least 28 weeks gestation and neonatal deaths occurring within seven days of birth (recommended by WHO).

Infant mortality rate (per 1,000 livebirths)

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

Maternal mortality ratio

$$= \frac{\text{number of direct and indirect maternal deaths}}{(\text{total number of confinements})} \times 100,000 \text{ confinements}$$

APPENDIX B: DEFINITION: SUDDEN INFANT DEATH

“Sudden Infant Death Syndrome and Unclassified Sudden Infant Deaths: A definitional and Diagnostic Approach”, Krous HF, Beckwith JB, Byard RW, Rognum TO, Bajanowski T, Corey T, Cutz E, Hanzlick R, Keens TG, Mitchell EA. *Pediatrics* 2004;114(1):234–238.

General definition of SIDS

SIDS is defined as the sudden unexpected death of an infant <1 year of age, with onset of the fatal episode apparently occurring during sleep, that remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of the death and the clinical history.

Category 1A SIDS: Classic features of SIDS present and completely documented

Category 1A included deaths that meet the requirements of the general definition and also all of the following requirements.

Clinical

- >21 days and <9 months of age
- Normal clinical history including term pregnancy (gestational age ≥ 37 weeks)
- Normal growth and development
- No similar deaths among siblings, close genetic relatives (uncles, aunts or first degree cousins), or other infants in the custody of the same caregiver

Circumstances of Death

- Investigation of the various scenes where incidents leading to death might have occurred and determination that they do not provide an explanation for the death
- Found in a safe sleeping environment, with no evidence of accidental death

Autopsy

- Absence of potentially fatal pathologic findings. Minor respiratory system inflammatory infiltrates are acceptable; intrathoracic petechial haemorrhage is a supportive but not obligatory or diagnostic finding.
- No evidence of unexplained trauma, abuse neglect or unintentional injury
- No evidence of substantial thymic stress effect (thymic weight of <15g and/or moderate/severe cortical lymphocyte depletion). Occasional ‘starry sky’ macrophages or minor cortical depletion is acceptable.
- Negative results of toxicologic, microbiologic, radiologic, vitreous chemistry and metabolic screening studies.

Category IB SIDS: Classic features of SIDS present but incompletely documented

Category IB includes infant deaths that met the requirements of the general definition and also meet all of the criteria for category IA except that investigation of the various scenes where incidents leading to death might have occurred was not performed and/or ≥ 1 of the following analyses were not performed: toxicologic, microbiologic, radiologic, vitreous chemistry or metabolic screening studies.

Category II SIDS

Category II includes infants that meet category I except for ≥ 1 of the following.

Clinical

- Age range outside that of category IA or IB (i.e. 0–21 days or 270 days (9 months) through to first birthday)
- Similar deaths among siblings, close relatives, or infants in the custody of the same caregiver that are not recognised suspect for infanticide or recognised genetic disorders
- Neonatal or perinatal conditions (for example those resulting from preterm birth) that have resolved by the time of death

Circumstances of Death

- Mechanical asphyxia or suffocation caused by overlaying not determined with certainty

Autopsy

- Abnormal growth or development not thought to have contributed to death
- Marked inflammatory changes or abnormalities not sufficient to be unequivocal causes of death

Unclassified sudden infant death

Includes deaths that do not meet the criteria for category I or II SIDS, but for which alternative diagnoses of natural or unnatural conditions are equivocal, including case where autopsies were not performed.

Post resuscitation cases

Infants found in extremis who are resuscitated and later die ('temporarily interrupted SIDS') may be included in the aforementioned categories, depending on the fulfilment of relevant criteria.

APPENDIX C: WEBSITES

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

Information on CCOPMM, the Perinatal Data Collection Unit (PDCU) and Birth Defects Register (BDR) is available at <http://www.health.vic.gov.au/perinatal>

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

Neonatal resuscitation guidelines

The Australian Resuscitation Council guidelines (February 2006) can be found at www.resus.org.au
A booklet on neonatal resuscitation guidelines can be purchased through the Australian Resuscitation Council: phone (03) 9249 1214.

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

Neonatal Handbook

With respect to neonatal care, health care professionals are reminded of guidelines which detail the initial assessment and management of many conditions encountered in the newborn period. The Neonatal Handbook is available at www.netsvic.org.au/nets/handbook

Newborn Emergency Transport Service (NETS)

For comprehensive information on NETS and bookings for educational sessions
Telephone: (03) 9344 2567
Website: www.netsvic.org.au

Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)

For information on RANZCOG guidelines
Website: www.ranzcog.edu.au

**CONSULTATIVE COUNCIL
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