

# The Consultative Council on Obstetric and Paediatric Mortality and Morbidity

## Annual Report for the Year 1994

### Incorporating the 33rd Survey of Perinatal Deaths in Victoria

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## Acknowledgements

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**The publication of this report was only possible because of the generous assistance of many individuals in diverse professional groups.**

Midwives provided detailed information concerning every birth in the State of Victoria, the basis for the perinatal statistics in this report. Outside the Perinatal Data Collection Unit, maternal and child health nurses were a valuable source of notifications to the Congenital Malformations Register, as were the Mercy Hospital for Women, the Monash Medical Centre, the Royal Children's Hospital and the Royal Women's Hospital.

Medical practitioners completed the confidential medical reports on perinatal deaths, frequently providing much additional information. The autopsy reports by anatomical pathologists played an indispensable part in the deliberations of the committees.

Personnel from the Victorian Institute of Forensic Medicine again provided the Council with valuable data on all cases referred to coroners in Victoria.

Members of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity and of the committees with widely diverse areas of expertise contributed their specialist knowledge and wisdom.

The Newborn Emergency Transport Service provided additional information on infants this organization transferred to and from tertiary neonatal centres.

The formidable task of collecting, collating and analysing data involved the Australian Bureau of Statistics and was a heavy workload for the other staff listed in this report.

## ADDENDUM TO 1993 REPORT

The Council was notified of 2 additional deaths in 1993 after the report was published. Both resulted from multiple injuries sustained in separate motor vehicle accidents, a 3-week-old infant and a 10-year-old child. The relevant tables have been amended in this report to include these cases.

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## Chairman's Report

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In 1994, the perinatal mortality rate increased from the record low of 7.0 per 1,000 births in 1993 to 7.9 per 1,000 for all infants with birth-weight of 500g or more. The guide for international comparison (birth-weight 1,000g or over) continued its progressive reduction to 4.6 per 1,000 (4.8 in 1993).

**In other words, these less favourable overall results resulted from more deaths of very small infants.**

There was an increase in the number of infants with birth-weight less than 1,000g (from 281 (0.4%) in 1993 to 325 (0.5% of all births) in 1994). Also, the perinatal mortality rate of these infants increased from 505 to 548 per 1,000. One hundred and seven of the 329 stillbirths and 71 of the 184 neonatal deaths were infants with birth-weight less than 1,000g. **In 1994, there were more small babies and more of them died; the reasons for this are not clear. It should be noted that these small infants accounted for only 0.5% of all births (325 of 64,705) but 34.7% of all perinatal deaths (178 of 513).**

In 1994, the neonatal death rate was 2.9 per 1,000 births and avoidable factors were identified in only 14.1% (26 of 184). In contrast, the stillbirth rate was 5.1 per 1,000 births and avoidable factors were identified in 34.4% (113 of 329). Stillbirths comprised 64% (329 of 513) of perinatal deaths and remain first priority for prevention. It is salutary to note (Table 2) that since 1985, the reduction in the rates of stillbirths, neonatal deaths and perinatal deaths is 21.5%, 48.2% and 34.7% respectively.

**Adequate monitoring of fetal welfare in late pregnancy in low risk as well as high risk pregnancies is strongly recommended.** The infant mortality rate in 1993 fell 13% compared with 1992 to the lowest figure recorded (4.1 per 1,000 births).

The perinatal mortality rate in **multiple pregnancy** increased from 27.8 per 1,000 in 1993 to 33.6 per 1,000 in 1994 and accounted for 12.1% of all perinatal deaths (62 of 513 in 1994; 51 of 450 in 1993).

**Termination of pregnancy after prenatal diagnosis of fetal malformations can have a profound influence on perinatal mortality rates, infant death rates and survival rates of children with malformations.** In the past 8 years, terminations for malformations increased from 82 in 1986 to a record number of 250 in 1994 (213 in 1993).

A feature of this report is the continued reduction in the postneonatal infant and child deaths (from 29 days up to 15 years of age). In 1994, there were 257 of these deaths (292 in 1993, and 433 in 1985 when this audit began). **This record result was achieved by continued reduction in the number of birth-related (108 to 83) and accidental deaths (60 to 39).** The majority of birth-related deaths result from malformations/birth defects which usually cause death in the first year of life.

Disappointingly, the number of **cot deaths** increased from 48 in 1993 to 60 in 1994, still our second lowest value on record and 57% less than in 1985 (140 deaths).

There were 7 **maternal deaths**, 2 from complications of pregnancy, 3 indirect deaths from associated diseases and 2 from incidental causes not influenced by pregnancy.

In 1994, the percentage of all births to women aged 35 years or more increased to a record 14.0%, and 75% of all births occurred to women born in Australia.

The **Caesarean section rate** was 18.8%, the highest rate recorded in Victoria. The **length of stay after connement** continued to decrease.

Since 1985, the proportion of mothers staying in hospital for 3 days or less increased from 7% to 29% and those remaining more than 5 days decreased from 69% to 33%.

The details of this report warrant careful scrutiny. We eagerly await the results for 1995 to see the future direction of the changes outlined above.

**Professor Norman A. Beischer**

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## MEMBERS OF THE COUNCIL, COMMITTEES AND STAFF

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### Council

Professor N A Beischer (Chairman)	Dr J Lumley
Dr M J Ackland (from September)	Dr P N McDougall
Associate Professor T M Adamson	Professor R J Pepperell
Ms R B Bryant	Professor P D Phelan
Dr D W Fortune	Mr I C Ross
Ms J Jamieson	Dr R L Simpson (until May)
Professor G T Kovacs	

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 Dr D W Fortune Mrs S Braybrook  
 Dr D Johnson Dr C M Duncan  
 Dr W H Kitchen Associate Professor J R Fliegner  
 Ms S Murray Dr D W Fortune  
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 Dr P M Renou Dr P M Renou  
 Mr I C Ross Mr I C Ross

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 Associate Professor T M Adamson Dr P E Campbell  
 Associate Professor L W Doyle Professor A L Clark  
 Associate Professor J H Drew Dr W H Kitchen  
 Dr D W Fortune Associate Professor T Nolan  
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**Staff**

Consultant Epidemiologist – Dr Judith Lumley

Consultant Paediatricians – Dr W H Kitchen, Dr L Shefeld

Research Midwife – Ms Helen Robertson

Senior Research Officer – Miss Judith Yates

Chief Medical Record Administrator – Mrs Monique Kilkenny

Medical Record Administrator – Mrs Marilyn Riley

Computer Clerks – Mrs Debbie Arnold, Mrs Karen Cornish, Mrs Linda Weeks

Executive Officer – Ms Barbara Scott

## POLICY STATEMENT

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### ADDITIONAL DATA FOR STATISTICAL AND RESEARCH PURPOSES

The Perinatal Data Collection Unit has information on all Victorian births and there are more extensive data available for perinatal, infant and child deaths. **The Council encourages the release of data to all health professionals.**

The paramount consideration is that the release of data by the Council will not endanger the confidentiality of information.

A fee may be charged for retrieving information from databases.

Requests for additional tabulated data, not given in the Council's annual reports, must be in writing; the information required should be clearly stated and a contact telephone number supplied.

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

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

#### **All correspondence should be addressed to:**

Executive Officer  
Consultative Council on Obstetric and Paediatric Mortality and Morbidity  
Locked Bag 4923 GPO  
Melbourne 3001

## INTRODUCTION

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This report includes the 10th Annual Survey of Deaths in Infancy and Childhood as well as the 33rd consecutive Survey of Perinatal Deaths. It therefore contains details of all stillbirths, neonatal deaths and deaths of children in Victoria up to, but not including their 15th birthday.

The perinatal mortality rate (now 7.9 per 1,000 births) increased in 1994; there was an increase in both the stillbirth rate (5.1 in 1994, 4.4 in 1993) and the neonatal death rate (2.9 in 1994, 2.6 in 1993). The Council believes further improvement is possible.

The Council operates by compiling case histories and submitting them to its specialist committees so that any potentially avoidable factors in management can be identified. This allows all practitioners to share the benefits of their colleagues' experience. Clinical lessons that might not emerge from an individual practice may readily be apparent from the cumulative experience of over 64,000 births annually.

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

**Sometimes, the information is incomplete. For stillbirths, results of antenatal tests for fetal wellbeing are often not included (for example, glucose tolerance test, cardiotocography, biophysics). Report has been completed by a paediatrician, obstetrical information is sometimes deficient. It would be appreciated if these aspects of documentation could be improved.**

All information supplied to the Council is treated in the strictest confidence. Before a case is considered by the Committee, all information identifying the mother, hospital and medical practitioner is removed.

## DEFINITIONS

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In this report, the Council has followed the recommendations of the World Health Organization (WHO) for definitions, the content of statistical tables and the **International Classification of Diseases (ICD) (1)**.

**Unless otherwise stated, the following definitions apply:**

**Stillbirth:** A stillborn infant weighing at least 500g or, if the weight was not known, born after at least 22 weeks' gestation.

**Neonatal death:** A death occurring within 28 days of birth in an infant whose birth-weight was at least 500g or, if the weight was not known, an infant born after at least 22 weeks' gestation.

**Infant death:** A death, occurring within 1 year of birth in an infant whose birth-weight was at least 500g or at least 22 weeks' gestation if the birth-weight was not known. This category includes neonatal deaths as defined above.

**Neonatal mortality rate:** The number of neonatal deaths per 1,000 livebirths.

**Perinatal mortality rate:** The number of perinatal deaths (stillbirths plus neonatal deaths) per 1,000 births, live and still.

**Infant mortality rate:** The number of infant deaths, (including neonatal deaths), per 1,000 livebirths.

(1) Manual of the International Classification of Diseases, Injuries, and Causes of Death, World Health Organization, Geneva, Switzerland, 1977, pages 761–768.

## LEGAL REQUIREMENTS FOR REGISTRATION OF PERINATAL DEATHS

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The Council wishes to emphasize differences between the legal definitions which determine when a livebirth or stillbirth must be registered and the definitions adopted by the Council for its statistical collections.

In Victoria, the **legal requirements** for registration are set out in the Medical Certificate of Cause of Perinatal Death. Inquiries received by the Council indicate that some medical practitioners are unsure of these requirements.

**In summary, a stillbirth must be registered as such if the pregnancy was of at least 20 weeks or the infant weighed at least 400g and after being born, showed no signs of life. Any infant, regardless of maturity or birth-weight, who breathes or shows any other signs of life after being born, must be registered as a livebirth (and if death subsequently occurs within 28 days, as a neonatal death).**

The Australian Bureau of Statistics publishes data on perinatal deaths according to the year in which the death was registered, whereas the Council records deaths for the calendar year of birth. Sometimes there is a considerable delay in registering a perinatal death.

## Survey Population

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## PERINATAL AND INFANT DEATHS

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The denominator of perinatal mortality rates is based on all births in the State of Victoria in 1994; included were perinatal deaths where the mother's usual address was outside Victoria; excluded were 5 infants who died in Victoria but were born elsewhere.

### Tables/Figures

Table 1: Perinatal and Postneonatal infant deaths 1985–1994

Table 2: Mortality Rates 1985–1994

Figure 1: Perinatal Mortality Rates, 1985–1994 (per 1,000 births)

Infant mortality rates for 1993 for 30 industrialized countries (published by UNICEF) averaged 9 deaths per 1,000 live births (range 4 to 34). The Victorian rate in 1993 of 4.1 deaths per 1,000 live births compares very favourably with other developed countries.(2)

(2) The State of the World's Children. 1995, pp 67,85. Oxford University Press, New York.

## Survey Population

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## INTERNATIONAL COMPARISON

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

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

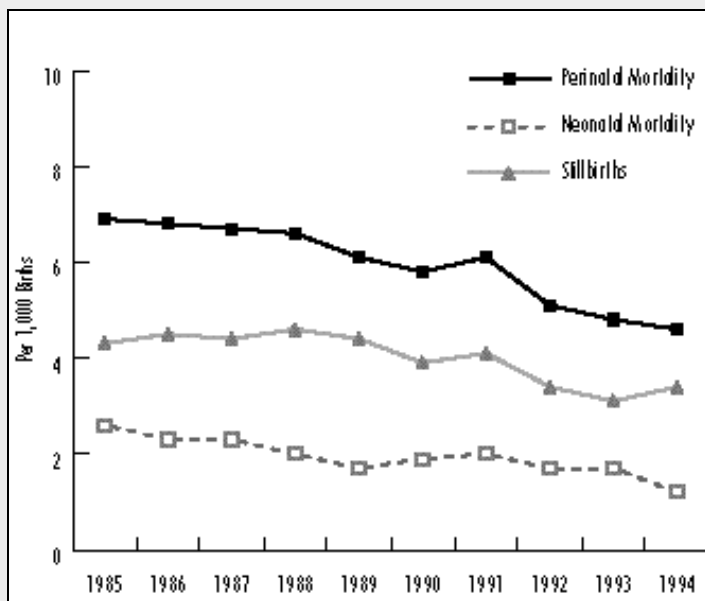
**Neonatal death:** A death occurring in an infant whose birth-weight was at least 1,000g (or, if the weight is not known, an infant born after at least 28 weeks' gestation) who dies within 7 days of birth.

Many countries do not use these definitions and there is considerable variation from country to country in the way statistics are recorded; caution must always be exercised in comparing published mortality rates.

**Table 3 and Figure 2 give the Victorian data for the last 10 years in terms of the WHO definitions.**

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Stillbirths	4.3	4.5	4.4	4.6	4.4	3.9	4.1	3.4	3.1	3.4
Neonatal	2.6	2.3	2.3	2.0	1.7	1.9	2.0	1.7	1.7	1.2
Perinatal	6.9	6.8	6.7	6.6	6.1	5.8	6.1	5.1	4.8	4.6

**Figure 2: Mortality Rates per 1,000 Births, 1985 to 1994 (for International Comparison)**



Survey Population

**BIRTH RATES**

**Table 4** shows the number of births in Victoria for each year since 1962. The livebirth rate is the number of livebirths per 1,000 of the estimated mean population for the year indicated. In 1994, there was a slight increase in the total number of births, from 64,570 in 1993 to 64,705 in 1994.

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

## Survey Population

**PERINATAL DEATHS REGISTERED BUT EXCLUDED FROM SURVEY**

**Table 5** is included because survival of infants in this category has been reported.

**There were 192 of these perinatal deaths legally required to be registered in Victoria in 1994; because of the Council's definitions, they are excluded from all other tables in this report**

39.6% (76 of 192) were of birth-weight 400 to 499g

31.8% (61 of 192) were malformed.

Birth-weight (g)	<200		200-299		300-399		400-499		Unknown		Total
	SB	NND	SB	NND	SB	NND	SB	NND	SB	NND	
Causes of death	SB	NND	SB	NND	SB	NND	SB	NND	SB	NND	Total
Malformations	7	-	11	2	11	5	21	4	-	-	61
Nonmalformations:											
Infections	-	-	-	-	3	1	-	1	-	-	5
Other:	7	-	14	5	40	7	40	10	3	-	126
Total	14	-	25	7	54	13	61	15	3	-	192

**SURVEY OF PERINATAL DEATHS**

After collecting all available information, the relevant committee of the Council considered selected cases in detail. In deciding that an avoidable factor was present, the committee measured each case against the most exacting standards as only the application of those standards seems likely to ensure continued reduction in the perinatal mortality rate. **It is considered that an avoidable factor is present when another course of action in the management of mother or infant might have resulted in a better outcome.**

**STILLBIRTHS**

After their consideration by the appropriate referee, 59.3% (195 of 329) of the stillbirths were presented to the Stillbirth Committee and 42.1% (82 of 195) were considered to be unavoidable. In the remaining 113 cases, there were 211 possible avoidable factors identified ([Table 6](#)).

**1. Inadequate Antenatal Monitoring**

This remains the most frequent avoidable factor identified in stillborn infants. The need for efficient monitoring is emphasized by the fact that on 96 occasions monitoring antenatally was considered to be inadequate (compared with 68 in 1993). That 16 of these were classed in the groups of misinterpretation or undue reliance on the test again illustrates the need for expertise in the application of monitoring tests and that clinical skill and suspicion complement antenatal monitoring.

**2. Inadequate Management of the Growth Retarded Fetus (Birth-Weight under 10th Percentile According to Gestational Age)**

Avoidable factors were present in 29 of these stillborn infants compared with 28 in 1993.

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

### **3. Inadequate Intrapartum Care**

Inadequate intrapartum care accounted for 24 of the avoidable factors (7 in 1993); inadequate intrapartum monitoring was noted in 8 cases.

### **4. Inadequate Management of Preeclampsia, Eclampsia and Maternal Hypertension**

This was noted in 6 stillbirths (7 in 1993) due to these conditions. There was undue delay in induction of labour in these cases; **the presence of persistent proteinuria is usually a signal for immediate action, no matter what are the results of antenatal monitoring.**

### **5. Inadequate Management of the Big Baby (Birth-weight above the 90th Percentile According to Gestational Age)**

The Council considered that avoidable factors were present in 4 macrosomic infants of mothers who were not diabetic; the attendant had failed to appreciate the large size of the fetus until a mechanical obstetrical problem was apparent. **Obstetricians are warned of this potential for mechanical problems and the need for glucose tolerance testing in such cases.**

### **6. Insufficient Antenatal Care and Family Neglect or Ignorance**

These factors were implicated in 14 cases.

### **7. Delay or Lack of Consultation in High Risk Pregnancy**

This was considered to be an avoidable factor in 8 stillbirths.

### **8. Inadequate Management of Prolonged Pregnancy**

This factor was implicated in 5 stillbirths.

## **SURVEY OF PERINATAL DEATHS**

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### **NEONATAL DEATHS**

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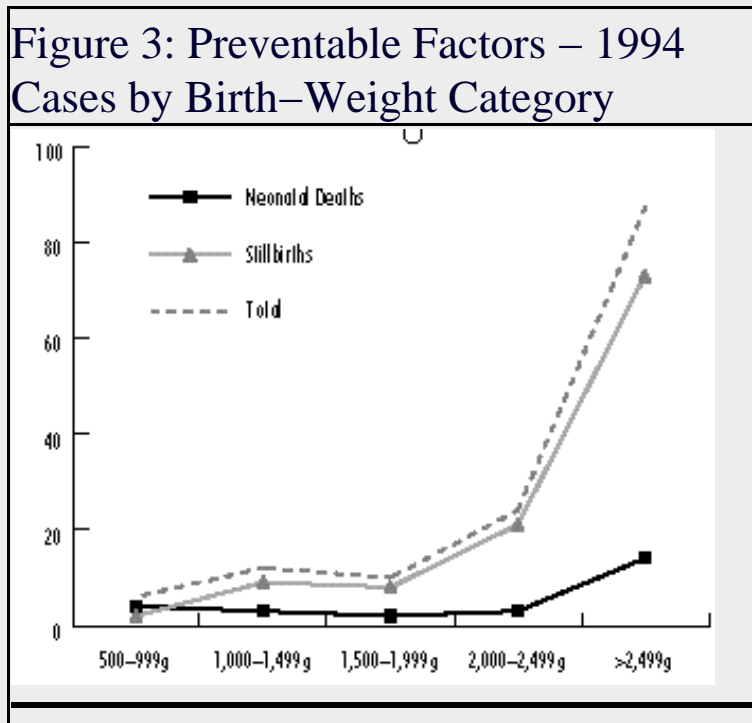
Only 26.1% (48 of 184) of neonatal deaths were selected by the referee for presentation to the Neonatal Committee. The remainder of the infants were extremely immature, severely malformed or there were no controversial features; 22 of those presented were considered unavoidable and there were 44 avoidable factors considered to be present in the remaining 26 cases.

Of these factors, 21 were obstetrical and 23 were problems in paediatric care ([Table 6](#)). Inadequate resuscitation was implicated most frequently (8 neonatal deaths) and a range of other paediatric factors in the remaining cases.

## SURVEY OF PERINATAL DEATHS

### PREVENTABLE FACTORS BY BIRTH-WEIGHT CATEGORY

Figure 3 shows the number of stillbirths and neonatal deaths in which 1 or more preventable factors were present. The birth-weights of most of these perinatal deaths (62.6%, 87 of 139) were at least 2,500g.



## SURVEY OF PERINATAL DEATHS

### FURTHER COMMENTS

*The consideration of the obstetric and paediatric avoidable factors in 1994 and in previous years, leads the Council to make the following observations and suggestions:*

(1) The ratio of stillbirths to neonatal deaths was 1.8 to 1 (329 to 184), yet the ratio of avoidable factors was 4.8 to 1 (211 to 44); the overriding conclusion is that further reduction in perinatal wastage depends on the prevention of some of the stillbirths, most of whom were not low birth-weight.

**Unexplained fetal death after 36 weeks' gestation remains a challenge to those conducting obstetrical care. In 1994, there were 37 fetuses, who were neither growth retarded nor malformed in this category (26 in 1993 and 30 in 1992).**

When intrauterine death occurs in late pregnancy (after 36 weeks) in an otherwise normal pregnancy, the committee classifies the case as potentially avoidable, if no test of fetoplacental function (oestriol assay, cardiotocography, ultrasonographic assessment) or screening test for gestational diabetes was performed. It should be noted, however, that the Royal Australian College of Obstetricians and Gynaecologists does not currently recommend routine testing to exclude gestational diabetes in all pregnancies or tests of fetoplacental function in low risk pregnancies.

**(2) Extreme immaturity continues to contribute heavily to the neonatal death rate.** Until such time as pregnancy can be safely prolonged to avoid extremely premature delivery, the clinician may be able to improve the outcome for the infant in several ways. First, **corticosteroid therapy** given to the mother before the birth is undoubtedly beneficial. Secondly, if time permits, **transfer of the mother** to an appropriate hospital for the delivery should be considered; extremely immature infants do better if they are born in level 3 centres. Thirdly, **artificial forms of surfactant** given to babies with breathing difficulties after birth have been shown to improve survival rates of these infants. Artificial surfactant has been available in Victoria since 1991.

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

**(4) Several fetal deaths were associated with ripening of the unfavourable cervix with prostaglandin E2 GEL. We would emphasize that when this drug is used, the fetal heart should be monitored electronically before and after the instillation of the gel. Prostaglandin should not be used for induction of labour when the cervix is unfavourable in the presence of high risk factors for the fetus, such as, intrauterine growth retardation and preeclampsia. The Council is also aware of cases where uterine rupture followed the use of prostaglandin E2 gel on occasions there had been no previous surgery on the uterus to increase the risk of rupture occurring.**

It does appear that the sensitivity to oxytocin is increased following the previous use of prostaglandin E2 gel, and careful surveillance of patients in labour under such circumstances is therefore required.

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

**(6) Women should be informed that they should report diminished or absent fetal movements promptly to their doctor.** Cardiotocography is useful in the management of these women since about 5% have an abnormal trace, and 0.5 to 1.5% (the incidence varies according to presence of other complications such as hypertension or growth retardation) have the signs of severe hypoxia that warrant immediate delivery, usually by Caesarean section. Reduced fetal movements are an indication for consideration of delivery in all patients at or beyond full term, even when cardiotocographic findings are normal; the presentation, station of the presenting part and state of the cervix will determine whether induction of labour is the best option to effect delivery in these women.

**(7)** Previous infertility is associated with increased hazards for the fetus. It is recommended that infertility patients, particularly those who conceive with the assistance of Clomiphene or the IVF technologies, be carefully monitored during the pregnancy and labour.

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

**(9) Multiple pregnancy** consistently accounts for more than 10% of perinatal deaths, although most of these are associated with prematurity; in 1994, the figure was 12.1% (62 of 513 perinatal deaths). **Cardiotocography**, performed

weekly from 34 weeks' gestation, may identify (by a sinusoidal heart rate pattern) the need for urgent delivery in cases of major **twin–twin transfusion**.

**(10) When premature rupture of the membranes occurs in a mother with a potentially viable fetus, it is recommended that cervical swabs be taken for microscopic examination of the smear as well as bacterial culture.**

**(11) Neonatal deaths as a result of fulminating group B streptococcal infection continue to occur.** Even prompt treatment, once the diagnosis is suspected on clinical grounds, is frequently ineffective. Emerging evidence suggests that mortality is reduced by half if mothers are screened during pregnancy and for carriers of the organism, antibiotics are given to the mother during labour and to the newborn infant.

**(12)** The Council has noted several instances of deaths in newborn infants caused by bacterial infections where antibiotic therapy has been delayed unnecessarily. If sepsis is a possible cause of sickness, early antibiotics may save the baby's life. Antibiotics should not be delayed because of failure to obtain appropriate cultures. Penicillin and gentamicin, intramuscularly if there is no venous access, would be appropriate initial antibiotics in most cases of neonatal sepsis. If in doubt, the Newborn Emergency Transport Service can be contacted on (03) 9347 7441 for advice.

**(13)** In the presence of cervical incompetence with or without evidence of infection, the recommended management is to remove the suture after the membranes have ruptured, perform bacteriological culture on the suture and commence antibiotics.

**(14)** Maternal substance abuse, including heavy cigarette smoking, was considered to be an important contributing factor in some perinatal deaths.

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

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

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

**(18)** Difficult intrauterine manipulations may require a general anaesthetic administered by an experienced anaesthetist, if adequate anaesthesia cannot be achieved by epidural or spinal anaesthesia. As this is often an emergency situation rapid anaesthesia commonly requires an epidural top up, when available, or general anaesthesia, if necessary.

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

**(20)** The presence of oligohydramnios is an ominous sign for the outcome of a prolonged pregnancy. Ultrasound (with estimation of fetal weight, fetal activity, umbilical artery blood flow and liquor volume) and cardiotocography are the best

tools to assess fetal condition in post-term pregnancies. Oestriol estimations and amniocentesis may also be useful investigations.

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

(22) Surgery should be avoided whenever feasible during pregnancy.

## CAUSES OF PERINATAL DEATHS

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In tables 7 to 11, each case has been assigned to a single category based on the principal cause of the perinatal death.

In 1994, malformations and birth defects accounted for 20.5% of perinatal deaths. The heterogeneous group of 'non-malformations' accounted for the remainder; 4.5% of deaths were attributable to infections (Table 7). Further details on malformations are given in Table 11.

The principal causes of perinatal deaths for the years 1985 to 1994 are shown in Tables 8 and 9.

**In the past 10 years, the proportion of deaths due to malformations has fallen as a result of termination of infants with birth-weight less than 500g (see Table 30) and improved results of paediatric surgery.**

Table 10 provides details of the 'non-malformation' group listed in Table 7.

The predominant principal maternal causes of perinatal deaths were accidental and antepartum haemorrhage (58 cases), multiple pregnancy (42 cases), preeclampsia, eclampsia and hypertension (24 cases) and premature rupture of the membranes (30 cases). The predominant fetal and infant conditions were antepartum and intrapartum hypoxia (87 cases) and fetal growth retardation (34 cases);

## CAUSES OF PERINATAL DEATHS

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### INFECTION IN PERINATAL DEATHS

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There was evidence of infection in 53 cases of perinatal death.

In the 30 cases in Table 12, infection was not considered the principal cause of death, so these cases are listed under other categories in tables 7 to 11.

In the other 23 cases in Table 13, infection was regarded as the principal cause of death and is listed as such in tables 7 to 10.

Table 14 lists the organisms if any identified in the 53 cases of perinatal infection.

**Group B beta haemolytic streptococcal infection accounted for 9 deaths.** Routine maternal screening by vaginal swab at 28 – 30 weeks' gestation with appropriate therapy in labour and of the infant after birth is suggested.

## CAUSES OF PERINATAL DEATHS

## TIME OF FETAL DEATH IN STILLBIRTHS

In 19.5% of cases (64 of 329), fetal death occurred during labour, slightly lower than 21.7% in 1993.

**Table 15: Time of Fetal Death in Stillbirths, 1994**

Birth-weight (g)	During labour	Before the onset of labour										Total
		Under 1 day	2nd -3rd day	4th -7th day	2nd week	3rd week	4th week	>27 days	week	No. of days unknown	Unknown whether before or during labour	
500-999	26	6	20	9	4	3	-	-	2	23	14	107
1,000-499	3	6	6	2	2	1	-	-	1	7	2	30
1,500-1,999	4	7	8	5	2	-	-	1	-	6	3	36
2,000-2,499	2	6	16	6	1	-	-	-	-	4	2	37
2,500-2,999	6	7	11	6	-	-	-	-	-	7	5	42
3,000-3,499	10	13	7	2	1	-	-	-	-	3	2	38
3,500-3,999	7	5	6	2	1	-	-	-	-	1	1	23
4,000	6	4	-	1	-	-	-	-	-	-	4	15
Not recorded	-	-	-	-	-	-	-	-	1	-	-	1
Total	64	54	74	33	11	4	-	1	4	51	33	329

## CAUSES OF PERINATAL DEATHS

## Time of Neonatal Deaths

In 30.4% of cases (56 of 184), the neonatal death occurred within 6 hours of birth compared with 36.6% in 1993. (Table 16:)

Birth-weight (g)	Age at Death								Total
	Under 6 hours	6 to 11 hours	12 to 23 hours	2nd and 3rd day	4th to 7th day	1 week to <2 weeks	2 weeks to <3 weeks	3 weeks to <4 weeks	
500-999	35	1	5	16	4	3	4	3	71
1,000-1,499	3	2	2	5	2	2	4	1	21
1,500-1,999	3	2	1	3	2	4	2	3	20
2,000-2,499	6	4	1	4	3	3	-	-	21
2,500-2,999	2	-	3	2	4	4	1	3	19
3,000-3,499	5	-	2	3	1	3	1	1	16
3,500-3,999	2	-	1	1	3	-	2	2	11
>4,000	-	-	1	2	-	1	-	1	5
Total	56	9	16	36	19	20	14	14	184

## Data from Perinatal Data Collection Unit

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### All Births in Victoria, 1994

#### Tables/Figures

These tables give details of all 1994 births in terms of sex of the infant, parity, gravidity, birth-weight, maternal age, mother's country of birth, duration of pregnancy, onset of labour, method of delivery and marital status of mother. **Note that some of these tables give the number of confinements rather than the number of births and the resultant perinatal mortality rate is therefore slightly different from that quoted elsewhere in this report.**

Table 17: Sex of Infants – All Births

Table 18: Parity – Confinements

Table 19: All Previous Pregnancies – Confinements

Table 20: Birth-Weight Distribution – All Births

Table 21: Maternal Age – Confinements

Table 22: Mother's Country of Birth – Confinements

Table 23: Gestation at delivery – Confinements

Table 24: Onset of Labour – Confinements

Table 25: Method of Delivery – Confinements

Table 26: Marital Status of Mother – Confinements

Figure 4: Maternal Age at Confinement, 1985 to 1994

Figure 5: Neonatal and Perinatal Mortality Rates, 20 to 31 Weeks of Gestation

**The increase in the perinatal mortality rate (per 1,000 total births) from 7.0 in 1993 to 7.9 in 1994 was in large part attributable to more births of infants of birth-weight under 1,000g (281 to 325) and an increased mortality rate (505.3 to 547.7) There was also a slight increase in mortality rates in birth-weight groups above 1,999g.**

Although in 1994 only 0.5% (325 of 64,705) of all infants weighed between 500 and 999g at birth, they accounted for 34.7% (178 of 513) perinatal deaths.

**The Council emphasizes that extremely low birth-weight infants have better prospects for survival if delivered in a Level 3 centre.**

The increase in the proportion of births to women older than 29 years and the concomitant fall in those in younger age groups are shown in Figure 4 for the years 1985 to 1994.

Figure 5: shows the neonatal, stillbirth and perinatal mortality rates (per 1,000 births) for the gestational age range of 20 to 31 weeks. The Council considers that this information will be useful to obstetricians caring for mothers who are likely to deliver an extremely immature infant and where the fetal weight cannot be known with certainty. In 1994, the neonatal survival of infants liveborn at 20 – 23 weeks of gestation was 10.9% (7 of 64) and 58.3% (42 of 72) at 2425 weeks. Note that the birth-weight of all

survivors was compatible with the stated gestation. Malformed infants (often diagnosed antenatally) have been included. Obstetricians will also be aware that in the gestational age range shown in [Figure 5](#), estimates of gestation are sometimes uncertain.

**Figure 5 includes the 192 perinatal deaths of known gestational ages who were legally required to be registered but who did not meet the Council's criteria for inclusion elsewhere in this report, other than in [Table 5](#); registration of extremely small and extremely immature perinatal deaths may be incomplete so the neonatal survival prospects may be less optimistic than stated above.**

## Data from Perinatal Data Collection Unit

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### Caesarean Section

#### Tables/Figures

[Table 27: Caesarean Section, Incidence and Perinatal Mortality](#)

[Table 28: Indications for Caesarean Section](#)

[Figure 6: Forceps and Caesarean Delivery, 1985 to 1994](#)

In 1994, there were 11,955 Caesarean sections resulting in the birth of 12,379 infants, a rate of 18.8%. [Figure 6](#) shows the increase in rate of Caesarean sections and decrease in forceps deliveries from 1985 to 1994.

The perinatal mortality rate for infants delivered by Caesarean section in 1994 was 8.2 per 1,000 births, compared with rates of 7.9 in 1993, 8.1 in 1992, 7.1 in 1991 and 11.1 in 1990.

A Caesarean section for fetal indications before a maturity of 26 weeks was associated with a perinatal mortality rate of 285.7 per 1,000 births; in 1994, there were 10 neonatal survivors, 9 in 1993 and 4 in each year from 1990 to 1992. Although the likelihood of a successful perinatal outcome is improving, Caesarean section should usually be carried out before 26 weeks' gestation only for maternal indications.

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

[Table 28](#) gives the indications for Caesarean births expressed as a percentage of all infants delivered by Caesarean section at that gestation. In many instances, more than one indication is recorded, so the total number of indications exceeds the number of cases. Further, in 1994, where an indication for Caesarean section was not recorded on the perinatal morbidity statistics form, the code for 'Caesarean section without indication' was used.

## Data from Perinatal Data Collection Unit

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## Multiple Births

### Tables/Figures

#### Table 29: Birth–Weight Distribution, Multiple Births

Multiple births were made up of 898 sets of twins 41 (894 in 1993), 14 sets of triplets (24 in 1993) and 2 sets of quadruplets, 1 of which weighed less than 500g.

There were 17 sets of twins, both with a birth–weight under 500g (14 in 1993), whose birth was registered; these have been excluded from Table 29.

Therefore, there were 1,846 infants whose multiple births were notified to the Council, 34 of whom have been excluded from the total shown in Table 29 because the birth–weight was below 500g. There were no twins where one weighed less than 500g but who had a heavier co–twin.

Multiple pregnancy makes a significant contribution to the number of perinatal deaths of 'Very Low Birth–Weight' (In 1994, the overall perinatal mortality rate in multiple pregnancies (33.6 deaths per 1,000 births) increased from the rate of 27.8 in 1993, predominantly due to an increase in the number of infants of birth–weight under 1,500g. In 1994, multiple births accounted for 12.1% (62 of 513) whereas in 1993 the figure was 11.3% (51 of 450).

## Data from Perinatal Data Collection Unit

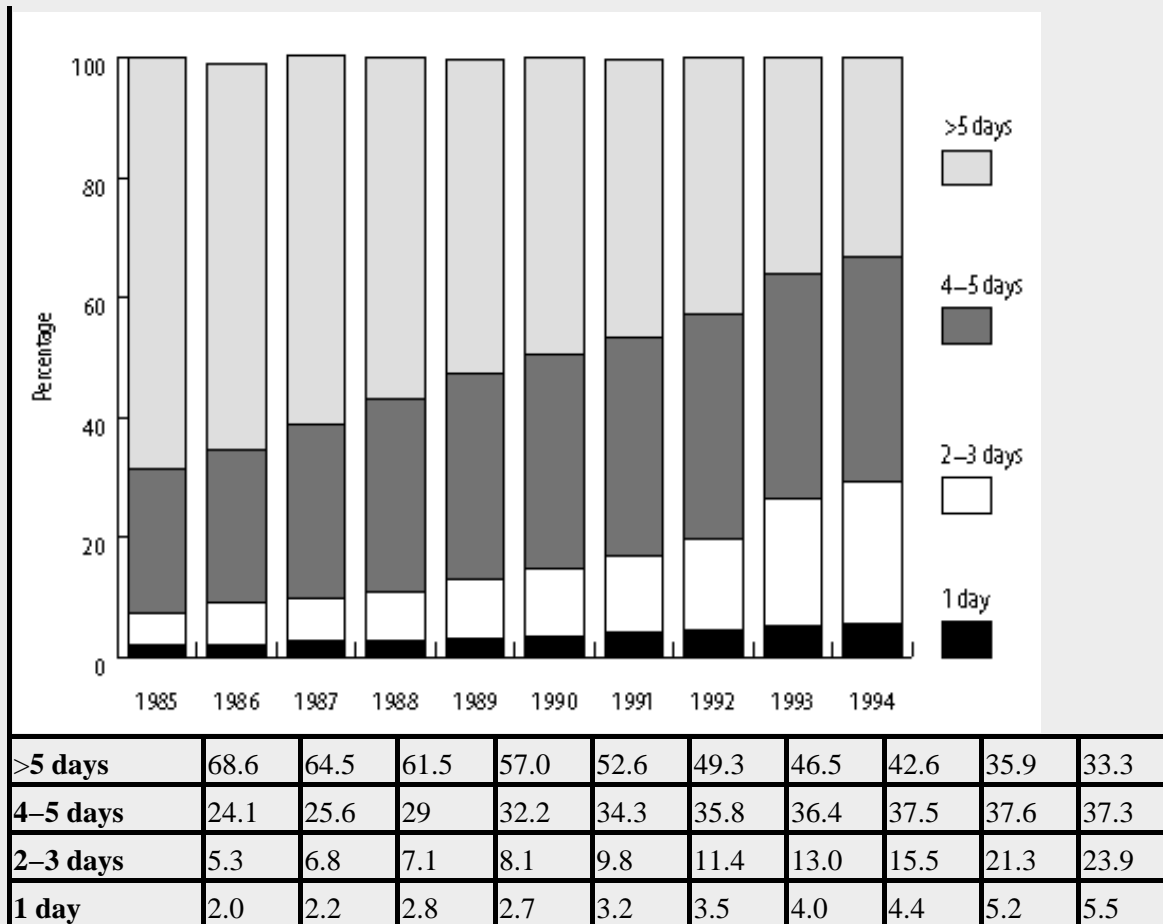
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### Length of Mother's Stay in Hospital

Figure 7 (new for 1994) shows the percentage of mothers in each of the categories of length of the postnatal stay in hospital. **There has been a steady decrease in the length of hospitalization over the decade.**

Figure 7: Length of Postnatal Hospitalization, 1985 to 1994





## Necropsy Service

### Tables/Figures

Figure 8: Perinatal Necropsy Rates, 1985 to 1994

Doctors are reminded of their statutory obligation to provide the Registrar of Births, Deaths and Marriages with a death certificate in the prescribed form within 48 hours of a death (including a stillbirth).

The cause of death will often be based on clinical observations but the ultimate necropsy findings should be communicated to the Registry of Births, Deaths and Marriages as soon as they are available.

It is vital to the accuracy of the Council's surveys that full advantage be taken of the free necropsy service available for perinatal deaths occurring in Victoria.

To use the service, the attending doctor should contact the

**pathology department of the nearest major hospital**

and then arrange with a funeral director to transport the infant to the pathology centre.

Costs associated with the necropsy service are met by the Consultative Council and the service involves no expense for parents.

Pathologists and funeral directors should send their accounts, showing all relevant details

to:

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

A necropsy was performed on 190 of 329 stillbirths (57.8%) and 101 of the 184 neonatal deaths (54.9%) in 1994. The percentages for 1985 to 1994 are shown in Figure 8. The fall in the necropsy rate is disappointing.

**All practitioners are urged to encourage parents to consent to necropsy in all cases and especially when the cause of fetal death is uncertain. If permission for necropsy is not given, usually the parents of such babies will consent to a careful external examination, x-ray and photography.**

**The examination of the placenta is an integral part of the perinatal necropsy. If permission for necropsy is not given, the placenta should be retained. Its examination may well provide vital information in elucidating the cause of fetal death.**

## Congenital Malformations/Birth Defects

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### Tables/Figures

Table 30: Congenital Malformations/Birth Defects

Table 31: Sources of Notifications to the Congenital Malformations

Table 32: Termination of Pregnancy for a Malformation

Under the legislation, by which it is constituted, the Council is required to establish a register of congenital abnormalities and to provide information to the medical profession for research into the medical epidemiology of these disorders. Responsibility for these functions is vested in a specialist subcommittee and the register itself is maintained in the Perinatal Data Collection Unit.

The incidence of birth defects among infants born in 1994 is summarized in Table 30 which is designed to emphasize the numbers of infants rather than the numbers of malformations. Each infant is counted only once. All infants with a recognizable syndrome or with 2 or more malformations are classed as multiple. Those with a single defect are listed according to the anatomical site of the malformation (nervous system, cardiovascular and so on).

The category of multiple malformations is highly heterogeneous, ranging from Potter syndrome, the group of malformations known as the VATER association and fetal alcohol syndrome, to infants with 8 or more birth defects and no overall diagnosis.

**Among chromosomal disorders Down syndrome was the commonest at birth and accounted for most of the surviving infants in this category.** Infants with neural tube defects (anencephalus and spina bida) made up many of those in the central nervous system group. The commonest cardiovascular malformations were atrial and ventricular

septal defects but this category included such major disorders as transposition of the great vessels and hypoplasia of the left heart. Cleft lip and palate accounted for more than half the gastrointestinal category with atresias of the oesophagus or bowel another important group. Many urogenital birth defects occurred as part of syndromes and were classed here as multiple so that this category is dominated by hypospadias and hydronephrosis. Similarly, most major respiratory malformations occurred as part of these syndromes. Among musculoskeletal disorders, congenital dislocation of the hip and talipes were numerically important but dwarfing disorders also contributed. The category called genetic and metabolic defects included cystic fibrosis, thalassaemia and haemophilia. The final group ('Other') comprised malformations of the eyes, ears and skin as well as congenital infections such as cytomegalovirus.

In 1994, there was a small decrease in the number of birth defects notified to the register. This was due to the exclusion of certain soft tissue defects from registration, to make the Victorian Register more like other State and National systems. A list of exclusions is given at the end of this section of the report.

Table 31 summarizes the notifications received in 1992, 1993 and 1994. The Maternal and Child Health Service continued to make a significant contribution to the congenital malformation/birth defects register. The major change in the last 3 years was the development of a direct reporting system with the Royal Children's Hospital that has improved notification of multiple malformations and infants with cardiovascular, genetic and metabolic defects. Notifications from paediatricians and paediatric hospitals are particularly helpful since they often contribute a more complete picture and a more precise diagnosis.

Table 32 shows details of pregnancies terminated after the diagnosis of a fetal malformation. All were of under 20 weeks of gestation.

There were an increased number of terminations of pregnancy for fetal malformation reported to the PDCU in 1994. These data were obtained after specific written requests were made to the 130 hospitals offering obstetric services in Victoria. In the case of the two large teaching hospitals, manual retrieval of information from relevant medical records was made by staff of the PDCU. Although all hospitals approached responded to requests for this information, it is unlikely that ascertainment is complete for a number of reasons: some terminations may be done very early in pregnancy and therefore outside of a hospital setting; others may be done in hospitals that were not approached (non-obstetric).

## Exclusions

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**The following conditions are excluded from Table 30:**

Abnormal palmar crease

Accessory nipples

Anal fissure

Balanced autosomal translocation (unless with structural defects)

Birth injuries

Birth marks (smaller than 4cm, not including giant naevus)

Bowing of legs (unless severe)

Blocked tear ducts

Brushfield spots

Cephalhaematoma

Cleft gum

Clicky hips

Clinodactyly

Craniotabes (unless severe)

Dermatoglyphic abnormalities

Ear abnormalities (minor)

Epicanthic folds

Gastro-oesophageal reflux

Haemangioma (less than 5cm wide)

Herniainguinal, umbilical

High-arched palate

Hydrocoele

Hypertelorism

Imperforate hymen

Laryngeal stridor

Laryngomalacia

Low slung/set ears

Macroglossia

Meckel diverticulum

Meconium ileus

Mental retardation (unless with a syndrome /structural defect)

Metatarsus varus

Micrognathia (unless severe)

Mongolian (blue) spots

Occiput, at/prominent

Patent ductus arteriosus (less than 37 weeks)

Philtrum, long/short

Plagiocephaly

Pre-auricular sinus

Prominent forehead

Protruding tongue

Ptosis

Pyloric stenosis

Retrognathia (unless severe)

Rocker-bottom feet (prominent heels)

Sacral pits, dimples, sinuses

Short sternum

Simian creases

Single umbilical artery

Skin folds

Skin tags

Slanting eyes

Small mouth

Spina bida occulta

Sternomastoid tumour

Subluxating knee joint

Talipes (unless with a structural defect)

Toe anomalies minor

Tongue tie

Torticollis

Undescended testis/testes (not requiring treatment)

Ureteric reux (ultrasound diagnosed)

Webbing of second and third toes/ngers

Wide suture lines

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### **Importance of Notication**

**The Council wishes to emphasize to all those involved in the care of children the importance of reporting cases of suspected or proven birth defects, regardless of whether or not they are believed to have already been notified from another source.** It is only by this means that it will be possible to establish and maintain a comprehensive register of relevant conditions. The register is frequently used to answer questions about the incidence of specific defects in Victoria and to respond to queries about possible clusters of malformations. These functions require full and reliable information on birth defects.

Supplies of notication forms can be obtained by writing to:

The Congenital Malformations Register

GPO Box 4790, Melbourne 3001

or by telephoning (03) 9412 7414.

Prenatal Diagnosis and Genetic Counselling in Relation to Birth Defects

The increasing role of prenatal diagnosis can be seen by comparing terminations for malformations in the past 6 years: 82 (1986); 71 (1987); 106 (1988); 134 (1989); 139 (1990); 138 (1991); 154 (1992); 213 (1993); and 250 (1994).

Prenatal diagnosis by ultrasound examination, by amniocentesis, by chorion villus sampling and occasionally by fetoscopy or fetal blood sampling is now well established in Victoria. Ultrasound scans are performed in almost all pregnancies with the best time for this being around 18 weeks', to improve the chances of detecting structural abnormalities such as spina bida, while still allowing a reasonably accurate estimation of gestational age. Routine monitoring of over 5,000 diagnostic tests, two thirds being amniocentesis and one third chorion villus sampling, is done by the Murdoch Institute at the Royal Children's Hospital, who produce annual reports on the details.

Concern over the risk of Down syndrome in women aged 37 years and older is the most frequent reason for amniocentesis and chorion villus sampling. The utilization of these services by women in the advanced aged groups continues to increase in Victoria. For younger women, screening for Down syndrome by maternal serum testing has begun on a

small scale.

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

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

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

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

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

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

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

## Postneonatal Infant and Child Deaths

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## Tables

### Table 33: Postneonatal Infant and Child Deaths, 1994

### Figure 9: Postneonatal and Child Deaths, 1985 to 1994

### Figure 10: Infant and Child Deaths by Age Groups, 1985 to 1994

This section of the report (Tables 33 to 40) concerns deaths that occurred in Victoria in the calendar year 1994.

The deaths of 4 infants and 7 children have been excluded (as in previous years) because they lived outside Victoria and were referred for treatment of a terminal illness.

A total of 257 deaths occurred in 1994 in children aged between 29 days and under 15 years compared with 292 in 1993. This reduction was marginal for postneonatal infant deaths (106 in 1994, 110 in 1993), but substantial for deaths occurring in childhood (151 in 1994, 182 in 1993).

The numbers of late infant and child deaths from 1985 to 1994 are shown by category of death in Figure 9 and age at death in Figure 10.

**It is noteworthy that this record low number of late infant and child deaths was achieved by the continued reduction in the number of birth-related deaths and accidental deaths. However the number of cot deaths increased from 48 in 1993 to 60 in 1994.**

## Category 1 – Determined at Birth

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### Tables/Figures

### Table 34 : Fatal Malformation/Birth Defects, 29 Days to 14 Years

### Figure 11: Postneonatal and Child Deaths – Cause Determined at Birth, 1985 to 1994

#### **1A Birth Hypoxia/Asphyxia**

Four infants and 5 children were in this category had a history of severe perinatal hypoxia; all had severe developmental delay and 6 of the children also had cerebral palsy most probably due to intrapartum hypoxia.

#### **1B Malformation/Birth Defect**

In 1994, 67 infant and child deaths were classified in this group. Table 34 shows the anomalies; 7 cases of cerebral palsy without an apparent obstetrical cause were included in this group.

#### **1C Prematurity**

There were 3 late infant deaths primarily from sequelae of prematurity; all had weighed less than 1,000g at birth. Chronic lung disease following intermittent positive pressure ventilation in the neonatal period was responsible for 2 of these postneonatal infant deaths and sepsis for the other late infant death. The 2 child deaths occurred in children with severe developmental and neuromotor delay.

Figure 11 shows the number of late infant and child deaths in each of the above categories from 1985 to 1994.

## Category 2 – Cot Deaths

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### Tables/Figures

Table 10: Perinatal Deaths (Excluding Malformations), 1994

Table 35: Principal Conditions Associated with Cot Death

Figure 12: Cot Deaths – Postneonatal and Child, 1985 to 1994

The total number of postneonatal infant and child cot deaths in 1994 was 60, 12 more than in 1993. There were 3 additional **neonatal deaths** attributable to this cause and listed in Table 10.

The number of late infant and child cot deaths in each category since the Council has collected these data are shown in Figure 12. There was a sharp decline in the number of cot deaths in 1991, 1992 and 1993.

**This sharp decline has been associated with the extensive public education campaign carried out by the Sudden Infant Death Research Foundation that highlighted the association between the prone sleeping position and other risk factors with an increased incidence of cot deaths.** It is disappointing that the reduction in the number of cot deaths has not been sustained in 1994.

In reports before 1993, there were only 3 categories; Category A has not changed, former Category B is now subdivided to comprise Categories B and C, and former Category C is now termed Category D.

### 2A Explained

The 5 cot deaths in this category resulted from myocarditis (2), pneumococcal meningitis (1), bronchopneumonia (1) and adenovirus infection (1).

### 2B Significant Pathology Identified

The principal pathological finding in each of the 40 cases is listed in Table 35. Although significant, they were considered unlikely to have resulted in death. In many of these cases, other lesser abnormalities were also recorded.

### 2C Minor Pathology Identified

The principal condition in each of the 13 cases is listed in Table 35.

### 2D No Significant Abnormality Detected

There were 2 in this group compared with 4 in 1993 and 19 in 1992. (See [Figure 12.](#))

### Comments on the terms 'Cot Death' and 'SIDS'

The Council uses the term '**Cot Death**' to include all infants **where the death is sudden and unexpected on the clinical history** .

The term '**Sudden Infant Death Syndrome (SIDS)**' is defined as the **sudden death** of an infant or young child unexpected by history and **in whom a full necropsy fails to reveal an adequate cause of death**. The interpretation of the word 'adequate' is responsible for differences of opinion about the classification of a given case.

Some babies dying this way show no significant pathological abnormalities; it is accepted that mild upper respiratory infection manifested by inflammatory cell infiltration in the submucosa of the nasopharynx and /or trachea does not negate the diagnosis of SIDS. But what if the infection is more extensive, to involve say the bronchi, or some bronchioles or even a few small foci of pneumonia or pneumonitis? What about urinary tract infection, bilateral otitis media and gastroenteritis without dehydration?

Are infants showing these pathological changes at necropsy to be excluded? In the opinion of the Council, they should be included for 2 main reasons.

**First**, such infants full the first part of the definition; when put down to sleep they were not ill or were not sufficiently unwell to cause any concern.

**Secondly**, it is difficult to explain how relatively mild infections could cause death so quickly.

Accepting that the above minor infections are consistent with SIDS, what conditions would be considered inconsistent with SIDS, that is, conditions adequate to explain death? There are relatively few acute myocarditis, septicaemia (confirmed by blood culture and histological evidence of disseminated intravascular coagulation), accidental asphyxiation and some metabolic abnormalities known to be able to cause severe hypoglycaemia. In the presence of such pathological conditions, in this and past reports, they have been classified as 2A although it would also be appropriate to reclassify under the appropriate category infection, accidental asphyxiation, inborn error and the like.

**Recognizing this problem of definition, the Council has used the term 'Cot Death', defined as the sudden unexpected death of an infant or child, with the following subgroups, of which only groups 2B, 2C, and 2D can be categorized as SIDS.**

- **2A Explained**
- **2B Significant Pathology, Insufficient to Cause Death**
- **2C Associated Minor Condition Identified**
- **2D No Significant Abnormality Identified**

In a large experience of necropsies performed in Melbourne, such adequate causes of SIDS are rare. Thus between 70% and 80% of cases with a thorough necropsy (this is important) show some evidence of infection, and only 20% to 25% show none. **Less than 5% would fall into the 'explained' category** ([Figure 12](#)). As more causes of SIDS are discovered, a greater proportion of SIDS should be classified as 'explained.'

## Category 3 –Accidents

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**Tables/Figures**Figure 13: All Accidents, 1985 to 1994Figure 14: Motor Vehicle Accidents, 1985 to 1994Figure 15: Drownings, 1985 to 1994Table 33: Postneonatal Infant and Child Deaths, 1994

Table 36: Motor Vehicle Accidents

Table 37: DrowningsTable 38: Preventable Factors – Fatal Infant and Child Accidents, 1994

There were 39 accidental late infant and child deaths (Table 33); the numbers each year from 1985 to 1994 are shown in Figure 13. The steady reduction in deaths due to accidents continued in 1994.

**3A Motor Vehicle Accidents**

There was a further reduction to 14 in the number of fatal motor vehicle accidents, the lowest number recorded since the survey commenced in 1985 (Figure 14).

**There has been a 78% reduction in the number of deaths per year from motor vehicle accidents, from 69 in 1985 to 14 in 1994.** Table 36 shows the position of the deceased at the time of death; 11 were traffic accidents.

Table 36: Motor Vehicle Accidents	
Position of deceased	
Passenger	6
Pedestrian	4
Pedal cyclist	2
Motor cyclist	1
Fell from trailer on farm	1
Total	14

The 3 non-traffic deaths comprised children who were killed by a car reversing in the home driveway (1), crushed after falling off a trailer on a farm (1) and 1 in a motor cycle collision on a dirt track (Figure 14).

**3B Drownings**

There were fewer deaths due to drowning, 13 in 1994, 20 in 1993. Nevertheless, drowning remains an important, often preventable, cause of deaths in children under the age of 5 years. See Table 37: Drownings.

**The Council wishes to draw attention to the dangers to toddlers of unprotected swimming pools and of the adult bath if the young or disabled child is not supervised. Even with protected swimming pools and spas, parental vigilance is still required because protection may be inadequate or mechanically defective.** Figure 15 shows the number of drownings in the sites indicated from 1985 to 1994.

**3C Fire**

There were 3 accidental child deaths in the 1 house fire in 1994 (2 deaths in 1993).

### **3D Accidental Asphyxiation**

There were 4 deaths in this group, 1 child was asphyxiated in bed by a blind-cord, 2 children were accidentally hanged by a loop of rope, and 1 infant was wedged between the slats of a substandard cot.

### **3E Train**

The only reported train accident in 1994 occurred at a level crossing.

### **3F Other**

Of these 3 child deaths, 1 resulted from the ingestion of a poisonous plant, 1 from crushing due to a collapsing brick wall, and 1 child died while diving, the cause of death being unascertainable at necropsy.

## **Preventable Factors in Accidental Deaths**

The Council considered that at least 84% (32 of 38) accidental deaths were potentially preventable. (Table 38: Preventable Factors – Fatal Infant and Child Accidents, 1994)

This opinion is based on positive evidence provided in coroners', police and necropsy reports; particularly in relation to motor vehicle accidents and fire, information was sometimes incomplete, so that the number of preventable cases may have been higher.

Inadequate caretaker supervision was the most frequent preventable factor identified.

Sometimes, more than one preventable factor was coded; for example, with drowning in an unfenced pool, inadequate caretaker supervision was frequently also implicated.

## **Category 4 – Acquired Disease**

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### **Tables/Figures**

Table 39: Infections – Infant and Child Deaths

Table 40: Fatal Malignancies – 29 Days to 14 Years, 1993

Figure 16: Acquired Conditions, 1985 to 1994

There were 75 deaths due to acquired diseases. The numbers of cases in these categories from 1985 to 1994 are shown in Figure 16.

### **4A – Infection**

There were 11 deaths due to infection in 1994 (19 in 1993). Table 39 outlines the types of infection that caused these deaths.

### **4B – Malignancies**

The 45 infant and childhood deaths are outlined in Table 40. This was 12 more than in 1993.

#### 4C – Other Acquired Diseases

The 1 infant death was the result of endocardial broelastosis. There were 2 child deaths resulting from asthma, 3 from epilepsy (in 1 case, anticonvulsant medication was not taken) and 1 case each of hyper trophic, cardiac myopathy, systemic lupus, Moya Moya disease and immuno–deficiency syndrome.

**In the 10 years 1985 to 1994, there have been 42 deaths from asthma. Sudden death from asthma continues to be of concern.** It is important that asthma of all grades of severity be recognized and treated appropriately. Children with unrecognized or undertreated persistent asthma are at risk of a sudden fatal episode. Also, children with apparently trivial, infrequent asthma can develop, extremely rapidly, a severe episode of bronchospasm that may be fatal unless appropriate emergency measures are undertaken. It is thus essential that every patient with asthma, even the most trivial, should have a crisis plan to cope with a sudden severe episode. If there is no response to 1 or 2 doses of the normal bronchodilator medication then urgent professional help should be sought and usually this should be an ambulance. While awaiting the arrival of this help, the patient should continue to take very frequent or continuous doses of inhaled sympathomimetic.

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

#### 4D – Nonaccidental Trauma

Two deaths followed suspected child abuse and 6 resulted from homicide.

#### 4E – Suicide

This death was as a result of a self–inflicted gunshot wound to the head.

## Hospital Morbidity, 1994 to 1995

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### Tables/Figures

Table 41: Admission of Children Aged Less than 15 Years to Hospital in 1994 to 1995

Table 42: Maternal Deaths in Victoria, 1953 to 1994

As in the previous 3 reports, the Council is again providing figures on the admission of children aged less than 15 years to hospital. These figures were made available to the Council by the Acute Health Division of the Department of Health and Community Services and the Council is appreciative of this information.

In Table 42, data is provided on the admission rate per 1,000 and the average length of stay for the top 10 Australian National Diagnosis Related Groups (ANDRGs) Version 1

for children living in the metropolitan and non-metropolitan areas of Victoria. They cover admissions to both public and private hospitals. In 1994 to 1995, there was a 100% coverage of private hospitals whereas in 1993 to 1994 the coverage was 81%. As children are admitted to private hospitals predominantly for elective surgery, this improved coverage will alter some admission rates.

The pattern as seen in previous years continues. The admission rate for medical conditions such as asthma, laryngotracheitis and otitis media or respiratory infection continues to be substantially higher for non-metropolitan than metropolitan children. There are some interesting differences in elective surgical rates. That for dental extraction was almost twice for non-metropolitan than for metropolitan children whereas metropolitan children had a myringotomy rate of 50% higher than non-metropolitan. There is no obvious explanation for these differences other than medical practice. The high rate of admission of term newborn infants continues and this predominantly reflects coding practice.

The major differences between 1993 to 1994 and 1994 to 1995 admission rates were due to higher rates for elective surgery and are almost certainly due to the better coverage of private hospital data. The admission rate for laryngotracheitis was less in 1994-1995 than in 1993-1994 which relates to the Parainfluenzae type 1 epidemics in Victoria during the autumn of even years.

The second year of casemix funding for public hospitals does not seem to have had a significant effect on either admission rates or length of hospital stay. The period of admission of children to hospital in Victoria is short, reflecting good clinical practice, see [Table 41](#): Admission of Children Aged Less than 15 Years to Hospital in 1994 to 1995

## Maternal Deaths in Victoria, 1994

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### Tables/Figures

#### Table 42: Maternal Deaths in Victoria, 1953 to 1994

[Table 42](#) shows the number of births and maternal deaths from 1953 to 1994.

**A maternal death as defined by the World Health Organization is the death of a woman during pregnancy, childbirth or in the 42 days of the puerperium, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management.**

This definition includes death from abortion and ectopic pregnancy, but excludes incidental deaths from accidents, suicide, malignant tumours and so on.

**It should be noted that in this and other reports on maternal deaths in Australia these incidental deaths are included.**

**Maternal deaths are subdivided into 3 groups:**

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

**(3) Incidental deaths as defined above.**

In 1994, there were 7 maternal deaths. There were 2 direct maternal deaths, 3 indirect deaths and 2 incidental deaths. 1987 remains the only year in which no direct maternal death occurred in the State of Victoria. For comparison, it may be noted that the number of direct maternal deaths occurring in the 6 years from 1988 to 1993 were 3, 2, 6, 1, 2 and 3 respectively. For comparison, it is noted that of the 96 maternal deaths which occurred in Australia between 1988 and 1990, 37 were direct deaths, 33 indirect, and 26 were from incidental causes.

**Causes of the Seven Maternal Deaths**

The 2 direct deaths resulted from antenatal thromboembolism (1) and respiratory depression following Caesarean section in a woman with preeclampsia (1). The 3 indirect deaths were due to Eisenmenger syndrome (1), cerebral haemorrhage due to an arteriovenous malformation (1) and mitral valve obstructed by thrombus in a woman who had had mitral valve replacement (1). The 2 incidental deaths were due to acute demyelinating encephalitis (1) and a motor vehicle accident (1).

## Maternal Deaths in Victoria, 1994

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### Directs Deaths

#### Tables/Figures

#### Table 42: Maternal Deaths in Victoria, 1953 to 1994

(1) A 26 year old primigravida with **preeclampsia** at 38 weeks' gestation had a Caesarean delivery under **spinal anaesthesia with intrathecal morphine for postoperative analgesia**, after failed induction of labour with Prostin. The operation was uneventful and the woman was returned to the ward 2 hours later. The woman was found unrousable 16 hours after delivery; although resuscitated there was evidence of severe cerebral hypoxia, and ventilatory support was withdrawn 3.5 days after delivery. Autopsy showed evidence of hypoxic brain damage.

(2) A 23 year old woman became pregnant after **in vitro fertilization and embryo transfer**. She developed **deep venous thrombosis** in her leg, 21 days later. She was treated with heparin but suffered a massive **pulmonary thromboembolism** 29 days after the embryo transfer procedure and died in spite of treatment in an intensive care unit. She had a past history of deep venous thrombosis 7 years previously.

## Maternal Deaths in Victoria, 1994

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### Indirects Deaths

- (3) A 22 year old primigravida with known **Eisenmenger syndrome** and acute fetal distress at 35 weeks' gestation was delivered by Caesarean section with Intensive Care monitoring. **Cardiopulmonary failure** occurred 24 hours after an 'uncomplicated' Caesarean section and despite skilled resuscitative efforts. Death occurred 2 days after delivery. The baby survived.
- (4) A 35 year old developed headache and nausea 7 hours after normal uneventful delivery of her second child; her blood pressure was normal but 20 minutes later she collapsed and was clinically dead. She was resuscitated and CAT scan confirmed the diagnosis of **intracerebral haemorrhage**. An **arteriovenous malformation** in the cerebellum was treated surgically but the woman did not regain consciousness and died 8 days after delivery.
- (5) A 33 year old primigravida with **porcine mitral valve replacement** 18 months previously had an elective Caesarean delivery at 39 weeks' gestation because of breech presentation and contracted pelvis. She did not receive anticoagulation therapy and went home 8 days after delivery. She developed numb arms 10 days after delivery but did not call for medical attention and died at home. Autopsy revealed **obstruction to the mitral valve by an adherent thrombus** (0.8 cm) continuous with a large ball thrombus (4 x 3 x 3cm).

## Maternal Deaths in Victoria, 1994

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### Incidental Deaths

- (6) A 31 year old para 1 developed headache, ataxia and deteriorating conscious state with focal neurological signs at 15 weeks' gestation. The diagnosis was **acute demyelinating encephalitis**. After craniotomy and insertion of a shunt, the pregnancy continued until intrauterine death occurred at 18 weeks. The woman's condition deteriorated and she died 2 days later, undelivered.
- (7) A 21 year old para 1 was 38 weeks' pregnant when the car in which she was a rear seat passenger (middle position) veered to the wrong side of the highway and collided with another vehicle. She was taken to hospital and died after Caesarean section of a stillborn infant, from multiple injuries to the brain, abdomen and pelvis.

## Standards of Antenatal Care

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

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### Antenatal Care

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

1. The patient should consult her doctor during the first 8 weeks of pregnancy.

2. First consultation:

(a) General medical, nutritional, and socioeconomic and demographic history.

(b) Past obstetric history including previous contraception.

(c) A general physical examination of all systems including:

- ◇ record of height, weight and blood pressure;
- ◇ examination of varicose veins; and
- ◇ the teeth, gums, heart, lungs, breasts and nipples.

(d) Obstetric examination which includes:

- ◇ vaginal examination for detection of abnormalities such as vaginitis or an ovarian cyst. Cytological screening for cervical cancer is recommended;
- ◇ consideration of the size and shape of the bony pelvis;
- ◇ correlation of the size of the uterus with the period of amenorrhoea. To check the duration of pregnancy ask patient to write down the date when she first notices fetal movements.

(e) Where duration of pregnancy is in doubt, arrange for ultrasonography to be performed.

**Ultrasonologists recommend 18 weeks as the preferable time for an ultrasound examination rather than the spread of 14 to 18 weeks.**

(f) Haematological investigations, including haemoglobin level, blood grouping with rhesus grouping, serological diagnostic test for syphilis, rubella antibodies, and an antibody test (indirect Coombs) in both Rh–D negative and positive women.

(g) Record the use of all therapeutic substances and significant nontherapeutic substances such as alcohol, tobacco and narcotic substances. Caution the patient regarding the use of drugs (other than iron and folic acid) in pregnancy.

(h) The emotional needs of the patient should be assessed.

(i) Education is of great importance. This should include personal hygiene, dental care, nutrition and diet counselling, antenatal preparation for pregnancy and labour, lactation, parentcraft and contraceptive information.

3. Average intervals for subsequent consultation should be:

- ◇ each 4 weeks to 28 weeks; then
- ◇ each 2 weeks to 36 weeks; then
- ◇ thereafter weekly until delivery.

4. Routine examinations at each consultation to include the following:

(a) weight;

(b) blood pressure;

(c) abdominal examination; and

(d) urine examination for protein, sugar, nitrates. Presence of proteinuria warrants further investigation.

5. Women with an identified potential of a high-risk delivery, that is, previous Caesarean section, multiple pregnancy or breech presentation, should be considered for referral to an appropriate hospital for delivery.

6. Where there is inappropriate maternal weight gain or uterine growth the following possibilities should be considered:

- (a) polyhydramnios;
- (b) intrauterine growth retardation;
- (c) twinning or multiple pregnancy; or
- (d) congenital abnormalities.

Any one of these may be an indication for ultrasonography and/or other assessments of fetal well-being.

7. A screening test for **gestational diabetes** at 26 to 28 weeks and for **fetoplacental function** at 30 to 34 weeks should be considered in all women.

8. **At 30 weeks:**

- (a) Haemoglobin level should be repeated.
- (b) Where Rh negative, the indirect Coombs test should be repeated and again at 36 weeks and 40 weeks.

9. When complications are present or anticipated consultation should be sought promptly and admission to hospital with appropriate facilities should be arranged.

## Standards of Antenatal Care

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### "At Risk" Pregnancies

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

#### 1. General Factors

- ◆ age (early teenage, later reproductive years);
- ◆ social class (underprivileged);
- ◆ aboriginality;
- ◆ parity (primigravida and gravida 4+);
- ◆ height (short stature);
- ◆ weight (overweight and underweight);
- ◆ dietary aberrations;
- ◆ drug addiction and abuse of alcohol or tobacco;
- ◆ mental disturbance.

## 2. Maternal Diseases

- ◆ cardiovascular disease including hypertension;
- ◆ diabetes mellitus;
- ◆ anaemias (all types);
- ◆ chronic renal disease including recurrent urinary infection;
- ◆ past history of venous thrombosis and/or pulmonary embolism.

## 3. Family History of a Genetic Disorder

## 4. Bad Obstetric History

- ◆ previous Caesarean section;
- ◆ previous abortion, including habitual abortion;
- ◆ previous perinatal mortality;
- ◆ previous premature labour or placental insufficiency.

## 5. Diseases Peculiar to Pregnancy

- ◆ preeclampsia;
- ◆ rhesus and other blood group incompatibility.

## 6. Bleeding in Pregnancy

- ◆ threatened abortion;
- ◆ abruptio placentae;
- ◆ placenta praevia.

## 7. Obstetric Difficulties Discovered Antenatally

- ◆ malpresentation especially breech presentation and transverse lie;
- ◆ disproportion.
- ◆ **Multiple Pregnancy**
- ◆ placental insufficiency and retarded intrauterine growth;
- ◆ prolonged pregnancy (past 42 weeks);
- ◆ premature rupture of the membranes.

## 8. Patients Having Inadequate Antenatal Care

- ◆ failure to attend for regular antenatal checks;
- ◆ nonbooked cases;
- ◆ late booked cases.

## 9. Difficulties Discovered During Labour

- ◆ failure to progress satisfactorily, including prolonged labour;
- ◆ fetal distress;
- ◆ malpresentation.