Clinical Practice Guideline
for
Perinatal Mortality

THE PERINATAL SOCIETY OF
AUSTRALIA AND NEW ZEALAND

Perinatal Mortality Group
http://www.psanzpnmsig.org.au
Clinical Practice Guideline for Perinatal Mortality Audit

Produced by:
The Perinatal Mortality Group of the Perinatal Society of Australia and New Zealand in collaboration with the Australian and New Zealand Stillbirth Alliance.

Compiled by:
The Mater Mothers’ Research Centre (previously Centre for Clinical Studies), Mater Health Services, Brisbane.

Supported by:
The Perinatal Society of Australia and New Zealand; Royal Australian and New Zealand College of Obstetricians and Gynaecologists; SIDS and Kids Queensland; Stillbirth and Neonatal Death Support Group (SANDS) Queensland (QLD); and Mater Health Services, Brisbane, Queensland.

Endorsed by:
Perinatal Society of Australia and New Zealand; Australian and New Zealand Stillbirth Alliance; Royal Australian and New Zealand College of Obstetricians and Gynaecologists; Australian College of Midwives Incorporated; SIDS and Kids; SANDS (QLD); Australian College of Neonatal Nursing (previously Australian Neonatal Nursing Association); Bonnie Babes Foundation; Stillbirth Foundation Australia.

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IMPORTANT NOTICE

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 in Australia and New Zealand. The overall aim is to reduce the risk of perinatal death and provide appropriate assistance to parents.

This is the second edition of the PSANZ Clinical Practice Guideline for Perinatal Mortality Audit. In preparation of this document input from many stakeholders was sought. The first edition was finalised in March 2005 following wide consultation and endorsement by the Perinatal Society of Australia and New Zealand; Royal Australian and New Zealand College of Obstetricians and Gynaecologists; Australian College of Midwives Incorporated; SIDS and Kids; SANDS (QLD); and the Australian Council of Neonatal Nurses (previously the Australian Neonatal Nurse Association). The guideline sections 1-6 were reviewed and revised and made available in December 2008. Subsequently, Section 7 was revised and incorporated into this the second edition, Version 2.2, April 2009. This guideline will be reviewed and updated as required on or before April 2011. However, as the recommended data collection within Section 1 is currently being revised, it is anticipated that an update of this section will become available in late 2009.

The guideline is not intended to be prescriptive, but is designed to provide reliable, up-to-date information enabling integration of best evidence, clinicians’ judgement and individual choice in arriving at decisions about care. Clinical practice guidelines may be considered as generally recommended practice. Inevitably, given the nature and sensitivity of the subject and the lack of high quality studies, some contentious issues remain. The Working Party welcomes comments which will assist with further refinement of the Guideline in the future. Comments should be sent to Vicki Flenady, Email: vicki.flenady@mater.org.au with ‘Perinatal Mortality Guideline’ in the subject line.
SPECIAL THANKS

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This document may be downloaded from the Perinatal Society of Australia and New Zealand Perinatal Mortality Group website at www.psanzpnmsig.org
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SECTION 1  OVERVIEW AND SUMMARY OF RECOMMENDATIONS

1.1 Introduction

In acknowledging the importance of developing a systematic approach to the audit and review of perinatal deaths in Australia and New Zealand (ANZ) and the need to support audit and research activities aimed at reducing perinatal death, the Perinatal Society of Australia and New Zealand (PSANZ)[1-3] endorsed the establishment of the Perinatal Mortality Group (PSANZ-PMG)[4] in March 2003. The establishment of this group was the culmination of collaborative efforts of members of the PSANZ over many years. The first major activity of the PSANZ-PMG was the development of a classification system for perinatal deaths. The PSANZ Perinatal Death and Neonatal Death Classifications[5] have been developed and are in use across Australia and some jurisdictions in New Zealand (Please see Section 7 Perinatal Mortality Classifications of the guideline for further details). The development of this guideline is the second major activity of the PSANZ-PMG.

In 2007, the Department of Health and Ageing, Canberra provided seed funds to establish the Australian and New Zealand Stillbirth Alliance (ANZSA) to address the problem of stillbirth. One of the key objectives of ANZSA is to assist in the implementation of the PSANZ guidelines for perinatal mortality audit. ANZSA is working with the PSANZ-PMG to achieve this objective through the establishment of regional coordinators and conduct of educational programs for clinicians. For further information please go to the ANZSA website: www.stillbirthalliance.org/anz

The guideline is presented in 7 Sections as follows:
Section 1  Overview and summary of recommendations;
Section 2  Institutional perinatal mortality audit;
Section 3  Psychological and social aspects of perinatal bereavement;
Section 4  Perinatal post-mortem examination;
Section 5  Investigation of stillbirths;
Section 6  Investigation of neonatal deaths; and
Section 7  Perinatal mortality classifications.

This first section contains an overview of the guideline including a summary of key recommendations.

A Perinatal Mortality Audit Package, which includes checklists and data collection forms, is provided to assist clinicians in implementation of the recommendations and to enhance the quality of information available for audit and research activities. This data collection tool is under revision and will be disseminated in late 2009. To ensure the guideline remains relevant and useful, review, and revision as required, is planned as a minimum every two years. To ensure the most up-to-date version of the guideline is easily accessible, the guideline will not be produced as a bound document but rather each section will be made available in a downloadable format from the PSANZ website: www.psanz.org.au.

1.2 Background and rationale

In Australia for the year 2006, based on data from the National Perinatal Statistics Unit (6) there were 282,619 births, and 2907 perinatal deaths giving a perinatal mortality rate (PMR) of 10.3 per 1000 births. The perinatal mortality comprised of 2091 fetal deaths, giving a fetal death rate (FDR) of 7.4 per 1000 births, and 816 neonatal deaths giving a neonatal death rate (NDR) of 3 per 1000 livebirths. Due to differences in reporting processes, the PMR calculated according to the Australian Bureau of Statistics (ABS), was 8.5 per 1000 (FDR 5.4, NDR 3.1) for the same year. In Australia in 2006, the PMR of babies born to Aboriginal or Torres Strait Islander mothers was approximately double that of babies born to other mothers (20.7 versus 10.1)(6).

In New Zealand in 2004, there were 58,723 births and 666 perinatal deaths, giving a PMR of 11.2 per 1000 (8.5 and 3.4/1000 for fetal and neonatal death rates respectively) (7).

Differences in definitions and reporting processes across regions within Australia and New Zealand (ANZ) make comparisons of perinatal mortality rates difficult, and it is hoped that these differences will be addressed by the various reporting agencies.

According to ABS data, the PMR in Australia declined by nearly two-thirds over the period from 1973 - 2000 from 23 per 1000 to the current rate of approximately 8 per 1000(8). The fall in the neonatal death component (a 75% reduction from 12.6 to 3 per 1000) was greater than the fetal death reduction which fell by 50% from 11 to 5 per 1000 births. Fetal death after the onset of labour has decreased by two-thirds. Antepartum deaths decreased to a lesser extent (46%)(8) and currently make up approximately 65% of all fetal deaths(6). This pattern is similar to other higher income countries where the reduction in the PMR is largely due to a decrease of deaths resulting from intrapartum asphyxia, birth trauma, and
isoimmunisation\(^{(9-11)}\). Congenital abnormality, unexplained fetal death and spontaneous preterm births have now emerged as the leading causes of perinatal death\(^{(10, 12-14)}\). Using the PSANZ-PDC the leading categories of causes for perinatal death are Congenital anomaly and Spontaneous preterm. Approximately 20-30% of stillbirths are classified as unexplained \(^{(12, 15)}\). These are therefore the categories where efforts to further reduce the PMR need to be focussed. Contributing factors relating to care (also called sub-optimal, avoidable or suspected preventable factors) have been reported in approximately 30-50% of perinatal deaths\(^{(13, 16-18)}\) and therefore also require consideration as part of routine review of perinatal deaths by hospital committees. The report of the inquiry into Obstetrics and Gynaecology Services at the King Edward Memorial Hospital\(^{(19)}\) highlighted the importance of clinical audit of perinatal deaths as part of ongoing clinical practice improvement.

The lack of comprehensive systematically collected information across ANZ hinders research and audit activities aimed at further reducing perinatal mortality. Inadequate investigation of a perinatal death limits the information available to health care providers and parents to assist with the understanding of the reasons for the death and also for planning future pregnancies.

It is hoped that systematic implementation of the recommendations included in this guideline through the planned educational programs of the PSANZ-PMG and ANZSA combined with local support from regional coordinators will enhance the quality of investigation and audit of perinatal deaths and care for parents following a perinatal death.

1.3 Purpose of the guideline

The main purposes of the guideline is to enable a high quality systematic approach to the provision of care around the time of a perinatal death including investigation and audit and bereavement care for parents across Australia and New Zealand (ANZ) to:

- enhance the accuracy of information about the causes of death and important contributing factors for stillbirth which will:
  - assist parents in gaining a better understanding of the cause of the death of their infant;
  - assist parents and clinicians in the planning and management of future pregnancies;
  - enhance the ability to undertake effective monitoring of strategies aimed at reducing perinatal deaths; and
  - contribute to the body of knowledge to further reduce perinatal death;
- enhance the quality of bereavement care for parents and families around the time of a stillbirth or neonatal death.

1.4 Intended audience

The intended audience for the guideline is clinicians providing maternity and newborn care in hospitals in ANZ, and all other parties with an interest in perinatal mortality audit, bereavement care and research.

1.5 Methods

The PSANZ-PMG commissioned the Mater Mothers’ Research Centre (MMRC) (previously Centre for Clinical Studies), Mater Health Services, Brisbane to develop the guideline. The MMRC followed the National Health & Medical Research Council (NHMRC) recommended process for guideline development, which included the development of a multidisciplinary Working Party; searching for existing guidelines and a systematic literature search. Due to a lack of high quality evidence to guide the process of mortality audit, the recommendations are based on consensus by the Working Party after review of the available information; levels of evidence are therefore not referred to in the guideline. Subgroups of Working Party membership were formed to develop each section of the guideline prior to a wider distribution for comment. For this current update the Mater Mothers Research Centre (previously Centre for Clinical Studies) undertook a comprehensive literature review, screened all findings for relevance and incorporated new publications where relevant throughout.

(Please see Section 1; Appendix 1 Methods of guideline development for further details)
1.6 Changes in this update

The updated literature review did not identify any publications which have major implications for the current recommendations. Therefore only minor changes have been made to the guidelines. These changes are largely based on consensus of the Working Party. In brief, the main changes relate to:

a) The title and recommended citation of the guideline have been revised for clarity.
b) Section 1: The Purpose of the Guideline (Item 1.3) has been revised to more clearly incorporate the bereavement aspects of the guideline.
c) Sections 4, 5 & 6: the wording of the recommendation for seeking consent for a perinatal autopsy to ensure that autopsy is an option for parents and not mandated (“offering the option of the procedure” is now stated instead of “seeking consent for the procedure”);
d) Section 5: expansion of the recommended core investigations for stillbirths to include: Bile acids, thyroid function and Guthrie test. Further testing for thrombophilia has been expanded to include Antithrombin III and MTHFR testing for cases infants with cleft lip or palate and cardiac abnormalities. It is also suggested that the follow-up testing recommended at 8-12 weeks testing can be undertaken at birth where relevant with follow-up testing as required.
e) Section 6: Addition of a CRP to the recommended investigations for high risk newborn infants presenting at birth with suspected infection or severe cardiorespiratory depression.
f) Section 7: Inclusion of an additional digit in the PSANZ-PDC classification to identify all terminations of pregnancy. Additional subcategories have been included in both the PSANZ PDC and NDC. Please see Section 7 for full details.

These changes are listed in detail in Section 1; Appendix 1. Further, the Working Party plan to collaborate with the New Zealand Maternal Perinatal Mortality and Morbidity Committee in revising the minimum dataset for perinatal death audit and reporting currently included within the Perinatal Mortality Audit Package in Section 2 of the guideline. Once finalised, the data collection tool will be disseminated to hospitals via the PSANZ-PMG/ANZSA regional coordinators. (For details of regional coordinators, please see Appendix 3).

1.7 Summary of key recommendations

1.7.1 Section 2: Institutional perinatal mortality audit

(i) Implementation of the guideline

The PSANZ Clinical Practice Guideline for Perinatal Mortality Audit should be implemented in all institutions where births occur.

Strategies to assist in the uptake of the guideline into practice at the hospital level should be implemented. These strategies may include: identifying and addressing local barriers to uptake; ongoing structured and unstructured education for clinical staff including clinical leader advocacy; and implementing an audit and feedback mechanism on compliance with guideline recommendations.

(ii) Perinatal mortality review committees

Format

A format for review of perinatal deaths needs to be developed in each institution, taking into account principles of confidentiality and impartiality. All perinatal deaths should be reviewed by the Perinatal Mortality Committee, including deaths of infants born within the service but who died elsewhere. Maternity services (particularly smaller hospitals) may choose to combine the functions of the perinatal mortality review committee with another hospital committee or regional mortality review committee.

Purpose

The functions of the perinatal mortality committee should include:

- review of all stillbirths and neonatal deaths;
- classification of perinatal deaths according to the Perinatal Society of Australia and New Zealand (PSANZ)-Perinatal Death Classification (PDC) and Neonatal Death Classification (NDC);
- evaluation of the circumstances surrounding the death including a consideration of contributing factors; and
- on the basis of such considerations, the development of recommendations for improving processes of care, ensuring feedback to clinicians;
• implementation of action required based on these recommendations;
• provision of a confidential case summary to the relevant agency within the jurisdiction’s Health Department; and
• coordination of care for parents following a perinatal death including follow-up.

Membership
The Perinatal Mortality Committee meetings should include multidisciplinary involvement, including those who are familiar with the circumstances of the death.

Membership of the Perinatal Mortality Committee should include representatives from: obstetrics, neonatology/paediatrics, pathology (preferably a perinatal/paediatric pathologist), midwifery, neonatal nursing, social workers, other relevant medical specialists, and allied health professionals.

It is the responsibility of each institution’s management to ensure that committee members and their deliberations are indemnified while undertaking this kind of audit on their behalf.

(iii) Review of a perinatal death
The review should take place as soon as possible after the death, once results of core investigations are available.

The main cause of death and associated maternal/fetal/neonatal conditions, if present, should be classified according to PSANZ-PDC for all perinatal deaths and in addition for all neonatal deaths the PSANZ-NDC.

The review of each perinatal death should include consideration to the presence of potentially contributing factors in three main areas:
• maternal/social i.e. factors relating to the woman including her social situation;
• infrastructure/service organisation i.e. factors related to the setting in which the care was provided; and
• professional care delivery i.e. factors relating to the clinical care provided.

At the review of each perinatal death, consideration should be given to the adequacy of communication with parents and between health care professionals and the investigations undertaken.

(iv) Data collection, documentation and reporting
Clinicians should ensure that all relevant clinical details are documented clearly and accurately in the medical record at the time of the event and that all relevant documentation is completed according to local policy.

The Medical Certificate of Perinatal Death should be completed by, or under the supervision of, the Consultant responsible for care with due consideration to presence and significance of all perinatal conditions and complications. A revised Medical Certificate of Perinatal Death should be submitted, following review by the Perinatal Mortality Committee, where required.

A comprehensive confidential clinical summary should be completed for every perinatal death to facilitate local audit and, if required, forwarded to the relevant agency within the jurisdiction’s Health Department.

A standardised data set should be collected for all perinatal deaths. This data set includes all significant family, medical and obstetric history; all major pregnancy complications including whether the pregnancy was terminated; and investigations undertaken around the time of the death including placental histopathology and autopsy.

The PSANZ Perinatal Mortality Audit Package (Section 2; Appendix 1) is recommended for data collection and perinatal mortality review.

(v) Communication and feedback
Notification of the death to the General Practitioner and other relevant care providers should be undertaken as soon as possible after the death. This should be followed by a comprehensive clinical summary promptly after review of the death.
A process of feedback to clinicians needs to be in place so that individual practices and hospital policy can be improved as a result of the review process. This includes standards in relation to perinatal mortality investigation, documentation and communication.

A follow-up consultation service should be provided for all parents following a perinatal death.

1.7.2 Section 3: Psychological and social aspects of perinatal bereavement

(i) **Respect**
   - For baby: deceased baby to be treated with same respect as live baby
   - For parents: parents need to feel supported and in control; death validated
   - Cultural/religious practices: different approaches to death and rituals respected

(ii) **Provision of information**
   - Timing of information: allow plenty of time to discuss issues at most appropriate time
   - Delivery of information: clear, honest and sensitive. Repeat important information. Ensure both parents are present
   - Mode of information: fact sheet/written information given for frequent reference
   - Withdrawal of support: parents given prognostic information to reach decision
   - Terminology: parent friendly language. Do not use terms such as fetus
   - Post-mortem Examination: verbal and written information given. Allow time for discussion

(iii) **Birth options**
   - Timing: ascertain appropriate time to discuss birth options following determination of a fetal death in utero or abnormalities
   - Mode of delivery: benefits of birthing options given

(iv) **Time**
   - Parents are given time to make decisions
   - Inform parents of how much time can be spent with baby

(v) **Hospital stay**
   - Environment: parents are given the option of a private room in surgical, maternity or gynaecological ward
   - Universal symbol placed outside room to alert all staff of death

(vi) **Creating memories**
   - Spending time with baby: no hurry to leave baby or hospital. Option to take baby home
   - Parenting baby: inform parents that they can hold, undress, bath baby
   - Mementos: helpful for long-term grief outcome. (Please see Section 3.2.6)
   - Baptism/blessing: inform parents that this can be arranged through the hospital

(vii) **Special circumstances**
   - Multiple Pregnancies: special care is required in the circumstance where some infants in a multiple pregnancy survive
   - Maternal illness: consideration given regarding access to baby/memory creation
   - Previous perinatal/child death: consider impact of previous death/s on emotional response to and coping with current death

(viii) **Aftercare**
   - Maternal changes: advise on milk production and methods to manage supply
   - Support services for parents and children: written information given regarding available support services for parents and children
   - Grief: inform parents of expectations of grief journey
   - Follow up/Appropriate referral: expectations for 6 week check up – other babies present

(ix) **Autopsy**
   - Parents given choice of funeral directors
   - No urgency to organise funeral
   - Continued access to baby if desired
Health care professionals
Education: specific training in support skills given to relevant staff
Access to support: debriefing/support services available to staff working with perinatal death

1.7.3 Section 4: Perinatal post-mortem examination

(i) Autopsy rates
Clinicians should discuss the value of an autopsy with the parents in all cases of a perinatal death and offer the option of the procedure.

To increase the rates of perinatal autopsy:
- Clinicians should collaborate with pathologists and parent groups such as Stillbirth and Neonatal Death Support (SANDS) and SIDS and Kids to raise public awareness of the value of perinatal autopsy and to advocate for high standards in perinatal autopsy at the local and government level.
- Clinical leaders should promote formal and informal educational opportunities for clinicians on: post-mortem examination procedures; the potential benefits of an autopsy; compassionate counselling and obtaining parental consent; and address specific local barriers to the conduct of perinatal autopsy.

(ii) Placenta, membrane and cord histopathology
Following a stillbirth, neonatal death in the delivery room or birth of a high risk infant, the placenta, membrane and cord should be sent fresh and unfixed for examination by the perinatal/paediatric pathologist regardless of whether consent for an autopsy has been gained.

(iii) Quality and minimum standards
The Guidelines on Autopsy Practice produced by the Royal College of Pathologists should be used for guidance on minimum standards until guidelines for Australia and New Zealand are developed.

Specific protocols developed for post-mortem examination in the circumstance of Sudden Unexpected Death in Infancy and deaths with suspected genetic metabolic disorders should be followed (Please see Section 4 for further details).

A perinatal/paediatric pathologist should perform or supervise all perinatal post-mortems. Clinicians should request autopsies from the service providing the highest quality.

Transport to a centre with appropriate expertise should be arranged to ensure that all perinatal post-mortem examinations are of sufficient quality. Transport should be arranged with a registered undertaker.

A comprehensive maternal history should accompany the baby for a post-mortem examination including:
- clinical/obstetric history including relevant previous obstetric history (Please see Section 2; Appendix 3);
- copy of the death certificate;
- copies of all antenatal ultrasound reports; and
- copy of amniocentesis report if available.

(iv) Post-mortem reporting
Guidelines for post-mortem reports produced by the Royal College of Pathologists should be used as a guide for reporting of perinatal post-mortem examinations.

Ideally, a preliminary post-mortem report should be forwarded to the referring clinician within 3 working days of the post-mortem. The final report should be forwarded to the referring clinician within 8 weeks of the post-mortem.

The post-mortem report should be made available to the parents at a time when the primary care clinician is present to discuss the findings.

A Plain Language Report (PLR) should be available to parents on request.
A request for the General Practitioner to receive a copy of report (including the PLR if available) should be explicit on the request form, as they are the main care provider on discharge.

(v) Communication and consent for post-mortem examination
Where possible, a senior clinician who has established a rapport and understanding with the parents and who has a clear understanding of the autopsy procedure should discuss the value of a post-mortem examination and offer the option of the procedure. The clinician should have a high level of communication skills and knowledge of the post-mortem examination, preferably having witnessed several perinatal post-mortem examinations.

The clinician approaching for autopsy consent should discuss the options for a full, limited or stepwise post-mortem examination; the issue of retained tissues; the value of the autopsy and the possibility that the information gained may not benefit them but may be of benefit to others. Parents should be given written information explaining the post-mortem examination.

When consent has been obtained for specific organ/s to be retained for further examination, the parents should be offered the choice of either delaying the funeral until the organs can be returned to the body or specifying their preferred method of organ disposal.

Consent for the autopsy which clearly outlines the extent of the investigation should be recorded on an approved consent form, relevant to the jurisdiction.

The pathologist should be available to discuss the autopsy with the parents before and/or after the procedure and, where possible, the requesting clinician should attend the autopsy and provide the parents with a preliminary report immediately after the examination.

(vi) Costs of a post-mortem examination and transport
Clinicians need to be aware of costs associated with transfer of an infant from non-metropolitan areas to the tertiary centre for post-mortem within their region and to inform parents of any personal cost implications.

1.7.4 Section 5: Investigation of stillbirths
A post-mortem examination, including examination of the placenta, by a perinatal/paediatric pathologist should be offered to all parents following stillbirth.

Following a stillbirth, the placenta, membranes and cord should be sent to the perinatal pathologist fresh and unfixed for macroscopic and histological examination regardless of whether consent for autopsy has been gained.

(Please refer to Section 4 Perinatal post-mortem examination for further details, including rationale, on autopsy and placental pathology.)

A non-selective approach according to a list of recommended Core Investigations should be adopted for all stillbirths. This non-selective approach is defined as investigations which should be undertaken as the standard approach for all stillbirths, debating the relative merits of not following this approach on an individual case basis.

Further investigations should be undertaken according to the particular clinical problem (See Item 5.2.2).
(i) **Core Investigations for all stillbirths**

At diagnosis of a fetal death
- Comprehensive maternal and family history;
- Ultrasound scan to detect possible fetal abnormalities and to assess amniotic fluid volume;
- Amniocentesis (where available) for cytogenetic and infection investigation;
- Low vaginal and peri-anal swab to culture for anaerobic and aerobic organisms;
- Blood tests:
  - Full blood examination;
  - Serology for Cytomegalovirus, Toxoplasma, Parvovirus B19;
  - Rubella and Syphilis if not already undertaken in this pregnancy;
  - Blood group and antibody screen if not already undertaken in this pregnancy;
  - Kleihauer-Betke test;
  - Renal Function Tests including Uric Acid;
  - Liver Function Tests including Bile acid:
    - Thyroid Function Tests;
    - HbA1c;
    - Anticardiolipin antibodies;
    - Lupus anticoagulant; and
    - Activated protein C (APC) resistance.

Following birth
- External examination of the baby (by a perinatal pathologist, neonatologist or paediatrician where possible);
- Clinical photographs;
- Surface swabs (ear and throat) for microbiological cultures;
- Post-mortem examination;
- Blood samples from the cord or cardiac puncture for investigation of infection;
- Blood samples for chromosomal analysis and Guthrie test;
- Detailed macroscopic examination of the placenta and cord;
- Placental microbiological cultures;
- Placental and amnion biopsy for chromosomal analysis; and
- Placental histopathology.

(ii) **Further investigations for thrombophilia**

Further investigation for thrombophilia should be undertaken 8-12 weeks postnatally where a fetal death is associated with fetal growth restriction, pre-eclampsia, maternal thrombosis and/or maternal family history of thrombosis, remains unexplained following the core investigations or where tests for thrombophilia were positive at the time of the intrauterine fetal death (IUFD) as follows:

- Anticardiolipin antibodies; and Lupus anticoagulant repeated if positive at the time of the IUFD or initial testing if not previously undertaken;
- APC resistance if not undertaken at birth;
- Factor V Leiden mutation if APC resistance was positive at birth;
- Fasting Homocysteine and if positive test for *MTHFR gene mutation;
- Protein C and S deficiency; and
- Prothrombin gene mutation 20210A; and
- Anti-thrombin III

These additional thrombophilia tests may be performed at birth where the above specific conditions eg fetal growth restriction are known. MTHFR mutation testing should be performed when the following fetal anomalies are identified: cleft lip/palate, neural tube defects or congenital cardiac defects.
1.7.5 Section 6: Investigation of neonatal deaths

(i) Neonatal deaths
Clinicians should discuss the value of an autopsy with the parents in all cases of a neonatal death and offer the option of the procedure.

A newborn screening blood sample should be performed for all neonatal deaths if not undertaken before the death occurred.

A detailed external examination including recommended photographs of the baby should be performed by a perinatal pathologist or an experienced Neonatologist or paediatrician where possible.

(ii) High risk infant
Close collaboration between the obstetric/midwifery and neonatal care teams is required to ensure that relevant maternal and neonatal factors are considered in the investigation of the neonate.

The following core investigations are recommended at the birth of high risk infants:

- detailed external examination of the baby by a neonatologist or paediatrician (where possible) with clear documentation of the findings in the medical record;
- A comprehensive maternal medical, social and antenatal history including the results of investigations should be documented in the medical record by the obstetric staff;
- Cord blood gas analysis including both arterial and venous samples;
- A detailed macroscopic examination of the placenta and cord and documentation of the findings in the medical record by the obstetric staff; and
- Placenta, cord and membranes sent fresh and unfixed to pathology for histopathological examination.

Further investigations are recommended for particular clinical scenarios (Please see Section 6 Investigation of neonatal deaths for further details).

1.7.6 Section 7: Perinatal Mortality Classification

Please See Section 7
1.8 References


Section 1: Appendix 1 Methods of guideline development

The guideline has been developed by the Perinatal Society of Australia and New Zealand Perinatal Mortality (PSANZ-PMG)(4). The Centre for Clinical Studies (CCS) (now Mater Mothers’ Research Centre), Mater Health Services, Brisbane was originally commissioned by the PSANZ-PMG (through funding made available by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, SANDS Queensland and SIDS and Kids) to coordinate the development of the guidelines. The MMRC conducted the literature search and collated the review and assembled the draft guidelines in consultation with Working Party members. In this second revision (2008/2009), the PSANZ-PMG collaborated with Australia and New Zealand Stillbirth Alliance (ANZSA) with funds made available by PSANZ and ANZSA.

Perinatal Mortality Audit Guidelines Working Party
The Working Party was originally convened in March 2004 to:

- produce a guideline on Perinatal Mortality Audit for use in ANZ;
- identify gaps in current information and data for the ongoing refinement and evaluation of the above guideline; and
- collaborate with local and national bodies in the development, implementation and evaluation of the guideline including the impact on health outcomes

In fulfilling this task, the Working Party followed the procedures recommended in the NHMRC documents: Handbook series on preparing clinical practice guidelines, endorsed November 1999(22). This process included attention to the following steps:

- define the scope of the guidelines in order to: ensure clinical relevance; identify further questions, target groups and relevant health outcomes to be addressed by the guidelines;
- assess any existing guidelines;
- undertake (or commission) a systematic review of the literature and evaluate the extent and strength of the scientific evidence relating to the effectiveness and appropriateness of the relevant interventions;
- refine the evidence-based guidelines and other materials to explain guidelines to consumers and other defined target groups;
- undertake wider consultation;
- disseminate and implement guidelines; and
- evaluate and maintain guidelines.

The Working Party was re-convened in February 2008 to review and update the guideline. A one-day meeting was held in Sydney to discuss the required changes on the basis of which amendments were made and finalised through email communication. The revisions to Section 7 were finalised in April 2009.

Consultation process:
For the first version of the guideline, two meetings were held in March 2004 at the PSANZ 8th Annual Congress, Sydney, Australia; one meeting involved the whole Working Party; the other, the perinatal pathologists. Subsequently, subgroups of the Working Party were set up for each of the major sections of the guideline based on the interests of the members. Consultation was undertaken with the subgroup members by email and telephone to produce a final draft for consultation.

Organisations included in the wider consultation were as follows:

- ACMI Australian College of Midwives Incorporated
- ACNN Australian College of Neonatal Nurses
- HGSA Human Genetics Society Australasia
- PSANZ Perinatal Society of Australia and New Zealand
- RANZCOG Royal Australian and New Zealand College of Obstetricians and Gynaecologists
- SANDS (Qld) Stillbirth and Neonatal Death Support Group (Qld)
- SIDS & Kids Sudden Infant Death & Stillbirth and Kids
- ANZNN Australian and New Zealand Neonatal Network
- Bonnie Babes Foundation
- The Stillbirth Foundation Australia
SBF Stillbirth Foundation Australia
BBF Bonnie Babes Foundation
*second edition of the Guideline only.
## Working Party Membership

<table>
<thead>
<tr>
<th>Member</th>
<th>Profession &amp; Organisation</th>
<th>WP Sub-group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Susan Arbuckle</td>
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<td>All sections</td>
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<tr>
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<tr>
<td>Member</td>
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<tr>
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<td>Neonatal Death Classification</td>
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<tr>
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<tr>
<td>Ros Richardson</td>
<td>Health Promotion Manager, SIDS and Kids, NSW. Co-Chair Public Awareness &amp; Health Promotion Committee, ANZSA.</td>
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</tr>
<tr>
<td>Dr Christine Roberts</td>
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</tr>
<tr>
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<td>Investigation of neonatal deaths</td>
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<tr>
<td>Trish Wilson</td>
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<td>Second version consultation</td>
</tr>
<tr>
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</tr>
</tbody>
</table>
Search strategy

A comprehensive search strategy was developed based on the initial discussions of the Working Party and those of the Working Party’s sub-groups. The search strategy included an electronic database search and guideline web site search. In addition, the CCS and members of the Working Party searched previous reviews including cross references and contacted experts in the field for additional information.

The search strategy for the first edition included searches of the following electronic databases: The Cochrane Library (Issue 2, 2004); MEDLINE (1966-2004); and CINAHL (1982-2004). Generic terms were used throughout the guideline, with additional terms included in the section specific searches.


The generic search terms were combined with section specific terms, including the following: review, audit, classification, investigat*, guideline, protocol, test*, explor* rural, non-metropolitan, outreach, isolat*, info*, brochure*, pamphlet*, parent*, mother*, father*, profession*, nurs*, midwi*, doctor*, p?ediatric*, neonatolog*, bereave*, grief, emotion*, care, psycho*, funeral, social*, suboptimal, substandard, standard*, inadequate, compliance, manage*, HBA1c, glucose tolerance test, GTT, Fasting blood glucose.

This search was updated and expanded in February 2008, searching the years 2004 to March 2008 as follows:
The following guideline web sites were searched in March 2008 for existing perinatal mortality audit guidelines:

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<th>Web site name/Organisation name</th>
<th>Web site address/URL</th>
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<td>Alberta Medical Association, Canada</td>
<td><a href="http://www.albertadoctors.org/home">http://www.albertadoctors.org/home</a></td>
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<tr>
<td>American College of Obstetrics and Gynecology</td>
<td><a href="http://www.acog.com/">http://www.acog.com/</a></td>
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<tr>
<td>Association of Women’s Health, Obstetric and Neonatal Nurses</td>
<td><a href="http://www.awhonn.org/awhonn">http://www.awhonn.org/awhonn</a></td>
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<td>Australian Government, National Health &amp; Medical Research Council</td>
<td><a href="http://www.nhmrc.gov.au">http://www.nhmrc.gov.au</a></td>
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<tr>
<td>British Columbia Perinatal Care Program, Canada</td>
<td><a href="http://www.bcphp.ca/Perinatal%20Mortality%20Guidelines.htm">http://www.bcphp.ca/Perinatal%20Mortality%20Guidelines.htm</a></td>
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<tr>
<td>Canadian Paediatric Society</td>
<td><a href="http://www.cps.ca/english/publications">http://www.cps.ca/english/publications</a></td>
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<tr>
<td>Canadian Task Force On Preventive Health Care: Evidence-Based Clinical Prevention</td>
<td><a href="http://www.ctfphc.org/">http://www.ctfphc.org/</a></td>
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<tr>
<td>Confidential Enquiry into Maternal and Child Health (CEMACH)</td>
<td><a href="http://www.cemach.org.uk/Publications.aspx">http://www.cemach.org.uk/Publications.aspx</a></td>
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<tr>
<td>Department of Health, United Kingdom</td>
<td><a href="http://www.dh.gov.uk/Home/fs/en">http://www.dh.gov.uk/Home/fs/en</a></td>
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<tr>
<td>Guideline Advisory Committee, Ontario, Canada</td>
<td><a href="http://www.gacguidelines.ca/">http://www.gacguidelines.ca/</a></td>
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<tr>
<td>Human Tissue Authority, United Kingdom</td>
<td><a href="http://www.hta.gov.uk/guidance/codes_of_practice.cfm">http://www.hta.gov.uk/guidance/codes_of_practice.cfm</a></td>
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<tr>
<td>Institute of Clinical Systems Improvement</td>
<td><a href="http://www.icsi.org/guidelines_and_more/">http://www.icsi.org/guidelines_and_more/</a></td>
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<tr>
<td>King Edward Memorial Hospital for Women, Subiaco, Western Australia</td>
<td><a href="http://www.kemh.health.wa.gov.au/">http://www.kemh.health.wa.gov.au/</a></td>
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<tr>
<td>National Guideline Clearinghouse</td>
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<tr>
<td>National Institute for Clinical Excellence, UK</td>
<td><a href="http://www.nice.org.uk/">http://www.nice.org.uk/</a></td>
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<td>Neonatology on the Web</td>
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<td>Princess Margaret Hospital for Children, Subiaco, Western Australia</td>
<td><a href="http://www.pmh.health.wa.gov.au/">http://www.pmh.health.wa.gov.au/</a></td>
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<td>Royal Children’s Hospital, Melbourne, Australia</td>
<td><a href="http://www.rch.org.au/clinicalguide/index.cfm?doc_id=5033">http://www.rch.org.au/clinicalguide/index.cfm?doc_id=5033</a></td>
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<td>Royal College of Pathologists</td>
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<td>Scottish Intercollegiate Guidelines Network (SIGN)</td>
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<tr>
<td>Society of Obstetricians and Gynaecologists of Canada</td>
<td><a href="http://www.sogc.org/index_e.asp">http://www.sogc.org/index_e.asp</a></td>
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<tr>
<td>University of California and San Francisco, United States</td>
<td><a href="http://medicine.ucsf.edu/resources/guidelines/">http://medicine.ucsf.edu/resources/guidelines/</a></td>
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<tr>
<td>University of Manitoba, Canada</td>
<td><a href="http://umanitoba.ca/">http://umanitoba.ca/</a></td>
</tr>
<tr>
<td>Wisconsin Stillbirth Service Program</td>
<td><a href="http://www.wisc.edu/wissp/">http://www.wisc.edu/wissp/</a></td>
</tr>
<tr>
<td>Women’s and Children’s Hospital, Adelaide, Australia</td>
<td><a href="http://www.wch.sa.gov.au/">http://www.wch.sa.gov.au/</a></td>
</tr>
</tbody>
</table>
The guideline web site search yielded the following 22 guidelines on aspects of perinatal mortality audit:

<table>
<thead>
<tr>
<th>Association</th>
<th>Guideline</th>
</tr>
</thead>
</table>
Levels of evidence


Level I evidence obtained from a systematic review of all relevant randomised controlled trials.

Level II evidence obtained from at least one properly designed randomised controlled trial.

Level III-1 evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).

Level III-2 evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case control studies, or interrupted time series with a control group.

Level III-3 evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group.

Level IV evidence obtained from case series, either post-test or pre-test and post-test.

Although an attempt was initially made to apply the above quality ratings to the available literature, due to limited resources available for development of the guideline combined with the apparent paucity of high quality evidence, it was decided not to continue with this activity. Therefore, recommendations are based on consensus by the Working Party after review of the available information and levels of evidence are not referred to in the guideline.
Section 1; Appendix 2 Glossary of terms / abbreviations

ABS
Australian Bureau of Statistics.

ACMI
Australian College of Midwives Incorporated.

ACNN
Australian College of Neonatal Nurses.

AETIOLOGY
The science of causes, especially of disease.

AMNION
A thin but tough extraembryonic membrane of reptiles, birds and mammals that lines the chorion and contains the foetus and the amniotic fluid around it, in mammals it is derived from trophoblast by folding or splitting.

AMNIOTIC FLUID
The fluid that surrounds the developing foetus within the amniotic sac. This environment cushions the baby from injury and plays an important role in foetal development.

ANTEPARTUM DEATH
Death of a baby before the onset of labour.

ANZNN
Australian and New Zealand Neonatal Network.

ANZSA
Australian and New Zealand Stillbirth Alliance.

APC RESISTANCE
Activated protein C resistance.

APGAR SCORE
A system to assess the status of the infant after birth. The Apgar score is based on the following five variables: heart rate, respiratory effort, muscle tone, reflex irritability and colour. Maximum score is 10. It is recorded at one minute and five minutes after birth.

AP View
Anterio-posteria view.

ANZSA
Australia and New Zealand Stillbirth Alliance.

AUTOPSY
A surgical procedure postmortem, which involves the examination of body tissues (including internal organs), often to determine cause of death.

CARDIOTOCOGRAPH (CTG)
The electronic monitoring of the fetal heart rate and of uterine contractions. The fetal heart rate is recorded by means of either an external ultrasonic abdominal transducer or a fetal scalp electrode. Uterine contractions are recorded by means of an abdominal pressure transducer. The recordings are graphically represented on a continuous paper printout (trace).

CASE CONTROL STUDIES
Case control studies are used to evaluate multiple risk factors associated with a particular disease or outcome. They are particularly useful when the condition is rare.

CHORION
Extraembryonic membrane surrounding the embryo of amniote vertebrates. The outer epithelial layer of the chorion is derived from the trophoblast.

CHROMOSOME ANALYSIS (KARYOTYPE)
A picture of the chromosomes of an individual arranged in a standard manner so that abnormalities of chromosome number or form can be identified.

CONFIDENTIAL ENQUIRY
Enquiry by peer groups, including experts in the field, into the cause of, and the factors surrounding, a death, where strict confidentiality is observed at all stages of the process. It is a form of clinical audit, with the important difference that the feedback or ‘closing of the audit loop’ is via reports on the general findings, and not direct feedback to those involved with the individual cases subjected to enquiry.

CESDI
Confidential Enquiry into Stillbirths and Deaths in Infancy.

CMV
Cytomegalovirus.

CONFIDENCE INTERVALS (95% CI)
A range of values about which there is a 95% chance that it includes the true value. For example, if the stillbirth rate is 5.4 per 1000 total births and the 95% confidence intervals are 5.3 to 5.5 per 1000 total births, then there is a 95% chance that the actual stillbirth rate lies between 5.3 and 5.5 per 1000 total births.

CONGENITAL ANOMALY
A physical malformation, chromosomal disorder or metabolic abnormality which is present at birth.

CONTROL
As used in a case control study, ‘control’ means person(s) in a comparison group that differ only in their experience of the disease or condition in question. If matched controls are used they are selected so that they are similar to the study group, or cases, in specific characteristics, eg age, sex, weight.

CUSTOMISED BIRTHWEIGHT
The principle that the weight reference for the fetus should be individualised (customised), and not based on population averages. Factors shown to be predictive of birthweight are maternal height, weight at booking for the first antenatal visit, ethnicity and fetal gender and gestational age. The customised birthweight is an adjusted standard for the individual infant. Gardosi, J., M. Mongelli, M. Wilcox, and A. Chang. 1995. An adjustable fetal weight standard. Ultrasound Obstet Gynecol 6 (3):168-74.

CYTOGENETICS
The study of the structure of chromosomes; cytogenetic tests are carried out to detect any chromosomal abnormalities associated with a disease; these help in the diagnosis and selection of optimal treatment.

DENOMINATORS
The population at risk in the calculation of a rate or ratio. An example relevant to CESDI is the number of all live births as the denominator for neonatal mortality rate.

DIC
Disseminated intravascular coagulation is an acquired disorder of clotting characterised by intravascular fibrin formation which occurs in the course of a variety of conditions including sepsis and pre-eclampsia.

DCT
Direct Coombs Test.

EARLY NEONATAL DEATH
Death of a liveborn infant occurring less than 7 completed days (168 hours) from the time of birth.

EFM
Electronic fetal monitoring.
FASTING BLOOD GLUCOSE
A method for finding out how much glucose (sugar) is in the blood. The test can show if a person has diabetes.

FBS
Fetal blood sampling. This is a test performed in labour to obtain a capillary blood sample from the baby to check for well-being.

FETAL GROWTH RESTRICTION (FGR)
This is a term often used interchangeably with the term ‘small for gestational age’ (SGA). SGA is defined as a baby/fetus with antenatal ultrasound biometry assessment less than the 10th centile for gestational age according to National birthweight centiles. FGR strictly refers to babies that have failed to reach their growth potential during pregnancy. They are frequently but not always SGA. FGR is defined antenatally by an estimated fetal weight or serial antenatal ultrasound evidence of growth restriction or growth arrest and at birth a birthweight below the 10th centile using the National birthweight centiles. Ideally FGR should be defined according to the infant’s individual growth potential using customised birthweight centiles. See Customised Birthweight.

FETAL DEATH
See Stillbirth.

FHR
Fetal heart rate.

GBS
Group B Streptococcus.

GESTATION
The time from conception to birth. The duration of gestation is measured from the first day of the last normal menstrual period.

GESTATIONAL DIABETES
A carbohydrate intolerance of variable severity with onset, or first recognition during pregnancy.

GLUCOSE TOLERANCE TEST
A test for diagnosing diabetes, where blood glucose is measured in intervals after a glucose-rich meal is taken.

GP
General Practitioner.

GROWTH RESTRICTION
See also FETAL GROWTH RESTRICTION
Birthweight below the 10th centile for gestational age according to National birthweight centiles. Ideally FGR should be defined according to the infant’s individual growth potential using customised birthweight centiles.

GTT
Glucose tolerance test. This is a test for diagnosing diabetes, where blood glucose is measured at specific intervals after a glucose-rich meal is taken.

HAEMOGLOBIN A1C
The substance of red blood cells that carries oxygen to the cells and sometimes joins with glucose. Because the glucose stays attached for the life of the cell (about 4 months), a test to measure haemoglobin A1C shows what the person’s average blood glucose level was for that period of time.

HELLP SYNDROME
Haemolysis, Elevated Liver function, Low Platelets.

HISTOLOGY
The study of cells and tissue on the microscopic level.
HISTOPATHOLOGY
This is the science concerned with the study of microscopic changes in diseased tissues.

INFANT DEATH
Death in the first year following live birth; on or before the 365th day of life (366th in a leap year).

INFANT MORTALITY RATE
See Mortality Rates.

INTERMITTENT AUSCULTATION
Listening to the fetal heart at regular intervals between contractions.

INTRAPARTUM DEATH
Fetal death during labour. If a baby is born without signs of life, but also without maceration (the skin and other changes that occur at varying lengths of time after death in the womb), there is a strong presumption that death occurred during labour. There are exceptions in both directions, which require judgement on the timing of death in relation to the presumed onset of labour.

INTRAUTERINE FETAL DEATH (IUFD)
Death of a fetus in utero after 20 weeks gestation or at birth weighing at least 400gms.
See Stillbirth.

ITP
Idiopathic Thrombocytopenia Purpura.

IUFD
See Intrauterine Fetal Death.

INTRA-UTERINE GROWTH RESTRICTION (IUGR)
See Fetal Growth Restriction.

KARYOTYPE
The complete set of chromosomes of a cell or organism; used especially for the display prepared from photographs of mitotic chromosomes arranged in homologous pairs

KLEIHAAUER-BETKE:
A blood test performed on the mother's blood to identify whether substantial bleeding has occurred from the fetus into the mother's circulation

LIVE BIRTH
A livebirth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered liveborn.

METHYLENETETRAHYDROFOLATE REDUCTASE (MTHFR) GENE
The MTHFR gene provides instructions for making an enzyme called methylenetetrahydrofolate reductase. This enzyme plays a role in processing amino acids (the building blocks of proteins)

MORTALITY RATES
Perinatal mortality rate
The number of stillbirths and neonatal deaths per 1000 births.

NEONATAL DEATH RATE
The number of neonatal deaths (those occurring within the first 28 days of life) per 1000 livebirths.

STILLBIRTH RATE
The number of stillbirths per 1000 births.

MRI
Magnetic Resonance Imaging.
NECROPSY
Rarely used term for autopsy.

MTHFR
Methylenetetrahydrofolate reductase.

NHMRC
National Health & Medical Research Council.

NEONATAL DEATH
Death before the age of 28 completed days following livebirth.

ODDS RATIO (OR)
This is a measure of the excess risk or degree of protection given by exposure to a certain factor. An odds ratio of greater than one shows an increased risk and less than one shows a protective effect.

PA VIEW
Posterio-anteria view.

PATHOLOGY
The branch of medicine concerned with disease, especially its structure and its functional effects on the body.

PCR
Polymerase Chain Reaction

PERINATAL MORTALITY RATE (PMR)
see Mortality Rates.

POST-MORTEM
After death. Hence a post-mortem examination may or may not include an autopsy.

POSTNEONATAL INFANT DEATH
Death occurring after 28 completed days up to 1 year following live birth.

PSANZ
Perinatal Society of Australia and New Zealand.

PSANZ-PDC
Perinatal Society of Australia and New Zealand – Perinatal Death Classification.

PSANZ-NDC
Perinatal Society of Australia and New Zealand – Neonatal Death Classification.

PSANZ-PMG
Perinatal Society of Australia and New Zealand Perinatal Mortality Group.

RANZCOG
Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

RCP
Royal College of Pathologists.

RCPA
Royal College of Pathologists of Australasia.

RACP
Royal Australasian College of Physicians – Division of Paediatrics & Child

SAFDA
Support After Fetal Diagnosis of Abnormality.
SANDS
Stillbirth And Neonatal Death Support Group.

SGA
Small for gestational age – see IUGR.

SLE
Systemic lupus erythematosus.

STILLBIRTH (Fetal Death)
Death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400 g or more birthweight where gestation is not known. The death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.

SUDDEN INFANT DEATH SYNDROME (SIDS)
General Definition of SIDS

SIDS AND KIDS
TERMINATION OF PREGNANCY
This is the term used to describe deliberate ending of a pregnancy with the intention that the fetus will not survive.

VTE
Venous Thromboembolism.

WISSP
The Wisconsin Stillbirth Protocol Program.