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THE NOMENCLATURE AND CLASSIFICATION OF DISEASE IN THE PERINATAL PERIOD

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Fig 1
World Health Organisation, Geneva

Nomenclature, definitions and classification of perinatal disease had long been interests of mine and in 1971 I was asked by the World Health Organisation, Geneva (Fig 1), to assist in the preparation of the 9th revision of the International Classification of Diseases (ICD) in respect to the chapters on pregnancy and the purerperium, congenital anomalies and the perinatal period, including perinatal definitions and a perinatal death certificate.

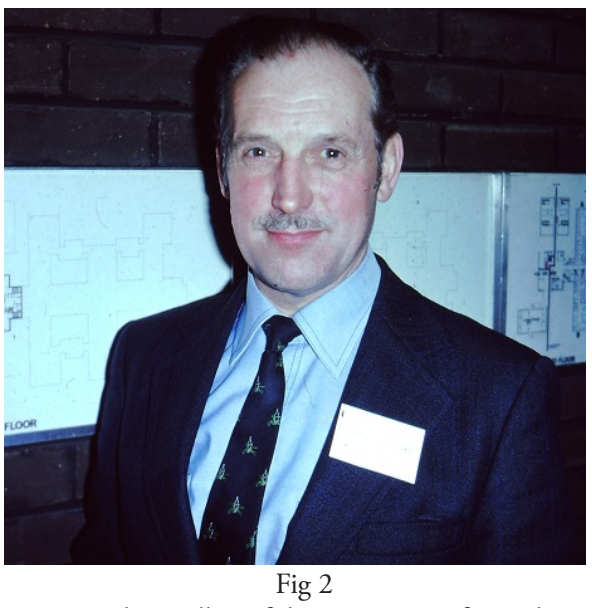

Fig 2
Dr. Colin Walker of the University of Dundee

The 9th revision of the ICD was published in 1979[1]. Back in Britain, as chairman of the British Paediatric Association's Health Statistics Committee, I set up a working party under the chairmanship of Dr. Colin Walker (Fig 2) in order to revise the British Paediatric Association's Classification of Diseases.

This we did by bringing the classification into line with the WHO's 9th International Classification of Diseases, only with the use of an additonal 5th digit to permit greater specificity. This second BPA edition was also published in 1979 along with a perinatal diagnostic classification[2].

One of the reasons I chose to work in Bristol was that the City and its surrounds provided a relatively stable population of around a million people with approximately 10,000 births each year. Furthermore, this population was separated from other urban centres such as Cardiff, Birmingham, Oxford and Southampton, either by the Severn Estuary or by considerable tracks of countryside. Thus the county of Avon was ideal for epidemiological population studies. In 1976 we commenced a ten year study of the perinatal mortality and neonatal survival among 95,000 births in Avon, 1976-85[3,4] (Fig 3, 4).

Number of total births ≥ 500 g	10 146
Number of stillbirths ≥ 500 g	36
Number of live births ≥ 500 g	10 110
Number of early (1st week) neonatal deaths	35
Number of late (2nd–4th weeks) neonatal deaths	12
Number of perinatal deaths	71
Number of births < 1 kg	39
Number of stillbirths < 1 kg	2
Number of early neonatal deaths < 1 kg	13
Number og late neonatal deaths < 1 kg	1
Number of infants with lethal malformations	28 (2 < 1 kg)
Number of stillbirths with lethal malformations	6
Number of early neonatal deaths with lethal malformations	17 (2 < 1 kg)
Number of late neonatal deaths with lethal malformations	5
Perinatal statistics	
Lethal malformation rate per 1000 total births (28/10 146)	2.8
Stillbirth rate per 1000 total births (36/10 146)	3.6
Neonatal mortality rate per 1000 live births (47/10 110)	4.7
Perinatal mortality rate per 1000 total births (71/10 146)	7.0
Excluding lethal malformations (includes < 1 kg)	
Stillbirth rate per 1000 total births (30/10 118)	3.0
Neonatal mortality rate per 1000 live births (25/10 088)	2.5
Perinatal mortality rate per 1000 total births (48/10 118)	4.7
Excluding births < 1 kg (includes malformations)	
Stillbirth rate per 1000 total births (34/10 107)	3.4
Neonatal mortality rate per 1000 live births (33/10 096)	3.3
Perinatal mortality rate per 1000 total births (56/10 109)	5.5
Excluding lethal malformations and births < 1 kg	
Stillbirth rate per 1000 total births (28/10 091)	2.8
Neonatal mortality rate per 1000 live births (13/10 045)	1.3
Perinatal mortality rate per 1000 total births (35/10 091)	3.5

[a] Format according to recommendations of a report of the FIGO Committee on Perinatal Mortality and Morbidity following a workshop on Monitoring and Reporting Perinatal Mortality and Morbidity, Heidelberg, March 1982.

Fig 3. Perinatal mortality statistics for babies of Avon residents born in Avon, UK, in 1985 (excludes all births <500g, n=5)

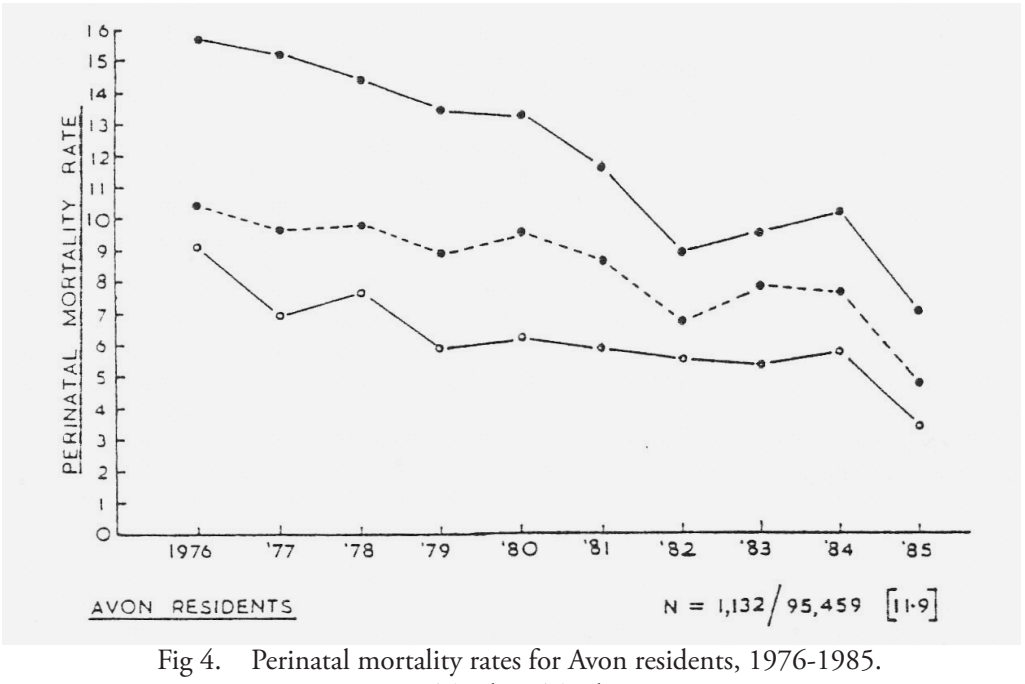

Fig 4. Perinatal mortality rates for Avon residents, 1976-1985.
Top line: Total
Middle line: minus malformations
Bottom line: minus malformations and < 1kg

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Fig 5
Participants in the FIGO workshop on monitoring and reporting perinatal mortality and morbidity, Heidelberg, 1982.

The experience gained from this study proved valuable when in 1982, as a member of the International Federation of Gynaecologists and Obstetricians (FIGO) Standing Committee on Perinatal Mortality and Morbidity workshop in Heidelberg (Fig 5), I helped to prepare FIGO Recommendations on the Methodology of Monitoring and Reporting Perinatal Mortality and Morbidity[5]. Indeed this workshop report (Fig 6) of which I was rapporteur, was to a large extent based on the Bristol practice.

The report also included a copy of the WHO recommended certificate for the cause of perinatal death (Fig 7).

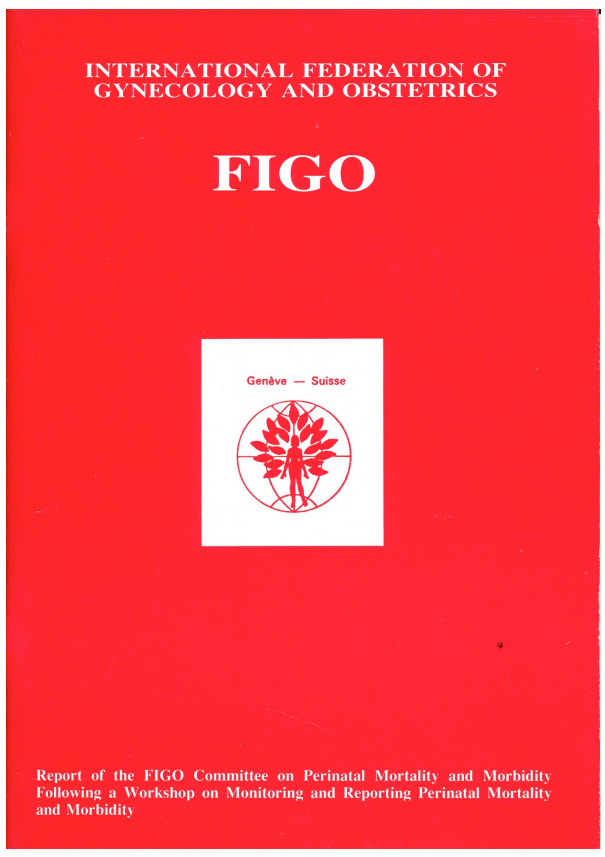

Figure 6
FIGORecommendations on the Methodology of Monitoring and Reporting Perinatal Mortality and Morbidity

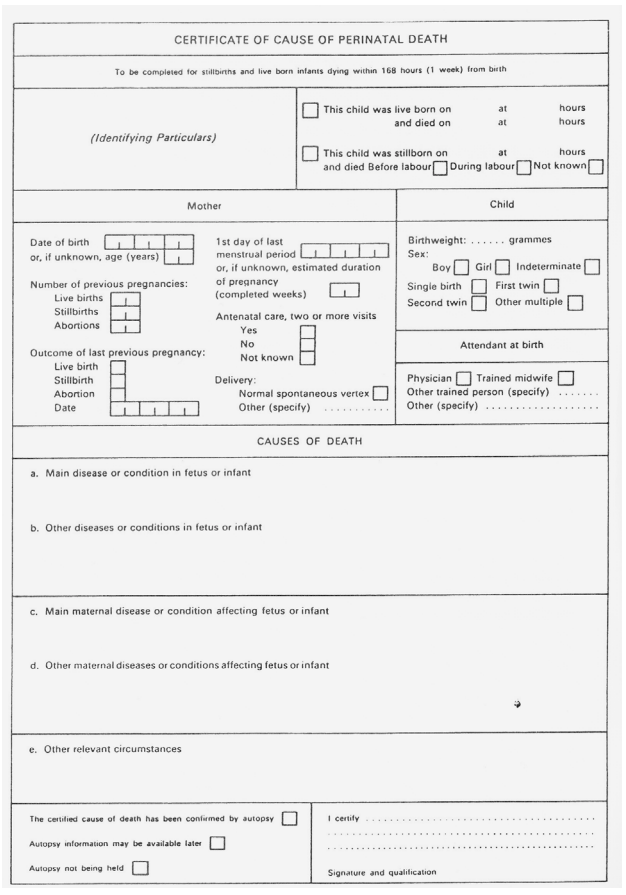

Figure 7
WHO recommended certificate for the cause of perinatal death

At this time I was appointed chairman of the FIGO Sub-Committee on Perinatal Epidemiology and Health Statistics with responsibility for using the FIGO methodology to collect perinatal mortality statistics from some 88 FIGO member countries around the world. In order to assist standardisation of the classification of disease in the perinatal period and its analysis, I prepared a memorandum with this title in 1988[6]. Because of retirement that year, this memorandum, although circulated, was never formally published. The format is simple and straightforward and has the advantage of focusing on the relatively small number of perinatal deaths that best reflect the standard and quality of perinatal care. It is hoped that it may still be of use in the future.

WORKING PAPER

prepared by P.M. Dunn for the International Federation of Gynaecologists and Obstetricians (FIGO) in 1988[6]

The Classification of Disease in the Perinatal Period and Analysis of the Causes of Perinatal Mortality

1. *A 'birth'* has been defined by WHO (1979) as all fetuses and infants delivered weighing 500g or more (or when birthweight is unavailable, the corresponding gestational age (22 weeks) or body length (25cm crown-heel), whether alive or dead.
2. Although institutional data is useful, whenever possible perinatal mortality statistics should be based on all births in a *geographically defined population*,
3. To permit useful analysis the following *minimum basic information* should be recorded for all births (in addition to identification data such as name and address etc).

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- Date/hour of birth
- Place of birth
- Single/multiple birth (twin I/II, etc)
- Sex of infant
- Birthweight
- Live/dead born

More sophisticated data collection systems may wish to include the further information listed in the Appendix.

4. *Necropsy:* The importance of obtaining necropsy confirmation of the suspected cause of death cannot be over-emphasised. Information should be recorded as to whether or not a necropsy (macroscopic alone or macro- and microscopic) was undertaken in respect to each perinatal death.

5. *Time of death*

A stillborn infant is one who after delivery shows no signs of life whatsoever (umbilical cord pulsation, movement, heart beat). As accurate information as to the time of death before birth is usually not available, the best that can be achieved is an attempt to divide the group into 'prepartum' and intrapartum' deaths. In the absence of more reliable information, a macerated fetus should arbitrarily be classified as dying 'prepartum' and a fresh stillbirth as having died 'intrapartum'. This subdivision is desirable but not essential.

A neonatal death is defined as the death of a liveborn infant within 28 completed days of birth. The age at death should be recorded (hours/ days). Neonatal deaths may be subdivided into 'early' (1st week) and 'late' (2-4th weeks) deaths.

6. *Lethal Malformation:* Death due to lethal malformation is defined (FIGO 1982) as death of a baby with a congenital morphological anomaly (see International Classification of Diseases) when the malformation is considered to be responsible for the train of events leading to fatal outcome, whether or not the train of events might have been interrupted by different management (for example it includes the infant with an open myelocele that is not surgically closed and dies of meningitis and the infant with a diaphragmatic hernia that dies during surgery). The diagnosis of pulmonary hypolasia following oligohydramnios and in the absence of other malformation, is acceptable provided that the infant exhibits evidence of external compression in the form of at least two congenital postural deformities[7]. The presence of lethal malformation whether on clinical observation or at necropsy, should be recorded for all deaths. As the number of preventable perinatal deaths has fallen with improved care in developed countries, an increasing proportion (30-40%) of the residual deaths are due to lethal malformation. As such defects arise at conception or early in pregnancy, their demise does not reflect the quality of perinatal care. Thus they need to be identified and studied separately.

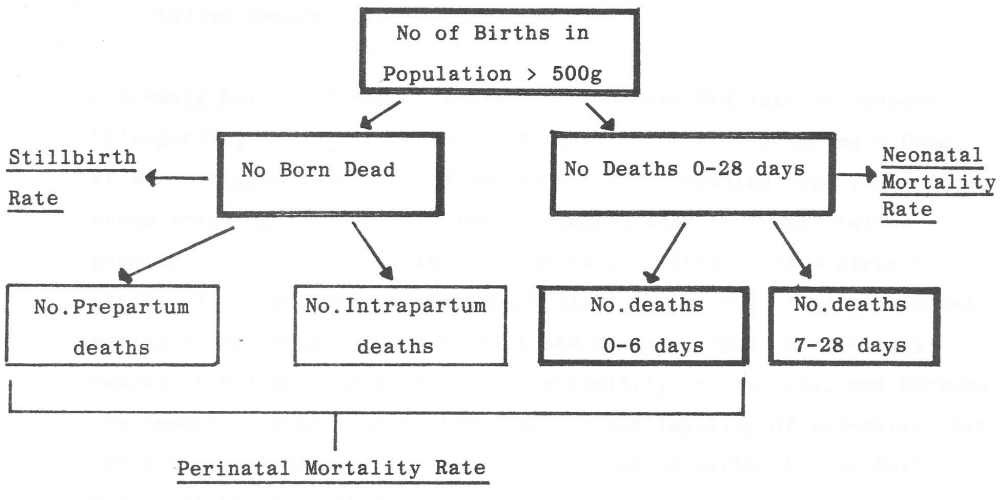
7. *Extremely Low Birthweigh:* In 1976 WHO recommended that in respect to reporting perinatal mortality statistics, infants weighing <1000g at birth (approximately <28 weeks) should be studied separately from those weighing >1000g. It was recognised that the registration practices for these tiny infants varied very greatly from place to place. Although they represented 0.5% of the births, their perinatal mortality was high and numerically had a major impact on the total number of deaths. Because of the variability in reporting and because the neonatal management in terms of the availability of intensive care facilities was crucial to their survival after birth, it was felt essential to study them as a separate group.

8. *Basic Classification:* In order to meet the requirements of sections 5, 6 and 7 it is necessary to have the following information:

- Number of total births >500g .....
- Number of stillbirths >500g .....
- Number of livebirths >500g .....
- Number of early (first week) neonatal deaths. .....
- Number of late (2-4th weeks) neonatal deaths .....
- Number of births <1Kg .....
- Number of stillbirths <1Kg .....
- Number of early neonatal deaths <1Kg .....
- Number of late neonatal deaths <1Kg .....
- Number of infants with lethal malformation .....
- Number of stillborn with lethal malformations* .....
- Number of early neonatal deaths with lethal malformations* .....
- Number of late neonatal deaths with lethal malformations .....

* Indicate in brackets number <1Kg

FIGURE 1



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9. *Perinatal Mortality Rate:* With the information provided in Section 8, the following perinatal mortality rates may be calculated:

Perinatal Statistics:
Lethal malformation rate per 1000 total births ...
Neonatal mortality rate per 1000 live births .....
Perinatal mortality rate per 1000 total births .....

Excluding Lethal Malformations (includes <1Kg):
Stillbirth rate per 1000 total births .....
Neonatal mortality rate per 1000 live births .....
Perinatal mortality rate per 1000 total births .....

Excluding Births <1Kg (includes malformation):
Stillbirth rate per 1000 total births .....
Neonatal mortality rate per 1000 live births .....
Perinatal mortality rate per 1000 total births .....

Excluding Lethal Malformations and Births <1Kg:
Stillbirth rate per 1000 total births .....
Neonatal mortality rate per 1000 live births .....
Perinatal mortality rate per 1000 total births .....

Note that the stillbirth rates may be subdivided according to whether death took place pre- or intrapartum.

10. *Classification of Lethal Malformations*: these may be classified using the WHO International Classification of Disease.

11. *Cause of Death of <1Kg Normally Formed Infants*: The main factors and sub-groups of interest to the perinatal clinician after excluding congenital malformations are:

- Macerated stillbirth
- Antepartum asphyxia, stillborn (includes abruption placenta, growth retardation and cord complications)
- Intrapartum asphyxia (includes birth trauma)
- Infection (primary cause of death only)
- Neonatal death from extreme immaturity (includes respiratory failure, periventricular haemorrhage and pneuomothorax)
- Other causes

12. *Cause of death of normally formed infants >1000g at birth*: The perinatal mortality statistics after excluding infants with lethal malformation and those weighing less than 1Kg at birth accurately reflect the quality of perinatal care. In a developed country the stillbirth rate is unlikely to be more than 3 per 1000 nor the neonatal mortality more than 2 per 1000. Thus in a geographical area with 10,000 births annually there should not be more than 40-50 deaths to analyse each year.

Experience shows that most deaths after excluding malformations classify into the following main groups:

<u>Fetal death</u>
- Intrauterine infection
- Placental abruption
- Other antepartum asphyxia (includes placental insufficiency/ fetal growth retardation)
- Intrapartum asphyxia/birth trauma
- Other deadborn foetuses (includes macerated, cause unknown)

<u>Neonatal death</u>
- Birth asphyxia/birth trauma (includes meconium aspiration syndrome)
- Infection (includes necrotising enterocolitis)
- Short gestation causes (includes respiratory distress syndrome and periventricular haemorrhage)
- Other causes (subgroups include: haemolytic disease, haemorrhagic disease, inborn errors of metabolism, SIDS)

APPENDIX

Maternal, pregnancy and perinatal information to be collected for all births and perinatal deaths in countries or institutions with more advanced data collection systems.

(A)

- Maternal age
- Number of previous pregnancies
- Outcome of last pregnancy
- Months since last pregnancy ended
- Antenatal care, number of visits
- Gestational age
- Presentation at delivery
- Method of delivery
- Attendant at birth
- Causes of death (see WHO format)

(B)

- Mother's education
- Mother's height
- Smoking during pregnancy
- Complications of pregnancy
- Labour and delivery
- Type of antenatal care

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