Kathmandu University Medical Journal (2004) Vol. 2, No. 4, Issue 8, 375-383

Review Article

Perinatal death audit

Manandhar DS[1]
[1]Head, Department of Paediatrics, Kathmandu Medical College, Sinamangal

Abstract
Perinatal mortality rate (PMR), which indicates quality of care provided to women in pregnancy, at and after child birth and to the newborns in the first week of life, is high in Nepal. Published results show wide variation in PMR in the country – higher rates are in the community and hospitals outside Kathmandu. Reduction of PMR is an important strategy in improving maternal and neonatal health and requires identification of factors related to perinatal deaths. Perinatal death audit is a process of assessing factors related to a perinatal death. It helps in reducing perinatal mortality by identifying preventable factors related to perinatal deaths. Classifying perinatal deaths into 5 groups of Wigglesworth helps in identifying major obstetric or neonatal factors related perinatal deaths. Major factors related to perinatal deaths in Nepal are poor antenatal care, poor monitoring and assistance at birth and lack of adequate neonatal care services. Regular perinatal audit would identify factors and lapses related to perinatal deaths and thus help in taking appropriate interventions to reduce avoidable perinatal deaths.

Key words: Perinatal death audit, Perinatal mortality rate, Reducing perinatal deaths, Nepal

Perinatal death audit is a process of assessing factors related to a perinatal death. The main aim of a perinatal death audit is to identify avoidable factors so that perinatal death could be reduced by taking appropriate actions against identified preventable factors. Perinatal period extends from 28 weeks of gestation to first 7 days of life after birth. Any death of a baby in this period is defined as a perinatal death. It has been stated in the World Health Organisation report that up to half of the perinatal deaths per year occur as a direct consequence of poorly managed deliveries[1]. In developing countries, sub-optimal care has been identified in up to 77% of perinatal deaths in hospital based studies [2].

Principles of the audit

Medical audit is primarily a mechanism for assessing and improving the quality of patient care. Clinical audit is the systematic, critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources and the resulting outcome for the patient: [3.]

- It compares the observed care against pre-defined standards
- The specific deficiencies identified should lead to the implementation of targeted recommendations
- These are monitored to complete the audit cycle

Aims of the audit

- To provide better care for the patients, family and the population as a whole
- To provide an educational exercise for doctors and other health workers
- To improve and to develop better clinical practice
- To justify the development of new techniques or expenditure to improve care
- To monitor and consequently achieve more efficient use of health resources

Perinatal death audit involves looking at the quality of care during the perinatal period. Perinatal mortality rate (PMR) is an outcome indicator and relates the quality of services provided to the women in the antenatal period, at and after childbirth and to the newborn infants in the first 7 days of life. As the services provided to the pregnant women and the newborn infants are poor, PMR in Nepal is high. The latest PMR in Nepal is reported to be 47.4 /1000 births[4] compared to 4-5/1000 births in developed countries. Regular perinatal death audit will help to find out preventable factors and deficiencies in management and by taking appropriate actions will help in reducing perinatal deaths.

Correspondence
Dr. D. S. Manandhar,
Professor & HoD, Department of Paediatrics
Kathmandu Medical College, Sinamangal

For practical purposes all stillbirths and early neonatal deaths after 28 weeks of gestation or weighing 1000 grams and above are included in calculating *Perinatal Mortality Rate*. However, with increasing survival of babies weighing less than 1000 grams or 28 weeks of gestation, perinatal deaths of up to 22 weeks of completed gestation or weighing 500 grams or more are included in *Extended Perinatal Mortality Rate.*

Perinatal death audit usually concentrates on the *outcome of the fetus or neonate*. The well being of the fetus and the newborn is obviously influenced by the quality of obstetric and newborn care and therefore effective perinatal audit requires the involvement of midwives, obstetricians, paediatricians or neonatologists and medical and nursing chiefs. To facilitate improvements in care, perinatal audit should concentrate *on the process of care* as well.

Types of Perinatal Audit

1. *Outcome audit* - Record all deliveries and perinatal deaths and estimate PMR
2. *Sentinel event audit (Critical incident audit)* - case review of perinatal deaths, identify avoidable factors and make recommendations
3. *Topic audit (criteria based audit)*- monitor implementation of a recommendation

Components of audit cycle [5]

1. Set acceptable local standards
2. Observe current practice
3. Systematic comparison of observations against pre-defined standards and recommend change
4. Implement appropriate change
5. Re-assess practice (closing the audit cycle)

Appropriate classification of a perinatal death is important in finding out the cause of death and taking appropriate measures to prevent avoidable deaths. Various classifications have been used in classifying perinatal deaths [5-8]. However, a simplified classification put forward by Wigglesworth [7] has been found to be very simple and useful particularly where autopsies are usually not performed. It helps not only to classify a perinatal death in one of the five groups but also helps to identify main obstetric or neonatal factors which need attention to prevent further avoidable deaths.

Causes of Perinatal Deaths

Health of a fetus and a newborn infant depends on the health of the pregnant woman and the care provided to the mother and the newborn infant. Thus any adverse factors affecting the mother will also adversely affect her baby. Nutritional status of the mother, any illnesses present before pregnancy or developing during pregnancy, quality of care provided during pregnancy and particularly at the time of childbirth will also have a great impact in the pregnancy outcome and survival in the perinatal period. Another important factor for the survival of the newborn infant is the care the baby receives at the time of birth and thereafter as nearly 2/3 of neonatal deaths occurs in the first week of life[9]. Quality of neonatal care will materially affect the survival of the newborn infants in the first week of life particularly those who are asphyxiated at birth or are born small due to preterm birth or intrauterine growth retardation or multiple pregnancies, or become sick after birth. Congenital malformations also affect the perinatal outcome. Therefore, factors associated with perinatal deaths can be broadly classified into maternal and fetal and neonatal factors.

Maternal factors leading to high perinatal mortality include very young age (<19 years) or high age (>30 years) of the woman, low nutritional, socio-economic and particularly educational status of the woman, short inter pregnancy interval (<2 years), rural residence, any preexisting illness before pregnancy and development of any illness during pregnancy, prolonged duration of labour and assisted or instrumental delivery and particularly the poor quality of care provided during pregnancy, at and after childbirth.

Fetal and neonatal factors related to high perinatal mortality include birth asphyxia, low birth weight, septicemia, congenital anomalies and other miscellaneous conditions.

The latest Nepal Demographic and Health Survey (NDHS 2001)[4] has revealed that only 49% of pregnant women received any antenatal check up and only 14.3% of them had four or more antenatal check ups which are recommended by National Maternity Care Guideline produced by the Ministry of Health, Nepal. Vast majority of births occurred at home and only 9% of births occurred at health facilities. Only 13% of births were attended by a medical professional with only 8% of births attended by a doctor. Relatives, friends or others assisted in 55% of births and in 9% of births no one assisted at the time of birth. Clean home delivery kit was used in only 9% of births delivered at home. Only 21% of women

who delivered at home received a postnatal check up. These figures indicate the poor quality of care provided to pregnant women and the newborn infants.

Classifying Perinatal Deaths

It is necessary to classify perinatal deaths and find out factors that are responsible for such deaths. Taking appropriate actions will help in reducing perinatal deaths in an institution or in a community. As stated earlier, it is convenient and easy to use Wigglesworth's classification particularly in situations where investigation facilities are limited and autopsies are hardly ever done. This classification helps to delineate major obstetrical or neonatal factors associated with perinatal death thus guiding to take appropriate actions to reduce perinatal death. All perinatal deaths, according to Wiggleswoth, have been classified into 5 groups (Table 1).

Perinatal Death Audit Process

A perinatal death audit form (appendix 1) is to be filled as soon as possible or at least within 24 hours of a perinatal death by the person who attended it. Ideally the death has to be discussed among obstetricians, paediatricians, midwives and nursing and hospital chiefs within 24-48 hours of death. However, it may not be possible to have such a meeting in the presence of all the above mentioned persons. In such cases, it should be discussed at least among the persons involved in the delivery and at the time of death. Depending on the number of perinatal deaths in the institution, a regular perinatal death audit meeting should be held either once a month or once in every three months. To be effective, the hospital chief and the nursing chief, in addition to obstetricians, paediatricians and midwives should be present. Details of the perinatal death should be presented by the doctor/nurse involved in that patient.

All deaths are classified according to maternal and fetal or neonatal factors. Perinatal deaths are then classified as stillbirths and early neonatal deaths. Stillbirths are further classified as fresh and macerated and then categorized according to Wigglesworth's group. Maternal factors include age, parity, any illness present before pregnancy, presence of any complications during pregnancy or at the time of childbirth, antenatal care, place of birth, type of delivery and assistance at delivery. Fetal/neonatal factors are to be classified by sex, birth weight category, day of death, cause of death and the group according to Wigglesworth classification. The perinatal death classification flow chart (Fig.1) will help in classifying a perinatal death. Perinatal mortality rate is calculated as given on Table II.

Reducing Perinatal Deaths

Perinatal mortality rate in Nepal is high. Published results show wide variation in the rate in different hospitals and in the communities[10]. Higher rate, as expected, is in the hospitals and the community outside Kathmandu and even among the hospitals of Kathmandu, there is a significant difference in the PMR indicating different factors including quality of care for such a difference. The main aim of perinatal death review is to reduce avoidable perinatal deaths by identifying preventable factors related to perinatal death. As autopsy is hardly ever done in Nepal, exact cause of perinatal death may be difficult to ascertain. However, classifying a perinatal death into one of the five groups of Wigglesworth will help to identify main deficiencies in obstetric or neonatal care. Regular reviewing of perinatal deaths in the presence of midwives, obstetricians, paediatricians, hospital and nursing chiefs and other hospital staff would help in reducing PMR as the staff would realize that any deficiencies or delays in the management would become clear and one would take better care in future and any deficiencies in management will also be dealt with. At present, only few hospitals in Kathmandu are conducting perinatal death review meetings on a regular basis.

It is, however, very important to discuss the death audit in a scientific way rather than making it a fault finding session, otherwise the atmosphere will be vitiated and the process will not continue long. It is also important to keep the discussion confidential among the staff so as to avoid any litigation. The main idea is to improve the quality of care by finding out preventable factors and the lapses that have contributed to the perinatal death.

Strategies for reducing perinatal deaths:

Reducing perinatal deaths included in Group I

Deaths in Group I indicate poor care during antenatal period. As majority of births occur at home and only 50% of pregnant women get any antenatal check up in Nepal and pregnant women come to health institutions only if there are complications and that too in late stage, most of the perinatal deaths occur before they arrive at health institutions as have been revealed by perinatal death audit reports from various hospitals [11-14]. Stillbirths are 2-3 times more common than early neonatal deaths in hospitals with very high PMR, and most of the pregnant women with stillbirths did not receive antenatal care while in the hospitals with fairly low PMR, stillbirths are equal or

only slightly higher than early neonatal deaths and antenatal care in these women have been very high. Therefore one important strategy to reduce perinatal deaths occurring in this group would be to provide *antenatal care to more pregnant women and also to improve the quality of antenatal* care so that high risk pregnancies are identified earlier and appropriate intervention provided in time.

Reducing perinatal deaths included in Group II

Reducing perinatal deaths due to gross congenital anomalies will not be that easy. It will require improving the health and nutritional status of women before pregnancy. Identification of anomalies early in pregnancy and then taking appropriate action, management of anomalies in utero or soon after, which requires excellent development of fetal or neonatal surgical capability, are some of the important strategies in reducing perinatal deaths in this group. However, some of the lethal anomalies are not amenable to prevention or treatment. Micronutrient supplementation particularly supplementation of folic acid, and genetic counselling will help in reducing some of the perinatal deaths included in this group.

Reducing perinatal deaths included in Group III

Preventing premature births by better care during pregnancy and use of steroids in inevitable premature deliveries and *improving neonatal care facilities* and skill of the health workers in the care of the newborns are important strategies in reducing deaths in this group. *Development of low cost special care baby units* will be an important strategy to reduce deaths in this group.

Reducing perinatal deaths included in Group IV

This requires better care and monitoring during labour and improving the skill of the attendant in delivery and correct neonatal resuscitation technique. Specifically, use of a partograph during labour has been found to be very useful in reducing perinatal deaths due to asphyxia. Training birth attendants and various categories of health workers in the use of partograph and better monitoring during labour, and neonatal resuscitation would help in reducing deaths in this group. *Ensuring a fully equipped resuscitation corner in the delivery room and presence of a person skilled in neonatal resuscitation would make a great impact in reducing deaths in this group.*

Reducing perinatal deaths in Group V

Early recognition and appropriate management of specific conditions in the newborns would help in reducing deaths in this group. The health staffs have to be trained and facilities for the care of the sick newborns have to be improved. Again, developing low cost special care baby units would help in reducing deaths in this group.

Reducing maternal and neonatal mortality in Nepal has become a major health priority and His Majesty's Government of Nepal (HMG/Nepal), Ministry of Health (MoH) has implemented Safe Motherhood Programme in 1996. One of the important actions in this programme has been reviewing of maternal deaths, and the Family Health Division (FHD) of the Department of Health Services (DoHS), has formed a national committee to develop tools for reviewing maternal and perinatal deaths in the country. Initially 3 hospitals in Kathmandu and 3 hospitals outside Kathmandu have been chosen for reviewing all maternal and perinatal deaths. This process will gradually be extended to other hospitals of the country. Hopefully, implementation of this policy will result in regular review meetings of perinatal deaths and thus help in reducing the present high perinatal mortality rate.

Conclusion

Regular perinatal death audit will help to reduce avoidable perinatal deaths by identifying and taking appropriate measures responsible for perinatal deaths. The three most important causes of perinatal deaths in Nepal are asphyxia, infection and premature birth/ low birth weight. In the majority of perinatal deaths, underlying maternal factors could be identified. A large proportion of perinatal deaths could be prevented by better care of the pregnant women in pregnancy and at child birth. Better monitoring and timely intervention in the intrapartum period, skilled attendance at birth, timely and appropriate intervention and improving skill and facilities for the care of the newborns at and after birth are required to reduce the present high PMR. As majority of births occur at home, strategies for reducing perinatal deaths in the community should include better awareness programmes for the mothers and families on the need for at least four antenatal check ups as recommended by National Maternity Care Guidelines[7] and improving facilities in the community based health institutions both for the mothers and the newborns. Strategies for reducing avoidable hospital perinatal deaths include introduction of partograms as a routine and training doctors and health staff in newborn care including neonatal resuscitation and developing low cost special care baby units[8] using affordable locally made equipment. Regular perinatal death audits would help identify preventable factors and thus help in reducing present high perinatal mortality rate.

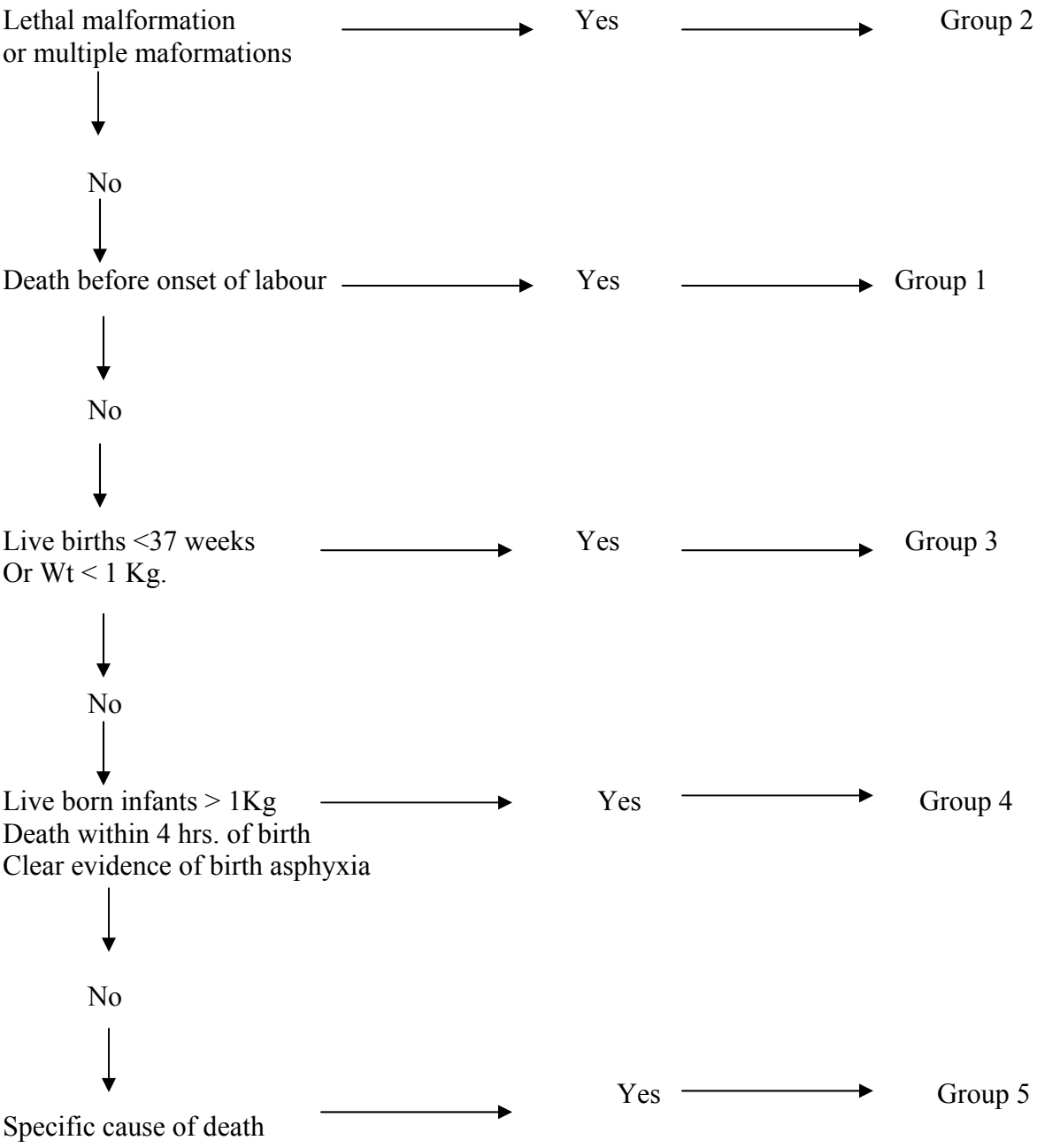
Table 1. Calculating Perinatal Mortality Rate (PMR)

To determine PMR, the following data are required: a. Total births b. Still births after 28 weeks of gestation c. Early neonatal deaths i.e. deaths occurring within first 7 days of life
PMR = Still births (late fetal deaths) + Early neonatal deaths x 1000 **Total births** (Only babies weighing 1000 grams or above and who have completed 28 weeks of gestation will be included) Because of increasing survival of babies weighing less than 1000 grams or less than 28 weeks in developed countries, the ***extended perinatal mortality rate*** is also calculated.
Extended PMR = **Still births (intermediate+ late fetal deaths) + Early neonatal deaths x 1000** **Total births** (Babies weighing up to 500 grams or who have completed 22 weeks of gestation will be included)

Table 2. Wigglesworth's classification of Perinatal deaths

Group I consists of ***normally formed macerated stillbirths*** Death before the onset of labour i.e. any macerated stillbirth will be included in this group *except* the one with severe congenital anomaly.
Group II includes ***congenital malformations (stillbirth or neonatal death)*** Perinatal deaths associated with severe or lethal malformations e.g. anencephaly, hydrocephalus or congenital malformations of internal organs etc are included in this group.
Group III includes ***conditions associated with immaturity*** Deaths associated with immaturity i.e. babies born *before 37 weeks of gestation* or who weigh <1000 grams at birth are included in this group.
Group IV includes *asphyxial conditions developing in labour*
Group V includes *conditions specific to the neonate* e.g. infection, blood group incompatibilities, hypothermia etc and any specific neonatal condition which is not included in other groups.

Fig. 1. Perinatal Death Classification Flow Chart



References

1. WHO,"Perinatal mortality. A listing of available information," World Health Organization FRH/MSM/96.7, Geneva (1996)
2. De Muylder X., "Perinatal audit in a Zimbabwean district," Paediatric and Perinatal Epidemiology **3** (1989): 284-293
3. Secretary of State for Health, "Working for patients," Cmnd 555, HMSO, London (1989)
4. Ministry of Health (Nepal), New ERA, and ORC Macro, 2002. Nepal Demographic and Health Survey 2001.
5. Hey EN, Lloyd DJ, Wigglesworth JS. Classifying perinatal death: fetal and neonatal factors. Br. J. Obstet. Gynaecol. 1986; 93: 1213–23.
6. Cole SK, Hey EN, Thomson AM. Classifying perinatal death: an obstetric approach. Br. J. Obstet. Gynaecol.1986; 93: 1204–12.
7. Wigglesworth JS, Monitoring perinatal mortality. A pathophysiological approach. Lancet 1980; ii: 684-6
8. Knutzen VK, Baillie P, Malan AF. Clinical classification of perinatal deaths. S. Afr. Med. J. 1975; 49: 1434–6
9. Save the Children US, Saving Newborn Lives, State of The World's Newborns: Nepal. Kathmandu 2002
10 Manandhar DS. An overview of perinatal mortality audit in Nepal. Prenat Neonat Med 1998;3:290-293
11 Manandhar DS. A study of perinatal mortality at the Maternity Hospital, Kathmandu. Workshop on Maternal and Perinatal Health and Family Planning. Sept. 1995; 60-67
12 Pradhan DP and Shah U. Perinatal mortality in Bheri Zonal Hospital. J Nep Med Assoc 1997;35:146-149
13 Morgan C, Rongon R, Maple-Brown L. Perinatal mortality at United Mission Hospital, Tansen. J Nep Med Assoc 1997;36:320-323
14 Manadhar SR, Manandhar DS, Baral MR, Pandey S, Padhye S. KUMJ (2003) Vol.2, No 3, Issue 7, 198-202

Appendix 1

PERINATAL DEATH AUDIT FORM

(**HOSPITAL** ……)

S. No. .....

Unit : .... **Date :** / / **Hosp. No. :** ..... **Name of the Mother :** .....

Completed **Age :** .....(yr.); **Address :** 1) Rural 2) Urban **Parity :** 1. Primi 2. Multi 3. Grand Multi

If multi, previous obstetric history:
(encircle only one in a, b, c, See below for abbreviations)

	a			b			c	
Birth Order	**FT**	**PT**	**Ab**	**LB**	**SB**	**NND**	**SEX M / F**	
1								
2								
3								
4								
5								
6								

Present Pregnancy :

ANC : Nil, 1-3, 4 or more **At :** Hospital , PHC , HP , Private , Others.....
LMP / / **EDD** / /
Completed weeks of Pregnancy : ..... **Maturity by assessment :** .....
Illness : APH, PIH, PET, Anaemia, Infection, others-specify .....
Date of Admission : / / **Date of Delivery :** / /
Time: ..... **Time :** .....
FHS: Yes /No **If Yes** regular/irregular, **Last FHS record :** hrs. ___, min. :__ before birth
Monitoring: Yes , No **If yes:** Regular/Irregular, **How frequently:** <1 1-2 >2 hourly
Last FHS record: hrs. _____ min. _____ before birth
Ultrasound findings (if done) : Normal / Abnormal (describe abnormality) -
Mode of Delivery: ND, CS, Vac, Forceps, Premature, Breech, Others specify .....
Indication for Instrumental / CS:
Liquor :Meconium stained Yes/ No**,** **if yes:** Light / Medium / Thick
Placenta : Normal / Abnormal / specify..... **Birth Attendant :** Dr., Nurse, Trainee (Dr./ Nurse), Others

Wt.: _____ , **Sex: M / F ,** **Apgar** 1' ..... , 5' .....,
Resuscitation : Yes, No **If Yes what ?** B & M, ET+IPPV, CC, Med., All
Resuscitation done by : Doctor / Nurse /Trainee (doctor/ nurse)/ Others
Perinatal Death: SB/ ENND **If SB**: Fresh / Macerated; **If SB** - cause of SB .....
Any congenital anomaly if so describe .....
If ENND - Day of death (1st 2nd 3rd 4th 5th 6th 7th); (in hours _____if on 1st day)

Cause of death:

Primary cause of death e.g.:
Severe asphyxia, Prematurity/ low birth weight, Septicaemia, Congenital anomalies, Respiratory distress, Haemorrhage, Hypothermia, and others (describe-).

Factors responsible for the death e.g.
Maternal – Ante partum haemorrhage, Prolonged labour, Pregnancy induced hypertension Pre/eclampsia and other maternal illnesses (describe -)

Diagnostic and management- wrong diagnosis, delayed diagnosis/ intervention, poor or inadequate monitoring, Lack of equipment/drugs/skilled person, others (describe-)
Miscellaneous – Other factors not mentioned above (describe-)
(Tick appropriate condition)

Comment: (Give a short description of the events leading to SB / NND)

Signature of the Doctor/Nurse Date:
Name of the Doctor/Nurse

NB:- Perinatal death = still birth + early neonatal death.
[Still birth - foetus delivered after 28 weeks of gestation, Early neonatal death within 7 days of birth or up to <168 hrs. after birth,
S. No.= Serial Number, **FT**= Full term, **PT**= Preterm, **Ab**= Abortion, **LB**= Live birth, **SB**= Still birth, **ENND**= Early neonatal death, **M**= Male, **F**= Female, **APH**= Ante partum haemorrhage, **PIH**= Pregnancy induced hypertension, **PET**= Pre eclamptic toxaemia, **ND**= normal delivery, **CS**= Caesarean section, B&M – Bag and mask ventilation, ET –Endotracheal intubation, IPPV- Intermittent positive pressure ventilation, **CC**- Chest compression, **Med**.- Medications;
Include all perinatal deaths weighing 500 gms and above or with 22 weeks of completed gestation to calculate Extended Perinatal Mortality]