

PRIORITIES IN NEONATAL CARE IN DEVELOPING COUNTRIES

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ABSTRACT

Lower perinatal and neonatal mortality have been achieved in the developed countries following advancement of neonatal care, introduction of high technologies, and better knowledge of pathophysiology of the newborn infants. Other contributing factors are organised delivery room care with skilful resuscitative techniques as well as risk identification and efficient transport of the sick infants including in utero transfer of the fetus, etc. It cannot be assumed that similar results can be attained in developing countries where financial and human resources are the problems.

With limited resources, it is necessary to prioritise neonatal care in the developing countries. It is essential to collect minimum meaningful perinatal data to define the problems of each individual country. This is crucial for monitoring, auditing, evaluation, and planning of perinatal health care of the country. The definition and terminology in perinatology should also be uniform and standardised for comparative studies.

Paediatricians should be well trained in resuscitation and stabilisation of the newborn infants. Resuscitation should begin in the delivery room and a resuscitation team should be formed. This is the best way to curtail complication and morbidity of asphyxiated births.

Nosocomial infections have been the leading cause of neonatal deaths. It is of paramount importance to prevent infections in the nursery. Staff working in the nursery should pay attention to usage of sterilised equipment, isolation of infected babies and aseptic procedures. Paediatricians should avoid indiscriminate use of antibiotics. Most important of all, hand-washing before examination of the baby is mandatory and should be strictly adhered to.

Other simpler measures include warming devices for maintenance of body temperature of the newborn babies, blood glucose monitoring, and antenatal steroid for mothers in premature labour. In countries where neonatal jaundice is prevalent, effective management to prevent kernicterus is essential. Simple assisted ventilatory device such as nasal continuous positive airway pressure (nCPAP) is also useful.

Keywords: neonatal care, priority of; extremely low birth weight (ELBW) infants, developing countries, perinatal data

SINGAPORE MED J 1996; Vol 37: 424-427

This plenary lecture was delivered at the Workshop of the Federation of Asia Oceania Perinatal Societies on 11 December, 1995 in Lahore, Pakistan.

INTRODUCTION

Many sick newborn babies are now surviving because of development, advancement as well as proper organisation of neonatal care, including neonatal intensive care. Reports of good results come mainly from the developed countries. What is the relevance of these findings when applied to the developing countries? One would be interested to know whether similar good results can also be achieved in the developing countries, where resources are scarce and limited. There are also human resource problems. Nevertheless, developing countries can still do considerably to achieve best possible results in neonatal care. It is no doubt with improvement of neonatal care and further gain in experience of management of newborn infants that we continue to see better outcome. It is appropriate for the developing countries to examine and evaluate the standard and effectiveness of neonatal care and to set the target in the development of newborn care. It is therefore necessary to prioritise the neonatal

care in the developing countries, based on their available resources, both financially and work force availability.

Definition and terminology in perinatology

In discussing the problems of newborn babies, the definition and terminology in perinatology must first be agreed upon. These include adoption of uniform denominators, time definitions, and outcome measures⁽¹⁾. Otherwise entirely different sets of data are compared and interpreted, with misleading findings or conclusions. These should be the priorities towards improvement in neonatal care in the developing countries.

Fetal viability has been conventionally defined as fetus attaining 28 weeks of gestation. Birth of a fetus before this gestation period is usually considered as abortion. In some countries, the viability limit was set at 24 weeks⁽²⁾. In Japan, the viability limit as defined in the Eugenic Protection Law was amended from 24 completed weeks of gestation to 22 weeks in 1991⁽³⁾. Some workers even set the lower limit at 20 weeks⁽⁴⁾. With such disparity and diverse definitions of fetal viability, how can one compare the perinatal mortality and morbidity statistics and determine the magnitude of the perinatal problems of different countries in the same region?

The definitions of preterm (less than 37 complete weeks of gestation), term (from 37 to less than 42 complete weeks of gestation) and post-term (more than 42 weeks of gestation) should be clear to all the people. Yet some medical practitioners still consider infants born before 40 weeks (but after 37 weeks) as preterm.

Variations in the definition of fetal viability can lead to

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tremendous social, administrative and legal implications. These include notifications and registrations of births, stillbirths or abortions, payment of accouchement expenses and hospital charges, approval for termination of pregnancy, etc.

There are no standardised classifications of neonatal as well as perinatal deaths. Confusions in reporting, recording, and certification of the cause of death may arise when a newborn baby with multiple conditions dies. This may possibly explain the differences in reporting the major cause of perinatal deaths. An example is a premature newborn with severe congenital malformation who died of infection. The cause of death could be certified as prematurity, congenital malformation, or neonatal infection. Not many people are aware of Butler's classification of congenital malformation. The classification states that all deaths were considered to be caused by congenital malformation when the malformation was incompatible with life. In the presence of this condition, the cause of death took precedence over other pathological abnormalities⁽⁵⁾.

Minimum meaningful perinatal data

Another priority in health care planning is the collection of reliable perinatal and neonatal health indices. These data enable the health planners to identify the problems of certain groups of high-risk newborn infants. Therefore perinatal and neonatal data are crucial for monitoring, auditing, evaluation, and planning of perinatal health care of the country. In many developing countries, it is almost impossible to collect large number of perinatal data. Nevertheless, one has to be satisfied with certain minimum meaningful perinatal data. What then are the minimum meaningful perinatal and neonatal data? How should these be collected? What sort of operable reporting system is adopted? Collection of data depends largely on the persons who attend to the birth or delivery of the baby. The level of training, literacy level and acumen of observation will therefore affect the accuracy and reliability of the data collected. At the community level, such data should be few and simple, easily collected, recorded and reported. More information may be needed at the institutional level, however. It may be necessary to have a two-tier system of data collection.

The minimum meaningful perinatal data may include birth weight, records of livebirths and stillbirths as well as perinatal, neonatal deaths (post-neonatal deaths if possible). By doing so, certain basic perinatal and neonatal statistics can be compiled and compared. Individual countries in the same region may have different systems to achieve this goal, including education of the birth attendants, trained and untrained (traditional), introduction of appropriate technologies, and even legislation. The final goal should be availability of perinatal and neonatal statistics on a national level.

For the small babies, how small is too small?

The advent of advanced perinatal and neonatal care such as properly organised delivery room care and availability of technologies have contributed greatly to improved survival of the small babies. Many centres are reporting their success stories in the management of smaller and smaller babies⁽⁶⁾. In the context of many other developing countries, however, how small is too small? Is saving the smallest babies a priority? What is the lowest limit below which no resuscitation measures should be initiated and active management should be done, on the basis of either birth weight or gestation⁽⁷⁾. The small babies, whose birth weight is less than 1,000 gm, constitute a high-risk group of infants with subsequent neurodevelopmental impairment and severe handicap. They may require life-long rehabilitation support, frequent re-hospitalisations as well as special educational programme later in life. They can drain off a large amount of

financial resources in the health budget. In a developing country, would allotment of a hefty budget for neonatal intensive care be a top priority in health care at national level?

Many centres set a limit for resuscitation of the extremely premature infants, below which no active resuscitation is done⁽⁸⁾. For those babies who are born in the developing or third world countries, is there a need to modify the lower limit, say, to older and bigger fetuses? ELBW infants (extremely low birth weight infants, weighing less than 1,000 gm at birth) are not routinely ventilated in some centres⁽⁹⁾. Davis believed that the economic and psychosocial costs of caring ELBW infants including many neonates with birth weight of less than 750g, could be warranted in developed countries for neonates with a good chance of survival and long-term outcome. However, she did not believe these costs were warranted when treatment offered little or no hope of even survival to hospital discharge, as might be the case for neonates weighing 750g or less who required cardiac compression in the delivery room⁽¹⁰⁾.

Neonatal intensive care - how costly?

The cost of neonatal intensive care can be enormous and is escalating⁽¹¹⁻¹³⁾. In 1988, it was estimated to be US\$2.4 billion annually in USA. This is especially true for the VLBW infants (very low birth weight infant or infants weighing 1,500gm or less at birth), and especially the micropremies (the ELBW's), who are spending a much longer hospital stay than any other babies. They always seem over-represented in a neonatal unit. In 1994, the cost for VLBW infants in New York under prospective payment system was estimated to be US\$74,000 per infant and US\$93,000 per survivor. The cost per survivor of a micropremie was around US\$151,000 to 135,000⁽¹⁴⁾. The cost to achieve survival of VLBW infants is substantial. Health administrators in the developing countries must consider the costs when formulating guidelines regarding the aggressive treatment of VLBW infants. They may have to decide the proportion of the health budget to go to preventive paediatrics, such as immunisation programme, and to neonatal intensive care.

Neonatal intensive care - how intensive?

Some people believe that in the provision of neonatal intensive care, the neonatal centre must first be fully equipped with all the sophisticated equipment, supplied with expensive drugs, and operated by well-trained staff, etc. Can one achieve a better neonatal outcome with less-than-ideal facilities? Would one discontinue development of neonatal care if these requirements have not been met?

When withdrawing or withholding treatment for the very premature babies have to be decided, based on the gestational age, what then is the acceptable definition of fetal viability in the developing countries? Such decision also includes no resuscitation in the delivery room. As discussed earlier, at which gestational age do we consider withdrawing or withholding treatment? Gestational age that reflects fetal or organ maturity at birth is the ultimate determinant of outcome and obstetric decisions are usually based on fetal maturity. If gestational age is taken as the criterion for decision making, determination of the infant's gestational age must be accurate. Unfortunately, it is difficult to adopt such a method in the developing countries because many women do not attend the antenatal clinics. Most women who deliver very premature infants are those who are uncertain of their dates. They are also not able to time their gestation. Some do not even know or remember their own menstrual dates! How to make decisions when one is not sure of the gestational dates?

Neonatal care or neonatal intensive care is advancing at a rapid pace. In the developed countries we see the introduction

of ECMO (extra-corporeal membrane oxygenation)⁽¹⁵⁾, high frequency ventilation⁽¹⁶⁾, and even the liquid ventilation⁽¹⁷⁾, inhalational nitric oxide therapy⁽¹⁸⁾, surfactant replacement therapy^(19,20), and erythropoietin treatment⁽²¹⁾. These centres are also equipped with the latest model of ultrasound machine, including a colour doppler. These facilities are very costly. However, is it necessary to jump the band wagon? Is this a priority in the development of neonatal care in the developing countries?

Even without these sophisticated facilities, much can be done for the newborn babies and better outcome and qualities of the survivals can be achieved by focusing on the following areas:

Resuscitation and stabilisation of the newborn infants

The first few minutes of life, when transition of intrauterine to extrauterine environment of the newborn takes place, are of paramount importance. Inappropriate or inadequate management of the baby at birth can lead to life-long disability and handicap. The babies at risk should therefore receive the best possible attention at birth, to avoid brain damage and to attain stabilisation as soon as possible after birth. The neonatal staff should be trained in neonatal resuscitation and a resuscitation team should be formed. They must also be available at all times. Resuscitation by the resuscitation team should begin in the delivery room. This is the best way to curtail complication and morbidity of asphyxiated births. It is mandatory in modern day neonatal and delivery room care to include proper resuscitation set-up, which can be done easily. Delivery room must be properly organised. Resuscitation facilities must be well equipped. On a community level, it is also advisable for the obstetric attendants to know how to initiate and maintain the resuscitation procedure until the resuscitation team arrives.

In resuscitation of the newborn, one wonders whether all the babies should be intubated. Not all the medical or nursing personnel are competent in performing endotracheal intubation. However, it is reassuring to note that most resuscitated patients needed only free-flow oxygen or bag and mask ventilation. Knowledge and compliance of the Neonatal Resuscitation Program (NRP) Guidelines are useful to avoid excessive intubation⁽²²⁾. Doctors and nurses in the developing countries should take note of this experience.

Nosocomial infections

Nosocomial infections have been the leading cause of neonatal deaths. It is of paramount importance to prevent infections in the nursery. The longer the baby stays in the nursery, the higher the risk of the baby acquiring infection. Staff working in the nursery should pay utmost attention to usage of sterilised equipment, avoidance of overcrowding, isolation of infected babies, aseptic procedures, proper umbilical cord care, etc. In places where sanitation and safe water supply are the problems, breast milk is the best and safest way of infant feeding. Paediatricians should avoid indiscriminate use of antibiotics. Most important of all, hand-washing before examination of the baby is mandatory and should be strictly adhered to.

Maintenance of body temperature of the newborn babies

The newborn baby is sensitive to thermal stress. The body surface of the newborn infant is about three times that of the adult. They also have thinner layer of subcutaneous fat. Therefore, the rate a baby loses heat is about four times that of an adult. It has been shown that the chance of survival of small or sick babies is greater if they are cared for at their neutral thermal environment. Maintenance of a higher relative humidity can also help to stabilise body temperature. Much can be done to provide an optimal environmental temperature that is also essential to the

survival of preterm infants. Prevention of postnatal fall in temperature can be achieved by simple procedures such as drying the infant immediately after birth⁽²³⁾, covering the infant's body or head with insulated materials, and simple skin to skin contact between the infant and mother⁽²⁴⁾.

Blood Glucose Monitoring

Neonatal hypoglycaemia if left untreated can affect the baby's neurological development. The short-term and long-term consequences of neonatal hypoglycaemia are not available and few data are available on outcome after less severe asymptomatic hypoglycaemia. Neonatal neurological outcome following convulsions due to hypoglycaemia is however poor⁽²⁵⁾. Many babies who had neonatal hypoglycaemia are asymptomatic and appear well. It is necessary to screen for hypoglycaemia for the babies who are considered at risk. These include the low birth weight babies who are either premature or intrauterine growth retarded, the asphyxiated babies, etc. A simple chemical strip test is cheap and useful for screening purposes. A confirmatory test by the laboratory is necessary^(26,27).

Neonatal Jaundice (NNJ)

Babies with elevated serum bilirubin level are at potential risk of bilirubin encephalopathy or even kernicterus. The sequelae could be serious as the patient may develop cerebral palsy, neurosensory deafness. In countries where NNJ is prevalent, preventive measures including screening of G6PD deficiency (glucose 6 phosphate dehydrogenase) and effective treatment of NNJ should be established⁽²⁸⁾.

Antenatal steroid for mothers in premature labour

Antenatal administration of corticosteroids to the pregnant woman in preterm labour plays an important role in reducing the mortality of the premature baby. It also helps to reduce the severity or frequency of respiratory disorders and intracranial haemorrhage (IVH) in the premature infants. IVH is a high risk factor for poor neurodevelopmental outcome⁽²⁹⁾.

Use of simpler assisted ventilatory device such as nasal continuous positive airway pressures (nCPAP)

In the developed countries, it is observed that there is a changing trend in respiratory support of infants, including the micropremies, in the neonatal intensive care unit. Many physicians have noted that, with good obstetric care, higher rate of *in utero* transfer of the at risk mothers and early initiation of nasal CPAP (continuous positive airway pressure), the proportion of infants requiring mechanical ventilation could be brought down to around 50%⁽³⁰⁾.

Prevention of premature births

Most problems in neonatal care come from the premature infants. The chance of survival of a premature infant is very strongly dependent on gestational age, and in the 20 to 26 weeks period, prolonging pregnancy by a week makes all the difference⁽³¹⁾. This will have a significant impact on resource utilisation and therefore hospital cost. Prevention of premature births should be the primary goal in neonatal management.

Unfortunately, low birth weight remains a health hazard to babies, especially in Africa and South Asia. At least one in five babies was born lighter than they should be. The 1990 World Summit for Children aimed to cut the global rate to less than 10%⁽³²⁾. Also, assisted reproduction techniques are contributing to the prevalence of multiple births and preterm labour⁽³³⁾.

Prevention of premature births or prematurity is still the most ideal answer for decreasing the incidence of poor neurodevelopmental outcome in these small infants. The next

frontier will include optimisation of neonatal care, extension of care into the home after discharge and concurrent introduction of intervention and family support programmes. These could also improve developmental outcome of these high risk children^{34 36}.

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