Quality of care for babies born at 27–28 weeks gestation

Prematurity (birth before 37 completed weeks gestation) accounts for approximately 13% of all livebirths but almost half of all neonatal deaths. There is a close, inverse relationship between survival and gestation: only approximately 1 in 10 babies born at 23 weeks gestation survive to discharge from hospital, whereas at 28 weeks gestation and beyond the situation is reversed with 9 out of 10 babies expected to survive (Lee et al, 2000; Wood et al, 2000).

PROJECT 27/28

The National Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) was established in 1992 to improve understanding of how risks of death in late fetal life and infancy might be reduced. From April 2003, a new organization, the Confidential Enquiry into Maternal and Child Health, is charged with taking over this role.

Project 27/28 (CESDI, 2003) was specifically designed to focus on liveborn babies at 27 and 28 weeks gestation to provide national data on neonatal survival, identify patterns of clinical practice or service delivery that may impact on mortality, and make recommendations for future practice. The gestation band of 27–28 weeks was chosen because the majority of babies at this gestation survive and therefore enquiries into deaths are more likely to identify deficiencies in clinical care.

METHODOLOGY

Central to this project was the use of regional multidisciplinary panels to review the clinical care provided for a mother and her baby against agreed standards. A working group compiled a list of ten care standards (one obstetric and nine neonatal) based on a consensus of the best available evidence (CESDI, 2003). Panels assessed and graded the care provided using a semi-structured questionnaire comprising obstetric, neonatal, pathology and general sections.

Project 27/28 was conducted over a 24-month period from 1 September 1998 to 31 August 2000 and involved deaths in England, Wales and Northern Ireland. All 366 neonatal deaths and 395 control infants selected randomly from the neonatal survivors were reviewed. The case-control design enabled a statistical comparison of the distribution of various clinical care factors in infants who died with that in those who survived. Recommendations were developed from the results of this project following widespread consultation of experts using the Delphi technique.

OVERALL SURVIVAL

Out of a total of 3522 liveborn infants, 88% survived to 28 days or beyond. Although population-based data for the UK are available for preterm infants below 26 weeks gestation (Wood et al, 2000), Project 27/28 has provided the only national mortality figures available for more mature preterm infants.

MATERNAL AND INFANT CHARACTERISTICS

The distribution of pregnancy complications was similar in mothers of babies who died or survived, except that shorter gestation at pre-labour rupture of membranes was associated with increased risk of mortality, and the presence of bacteriuria and spontaneous preterm labour with decreased risk of mortality. Babies who died were more likely to be male, lighter at birth and have an associated (non-lethal) congenital malformation. Their clinical condition at birth and within the first 12 hours was significantly worse than that of babies who survived, suggesting early clinical compromise.

ANTENATAL MANAGEMENT

Deficiencies in the assessment of fetal wellbeing were found significantly more frequently in babies who died compared with babies who survived. These included failure to perform, interpret correctly or take appropriate action following antenatal investigations.

Antenatal management of anticipated preterm delivery includes administration of corticosteroids to the mother, one of the most effective antenatal interventions available (Crowley, 2000). The standard was whether 'every effort' had been made to treat with a course of corticosteroids since this is not always possible before a rapid, unexpected delivery. Achievement of this standard was generally high, but the standard was met less frequently in mothers of babies who died than in mothers of babies who survived.

Approximately two-thirds of all babies were delivered by caesarean section. In such deliveries, 'difficulty in the conduct of the delivery' was identified significantly more often in babies who died. Panels found deficiencies in intrapartum care in approximately one-fifth of all pregnancies including problems with intrapartum surveillance of mother and baby, inappropriate action during labour and delivery, and concerns regarding the seniority of staff available.

NEONATAL RESUSCITATION

Ninety-five per cent of babies required some form of resuscitation at birth, although a breakdown of specific interventions was not provided. Concerns about the personnel available at delivery were raised in almost half of cases, but these were equally distributed among infants who died and survived. Although other standards were often achieved, problems during resuscitation such as difficulty in endotracheal intubation were identified in 31% of babies.

NEONATAL MANAGEMENT

Hypothermia is independently associated with increased neonatal mortality and morbidity in extremely preterm babies (Costeloe et al, 2000). The standard for early thermal care (admission temperature of above 36°C) was not met

in three-quarters of all infants, and deficiencies in thermal care were significantly more frequent in babies who died.

Babies born at 27–28 weeks gestation are at risk of surfactant-deficient lung disease. Early intratracheal administration of surfactant is effective in reducing neonatal mortality and should be performed in all intubated infants (Soll and Morley, 2000). Surfactant therapy was given in the vast majority of intubated infants but problems were found in one-quarter of infants, most commonly a delay in administration.

PATHOLOGY

Postmortem examination of the placenta and infant may provide valuable information about the cause of death and other diseases, and is an important part of continuing education and audit. Placental pathology was requested in 62% of cases and 36% of babies underwent a postmortem examination. Deficiencies in postmortem report were identified more frequently when the examination was performed by a general pathologist rather than a specialist perinatal pathologist.

COMMUNICATION

Panels identified communication failures in a quarter of cases reviewed and included problems related to communication between health professionals and providing information or explanations to parents. Deficiencies in record keeping, most commonly relating to an inadequate plan of care, occurred in over a half of all cases.

ORGANIZATION OF CARE

One in four mothers were transferred before delivery, and one in ten babies were transferred postnatally between hospitals, mainly because the transferring hospital lacked the facilities or the capacity to look after the mother and/or baby. Review panels identified a number of deficiencies in the organization of obstetric and neonatal care. The most common antenatal problems included gaining access to appropriate neonatal facilities because of a shortage of intensive care cots and staffing problems. Neonatal organizational problems included inadequate senior medical support at delivery or in the subsequent management, and inadequate staffing and supervision of junior medical staff.

OVERALL GRADE OF CARE

A degree of substandard obstetric care was identified in 36% of mothers and substandard neonatal care in 37% of babies. This is similar to the results of a recent audit comparing perinatal mortality in fetuses and neonate >28 weeks gestation across 10 European countries which found suboptimal factors in 46% of cases (Richardus et al, 2003).

RECOMMENDATIONS

Formulating recommendations based purely on 'risk factors' from a case-control study is problematic. A statistically significant association does not necessarily identify an important causal link. Furthermore, the efficacy of any proposed intervention should ideally be rigorously tested before being recommended and widely adopted.

Project 27/28 makes almost 100 specific recommendations categorized into those needing to be addressed at local, regional and national level. Many of the recommendations are not based directly on the findings of Project 27/28, but would still be widely accepted as representing good clinical practice. Others reinforce existing good practice guidelines published by the Royal College of Obstetricians and Gynaecologists or the British Association of Perinatal Medicine. In several areas, the report recommends formalization and improvement of existing practices such as developing more written guidelines for local use, identification and training of specialist emergency teams and improved communication with parents and health professionals. Some of the most important recommendations relate to the organization of obstetric and neonatal services and call for the formation of managed clinical networks. HM

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Confidential Enquiry into Stillbirths and Deaths in Infancy (2003) *Project 27/28*. The Stationery Office, Norwich www.cemach.org.uk/publications/p2728/mainreport.pdf

Costeloe K, Hennessy E, Gibson AT, Marlow N, Wilkinson AR (2000) The EPICure study: outcomes to discharge from hospital for infants born at the threshold of viability. *Pediatrics* **106:** 659–71

Crowley P (2000) Prophylactic corticosteroids for preterm birth. *Cochrane Database Syst Rev* CD000065

Lee SK, McMillan DD, Ohlsson A et al (2000) Variations in practice and outcomes in the Canadian NICU network: 1996-1997. *Pediatrics* **106**: 1070–9

Richardus JH, Graafmans WC, Verloove-Vanhorick SP, Mackenbach JP (2003) Differences in perinatal mortality and suboptimal care between 10 European regions: results of an international audit. *Br J Obstet Gynaecol* **110:** 97–105

Soll RF, Morley CJ (2000) Prophylactic versus selective use of surfactant for preventing morbidity and mortality in preterm infants. *Cochrane Database Syst Rev* CD000510

Wood NS, Marlow N, Costeloe K, Gibson AT, Wilkinson AR (2000) Neurologic and developmental disability after extremely preterm birth. EPICure Study Group. *N Engl J Med* **343:** 378–84

KEY POINTS

- The establishment of managed clinical networks (i.e. networks of hospital with neonatal units of differing nature, working in partnership to deliver care for newborn babies with agreed patterns of referral, shared protocols and shared commissioning) should be supported.
- National standards should be established for in-utero and ex-utero transfers.
- At national level, the need for development and training of high-risk delivery suite teams needs to be defined.
- Planned deliveries earlier than 28 weeks gestation require early, expert review involving a consultant obstetrician.
- Staff responsible for the immediate care of a baby born at <28 weeks gestation should be accredited in neonatal life support.
- Units should ensure that there is early and close neonatal consultant supervision of care during the first 24 hours of birth. There should be guidelines concerning circumstances in which senior neonatal staff should attend preterm deliveries.
- Formal communication should take place between obstetric, midwifery and neonatal teams.
- A specialist perinatal pathologist should perform all postmortem examinations on preterm infants, where resources allow.