Infant mortality rate in Sheffield

EDITOR,—In 1994 Sheffield had the highest infant mortality rate in England and Wales.1 The impact of neonatal care in Sheffield immediately came under the spotlight. An investigation led by the Public Health Department of Sheffield Health took place to establish the reasons for the high infant mortality rate.2 It is well known that factors affecting infant mortality and morbidity may operate in the antenatal, as well as the postnatal period.3 The Sheffield Health led investigation consequently included the antenatal period. Similar to Spencer et al, the investigation found that increased social deprivation as indicated by the Townsend Deprivation Index was related to a higher proportion of very low birth weight (less than 1500 g) infants.4 Moreover, a higher proportion of very low birth weight (less than 1500 g) infants was related to a higher infant mortality rate.5 The investigation found that the infant mortality rate in Sheffield was not significantly different to other areas of England and Wales with a similar level of social deprivation. Neonatal care in Sheffield was not found to be substandard.

The investigation highlights the hazards of interpreting annual mortality rates as league tables of clinical performance.6 In the Sheffield Health investigation, the most important factor on infant mortality was the level of social deprivation.

Spencer et al conclude that the differences in birth weight in their study may have major implications for later life. The investigation carried out in Sheffield, shows that differences in birthweight will certainly have major implications for later life.

The Government’s commitment to reducing inequalities is to be welcomed, and we wait with interest to see what impact new policy initiatives in maternal and child health will have on the health of the most disadvantaged children in our society. The issue for Sheffield, and indeed the rest of the United Kingdom, is that if we are to be serious about reducing health inequalities, we must be serious in reducing social deprivation.

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Abortion of written guidelines in neonatal units for ECMO referral may delay referral

EDITOR,—Extracorporeal membrane oxygenation (ECMO) is a complex technique for providing life support in respiratory failure. ECMO support has been shown to be both clinically and economically justifiable for mature newborns with severe respiratory failure. As a result of the UK trial, the Department of Health (England and Wales) has decided to fund centrally three centres to provide an ECMO service for these children. Prompt and appropriate referral is essential to maximise the potential benefits from ECMO. Recent data have shown that the success of ECMO is inversely associated with the number of days pre-ECMO ventilation.7 It is vital that information regarding eligibility for ECMO referral, and contact numbers for referral should be readily available.

In the past, guidelines in the form of a brief pamphlet giving information about the service have been circulated to regional neonatal units and special care baby units. We decided to ascertain what was known about the service we offered.

We undertook a simple postal questionnaire survey of all 238 neonatal intensive care units and special care baby units in England, Northern Ireland, and Wales. This asked whether written guidelines for ECMO referral were available on their unit. If these were, then the respondents were asked to send a photocopy of these with the reply in the accompanying stamped addressed envelope.

We had a high response rate, with 162 completed replies (71% response rate) within six weeks of posting. Responders, only 20 units had guidelines for ECMO referral (12.3% of responders). The potential delay that this may cause has obvious clinical implications. It is estimated that 100 to 200 neonates per year will benefit from ECMO. The neonatal ECMO trial established the following criteria for referral:

- Oxygenation index >40
- Gestational age >34 weeks
- Weight >2 kg
- Reversible lung disease (<10 days high pressure ventilation)
- No major (≥ grade 1) intracranial haemorrhage
- No lethal congenital abnormalities
- If in doubt discuss with your nearest ECMO centre.

Oxygenation index = Mean airway pressure x PaO2 x 0.0100 / Petocrital Fio2 (mm Hg)

Contact telephone numbers:
- Glenfield Hospital, Leicester: 0116 287 1471 and ask for the ECMO coordinator.
- Great Ormond Street, London: 0171 405 9200 and ask for Cardiac ICU.
- Freeman Hospital, Newcastle-upon-Tyne: 0191 284 3111 and ask for Paediatric ICU.

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they are better than estimates based on a knowledge of urinary sodium concentration or osmolality alone, as suggested by Matos et al.1

Matos et al. concluded that urinary creatinine excretion was very variable because their urinary creatinine concentrations and urinary sodium to creatinine ratios varied widely, but this deduction does not necessarily follow. We present longitudinal data on 16 babies (mean of five data points each) obtained during the first week of life at the time of our earlier study,1 but not previously published, which undermine this conclusion. Creatinine excretion was very stable from day to day (despite some slight suggestion of a downward trend) particularly in individual babies, although urine flow and osmolal excretion varied widely. Creatinine excretion rates varied threefold, urine flow varied ninefold, and osmolal excretion tenfold (fig 1). We would contend that it is possible to obtain a clinically useful estimate of the excretion of a substance, X, in units/kg per day from an untimed (“spot”) urine sample using the simplified, but easily memorable, formula

\[
\text{Ux} = \frac{\text{Xc}}{\text{Uc}}
\]

from an untimed (“spot”) urine sample using extracellular fluid (ECF) concentrations in spot urine samples taken in the first week of life. This is clearly not the case. We drew our conclusion from simple direct (!) measurement of the urinary creatinine concentration and osmolality in fresh spot urine samples. Therefore the data are what they are: the urinary creatinine concentrations show a wide scatter that is somewhat corrected but not explained by different states of urine concentration, as shown when the data were factored by urine osmolality. We did not quote the paper of Al-Dahhan et al or that of Coulthard et al precisely because they did not provide simple data such as the urinary creatinine concentration in spot urine samples. Actually, the same wide dispersion of urinary creatinine excretion rates can be found in the paper by Al-Dahhan et al.1 During the first 10 days of life, we see (figs 5 and 6) that 24 hour creatinine excretion rates vary from about 40 to 450 mmol/l per day. The variation is still substantial (30–180 mmol/l per day) when the excretion rate is expressed per kg body weight. The findings by Al-Dahhan et al therefore support our contention, rather than that they disagree with our results.2

Why there is such a scatter in the urinary creatinine excretion rates is not really known and was not addressed in our paper nor by Al-Dahhan et al. It certainly is a rather amazing finding, taking into account that newborn babies have about the same birth weight, receive similar nutrition, and have the same kind of bodily activity. This finding probably reflects, at least in part, the special situation of the neonate, who has to cope with the significant creatinine load transmitted from the mother, at a time when its glomerular filtration rate is very low and was not addressed in our paper nor by Al-Dahhan et al.1

Later outcome data for that study have indeed shown less variation (50–150 mmol/kg per day) compared to inulin. Early Hum Dev 1985;11:281.


Figure 1 Serial daily urine excretion rates of creatinine, water (volume), and osmoles in 16 babies studied using inulin infusion during the first week of life.

Use of inhaled nitric oxide to improve oxygenation in the neonate

EDITOR.—We read with interest the recent annotation by Rennie and Bokhari1 on the subject of recent advances in neonatology. The piece was introduced by a foreword mentioning that the article was aimed at the non-specialist. It seems particularly important therefore that the information contained should have been clear and well balanced; we feel that this was not the case with regard to inhaled nitric oxide (NO).

In relation to mature infants, a number of studies have shown that short term improvements in oxygenation can be achieved in some babies. What is more important, however, is to assess what this means in terms of more substantive clinical outcomes. One large trial conducted in North America did show that a significant number of infants with persistent pulmonary hypertension of the newborn can avoid extracorporeal membrane oxygenation if treated with NO, although no benefit in terms of preventing death was detected.2 Later outcome data for that study have recently been presented showing no significant difference between the groups at 18–24 months.3 The Bayley scores of the NO treated group were, however, some 5 points lower. This could have been due to chance,

as the trial was not sized on this outcome. It is also plausible, however, that a poorer long term outcome may result from NO treatment as if there is no response referral for extracorporeal membrane oxygenation and the establishment of physiological stability is delayed.

The situation with regard to preterm babies is even less clear, and there is very little evidence either for or against NO use. Again short term improvements in oxygenation have been noted, but there are no studies reporting substantive longer term outcomes. It is in this group that concerns about intraventricular haemorrhage and toxicity are most acute. There are, as yet, no studies that adequately address the risks to the developing lung of NO exposure in terms of its ability to influence local inflammation and disrupt cell signalling pathways. The annotation simply refers to current recommendations on the environmental exposure of adults.

To state that NO “...has already proved to be effective treatment” seems to distort the current picture. It is our view that sufficient uncertainty remains in relation to NO that its current use should remain part of a randomised trial such as INNOVO, funded by the MRC. New centres are still being recruited, and clinicians may choose to enter either term or preterm infants or both, depending on their position of equipoise. Currently, clinical uncertainty has mainly led to the establishment of severely ill oxygenation. In time, continued recruitment into INNOVO will allow more knowledgeable statements about the role of NO in this vulnerable population.

Rationing in child health services

EDITOR,—Hepatitis B continues to be a public health problem despite the existence, for the past decade, of a safe and effective vaccine. Particular concern exists for infants at risk of vertical transmission. The Department of Health recommends that all babies born to mothers who are hepatitis B carriers receive hepatitis B immunisation at birth, 1 month, 6 months, and 12 months of age. Universal screening of pregnant mothers for hepatitis B now takes place in Cardiff since 1995. We were concerned that, although babies received immunisation at birth, second and third doses were being missed. An audit therefore undertaken to assess the coverage of hepatitis B immunisation in infants at risk born between 1 January 1994 and 31 December 1996.

All hepatitis B carriers identified by antenatal screening at Llandough Hospital were included. Data on the hepatitis B status were obtained from the virology laboratory records. The mother’s antenatal notes and the baby’s neonatal notes were reviewed. Immunisation details on the infants were obtained from hospital notes, general practitioner records, and the computerised child health system.

Seventeen women were identified by antenatal screening as hepatitis B carriers. One woman moved out of the area antenatally, two postnatally, and one woman had an intrauterine death. Thirteen mothers and infants were included in the study. Twelve of the 13 women (92%) belonged to ethnic minorities and six (46%) had poor English comprehension, as reported by their general practitioner and health visitor. In only two cases was there evidence in the neonatal notes that the implications of the hepatitis B carrier state had been discussed. In none of the neonatal notes was there documentation of parental counselling on the need for follow-up of the baby and further hepatitis B immunisation.

All 13 babies were immunised within 48 hours of birth and received immunoglobulin. Eleven (85%) received the third dose, including five babies who received their second dose from one to six months late. Only five (38%) babies received their third dose, and three of them received it later than scheduled.

Our study highlights the difficulties of achieving adequate hepatitis B immunisation coverage in high risk infants. Most women belong to ethnic minorities, which is a considerable number having poor English comprehension. Also, communication between health professionals and patients, and between the various health professionals is poor. The Department of Health recently issued a directive to all health authorities to ensure that arrangements for universal antenatal screening are in place by April 2000, and that all babies born to infected mothers receive an adequate course of immunisation. Our study shows that even when universal antenatal screening is established, full protection of babies at risk does not necessarily follow. Since this audit, a public health nurse with specific responsibility for these families has been appointed. The consultant in communicable disease control now oversees the follow up and hepatitis B immunisation of these babies. Unless health authorities ensure that there is
an effective system in place for vaccine delivery, low prevalence countries like the United Kingdom may have to consider universal immunisation.3

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