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Postneonatal Mortality in Sheffield

The halcyon period of the immediate post-war years, when neonatal and postneonatal mortality rates fell steadily in all social groups (Morris & Heady 1955), is over. As Pharoah (1976) has pointed out, the postneonatal death rate in this country is now lagging behind not only the Scandinavian countries but many other countries such as France and Japan. Infant mortality rates would seem, particularly from the recent studies of Wynn & Wynn (1974*a*, *b*), to be linked to a variety of different child health care systems. There appear to be many and various factors affecting mortality.

An enquiry carried out by the Ministry of Health in 1964 indicated that there was a definite group of possibly preventable deaths. Our own studies reinforce this.

The pædiatric pathologist is usually concerned with naming diseases found at death and determining pathological causes of death but it is possible to take this a little further and to pose the question: 'How often and under what circumstances do possibly preventable deaths occur?'

This requires not only approaching each death from the point of view of diagnosis, but also in assessing the disease state from the viewpoint of the inevitability or otherwise of death. Such decisions must be rather arbitrary and debatable.

We divided deaths into four major groups, A, B, C and D, as follows:

Group A: Deaths in children with severe diseases of long standing in whom death is almost certainly not preventable though it may be delayable. Such deaths occurred in children with gross congenital deformities of the central nervous system and the heart. In this group also were children with progressive degenerative diseases.

Group B: Deaths from diseases for which treatments are available. There is an 'accepted mortality rate' in such diseases as meningitis and pneumonia. However, in these, mortality is probably modified depending on the time of treatment.

Group C: Deaths in children in whom the disease found at necropsy would not ordinarily be considered adequate to account for death but would produce symptoms. These deaths include children with virus infections but in whom the cause of death was not obvious and children with tracheitis and gastroenteritis...

Group D: Deaths with no evidence of ordinary disease. These deaths occur in two forms: (1) Those where there is evidence that the children have been unwell – they had fatty change in the liver and evidence of an alteration of growth rate in the costochondral junction (D1). (2) Those where the child appears to have died in a healthy state (D2).

There was also a small group of malignant tumours (T).

A breakdown of all postperinatal child deaths in Sheffield over a two-year period, analysed as just described, is shown in Fig 1.

The first, most striking, fact is that more deaths occurred out of hospital than in hospital. The in-hospital deaths were chiefly of the Group A type. There were a small number of tumours and the rest were of Group B type. In Sheffield, very ill children are all sent to hospital by their home doctors.

The other deaths occurred either at home as 'cot deaths' or on the way to hospital. There were a few inevitable deaths – chiefly undiagnosed congenital deformities of the heart – but the bulk of the deaths were of the B and C groups. Deaths in apparently normal children were extremely uncommon. There were no 'battered baby' deaths

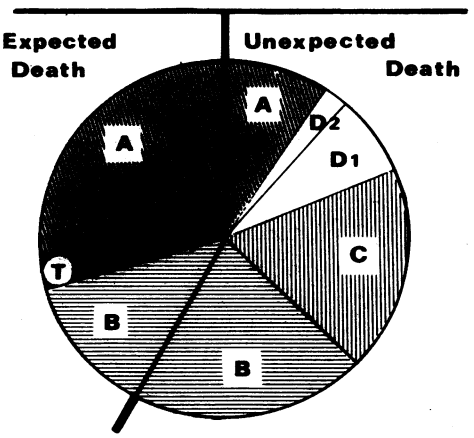

Fig 1 *Distribution of postperinatal deaths in Sheffield 1972–3 (see text). (Reproduced from Emery 1976 by kind permission)*

in this age group during this period. The most striking feature of Fig 1 is that about a third of all the deaths were from diseases for which treatment is available (Group B) and in two-thirds of those babies no treatment appeared to have been given.

Three questions immediately arose: (1) Did those 'B' deaths at home show the same symptoms as those who reached hospital with the same disease? (2) Of those who did get to hospital, was the duration of symptoms the same in those who recovered as in those who died? (3) Of the children who died in hospital, how many deaths were due to late diagnosis and treatment?

The answer to the first two questions appears to be that the duration and type of symptoms are the same in all these children. The chief difference between the groups lies in the different levels of recognition of infant health states by both parents and medical personnel and in the differing abilities of people to obtain medical care (McWeeny & Emery 1975).

The answer to the third question was attempted by analysing all of the hospital 'B' deaths in detail (Oakley *et al.* 1976). In this study, in a two-year period, there were 81 deaths of which 60 were considered to be inevitable (Fig 2). There were 18 deaths in children admitted in the post-perinatal age from home but 15 of these were described as moribund on admission and they were thus admitted too late for adequate treatment. Looked at another way, of the 21 deaths in the age group from possibly treatable disease, in only 6 cases could we find any evidence that their likelihood of recovery would have been increased by an improvement in hospital care.

If we now look at the unexpected home death situation, we are entering the field of the so-called 'cot death' or 'crib death'. There has probably been more nonsense written about these child deaths than about most other present situations in pædiatrics. It will be apparent from Fig 1 that, in our experience, the death of a completely well child is an extreme rarity. It must also be realized that many of the deaths that are designated Group C in Fig 1 did not have the benefit of chemical analysis of the vitreous humour and at that time we were unable to diagnose hypernatræmia at necropsy. It becomes apparent that we have a situation where about half of the 'cot deaths', after excluding children with undiagnosed gross deformities, come into the possibly preventable death group. Statistics about 'cot deaths' are subject to many errors but there are some differences in communities where the standards of study are roughly comparable. The rate in this country is now estimated by Gardener & Carpenter (1974) to be about 1.4 per 1000 births. The rate in New Zealand is 4.3 per 1000 births in Maori and 1.5 per 1000 in European infants in the same community (Tonkin 1974). The rate in Sweden is 0.6 per 1000 births (Fohlin 1974) and in Holland, 0.42 (Baak & Huber 1974). The Finnish figures are apparently the same as those in Sweden. Any suggestion that the infants of Holland are three or four times less susceptible to a specific anomaly of the brain, heart or larynx is difficult to accept. On the other hand, if we were to postulate that in this country we have many children who are diagnosed as unexplained, unexpected deaths or 'SIDS' but who, in fact, are infants with treatable diseases not obtaining treatment, i.e. in our Groups B and C, and further postulate that by means of a better child health care system early adequate treatment could be given to most of these, we would see a situation when the larger number of the B and C deaths would be eliminated. We would then have post-perinatal mortality statistics in this country almost identical to those in Holland and Sweden.

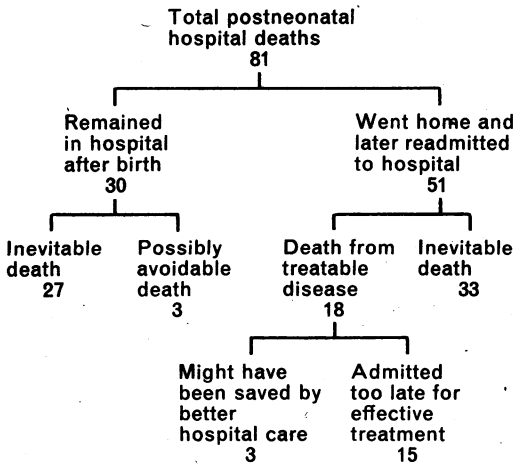

Fig 2 *Analysis of postneonatal hospital deaths in Sheffield 1973–5*

Our studies lead to fairly simple conclusions which are that we are unlikely to improve our postperinatal mortality rate in this country by doing anything inside our pædiatric hospital units or by improving the training of our pædiatricians inside hospitals. If we are to prevent these child deaths until we can prevent diseases occurring, we need a vast improvement in the primary home medical care of our infants and earlier care for children in the home. This has great implications for those training and appointing pædiatricians. Many consultant pædiatricians in this country have acquired consultant status without ever visiting a baby at home and many who do so as consultants tend to visit only the better houses after a family doctor has already made a diagnosis of illness. There is need for re-orientation in our specialty.

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Health Care Systems for Pre-school Children

In 1973 Sweden had an infant mortality of 9.9 and Finland of 10.0 per 1000 live births. The ranking of nations has been changing and a number of countries, including France and Japan, have overtaken England and Wales at 16.9 and Scotland at 19.0 in 1973. The biggest contrasts are in postneonatal mortality. English and Scottish postneonatal mortalities are between three and four times those achieved in Sweden and Finland. In Scotland, for which social-class breakdowns are available, postneonatal mortality is strongly correlated with social class, but even in Social Classes I and II the postneonatal mortality is almost double that achieved by the whole populations of these Scandinavian countries. The medical knowledge available and medical education are much the same in all countries and the differences are not to be explained at all in terms of the numbers of doctors or even the gross expenditure on health care. The character of the health care systems in these countries is the major factor producing the differences in results.

British studies of postneonatal deaths show that in many cases the death might have been prevented if treatment had been begun sooner. Many infants dying in hospital were moribund on admission. The parents of most of these sick infants were genuinely unaware of the gravity of the illness until too late.

The inability of parents to diagnose childhood morbidity was one finding of a French project at two centres which began in 1969 and continues. Over 20 000 children in Paris have been screened in this project at 10 months, 2 years and 4 years so far. Over 800 items of information are collected on each child by a team of specialists in an examination lasting half a day. This experimental project is quite distinct from the much less comprehensive screening of all children required by French law and part of its purpose is to decide what screening procedures are worthwhile. Summaries of the first 10 500 examinations have been published (Hazemann *et al.* 1973).

I mention these studies of Paris children because of one basic conclusion. Only one parent in ten had a child found to be suffering from some morbid condition was aware before the examination that anything was the matter with his child. The morbidity not previously diagnosed varied from only 6 out of 59 cases of serious disorders of the nervous system, to 98 out of 102 cases of ear, nose and throat disorders at 10 months and 63 out of 74 cases of serious respiratory illness. Every case out of 2 severe and 77 moderate cases of deafness at 10 months had escaped notice. The infant mortality in Paris is almost the lowest in France and is substantially lower than London and the 10 500 children in this survey did not come from particularly poor homes and had conscientious parents who accepted an invitation to participate.

Parents are the first people to be in contact with a sick child and medical advisers can do nothing unless parents ask for help. The education of parents in the recognition of illness is stressed in French and Scandinavian papers as a first requirement in any system of health care for small children. Such education should begin in the prenatal period (Mande 1974, Köhler & Köhler 1975). It is perhaps not so expected that even in Sweden, with one of the best child health services, parents are not content with the amount of information and advice they receive (Sundelin 1973).

The French teams of consultants found much more morbidity than had been suspected. Only one-third of the children at 10 months and 2 years, and only one-sixth at 4 years were given a completely clean bill of health; 10% of children were considered to require urgent treatment if their future was not to be prejudiced. Such results pose the question as to how much screening and treatment of young children is worth while. Any rational case for the use of more resources on health care should include an indication of both costs and benefits. The benefits from expenditure under different headings vary from zero up to high figures. Progress in Britain needs many more