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Perinatal mortality in Northern Ireland: where are we now?

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SUMMARY

Perinatal mortality in Northern Ireland has been declining over the last 30 years, but the factors which may account for this fall have not been clearly delineated. Crude perinatal mortality figures yield very little insight into the problem, and meaningful management statistics are urgently required if service performance is to be reasonably assessed. This paper sets out the case for birth-weight standardisation and explores the utility of a broad diagnostic taxonomy of causes of death.

INTRODUCTION

Since the early part of this century there has been a dramatic decline in perinatal mortality in this country. Over the last 25–30 years, crude perinatal death rates have fallen from 38 to 11 per 1,000 total births. The percentage improvement in Northern Ireland is higher over this period than in the other home countries, but there is debate about the factors to which this can be attributed (Fig 1).

Many perinatal deaths are determined by circumstances and events surrounding birth, and the perinatal mortality rate is widely regarded as a performance

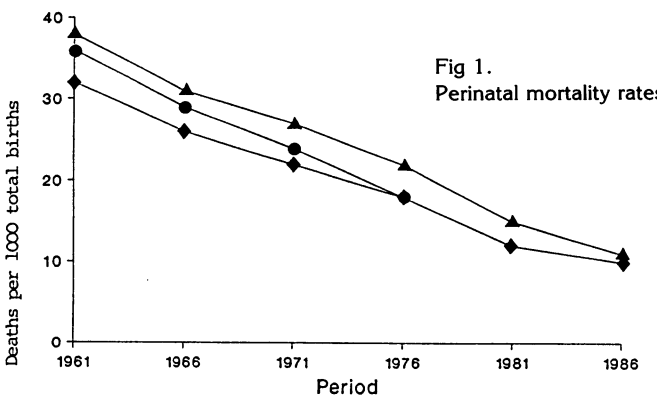

Fig 1.
Perinatal mortality rates for home countries.

Figure 1: The crude perinatal mortality rates for Northern Ireland ▲ Scotland ● , and England and Wales ◆ from 1961 to 1986.

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indicator for this aspect of the health services.[1-3] Health planners and other professionals, to say nothing of the public at large, have not been universally convinced that there are sufficient advantages in 'high technology' medicine in this area to compensate for the high cost, denial of free choice to mothers, and the possible impairment of development of mother-infant relationships. In contrast, the relationships between socio-economic status, low birthweight and mortality are consistently demonstrated[4] and have prompted some to recommend a closer liaison between social and medical interventions.[5-6]

Crude comparisons of overall perinatal mortality have very limited value in appraising the role of regional neonatal intensive care or the place of obstetric intervention in preterm labour, and there seems to be a consensus on the need for better indices of perinatal health. The routinely available statistics for Northern Ireland, which provide only crude death rates, contribute little to our understanding of how the prospects for low birthweight infants have changed in recent years. In view of the caution with which other crude mortality data are generally treated both by clinicians and epidemiologists, it is surprising how often circumspection is discarded when perinatal mortality rates are being compared.

One way of overcoming some of these criticisms is to use standardised perinatal mortality rates, analogous to the standardised mortality ratio, except that the standardisation is carried out according to the birthweight distribution instead of in terms of sex and age.[7, 8] It is clear that the major hope for improving perinatal mortality must depend upon measures which will shift the birthweight distribution to the right, whether through social or health care mechanisms, and, if we are to carry out realistic assessments of other components of care, then it is necessary to eliminate from the comparisons the effects of the birthweight distribution.[8]

A supplementary approach, as suggested by Wigglesworth, is to examine causes or modes of death within the various birthweight groups, as far as possible, selecting mutually exclusive groups of causes which carry implications for perinatal care.[9] He has suggested that the most pragmatic classification is that based on the following simplified pathological subgroupings to which most perinatal deaths can be provisionally assigned even if necropsy is not done:

1. Normally formed, macerated (stillbirth).
2. Congenital malformations (stillbirth or neonatal death).
3. Conditions associated with immaturity (neonatal death).
4. Asphyxial conditions developing in labour (fresh stillbirth or neonatal death).
5. Specific conditions other than above.

This paper explores the utility of such indicators in the Northern Ireland setting.

METHODS

The distribution of birthweights for all births in the province for the years 1984–86, and for the Northern Health and Social Services Board for the years 1976–78, was obtained from the Information Technology Unit of the Department of Health and Social Services, Northern Ireland. Birthweight was obtainable for 97·5% and 96·2% of all births during the respective periods. Birthweights were grouped into five categories; 0–999g, 1000–1499g, 1500–1999g, 2000–2499g and 2500g and greater. Calculation of the standardised perinatal mortality rate uses the technique of indirect standardisation, whereby perinatal mortality rates within specific weight bands in a reference population (Northern Ireland) are multiplied by the absolute numbers

of births in the same weight groups in a local population. The expected numbers within successive weight groups are added together to give an expected total. Finally, the observed total number of deaths and stillbirths is divided by the expected number and the result multiplied by 100.

Each health board receives a copy of the medical certificate of cause of death which enables an entry to be made in the birth register for each perinatal death. Wigglesworth's four main groups of causes of deaths present several minor problems of definition.[9] In some stillbirths with early maceration it may be difficult to decide whether death occurred before or after the onset of labour. Many congenital malformations which are fatal in the perinatal period are recognisable externally or clinically, but the total number of malformations may be underestimated unless post-mortem examination is performed. All normally formed fresh stillbirths of any birthweight and all early neonatal deaths in term infants are assigned to the asphyxial group, unless a specific condition, such as an inborn error of metabolism, has been diagnosed during life or at necropsy. Each perinatal death has been assigned to the place of residence of the mother.

RESULTS

The Table illustrates the crude and birthweight standardised perinatal mortality rates for the four health boards. Fig 2 elaborates this data by representing the contribution of each of Wigglesworth's cause of death groupings to the overall birthweight standardised mortality.

TABLE

Crude and birthweight standardised perinatal mortality rates (1984–1986) for the four health boards (weighed births only)

Board	*Crude rate per 1,000 total births*	*Birthweight standardised rate*	*(95% confidence limits)*
Eastern	11·45	99·41	(89–110)
Northern	10·78	90·78	(78–104)
Southern	13·23	115·98	(99–133)
Western	10·97	96·73	(82–112)

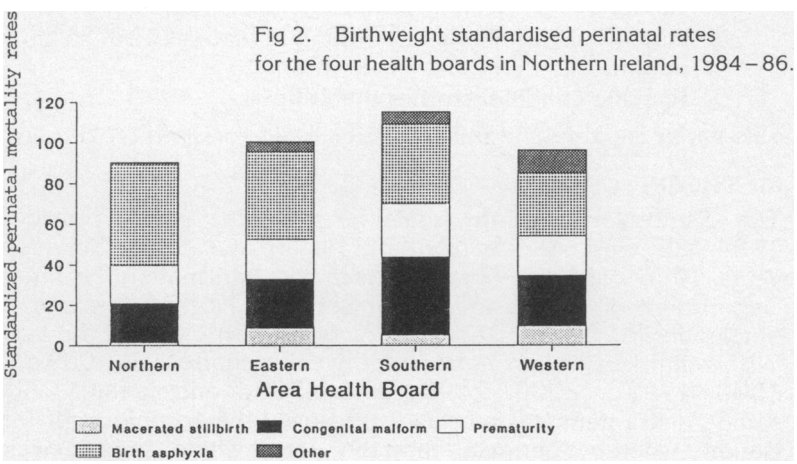

Fig 2. Birthweight standardised perinatal rates for the four health boards in Northern Ireland, 1984–86.

Fig 3 illustrates how the Northern Board has reached its present position since the earlier period of 1976–78. The weight-specific mortality rates of 1984–86 have been used as the standard for both periods shown. The fall in the standardised perinatal mortality rate has arisen from declines in all groups of causes.

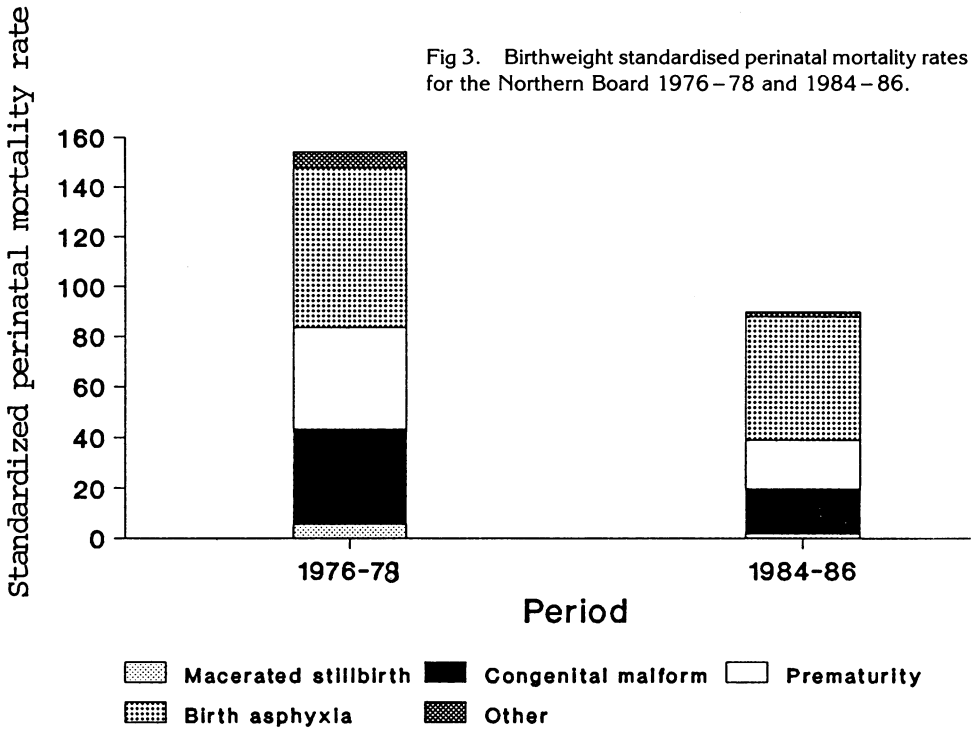

Fig 3. Birthweight standardised perinatal mortality rates for the Northern Board 1976–78 and 1984–86.

DISCUSSION

It is now generally accepted that, while crude perinatal mortality rates have been widely used as indicators of the quality of obstetric and early neonatal care, they provide little insight into the varying mortality experience across the birthweight distribution.[3] When different populations are being compared, birthweight standardisation can reduce the breadth of the distribution and consequently the chance of an area being labelled as aberrant.[7] There remain problems arising from small numbers and sampling variation, and all presentations relating to perinatal mortality should be accompanied by confidence limits.[10]

The statistical stability of small area rates can be enhanced by aggregating deaths over a number of years. and it is possible that, for small areas of the province like council districts or units of management, a three-year grouping is not sufficient. The confidence limits for some of these areas are wide but there is a real difficulty that aggregation over longer periods (five or six years) would mask the significant effects of other determinants of birthweight which could change during such an interval. An example might be the social class distribution — in the Northern Board, for 1976, 4·1% of social class I and II births were of low birthweight (<2500g) as compared with 6·3 of social class IV and V births. Although these percentages changed little for the later period (1984–86), the proportion of all births in social classes IV and V fell from 27·8% to 13·6% during the interval.

Gestational age is, of course, a further independent variable against which both birthweight and perinatal mortality might be assessed. However, because it is notoriously inaccurate in a substantial proportion of cases,[11] further standardisation by this variable was not thought worthwhile.

The purpose of breaking down the weight-standardised mortality into Wigglesworth's cause of death groupings was as far as possible to recognise groups with 'clear implications for clinical management'.[9] For instance, he suggests that a high rate of macerated stillbirths should prompt investigation related to antenatal care and background maternal factors. The frequency of fatal asphyxial conditions arising during labour may reflect provision of facilities for intra-partum monitoring or the availability of personnel trained in the resuscitation of the newborn. A high congenital malformation rate may raise questions about facilities for pre-natal screening or procedures for early neonatal diagnosis of potentially treatable conditions (such as transposition of the great vessels).

There are perhaps more problems of definition than Wigglesworth suggested in the use of his five broad categories. The quality of notifications of congenital malformations suggests considerable unreliability.[12] When looking for secular trends in perinatal mortality using a Wigglesworth type of taxonomy, the position is complicated because modern treatment attempts the salvage of an ever wider spectrum of conditions, such that a stable definition of 'lethal malformation' is elusive. There is the added difficulty that premature delivery itself can cause in this respect — certain conditions, such as a diaphragmatic hernia (which covers a wide spectrum of severity) could be labelled either as a developmental abnormality and thus be coded as a death attributable to prematurity, or as a malformation.

These caveats aside, it has been suggested that there may well be a limit to the degree by which perinatal mortality can be further reduced — a limit imposed by the 'unavoidable causes of death', predominantly congenital malformations. However, the experience of the Northern Board, which has shown a marked improvement over the last 10 years, would suggest that this improvement has not just been limited to those causes related to asphyxia and prematurity. During this interval, the Northern Board introduced a neonatal intensive care service, but a causal link with the improved outcome is not necessarily proven. When such patterns are investigated in future and districts are compared, a more detailed review of weight-specific mortality trends might be useful. The limited explanatory power of ordinary standardised mortality ratios has already been noted,[13] and so weight-specific mortality data may prove a useful supplement when districts are compared and when trends are sought. Although all weight groups in the Northern Board showed some improvement the reduction in mortality was greatest (70%) for babies between 2000 and 2499 g.

There can, however, be no grounds for complacency. Several groups have shown that the rapid decline in perinatal mortality over the last 20 or 30 years has not been matched by a proportionate decrease in post-neonatal deaths and have postulated that this may be due to a postponement of some neonatal deaths into the post-neonatal period.[14, 15] This hypothesis is supported by the anomalous pattern of unchanging (or increasing) post-neonatal mortality rates, which is more marked for very low birthweight babies.[14] Although this would merit further investigation in Northern Ireland, perhaps we should also re-examine the objectives of perinatal care. Mitchell has submitted that the prime objective should be 'to ensure that new individuals reach adult life in the best possible state' and that the final outcome is determined by many interacting factors 'from genetic

endowment to educational achievement, but above all by the qualities of the parents, eugenically before conception, physiologically during pregnancy and personally after birth'.[6] While prevention of low birthweight must be a prime objective, there is a growing belief that, to provide the best future for infants at risk, attention must be paid to the qualitative aspects of their childhood as well as to the standards of care at birth.

In our continued quest for better performance indicators it is essential to avoid a blinkered view, and also to appreciate the shortcomings of small area ecological analysis. While there may be significant associations between variables like the social class, maternal age or parity distributions of an area, and its perinatal mortality rates, such correlations provide little clarification of the processes involved at the individual level. We suggest that birthweight standardisation at least should be a first step towards fairer comparisons. Although it has some obvious shortcomings, not least a reliance on death certification,[16] the Wigglesworth taxonomy of perinatal mortality might provide a useful management tool to point the way to more detailed investigation.

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