and to the doctor who is her team-mate? This difficulty does not arise for a health visitor working only for the local authority.

Range of Contacts

The health visitor may in the interest of her clients make contact with very many organizations and people. The list (by no means exhaustive) might include the public health inspector, the social services department (especially the child care officers), the N.S.P.C.C., teachers in schools and universities, the Citizens' Advice Bureau, the neighbourhood lawyer, the probation office, the social security office, housing agencies, family welfare organizations, the Society for the Unmarried Mother and her Child, specialist societies for the welfare of—for example—spastics, epileptics, diabetics, service and ex-service bodies, prison and moral welfare workers, medical and psychiatric social workers, hospital staff, and a host of church organizations, welfare offices of embassies, youth services and clubs, adventure playground leaders, and scoutmasters. Though she meets her biggest problems in the lowest income groups, many middle class mothers need and welcome advice on baby care and child management problems.

The health visitor deals with a large number of normal people, but this account of a family on the list of Miss X, a health visitor in central London, may illustrate the kind of long-term problems she may face.

The doctor to whom she has a part-time attachment asked her to call on Mrs. A, who was depressed and talking of suicide. She found her living at the top of a damp rat-infested house. Mrs. A. had had three spouses, and had her sixth, seventh, eighth, and ninth children with her. The first three were with a father, and the fourth and fifth were adopted. They had no bathroom and the lavatory was two floors down, so they usually used a bucket. Mrs. A never got out, had great difficulty in making the social security go round, and had quite lost heart. Miss X tried various housing agencies, with a slight prospect of eventual success, gave advice on budgeting,

and through the local council arranged a holiday for Mrs. A. The two youngest children, aged 5 and 7, went into care—not for the first time. The eldest boy was working, the next was an unstable 17-year-old girl with a very poor work record, who at this time became pregnant and aborted herself. Miss X visited her in hospital when she was ill with sepsis and tried to ensure that she realized the importance of the "pill."

Mrs. A. returned from holiday in high spirits, found a new partner, and went to live with him leaving the two older children in her flat. One month later the eldest daughter and her mother were both pregnant. The daughter seemed to have made a fairly stable alliance, and was supported with advice on money and ante-natal care, gifts of secondhand baby clothes, and a pram. Both were delivered in hospital, and both used to come to Miss X's clinic; she looks back rather wistfully to this as the highlight of their association. Soon Mrs. A. left her partner and came back to the flat with her baby. There was now no room for the daughter's boyfriend, so this fairly hopeful relationship collapsed. The two youngest children are now back with Mrs. A. silent, anxious, and enuretic.

All health visitors hope is that by sustaining parents they may help to make a better life possible for the children, but Miss X cannot help but feel that these two will be a problem for her successor.

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Problems of the Newborn

The Small-for-dates Baby—II

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British Medical Journal, 1971, 4, 480-482

Small-for-dates babies are those whose intrauterine growth has been abnormally slow and whose birth weight is therefore low for the gestational age at which they are born. An arbitrary decision has to be made about the dividing line between normal and low birth weight at a particular gestation, but a commonly used definition is that a baby is small for

dates if its birth weight is below the 10th centile for the gestational age. This implies that 10% of newborn babies will be regarded as small for dates, and some babies whose birth weight exceeds 2,500 g (5½ lb) will be included. The advantage of this somewhat inclusive and unbiological definition is that it will include most of the babies at risk for the particular problems associated with intrauterine growth failure. The Table shows the 10th centile birth weights for particular gestational ages, taken from the data of Thomson *et al.*¹

There are two main categories of cause of slow intrauterine growth: either the fetus has a poor growth potential, or the intrauterine environment in some way restricts the growth of an otherwise normal fetus. Causes of impaired fetal growth potential include fetal malformations, intrauterine infections (for example, rubella), and some forms of dwarfism where

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10th Centile Birth Weights for Particular Gestational Ages

Gestational Age	10th centile birth weight (g)	
	Males	Females
32	1,170	1,050
33	1,460	1,350
34	1,730	1,630
35	1,970	1,870
36	2,180	2,090
37	2,360	2,270
38	2,510	2,420
39	2,640	2,540
40	2,740	2,620
41	2,800	2,680
42	2,840	2,700

Babies whose birth weight is below the 10th centile for their gestational age are defined as "small-for-dates." The birth-weight distribution for a particular gestation depends on the sex of the infant, the mother's parity, and several other factors, but for simplicity only the baby's sex is taken into account in this table. (Taken from the data of Thomson *et al.*¹)

growth failure begins before birth (for example, "bird headed dwarfs"). The growth of an otherwise normal fetus may be restricted if there is severe maternal undernutrition, severe toxæmia, or multiple pregnancy. There is also a group of mothers who rather consistently bear small-for-dates babies in all their pregnancies without the presence of any of these factors.²

It is probably much more common for a baby to be small-for-dates because of a growth-restricting intrauterine environment than because of retarded growth potential. The problems of most small-for-dates babies can therefore be understood by regarding them as having suffered from intrauterine undernutrition (see Table in last week's article). Nevertheless, this is a considerable oversimplification and small-for-dates babies are certainly a heterogeneous group.³

General Care

OBSTETRIC CARE

It is increasingly recognized that the care of the infant begins before birth, and the problems of the small-for-dates baby are a good illustration. The most important causes of perinatal death in the undernourished small-for-dates baby, who may have an inadequate placenta, are chronic or acute fetal distress (leading to intrauterine or intrapartum death) and birth asphyxia. These dangers obviously have to be anticipated effectively before birth. The obstetrician considers the possibility of intrauterine growth failure if there is a previous history of small-for-dates babies or unexplained intrauterine deaths, if the mother has toxæmia or hypertension, or if the uterus seems small for the gestational age.

The suspicion of poor fetal growth may be supported by finding static or diminishing maternal weight and girth in the last trimester, or low maternal urinary oestriol levels. Under these circumstances the obstetrician will ensure that the mother is booked for delivery in a well-staffed maternity unit; that pregnancy does not continue if fetal growth appears to have stopped, that labour is not unduly prolonged, and that there is especially careful monitoring for signs of fetal distress; and that a paediatrician or other doctor skilled in resuscitation of the newborn is present at delivery to deal with birth asphyxia if it occurs.

NURSING CARE

Much of what was said in last week's article about nursing of pre-term babies—keeping them warm, and preventing infection—applies also to small-for-dates babies, especially if they are very small (less than 2 kg) or *both* pre-term and small-for-dates.

FEEDING

The small-for-dates baby will usually suck and swallow satisfactorily and be able to take his feeds from a bottle. Early and adequate feeding is especially important in the small-for-dates baby, because it largely prevents hypoglycaemia, which is the major postnatal hazard.

Problems

INTRAPARTUM DEATH AND BIRTH ASPHYXIA

Measures to prevent or anticipate these problems have been described above; the treatment of birth asphyxia was dealt with in the article by Professor Davis (October 16 1971).

HYPOGLYCAEMIA

The small-for-dates newborn baby is particularly subject to hypoglycaemia, which is most likely to occur in the first two or three days of life. In simple terms the hypoglycaemia may be understood on the basis that the small-for-dates baby has suffered intrauterine undernutrition and has poor reserves of energy-producing fuels such as glycogen. Furthermore, his brain (which is one of the main consumers of glucose) is of relatively normal size for his gestation, and therefore large in relation to the rest of the body. Nevertheless, the situation is probably more complex than this, and other factors are involved such as inappropriate insulin secretion.

Hypoglycaemia in the newborn is defined as a true blood glucose level below 20 mg/100 ml (normal blood glucose levels are much lower in the newborn than in older people). Sometimes babies can survive blood glucose levels below this level for many hours without any abnormal symptoms or signs, with also probably no long-term neurological sequelae. However, neonatal hypoglycaemia, especially after the age of 24 hours, may be associated with abnormal symptoms or signs—usually fits, or episodes of lethargy, apnoea, or hypotonia—and after symptomatic hypoglycaemia there is a substantial risk of permanent brain damage. There are three aspects of management of hypoglycaemia in the small-for-dates baby—prevention, detection before symptoms occur, and treatment.

Hypoglycaemia can be prevented in most small-for-dates babies by following the feeding plan described by Dr. Pamela Davies in her article (6 November, p. 351). This will not be discussed further except to emphasize the paramount importance of correct feeding of the small-for-dates baby, and the dramatic reduction in the incidence of hypoglycaemia which it can achieve.

Clearly hypoglycaemia should be detected before symptoms occur, and this requires screening measurements of blood glucose levels in all small-for-dates babies. In most, one measurement about 12-24 hours and another about 36-48 hours should suffice. In very small-for-dates babies blood glucose measurements should be made every four or six hours in the first 48 hours. Dextrostix may be used as a screening test, and gives an immediate result on one drop of blood. Nevertheless, if it suggests a low value a formal laboratory estimation of blood glucose should be done.

The management of the baby with a low blood glucose level depends on his age and whether he has symptoms. Symptomatic hypoglycaemia should be very rare if the instructions on prevention and detection have been followed, but if it does occur the baby should be given an immediate intravenous injection of glucose (1 g per kg body weight) followed by an infusion of 10% glucose at about 75 ml/kg/day.

The management of the baby with asymptomatic hypoglycaemia is less generally agreed. Personally I prefer to continue oral feeding and avoid intravenous infusion up to the

age of 24 hours, provided feeds are being taken satisfactorily, and not vomited, and there is no evidence of intestinal obstruction. Blood glucose levels would be checked every few hours, and commonly would have risen above 20 mg/100 ml by the age of 24 hours. I treat asymptomatic hypoglycaemia occurring or persisting after 24 hours with intravenous 10% glucose, given at a rate of about 75 ml/kg/day. If intravenous glucose is given it is important to set up the drip again very quickly if it stops, and to tail off the infusion slowly (usually after 24-48 hours), or reactive hypoglycaemia may occur.

INFECTION, FUNCTIONAL INTESTINAL OBSTRUCTION, AND ENTEROCOLITIS

These conditions may affect the small-for-dates baby in the same way as the pre-term baby; they are discussed in the previous article.

PULMONARY HAEMORRHAGE

Massive pulmonary haemorrhage is a much less common condition than it used to be—at the time of the 1958 Perinatal Mortality Survey it was a significant cause of death in small-for-dates babies. The baby developed respiratory distress or collapse about the 2nd-4th day of life, with coarse crepitations in the lung fields and blood welling up the trachea. The condition was commonly associated with hypothermia and hypoglycaemia, and may be less frequent because of the greater care which is now taken to prevent these disorders.

CONGENITAL MALFORMATIONS AND INTRAUTERINE VIRAL INFECTIONS

There is an increased incidence of these conditions in small-for-dates babies, though they are, of course, the cause rather than the result of intrauterine growth failure. They are mentioned as a reminder that the small-for-dates baby should be examined especially carefully for evidence of hidden malformations or intrauterine infections.

Assessment of Gestational Age

The definitions of the pre-term and the small-for-dates infant both assume that the gestational age is known. Gestational age is most accurately calculated from the first day of the mother's last menstrual period—provided her memory is reliable, her cycle is regular, and her last period was a normal one. Information on uterine size in early pregnancy and the date of quickening may provide useful confirmation. If the gestational age is uncertain from the mother's menstrual dates, this can be assessed by examining the baby after birth either from his reflex behaviour⁴ or from his physical characteristics.^{5,6} Nevertheless, such an estimate is only accurate to within about two weeks on either side of the true gestational age.

Prognosis of Low Birth Weight Babies

Past studies showed a considerably increased incidence of neurological handicaps—especially cerebral palsy, mental retardation, fits, and learning difficulties—in children whose birth weight had been low compared with the general population. Both groups of low birth weight babies were affected, but preterm babies were apparently more likely to develop spastic diplegia, and small-for-dates babies to be mentally retarded or have fits. The incidence of neurological disorder was highest in children of birthweight less than 1,500 g.

Studies of babies born in more recent years are still in progress, but early results (P. A. Davies, personal communication) suggest that even among those of the lowest birth weight a higher proportion are now surviving without obvious brain damage than in the past. It certainly seems likely that modern neonatal care, with greater attention to warmth and feeding (the latter being important for brain growth), and more energetic treatment of disturbances such as hypoxia, hypoglycaemia, and hyperbilirubinaemia which may cause neonatal brain damage, has improved the outlook for low birth weight babies. It is particularly important that low birth weight babies should have periodic developmental examinations, including tests of hearing and vision, so that neuro-developmental deficits can be detected early and a programme of treatment begun. However, it is reasonable to be optimistic about the prognosis for all except the very smallest low birth weight babies and those who have definite or prolonged neurological disturbances in the neonatal period.

Organization of Neonatal Care

Mothers considered at risk for going into premature labour, or for having a small-for-dates baby, should be booked for hospital delivery. Nevertheless, low birth weight babies will sometimes be born at home. If the baby's birth weight is below about 2,250 g (about 5lb) it is probably best to transfer him to hospital, because the incidence of neonatal problems rises sharply below this birth weight, and because there may be difficulties over feeding the baby and keeping him warm enough at home. If the baby is over 2,250 g he will probably do well at home, but if he is small-for-dates blood glucose should be checked by Dextrostix on the first and second days of life. If any of the medical problems described in these articles (including hypoglycaemia) develop, he should be transferred to hospital.

Some parts of the treatment of ill low-birth-weight babies which have been briefly described in these articles are very demanding in terms of medical and nursing staff, skill, and equipment. Ventilator treatment of respiratory failure is an example; it is best carried out in a neonatal intensive care unit. The future organization of neonatal care may involve a two-tier structure, with special care nurseries capable of dealing with most low-birth-weight and sick newborn babies, and intensive care nurseries, which can give the more complicated and difficult forms of treatment.⁷ Newborn babies requiring intensive care can be transported by ambulance, preferably with a doctor in attendance.⁸ Nevertheless, ideally the need for neonatal intensive care should be anticipated during pregnancy, or when the mother goes into premature labour, and the mother and fetus rather than the baby should be transferred for delivery in a maternity department which has a neonatal intensive care unit.

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