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THE PAEDIATRICIAN'S PART IN THE MATERNITY SERVICES*

BY

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If one turns back to the middle of the eighteenth century the early Bills of Mortality give some idea of the appalling threat to infant life at that time. For instance, during the period 1730-49 almost 75% of the children born in London died before the age of 5 years. No one would contend that the Bills of Mortality presented a fully accurate picture, and at that time there was, of course, no subdivision of infant deaths into neonatal and post-natal groups. But it is reasonable to assume that stillbirths and neonatal deaths were at that time at a level that constituted a national menace. Fortunately for this country, as Sir George Newman indicated in his Charles Heath Lectures (1932), a generation of brilliant general physicians arose during the eighteenth century—men like Mead, Heberden, Haygarth, and Jenner, whose clinical abilities were backed up by a wealth of sound common sense that encouraged them to introduce "preventive" ideas. Some of these men, like Lettsom and Cadogan, called attention to the very high rate of mortality among infants; and the former, in his *Medical Memoirs* (1774) commented upon improvements noted, even at that time, in these words: "In the nurture and management of infants as well as in the treatment of lying-in women, the reformation hath equalled that in the small-pox; by these two circumstances alone incredible numbers have been rescued from the grave."

It was in the same century that the obstetrician (or man-midwife) began to exert a significant influence—men like William Smellie and that famous son of Manchester Charles White, who published in 1773 his remarkable volume *On the Management of Pregnant and Lying-in Women, and the means of curing, but more especially of preventing, the principal disorders to which they are liable*. He strongly recommended antenatal supervision of the mother, and he is therefore entitled to an important place in the history of preventive neonatal paediatrics.

The next major event in the history of my subject was the arrival upon the scene of some of the leaders in public health. Again we find a Manchester man playing a highly important part. Edwin Chadwick—not a doctor—held the office of Secretary to the Poor Law Commission, and in 1842 there appeared his monumental

report on the conditions under which the labouring classes lived. This caused a great sensation; the Government set up a Royal Commission in 1843 to consider the facts which had been brought to light, and cities and districts began to appoint medical officers of health. Perhaps I may be permitted to remind you that Liverpool set a fine example in 1847, when she appointed a man of great distinction, Dr. William Duncan, to be the first medical officer of health in the country (Frazer, 1947). Britain was awakening to the need for a co-ordinated attack upon the causes of ill-health in general, and the Board of Health, which might perhaps be described as the great-grandfather of our Ministry of Health, was set up in 1849.

At that time Dr. Lloyd Roberts was 14 years of age, and it is a remarkable fact that his long life in active practice stretched right through the successive eras of the Medical Department of the Privy Council (which in a general sense succeeded the Board of Health), the Local Government Board (1871), and the first year or so of the Ministry of Health (1919). I have no doubt that Lloyd Roberts—a man of alert, progressive mind—read the very able reports prepared by John Simon (later Sir John Simon) when he was Officer in Charge of the Medical Department of the Privy Council, and by Dr. William Farr, who, in 1839, had been appointed Compiler of Abstracts in the newly opened General Register Office. In so far as child health was concerned, it was natural that these men should be occupied mainly with environmental causes of disease—such as sanitation, food, employment, and so forth; but we should particularly note that Farr referred to prematurity as a serious problem, and he stressed not only that infant morbidity should be taken into account as well as infant mortality, but also that more accurate clinical and pathological diagnosis was needed. Both Farr and Simon were far-seeing, courageous workers who never hesitated to express their views in unequivocal terms. It was largely through their remarkable reports that doctors, and the public, began to think constructively about foetal and neonatal mortality and morbidity.

Concern With Infant Mortality

During the last quarter of the nineteenth century there was increasing concern that the downward trend of infant mortality was lagging behind the much more

*Lloyd Roberts Lecture delivered at Manchester on November 23, 1954.

satisfactory decline of the general death rate. Furthermore, as Chalmers (1918) pointed out, the steady fall of the birth rate was tending to emphasize the comparatively stationary infant mortality rate; and the similarity between the known causes of infant mortality and of physical inefficiency among the survivors began to receive more attention. It is interesting to note, also, that the several commissions of inquiry held after the South African War of 1899-1901 underlined, perhaps rather indirectly, that the health of young children still left much to be desired and was worthy of closer attention. At all events, in the early years of the present century there were several national conferences on infant mortality, and gradually interest became focused upon the mortalities of the early weeks of life, as distinct from those occurring in the subsequent months of the first year.

Indeed, when the seventeenth International Congress of Medicine was held in London in 1913 the Section of Obstetrics and Gynaecology, under the Presidency of Sir Francis Champneys, and with Dr. Lloyd Roberts as one of the Vice-Presidents, held a full discussion on "Infant Mortality in the First Four Weeks of Life." The opening paper was by Dr. Henry Koplik, of New York, and in a masterly address he emphasized, among other things, the close relationship existing between the ills of the newly born baby and the health of both his parents. People were asking whether there might not be fundamental differences between ill-health due to congenital disorders on the one hand, and environmental causes on the other; the threats of nature as distinct from those of nurture, as it was sometimes expressed.

The time was ripe for detailed studies of foetal pathology to be undertaken, and it was fortunate for the further progress of the subject that this work was already in hand in Edinburgh, and that the investigator was an obstetrician, Dr. J. W. Ballantyne. There can be no doubt that he did more than anyone else in his time to preach the essential unity of the mother and her unborn child, with the placenta as go-between; and he gave practical expression to his teaching when he proposed that there should be "pre-maternity" units, with careful antenatal supervision of the mother, not only in her own home but at clinics.

It was my good fortune to know Ballantyne in the later years of his active life, and I am but one of many indebted to him for his guidance and inspiration. The immense experience of foetal and neonatal pathology that he had accumulated, recorded in his two great volumes on antenatal pathology and hygiene (1902-1904) was available to those who took up this line of attack upon the mortalities of antenatal and neonatal life. To quote Ballantyne's own words: "I began this work in a spirit of something very like active curiosity; I have prosecuted it with an ever-deepening interest, and I have brought it thus far with the growing sense that I have been dealing with a subject of tremendous importance for the future of the race and the individual, with, in fact, *preventive medicine* in its simplest and most hopeful because in its earliest aspects." These are the words of a true pioneer, and among those who came after him I give first place to Eardley Holland (now Sir Eardley Holland), whose brilliant studies of cranial stress in the foetus (Holland, 1920, 1922) had the double effect of guiding obstetrical practice and of encouraging the promotion of further work upon foetal and neonatal pathology.

Public Reaction

By the end of the first world war in 1918 public opinion was reacting strongly and constructively to the terrible loss of about one million young lives during the preceding four years; and in official circles note was being taken of the fact that during the last quarter of 1918, for the first time since the establishment of civil registration, there was an excess of deaths over births amounting to 79,443. Sir Walter Fletcher, Secretary of the Medical Research Council, had appreciated the significance of Holland's work, and his Council sponsored a scheme of pathological investigation of stillbirths and neonatal deaths in a number of centres (London, Edinburgh, Glasgow, Cardiff, and Liverpool, where I was fortunate to be the worker), and a joint report was published (Holland and Lane-Clayton, 1926).

Perhaps the greatest benefit that came from this 1919-23 epoch was that it stimulated the medical profession to take a much closer and more detailed interest in babies and the dangers which threatened them before, during, and immediately after birth. And as a natural consequence obstetricians saw to it that children's physicians with special experience of the newly born were invited to become associated with them in their work. This was indeed a novel development of the greatest significance, for it meant that individual status was to be accorded, in a practical way, to newly born babies, who from then onwards were to be regarded as *persons* entitled to enjoy the care of doctors specially charged with this duty.

I should like, on behalf of my fellow paediatricians, to express our gratitude to the obstetricians for the generous and friendly welcome they extended to us when we began to encroach upon their field of activity. If it is true that in their own early history obstetricians thought it discreet to enter the lying-in chamber on all fours, I have no doubt that their professional ability and tact soon gave them entitlement to assume the erect position. But having achieved this more comfortable posture, they might reasonably have expected to be able to advance boldly across the room without over-the-shoulder glances to see whether another figure was creeping along in the rear. All the more credit, then, to the broadmindedness and wisdom of obstetricians. I, personally, can never be grateful enough for the happiness I have enjoyed and the interest I have found in working with them. And it is highly satisfactory to note that the relations between the Royal College of Obstetricians and Gynaecologists and the British Paediatric Association have always been cordial, and have led to useful results.

Scope of the Paediatrician

The paediatrician is now firmly established as an essential member of a team which also includes obstetrician, general practitioner, and medical officer of health; he is held mainly responsible for the specialist paediatric care of newly born babies, both in maternity units and, when required, in domiciliary midwifery. His scope has widened out of all recognition during the past 30 years, as I know from personal experience; and during the same period many factors, including better obstetrics, more enlightened nursing care, and a general upgrading of the social, environmental, economic, and dietetic circumstances of the mothers, have combined to cause a considerable decline of the stillbirth rate and the neonatal mortality rate. The neonatal morbidity rate is more difficult to measure than the mortality rate, but I am convinced that with the exception of neonatal infection—to which I refer later—there has been a corresponding improvement. Even congenital malformations, which are probably no less frequent than formerly, now cause less anxiety because the prospects of effective treatment are much more hopeful, provided that diagnosis is made early and accurately and that highly skilled specialist aid is available.

As it will be necessary for me to call attention to some of the less satisfactory conditions under which our paediatric work is done in maternity hospitals, let me first try to

maintain a proper sense of proportion by giving you a brief statement summarizing the outcome when 1,000 babies (including hospital and domiciliary cases) are born in a large city like Liverpool. I think you will agree that in a general sense the results are satisfactory—in fact, *very* satisfactory, in comparison with former times, yet undoubtedly capable of being improved. Taking the year 1950 as my example, 963 of the 1,000 babies survived not only the neonatal period but the whole of the relatively dangerous first year of life. (For comparison, it may be pointed out that in 1920 only 920 of these babies would have lived longer than one year.) Some 20 of the 1,000 babies died during the neonatal period and 11 or 12 of them had been born prematurely. In addition to the 20 neonatal deaths, there was an additional loss of 17 babies during the remainder of the first year.

About 80 of the 1,000 babies were born prematurely, and 11 or 12 of them died in the neonatal period. Babies with a birth weight under 4½ lb. (2 kg.) are in need of special care and supervision, and 35 (44%) of the 80 came into this category.

When considering loss of infant life associated with pregnancy, labour, and the neonatal period one must also take stillbirths into account. In 1950 there were in Liverpool 23 stillbirths to be remembered alongside each group of 1,000 live births.

The full statistics for 1950 showed that in Liverpool there were 16,485 births, of which 375 (or 22.7 per thousand) were stillbirths. The neonatal deaths numbered 316 (or 19.6 per thousand live births). About 65 to 70% of all births took place in the four main maternity units.

The paediatrician has important duties in connexion with the general nursing care of the babies, their feeding (both breast-feeding and, when necessary, artificial feeding), the diagnosis and treatment of their diseases, and the measures which should be taken to prevent neonatal infection. He may be responsible for the breast-milk bank, and for B.C.G. inoculation (Gaisford and Griffiths, 1954). The variety of his clinical experience is wide, but I shall comment only upon the four chief problems that confront him—namely, congenital malformations, birth injury and asphyxia, prematurity, and neonatal infections.

Congenital Deformities

There are, of course, many varieties of malformation, ranging in severity from a small supernumerary digit to a gross deformity of the skull and brain, such as anencephaly. In live-born babies the incidence of deformity is found to be about 2 to 3%; and in a series of 8,716 live-born infants recently reported by Harris and Steinberg (1954) the frequency of obvious defects was found to be at least 5%. Even a relatively slight deformity, such as a birthmark on the skin or deformed toes, should be regarded as a possible psychological or physical handicap to the individual in later life. The paediatrician needs to know not only the kind of treatment available but where it can be obtained and the best time for its application (Craig, 1954).

The diagnosis of some of the internal malformations, like oesophageal atresia, tracheo-oesophageal fistula, duodenal stenosis, and some varieties of cardiovascular deformity—to mention only a few of our problems—may be difficult, involving radiological and other special examinations. Yet many of these deformities of internal organs, which in the past were usually fatal, now receive successful treatment if the expert surgeon and anaesthetist are given their opportunity by accurate and early diagnosis. In every large district there should be a suitably staffed and equipped surgical centre for the reception of these cases from the surrounding area. Centralization is essential if the surgeons, anaesthetists, and nurses are to become thoroughly competent. At the Liverpool Neonatal Surgical Unit, in Alder Hey Children's Hospital, there are eight cots, and during the year ending May, 1953, 120 babies were admitted, and 101 of these patients required major operations.

Birth Injury and Asphyxia

To speak of birth injury and neonatal asphyxia (or anoxia, to use the more modern word) together is reasonable from the clinical point of view, because the two conditions are often combined. But we have learnt—largely as a result of the outstanding contribution made by Barcroft (1946) and his colleagues, and Barclay *et al.* (1944)—to think of this subject in terms of physiology rather than pathology; we have to ask ourselves whether the baby's oxygen requirements are being met before, during, and after birth. In each case our study is of a moving picture, so to speak, that extends from before the onset of labour to some hours, or even days, after its termination; and harmful influences may operate, in varying and complicated fashion, from either the maternal or the foetal side. For instance, the foetus may be in a state of anoxia before birth if the mother is unhealthy or the placenta is abnormal; if there is accidental haemorrhage or placenta praevia; or when the child is post-mature and has outlived his placenta. During birth itself the influence of birth trauma (especially intracranial) or of drugs and anaesthetics administered to the mother may interfere with the child's ability to expand his lungs immediately after birth. Obstruction of the baby's air-passages by liquor amnii or blood is another possible cause of asphyxia. Ballantyne used to speak of the "physiological readjustments at birth," comprising a variety of changes which must occur if the baby is to make a successful transition from foetal life to the separate, independent mode of living that we all know. The onset of pulmonary respiration is the most important and dramatic of these physiological readjustments, and the fact that it must of necessity occur almost simultaneously with the physical stress of the birth process makes one of the major problems in obstetrics.

It is generally accepted that the foetus performs gentle, rhythmic respiratory movements before birth, and inhales liquor amnii into his bronchi. After birth, in the normal case, the liquor drains away from the mouth or is absorbed; and the prenatal respiratory movements become augmented under the influence of cutaneous and chemical stimuli acting through the respiratory centre in the spinal cord. The newly born baby is able to tolerate a relatively low oxygen concentration in his blood (hypoxia) without suffering harm; and indeed Cross *et al.* (1954) have emphasized that hypoxia is a necessity of foetal life and plays an important part in inducing pulmonary respiration. In the past there was a tendency to be over-enthusiastic about resuscitation of the anoxic baby; to-day there is general agreement that the baby should be handled with great care and gentleness, but opinions differ about the details of technique, especially for clearing the air passages of obstruction and for administering oxygen. The subject has been well reviewed by Smith (1948), Potter (1953), and Gairdner (1954). Clearly prevention, when possible, should be the keynote, and as an observer of obstetrics during the past 30 years I have been greatly impressed by the progress made in this direction.

Paediatricians, with the help of radiologists, have learnt to recognize a number of interesting respiratory conditions that may be associated with neonatal asphyxia, such as malformations, interstitial and interlobular emphysema, pneumothorax, pneumomediastinum, pulmonary haemorrhage, and hyaline membrane, with resorption atelectasis; and the possibility of infection, especially pneumonia, must always be remembered.

Prematurity

It is questionable whether there is any branch of medical practice, in any age group from birth to senility, that requires keener clinical acumen and a higher standard of nursing skill than the care of premature babies. When one remembers that about 45,000 premature babies are born each year in England and Wales, and that about 35 to 40% of these—approximately 16,000 infants—are in special need of skilled care, the importance of the subject will be apparent. The mortality rate for premature babies is falling quite well

(Taylor, 1954), and the following figures illustrate our experience in one of the Liverpool maternity units: during the period 1936-9 (inclusive) there were 679 premature births, and 140 (20%) died in the neonatal period; in the period 1949-52 (inclusive) there were 750 premature births, and 95 (12.7%) died. (It should be noted that the percentage of small-weight babies was almost identical in the two groups under consideration.) It is interesting also to note that in the earlier of the two periods mentioned the total death rate (premature stillbirths and deaths of prematures) associated with prematurity was 41.3%, and in the second period 31.3%. Between 1936 and 1952 the perinatal* mortality rate (mature and premature) of this maternity unit fell from 9.6 to 4.4%.

The improved outlook for premature babies is due to many causes—obstetrical, paediatric, nursing, social, etc. So far as their hospital care is concerned, full credit should be given to the modern types of incubator, which allow the child to be nursed naked, in an atmosphere of controlled heat and humidity, and with oxygen supply also under control. The initial period of starvation, used nowadays in many centres, has also proved helpful, though I think it may be overdone; and we believe that retrolental fibroplasia may usually be avoided by care regarding oxygen tension in the incubator.

It is a definite advantage to have the smaller premature babies accommodated together in a "prematurity unit," to which such babies born in their own homes may also be admitted when necessary. The nursing care required by these babies reaches a higher standard when selected sisters and nurses make the subject their special study; and for this the babies must be grouped together rather than scattered in various parts of the hospital; and other members of the hospital's nursing staff may be drafted into the unit to provide basic training. Furthermore, midwives, nurses, and health visitors working under the local authority scheme may also be given postgraduate "refresher" instruction in the prematurity unit. There should be close co-operation between obstetricians, paediatricians, general practitioners, and the medical officer of health in order to ensure that an adequate service is arranged for both the domiciliary and hospital care of prematures; the Newcastle and Bristol schemes, described respectively by Miller and Walton (1954) and the Southmead General Hospital Group Management Committee (1951), illustrate what may be achieved by enthusiasts.

The Joint Committee on Prematurity published a report in 1951 upon the care of premature babies in both urban and rural areas, and it should be consulted by all responsible for maternity arrangements. A valuable survey has recently been made by Crosse (1954), who has done so much for the premature in this country.

Infections

Some infections, such as syphilis, are passed from the mother to her child before birth; but I am speaking mainly of neonatal infections contracted by the child during or after birth, when, as is well known, the body's defence mechanisms are relatively imperfect. I shall not comment upon the clinical forms that infection may take in these young babies, except to say that almost every tissue in the body may be affected; the skin, eyes, respiratory tract, and intestinal tract are the commonest and the most obvious, but we also see pyelonephritis, meningitis, arthritis, osteomyelitis, septicaemia, and a few rarer types. Each neonatal infection, even if trivial when judged by "adult" standards, is potentially dangerous to the child, and constitutes a menace to other babies that are cared for in the same nursery and by the same nursing staff. In my earlier days it was unusual to see any evidence of neonatal infection in private practice. Nowadays the prevalence of such infections, at all events in maternity units, is considerable, and is increasing, as the accompanying table shows.

*Using the term "perinatal" to signify stillbirths plus neonatal deaths.

Neonatal Infections in Maternity Unit "A" Liverpool (Including Eyes, Skin, etc.)

Year	Infants Born Alive	Stillbirths	Neonatal Deaths	Neonatal Infections		Total Infections	%
				Survived	Died		
1932	1,840	137	43	38	3	41	2.2
1937	2,161	135	52	45	5	50	2.3
1942	2,115	107	50	81	2	83	4.0
1947	2,490	100	48	113	16	129	5.2
1952	2,639	83	37	231*	8 (5 prems)	239	9.0

* Including blepharo-conjunctivitis (115) and skin infections (61).

In the same maternity unit, during the ten-year period 1938-47 inclusive, there were 714 (3.5%) cases of neonatal infection, made up as follows: skin, 217; eyes (non-gonococcal), 413; eyes (gonococcal), 14; respiratory, 59; alimentary, 11. The live births during this period numbered 20,479.

As evidence that this scourge is not a local problem in the Liverpool area, it may be noted that the neonatal infection rate in a maternity unit in a Yorkshire city (April to September, 1953) was 14%, and in a London maternity unit (1951) 11.1%.

It may be argued that a false impression of danger is given by the inclusion of many relatively trivial local infections (especially of the eyes and skin); but even when these are omitted the figures are significant—for example:

Maternity Unit "A," Liverpool, 1952:	
Total live births	2,639
Neonatal infections (excluding eyes and slight skin lesions)	About 95 (3.6%)
Maternity Unit "D," Liverpool, 1953:	
Total live births	2,297
Neonatal infections (excluding eyes and slight skin lesions)	137* (6%)

* Of these, 6 died.

Happily the mortality rate in neonatal infections is usually low, but this fact should not be allowed to encourage complacency. Morbidity is to be considered before mortality, for it is a truer index of the potential danger, not only to the individual patient but to all the other babies in the same ward or nursery.

Here is a problem demanding urgent attention, especially in regard to prevention; and there are at least two possible causes. One is that the natural immunity of babies to infection during the neonatal period is lower than in the past, perhaps as a result of the widespread and sometimes foolish use of antibiotics for trivial diseases, both in hospital and in domiciliary practice. Furthermore, many strains of the common infecting agents are now resistant to penicillin and sometimes to other antibiotics. But the more probable cause is the great and increasing pressure under which maternity units must work, with two disadvantages so far as the babies are concerned: firstly, there is overcrowding; and, secondly, the nurses find much difficulty in not working hurriedly. This statement implies no criticism of the nurses, who deserve congratulation for the splendid and devoted service they give under difficult conditions. We must, however, remember that the nursing care of babies takes time if their delicate skin and other tissues are to be preserved from even the slight trauma that can open the way to infection. The present position is one of danger and should be studied now, before it deteriorates. We are well aware of the pressure exerted upon maternity units to admit more and more patients, sometimes for sociological considerations, sometimes for the obstetrical needs of the mothers; and at present there are limits to hospital expansion and to the recruitment of nurses. But I feel that paediatricians have a duty to emphasize that newly born babies usually remain free of these troublesome infections if their nursing care is given under conditions which permit gentle, thoughtful handling, and when adequate accommodation is available for the infants.

Various steps may be taken, and are usually taken in maternity units, to reduce the present danger to a minimum;

but I must emphasize that a hospital giving service to children of any age must see to it that a patient who is suspected of having a contagious illness (and this includes all types of neonatal infection) shall be segregated at once. I would also urge that, except in special circumstances, the use of antibiotics should be restricted to those patients whose clinical condition indicates that their natural defence mechanisms will not be adequate.

The Door of Opportunity

I now turn to the future and deal with the stimulating opportunities that lie before paediatricians in this fascinating age-period embracing antenatal as well as neonatal life. If there should still be anyone who believes that paediatrics begins only when the child is born, let him turn his thoughts back to 1635, when Sir Thomas Browne wrote: "Every man is some months elder than he bethinks him; for we live, move, have a being and are subject to the actions of the elements, and the malice of diseases, in that other world, the truest microcosm, the womb of our mother." Clearly the obstacle confronting anyone wishing to study the unborn child is the relative inaccessibility of the subject. Ingalls (1953) has summed up the situation very neatly in these words, "The nearly insurmountable obstacle to clinical study of prenatal sickness arises in the fact that the patient voices no complaint, remembers nothing about his illness, hides himself from view and puts off his visit to the doctor until the last possible moment." But the clinical application of modern techniques now available to physiologists, pathologists, epidemiologists, experimental embryologists, immunologists, biochemists, and physicians is opening up new fields, hitherto largely unexplored. As yet we comprehend little more than this: that before birth the baby is one component in a system made up of several parts or units, each with its sphere of influence; these units are mother, placenta, child, and father (as represented within the child's constitution). Generally speaking, the interrelationships within the system are sufficiently harmonious to maintain a balance within the limits of what we define as health; but we still know little about the fine adjustments by which such balance is maintained.

And the range of possible influences exerted by the individual units is wide—for instance, genetic, hormonal, chemical, immunological, and bacterial. An important phase in this concept of antenatal life was reached when the late F. B. Chavasse coined the phrases "maternal threat" and "foetal threat." It was in 1920, when he was working on the ABO blood groups of mother and child in the Liverpool Maternity Hospital for his M.D. thesis, that he discovered that in some cases there was incompatibility between the bloods. This was in the early days of transfusion studies when immunity reactions in blood-relationships were little understood, and long before the Rh factor was discovered in human blood. Chavasse examined the hypothesis that toxæmia of pregnancy might be caused by foetal (blood) threat to the mother, but he could find no proof. (It is interesting to note that Pike and Dickins (1954) have shown a significant excess of Group O women in a series of 541 patients suffering from toxæmia of pregnancy.)

At the same time I was working on general oedema of the foetus and was able to confirm the findings of Schridde and others that the foetal tissues (especially the liver) in this condition suggest that very active blood regeneration is occurring. I discussed with Chavasse the possibility that maternal (blood) threat to the child might be causing this remarkable response. We were not far from the truth, but neither of us appreciated that maternal threat might be a reaction to foetal (or perhaps more correctly, paternal) threat. I mention this chapter in history to illustrate the complexity of the reactions possible within the system, some advantageous, some dangerous. In general pattern, the adjustments may be as simple and smooth as the up-and-down movements of a seesaw: sometimes they can be likened to a key turning the mechanism in a lock; sometimes the end-results are happy, sometimes harmful or even tragic.

Sir Macfarlane Burnet's (1954) stimulating paper reveals how wide is the scope in regard to immunity-relationships between mother and child; and our knowledge of their hormonal relationships is growing quickly. No matter whether the paediatrician's interests are directed mainly to infections, to heredity, to immune reactions, to nutritional studies, or to any other of the possible fields of work before him, he cannot neglect the remarkable events occurring during antenatal life, and it is in studies such as these, in co-operation with obstetricians and with various specialists whose work is not primarily clinical, that the paediatrician is likely to find his most satisfying and constructive opportunities. But spectacular results may not be achieved for some time, and there are immediate problems to which attention should be given urgently.

Some Urgent Problems

First of these is the still considerable loss of infant life associated with maternity. In 1952, though maternal deaths associated with child-bearing in England and Wales had fallen to 492 (complications of pregnancy, 181; abortion, 90; complications of labour, 130; complications of the puerperium, 91), stillbirths were 15,636, and neonatal deaths 12,331, making a total of 27,967 infants who died before birth, during birth, and in the first four weeks after birth. In 1953 there were 15,681 stillbirths in England and Wales and approximately 12,113 neonatal deaths—a total of 27,794. It would be idle to pretend that, had they lived, all these babies would have been free from deformity and disease. But even when the figures are viewed in a severely critical and unprejudiced light they still come as a shock, especially to those who believe that considerable improvement is possible. One suggestion might be to hold a national investigation; but in my view it would be more valuable to invite a limited number of maternity units, located in different parts of the country, to make a careful investigation of each stillbirth and natal and neonatal death occurring in its practice. A small team composed of obstetrician, paediatrician, and pathologist would review all the circumstances of each fatality, preferably within one week of its occurrence, and would attempt to reach a firm opinion not only upon the primary cause of death but also upon the child's probable state of health if it had survived.

This type of investigation has been made in Aberdeen by Professor D. Baird and his colleagues (1954), and is an important step of great practical significance, though I suggest that its usefulness would be increased by including, as I have already proposed, the whole of the neonatal period in the review. Professor Baird uses the term "obstetric death rate" to include stillbirths and neonatal deaths occurring during the first week of life. This same group of foetal and neonatal deaths has sometimes been called "perinatal mortality," while other writers have included the whole of the neonatal period (the first four weeks after birth) in their definition of perinatal mortality. Clearly the group covered by Baird's "obstetric death rate" is of special concern to obstetricians, as it is also to paediatricians. But, as paediatricians well know, morbidity and mortality during the second, third, and fourth weeks of the neonatal period are by no means negligible and are due partly to delayed "obstetric" causes—for example, subdural haematoma, haemolytic disease, and various pulmonary conditions; and partly to the special circumstances of neonatal life, with such problems as neonatal infections and failure of breast-feeding.

It is therefore essential that the classification ultimately adopted should take cognizance of happenings during the whole of the neonatal period.

Crosse and Mackintosh (1954) have reported the results of similar studies in Birmingham. I have spent some time making an analysis of the stillbirth and natal and neonatal deaths occurring during the year 1950 in three of the Liverpool maternity units, and as a result of this experience I am confident that findings of much practical importance would

be brought to light by the plan I suggest, and that each individual case inquiry should be conducted by the clinicians in charge and while the details are fresh in their memory.

Still another opportunity for paediatricians will be found in extending the "follow-up" work which takes place now in a number of centres. As I know from experience, this task is difficult, especially when families change their place of residence rather frequently. But we want to know more about the future for post-mature and premature babies, for babies born by caesarean section, for asphyxiated babies, for birth-injured babies, etc. Retrospective studies are not very satisfactory; but the young paediatrician who decides to keep in touch, so far as is possible, with the babies he has seen at their birth will be able to make a valuable contribution not only to paediatrics but also to obstetrics. And such work will help to give him the background essential to one who will undoubtedly find increasing opportunities for the application of what Ingalls (1953) terms "preventive prenatal paediatrics."

Conclusion

Finally, in the planning and working of the maternity service the paediatrician will be invited to make a fuller contribution than has been expected of him in the past, and if he undertakes this task with enthusiasm and in a fully co-operative spirit his services will be invaluable. He can do much to encourage contacts with general practitioners and with all those who carry out maternity duties under the local authority; he can hold "refresher" courses for doctors, midwives, and health visitors, and can use his influence to ensure that those whose work is done mostly in hospitals shall have opportunities for studying maternity and infant welfare work in the homes of the people. He can, and I think he should, seek opportunities for co-operating in the very important work of antenatal clinics, particularly (1) in regard to the education of young mothers in respect of infant welfare, and (2) to encourage breast-feeding, as Professor Gaisford suggested at the 13th Congress of Obstetricians and Gynaecologists at Leeds in 1952.

But the heart of the matter is this, that the paediatrician is now recognized as a full member of the team concerned with maternity and the aftercare of the baby; his future scope is immense, and he is anxious to give his best services.

Summary

The status of newly born babies has been rising steadily for many years, and this movement was greatly accelerated when pathological studies of stillbirths and neonatal deaths were vigorously undertaken during the first two decades of the present century.

The appointment of paediatricians to the staffs of maternity units has already yielded valuable results and is likely to be even more fruitful in the future.

The loss of infant life by stillbirth and neonatal death is still considerable (27,794 in 1953) and should receive fuller attention, along with the problems of morbidity in the neonatal periods.

The pressure under which maternity units are working at the present time presents dangers so far as the babies are concerned. Questions such as the accommodation and nursing care of the babies need careful study if the incidence of neonatal infection is to be reduced and its spread more effectively controlled.

The proper treatment of the premature baby requires special provision in maternity units, and adequate arrangements for the domiciliary care of those that do not require admission to a ward for the premature.

More should be done to give expectant mothers training in mothercraft, and to advise them in regard to diet, hygiene, preparation for breast-feeding, etc. Paediatricians are well equipped to assist in this service.

In studying the causes of stillbirth and neonatal death it is essential that each case should be considered jointly by obstetrician, pathologist, and paediatrician, bearing in mind that several causes may operate simultaneously or in succession. These causes may be primarily maternal, paternal, placental, or foetal. Conclusions based upon studies made mainly from one angle, whether obstetrical, pathological, or paediatric, are open to the criticism of over-simplification. In each case of stillbirth or neonatal death it is necessary that an agreed aetiological "priority order" should be reached. And if, as is reasonable, the conclusions are to be of value in preventing morbidity as well as mortality in young infants the studies should not be restricted to the antenatal period and the first week after birth, but should include the whole of the neonatal period.

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