Completeness and Accuracy of Medical Information Recorded on Birth Certificates

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Other services than MCH might take to heart a concluding comment in this paper: "The medical information requested (on birth certificates) should be such that it can reasonably be secured by the hospital staff, and appears to have relevance to the current problems of maternal hygiene."

As a prelude to the development of Rules and Regulations for Hospital Maternity and Newborn Care, now in force, a detailed survey and analysis of such care in hospitals and in prenatal clinics in Washington, D. C., was conducted in 1951. The findings in this survey, as had those of previous surveys, and somewhat crude analyses of stillbirth and neonatal mortality in the various hospitals of the city during the decade between 1940 and 1950 served to highlight the need for regular and recurring studies of the obstetric and newborn experience and of other aspects of the community picture of maternal and newborn care.

Such an inquiry seemed essential to supplement, expand, and give more effective direction to current collaborative efforts of the Maternal and Child Health Service of the Department of Health with hospital maternity departments to improve standards of care and with the medical profession, per se, through the existing Maternal Mortality Committee and proposed fetal and neonatal mortality committees. We felt, too, that such analyses would serve to foster improved records in individual hospital maternity departments and would permit continuing evaluation of existing programs of care with better definition of specific areas in which greater effort was indicated.

The official livebirth and stillbirth certificates of the District of Columbia have had since 1940 a detachable supplement providing for submission on the livebirth certificate of data on the condition of the child at birth and on pregnancy, labor, and delivery of the mother. On the stillbirth certificate there is similar data on pregnancy, labor, and delivery, together with the causes of the fetal death, its time of occurrence, and the condition of the fetus. However, the Department of Health had not had the resources to process these data on any systematic basis, nor had there been any query regarding unreported items.

Obviously, the first step in planning for the possible use of these data in the maternal and child health program was a review of the information contained on these official records. With the assistance of the Children's Bureau we were enabled to set up a project, the

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specific objectives of which as originally planned included: (1) the development and testing of a plan for using the official data on livebirth and matched neonatal death records, as well as that on fetal death records, in the over-all community maternal and child health program evaluation and planning; (2) the investigation of the completeness and accuracy of reporting by hospitals of various items considered essential or desirable on the birth and stillbirth records; and (3) the review of the medical and health items on these records for appraisal of their usefulness and the possible need for revision, deletion, or expansion.

Because of the design of the study, it was possible to include as additional objectives a description, on the basis of a representative sample of hospital records, of the current obstetric practice in the community, together with the current experience with respect to the complications of pregnancy, labor, and delivery, and to the prevalence of congenital malformations and birth injuries, and an evaluation of the completeness and adequacy of maternal and newborn clinical records in hospitals.

To accomplish these objectives the 16,556 livebirth certificates registered with the Bureau of Vital Statistics as occurring in the District of Columbia between July 1 and December 31, 1952, and the 374 neonatal deaths occurring among these births were processed and analyzed, as were the 598 certificates of stillbirths reported as occurring during the calendar year 1952. In addition, a representative sample of 1,045 hospital records selected from the hospital delivery register of 10 civilian hospitals—at which 85 per cent of the livebirths in the city occurred—were reviewed, coded, and tabulated with reference to selected items on the livebirth certificates. Some additional items were also included in order to evaluate the completeness and adequacy of maternal and newborn clinical records in hospitals. The hospital records were matched with the livebirth records and the data on the hospital records compared by machine with corresponding reports on the livebirth certificates. There were 945 such matched records. This procedure was devised to test the accuracy of reports of selected items submitted on the birth records, based on the assumption that the hospital records were correct.

Twenty-four items on the 16,556 livebirth certificates and their medical supplements were evaluated for completeness of reporting with the following results. Identification details which have appeared over a long period of time on the birth record were universally reported, such as sex, race, age of mother, and status of the newborn with respect to legitimacy. Medical items, such as length of gestation, type of delivery, birth weight, parity, and induction of labor were reported with more than 95 per cent completeness. Items reported with from 90 to 95 per cent completeness included those dealing with the provision of prenatal care, previous fetal loss, the need of the infant for artificial respiration, and the type of medical care at delivery (i.e., staff, private), the use of analgesics and anesthetics.

Of the items reported with more than 10 per cent incompleteness, the response to the item dealing with the time of the first prenatal visit was 44 per cent incomplete, with complications of pregnancy 41 per cent incomplete, and complications of labor 30 per cent incomplete. In about 20 per cent of the livebirth records no information was submitted on questions relating to duration of labor, congenital malformations, and birth injury.

The assessment of accuracy of reporting as measured by the similarity between statements appearing on the birth record and those found on the hospital history included length of gestation,

birth weight, type of delivery, need for artificial respiration of the infant, complications of pregnancy and labor, duration of labor, and the occurrence of congenital malformations and birth injury.

Birth weight reported with 98 per cent completeness was the only item which combined both completeness and accuracy.

Length of gestation which was reported close to 100 per cent on the birth certificate was found grossly inaccurate with an extraordinary concentration of births in the 40-week category—76 per cent, as compared with 19 per cent in this category in comparable hospital records.

Type of delivery was reported with 98 per cent completeness on the birth records. In terms of frequency, the incidence of operative deliveries on the birth records was 48 per cent compared with 49 per cent on the hospital records. However, there was a 10 per cent deficiency in the reporting of Caesarean sections and 33 per cent deficiency in reporting breech extractions on the birth certificates as compared with the hospital records.

The question as to the necessity of instituting artificial respiration to establish breathing in the newborn was answered on the birth certificates with 94 per cent completeness. The birth records reported that 16 per cent of the babies received artificial respiration as compared with 13 per cent reported on the hospital records. However, the situation varied in different hospitals. To cite two examples: In one institution with a study sample of 148 births, none was specified on the birth certificate as requiring artificial respiration, whereas from the review of the medical records 29 required it. In another hospital in a sample of 94 histories, the birth records reported that 74 per cent required artificial respiration, whereas a study of the 88 hospital records on which this item was reported indicated that only 11 cases or 12.5 per cent were actually given artificial respiration.

Complications of pregnancy (reported with 58 per cent completeness on the birth certificates) was found not only grossly underreported, but inaccurately reported as well in the comparative cross-tabulation of the matched birth certificates and hospital records. From the analysis of the hospital records, exclusive of Rh negatives (not provided for on the birth certificates) 14 per cent of the cases were associated with some complication relating to pregnancy, whereas on the matched birth certificates, excluding births for which no information was recorded, the incidence of complications was 4 per cent. There were similar findings of underreporting and inaccurate reporting for complications not related to pregnancy —the hospital records indicated that 5 per cent of the births were associated with one or another such complication, compared with 2 per cent recorded on the matched birth certificates on which the information was reported.

For the complications of labor (reported with 70 per cent completeness) there was a similar pattern of underreporting and inaccurate reporting on the livebirth certificates. Their incidence as obtained from the hospital records was 16 per cent, the corresponding birth certificates which reported this item 9 per cent.

The item duration of labor was reported on 80 per cent of the birth records. The percentage distribution of births by duration of labor as obtained from the completed birth records approximates closely the true distribution as obtained from hospital histories. However, the relative frequency of labors of short duration, as well as prolonged duration, were underreported on the birth record.

Finally, as to birth injuries and congenital malformations, although the

incidence of birth injuries (0.4 per cent) was the same both for the birth and the hospital records, there were marked discrepancies between the two sources of reference. Similarly, the incidence of congenital malformations ranged between 1 and 2 per cent for both sources of reference, with some underreporting and inaccurate reporting on the birth records. Even the hospital record on these items must be considered an inadequate source of information because of the currently brief hospital stay and the delay often met in the manifest symptoms of a birth injury or congenital malformation.

It is apparent from these findings that very limited use can be made of much of the medical information reported to date on the livebirth certificates. Birth weight, however, is an exception and even the limited study possible of the variations in birth weight and associated factors, particularly with reference to prematurity, demonstrates clearly the value of complete and accurate information.

Prematurity, on the basis of birth weights of 2,500 gm or under occurred among 10.1 per cent of the livebirths, 8.3 per cent of the white, and 13.7 per cent of the nonwhite. The discrepancy between the two groups persists for birth weights of 2,000 gm and under, which occur among 2.8 per cent of the white and 4.9 per cent of the nonwhite. However, when prematurity ratios were classified according to the prenatal care received by the Negro mothers early prenatal care appeared to be a determinant in the risk of prematurity among Negro women. For among Negro mothers who received early prenatal care (first trimester of pregnancy) the prematurity ratio was 9.7 per cent which, although somewhat higher than the white over-all rate of 8.3 per cent, nevertheless, compares favorably with it. Premature ratios rose for Negro mothers whose prenatal care was started in the second and third trimesters of pregnancy and were excessively high for those who received no prenatal care, 23.5 per cent. The ratio of gross prematurity when early prenatal care was received was 2 per cent as compared with 12.3 per cent when no prenatal care was received. There were parallel findings for white women, but the number receiving no prenatal care was extremely low (1.4 per cent as compared to 14.7 per cent of the Negro women).

A further analysis of prenatal care by place of birth revealed that three-quarters of the nonwhite mothers who received no prenatal care were delivered at the city hospital. The implication of this in relation to the availability of prenatal care in the community for those dependent on public care is apparent.

Another significant differential in the incidence of prematurity is found in relation to legitimacy. Of the white illegitimate babies 14.8 per cent were premature as compared to 8 per cent of the legitimate. The ratio among nonwhite is 16.4 per cent among the illegitimate as compared to 12.5 per cent among the legitimate. These differences obviously require further study to determine among other things whether they indicate an association between definable social factors and the risk of prematurity.

Analysis of any association between complications of pregnancy and of labor with premature birth was not possible from livebirth certificates because of incompleteness and inaccuracy of reporting of these items. However, the study sample of hospital records made possible an analysis of the incidence of premature births in terms of the presence or absence of a complication, and revealed that the existence of some complication of pregnancy increases the risk of grossly premature birth by 300–400 per cent. A similar association was found to exist between the incidence of prematurity and the complications of

labor. The number of cases is too small to permit valid determination of the relative risks associated with given clinical entities.

Passing now to neonatal mortality in relation to birth weight—75 per cent of the neonatal deaths of both races were premature. A classification of the neonatal death rates by birth weight among the 16,556 livebirths studied confirms strikingly the well known role that maturity at birth plays in the survivorship of the newborn. For babies born with birth weights above 2,500 gm the risk of mortality is on the average less than 1 per cent, and rises sharply as the birth weight falls below 2,500 gm from 3 per cent in the weight group between 2,001 and 2,500 gm to 15 per cent, 45 per cent, and 91 per cent in the respective decreasing 500 gm weight groups. It is of interest that the risks of mortality for premature babies do not differ according to race, but for Negro babies weighing over 3,000 gm at birth the risks of mortality during the neonatal period are noticeably in excess of their white equivalent.

Finally, it is worthy of note that the prematurity rate for white babies in the District of Columbia was 8.3 compared with 7.4, 7.3, and 7.0 as fairly recently reported for Baltimore and California and the country as a whole, respectively, and for Negro babies 13.7 as compared with 9.7 in the country as a whole.

This material on prematurity demonstrates that intensive efforts to bring about complete and accurate reporting of medical information on birth certificates can be justified on the basis of continuing program evaluation and planning, as well as a contribution to medical knowledge. We have been aware of the situation with regard to the lack of prenatal care for many patients delivered at the public hospital. We have known, too, that it is largely associated with clearance for eligibility as to residence and income which delays and often results in refusal of authorization for care. But the data derived from this study are detached and objective. It can be shown from this material that the cost of providing readily available prenatal care, without regard to rigid eligibility restrictions, may be less than the cost of hospital care of the premature babies, quite apart from the saving of infant life that it effects. Again, the relatively high white prematurity rate compared to other jurisdictions provides justification and stimulus for a much broader program for the prevention of prematurity in the city.

Can we achieve the completeness and accuracy in reporting on birth certificates necessary for the full and most effective use of this type of data? Incompleteness of reporting on birth certificates is a deficiency that is readily amenable to corrective measures. The reporting of this information is required by law and failure to comply cannot be well defended by the hospital or physician concerned. The institution of a query program and an enforcement program can be expected to correct these deficiencies. Better cooperation can be expected from physicians if the reporting is simplified and facilitated; if it is known that use is being made of the data reported; and if the value of these data is demonstrated through the dissemination of periodic reports of the findings.

Correction of inaccuracies in reporting is a more difficult problem. A review of the items on which information has been demonstrated to be inaccurately reported reveals certain oustanding characteristics about each of these items. The item "length of gestation" involves a computation which the busy physician may be loath to make especially if the relevance of the information is not obvious. The item "need for artificial respiration" is open to different interpretations by different observers

and hence will not provide a uniform basis of response as presently worded. Similarly, the items regarding complications of parturition and operative delivery are subject to the same type of confusion. These clinical categories and procedures lack precise definition and hence lack general agreement as to definition and meaning, and their relevance to a favorable outcome of pregnancy is not always appreciated by the reporting physician.

In view of these findings we have given serious consideration to the appropriateness of the birth certificate as an instrument for securing meaningful information on current problems of maternal and early infant health. Problems of incompleteness of response, we believe, are amenable to correction by a conscientious effort on the part of the Department of Health to inquire into the reasons for such deficiencies. Problems of inaccuracy of response demand careful revision of the wording of items, as well as orientation of the hospital staffs concerned relative to the meaning of terms employed. The medical information requested should be such that it can reasonably be secured by the hospital staff and appears to have relevance to the current problems of maternal hygiene.

The medical supplement to the birth certificate must not be permitted to become a fixed part of this vital record in terms of its contents. As information is secured on a problem and a given problem clarified, it may be entirely appropriate to delete the item. Furthermore, newly developing problems, or old problems demanding a fresh inquiry, may call for the addition of new items. We know of no other method which for the same amount of effort can secure for us so much pertinent information.

The data used for this paper were derived from a study of medical information reported on birth certificates in the District of Columbia by Ella Oppenheimer, M.D., Samuel Shwartz, M.D., Matthew Taback, Sc.D., and Eleanor P. Hunt, Ph.D. To be published.

Medical Research Fellowships

Applications for 1956–1957 postdoctoral research fellowships are now being accepted by the Division of Medical Sciences, National Academy of Sciences—National Research Council. Fellowships in cancer research, in radiological research, and in tuberculosis are open to United States citizens, those in the medical sciences, also to Canadian citizens. Also available to United States citizens are British-American Exchange Fellowships in Cancer Research for advanced study in Great Britain in specialized fields pertaining to the problem of growth. Similar fellowships are awarded by the British Empire Cancer Campaign to British scientists for study in the United States.

Final date for applications is December 1, 1955. Fellowship Office, National Academy of Sciences—National Research Council, 2101 Constitution Ave., N. W., Washington 25, D. C.