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THE ALBERTA PERINATAL MORTALITY STUDY*

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IN 1954 THE Canadian Medical Association, Alberta Division, set up a committee to investigate and review stillbirths and infant mortality in the province of Alberta.

At the outset it was recognized by the committee that a scientific study such as might provide statistically significant detailed figures on mortality and morbidity for the whole province would, to a great degree, be impossible because there are over one hundred hospitals in the province and only eight of the largest hospitals have a pathologist. In 1954 there were 876 perinatal deaths in Alberta. Over one-half of these occurred in hospitals that had no pathological services; consequently no autopsy examination was done on these cases and it was in most instances impossible to be sure of the cause of death. Just to gather information on each death that occurred in the province, where over 1000 medical practitioners are licensed, would be difficult.

It was therefore decided that the objective of the committee should simply be to encourage the hospitals, and the profession as a whole, to follow recognized obstetric and pædiatric principles in their care of pregnant women and their offspring. The committee was confident that, when this was done, the death rate would fall to a creditable level.

Selection of sample.—The committee at first considered studying stillbirths and neonatal deaths. This was found to be impractical because it was difficult to get a comprehensive story of the illness after the infant had left hospital. By limiting the study to those infants dying within the first seven days rather than the first 28 days, it was possible to get better records and still study the majority of these deaths. From Table I it can be seen that over 53% of the infants who die in the first year do so in the first seven days.

TABLE I.—INFANT DEATHS IN ALBERTA 1955

0 to 7 days	478	53.8%
8 to 28 days	61	6.9%
29 to 365 days	348	39.4%
Total	887	100.0%

In order to make sure that a report is received on every death it is necessary to be able to cross-check the cases reported to the committee with those registered at the Bureau of Vital Statistics. The Bureau of Vital Statistics' definition of a stillbirth is "a child who has never breathed and whose period of gestation is more than 28 weeks".[1]

It was therefore necessary to accept this as the definition of a stillbirth. The liveborn babies that are studied include all babies of 1000 g. (2 lb. 3 oz.) weight and over who die on or before their seventh day of life. Deaths in these two groups of babies comprise the perinatal deaths studied in Alberta.

Collection of data.—The committee first attempted to collect information on each death by having the mother's and infant's charts sent in from the hospital concerned. This procedure was quickly abandoned because the information needed was not on the charts. Instead of this a questionnaire* was made up which contains about 50 questions and which, when properly filled out, gives fairly complete information about the mother's previous pregnancies, her present pregnancy, her labour, the birth of the infant, the condition of the infant at birth, the investigation and treatment of the infant, progress notes and, finally, autopsy findings or cause of death or suspected cause of death. Each of these Alberta perinatal death forms requires about 12 minutes to fill out.

Organization.—In order to get the most value from the study of these perinatal deaths, for the profession as a whole, the hospitals in the province

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*Copies of the Alberta Perinatal Death form are available on request to: The Perinatal Mortality Committee, Room 101, St. Joseph's College, University of Alberta, Edmonton, Alberta.

are divided into two groups: the urban section, in which each hospital has its own local committee to study its own perinatal deaths; and the rural section, in which each hospital sends its reports in to the central committee in Edmonton for review. In the urban group there are 10 local committees in five major cities in the province. Each local committee is composed of the physicians of that hospital who are doing obstetrics and pædiatrics, an anæsthetist and a pathologist. Each committee meets at regular intervals to study its own perinatal deaths and especially to ascertain if the case has been handled in an acceptable manner. The reports are then forwarded to the central committee for checking and tabulation. The same type of consideration is given by the central committee to each death that occurs in a rural hospital or any hospital without a local perinatal mortality committee. All the above information is punched on to keysort cards for filing.

Cause of death.—When a case is reviewed, either by a local or the central committee, an attempt is made first to decide on the cause of death. If no postmortem examination has been done this may be impossible. The following modification of Dr. Edith Potter's classification of cause of death is being used by the Alberta Perinatal Mortality Committee:

TABLE II.—CAUSE OF DEATH CODE

1. *Abnormal Pulmonary Ventilation*
   - (a) Hyaline membrane disease
   - (b) Atelectasis
   - (c) Unknown
2. *Birth Trauma*
   - (a) Intracranial hæmorrhage
   - (b) Other
3. *Malformation*
4. *Infection*
   - (a) Pneumonia
   - (b) Other
5. *Blood Dyscrasias*
   - (a) Hæmolytic disease
   - (b) Hæmorrhagic disease
6. *Anoxia* (due to maternal causes)
   - (a) Toxæmia
   - (b) Antepartum hæmorrhage
   - (c) Accidents to the cord
   - (d) Placental insufficiency
   - (e) Other
7. *Maternal Conditions*
   - (a) Infections
   - (b) Diabetes
   - (c) Hypertension
   - (d) Nephritis
   - (e) Other
8. *Miscellaneous*
9. *Unknown*

It would be desirable to use the International Statistical Code or some universally recognized code for this classification. However, the above has been used because of its simplicity and, for the purpose of the Alberta study, it has been fairly satisfactory.

Rating of responsibility.—After the cause of death has been discovered the committee tries to decide whether the death was the responsibility of the obstetric or the pædiatric care; whether it was preventable or not; and where the responsibility factors lay. These data are recorded by using a modification of the code used by Kendal and Rose of Philadelphia[2] (Table III).

TABLE III.—RESPONSIBILITY CODE

A. Obstetric	1. Inadequate prenatal care
B. Pædiatric	2. Family at fault
C. Combined	3. Physician, error in judgment
	4. Physician, error in technique
	5. Intercurrent disease
I. Preventable	6. Unavoidable
II. Nonpreventable	7. Unclassifiable
III. Unclassifiable	8. Hospital responsibility

"Hospital responsibility" has been added to cover factors over which the physician has no direct control, and to recognize the hospital responsibility in such matters as inadequate nursing care and inadequate or faulty equipment.

The committee's final appraisal of each death is sent to the attending physician by letter,* with a comment on the case where indicated. This letter is shown below.

NOTICE SENT TO DOCTOR REGARDING PERINATAL DEATH

Dear Doctor:

The following is the classification on Baby.....

born.....CAUSE OF DEATH.....CODE.....

A. OBSTETRIC	1. Inadequate prenatal care
B. PÆDIATRIC	2. Family at fault
C. COMBINED	3. Physician–error in judgment
	4. Physician–error in technique
	5. Intercurrent disease
I. Preventable	6. Unavoidable
II. Nonpreventable	7. Unclassifiable
III. Unclassifiable	8. Hospital responsibility

This classification has been arrived at after consideration of the information that was available to the Perinatal Mortality Committee. Should you have information in regard to this case which may not be known to us, and which might alter the classification, please communicate with us.

Yours sincerely,

At the end of the year statistics are compiled from the information gathered from the province. A letter is then sent to each hospital informing it of its perinatal death rate, and the reliability of that rate for the hospital. Each hospital is also informed of the over-all provincial perinatal death rate and of the average perinatal death rate for hospitals of its own size.

TABLE IV.—ALBERTA PERINATAL RATES 1955–56

Hospital size	*Total births 1956*	*Perinatal death rates per 1000 total births*	
		1955	*1956*
Over 300 beds.....	17,787	23.9	22.0
100 to 299 beds	3035	21.0	20.1
30 to 99 beds.....	9430	22.3	26.9
Under 30 beds.....	4001	23.2	22.7
Indian hospitals....	454	32.3	41.9
Rates for province..		23.9	23.9

*This form was adopted from one used by the University of Manitoba.

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Distribution of perinatal mortality.—Table IV shows the perinatal death rates per 1000 total births for Alberta for 1955 and 1956 according to hospital size.

It will be noted that the provincial rate for the two years is the same. The first two hospital groups, which are the hospitals with their own local committees, have a slightly improved rate for 1956. However, these differences are not significant. Table V shows the breakdown of this 23.9 perinatal mortality rate in 1956.

TABLE V.—PERINATAL MORTALITY IN MATURE AND PREMATURE INFANTS

	Mature	*Premature*	*Total*
Total births	33,282	2034	35,316
Stillbirths	216	204	420
Infant deaths	154	270	424
Total	370	474	844
Death rate per thousand for their own groups	11.1	233.0	23.9

Perinatal mortality rate in prematures.—It will be noted that there are over 100 more deaths in premature infants than in mature ones and that the perinatal mortality for mature babies is 11.1 per 1000 mature births, whereas the same rate for premature babies is 233–21 times as high. It is obvious that prematurity is a major problem from both the obstetric and pædiatric standpoints.

This picture is more graphically shown in Fig. 1.

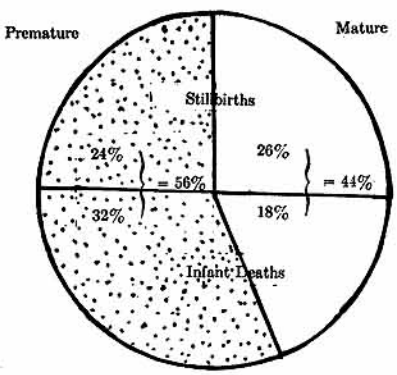

Fig. 1.—Alberta Perinatal Deaths—1956

One of the major problems, then, is in respect to prematurity. A premature infant in Alberta is an infant born weighing 5½ lb. or less. Table VI shows the premature birth rate for the province in 1956.

The prematurity rate of 5.9 is a little lower than the usual rate of 6 to 7%. This is partly due to the fact that stillbirths under 28 weeks' gestation are not included in this figure. The incidence of prematurity apparently decreases as the size of the hospital (and therefore the community) decreases. The difference in the incidence of prematurity between the hospitals of over 100 beds and those under 100 beds is highly significant; the "Z" value, or the standard normal variate, is 10. The reason for this significant difference is obscure, but no doubt worth investigating.

TABLE VI.—PREMATURE BIRTHS EXPRESSED AS PERCENTAGE OF TOTAL BIRTHS

Hospitals over 300 beds	$\frac{1256}{17787} = 7.1\%$
Hospitals 100–299 beds	$\frac{188}{3035} = 6.2\%$
Hospitals 30–99 beds	$\frac{415}{9430} = 4.4\%$
Hospitals less than 30 beds	$\frac{165}{4001} = 4.1\%$
Average for above groups	$\frac{2024}{34253} = 5.9\%$

Table VII reveals a difference in the perinatal mortality rates for premature infants in the different hospital size groups.

TABLE VII.—PREMATURE DEATH RATES PER 1000 PREMATURE BIRTHS

	Still-births	*Infant deaths*	*Total*
Hospitals over 100 beds	84	99	183
Hospitals under 100 beds	123	210	333
Provincial rate	100	133	233

Here again there is a highly significant difference in the perinatal mortality rates between the hospitals of over 100 beds and those under 100 beds. The "Z" value here is 7.21. It is possible that this difference reflects the less specialized equipment and nursing personnel in these smaller centres.

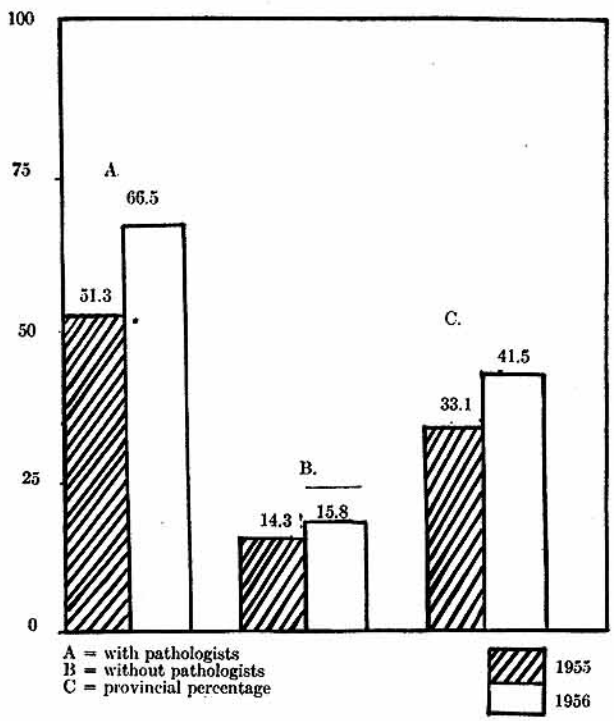

Fig. 2.—Percentages of autopsies on perinatal deaths in 1955–1956.

Autopsy rates.—The autopsy rates for 1955-1956, as shown in Fig. 2, indicate that there has been an increased interest in, and concern about, these deaths.

The Alberta Perinatal Mortality Committee has now been functioning for two and a half years. Although the death rate has not decreased, a major interest has been created in this group of deaths. The co-operation of the medical profession has been very encouraging. As far as the Perinatal Mortality Committee is aware, the medical profession in Alberta would like to see the study continue. The aim of the committee has been to encourage the adoption of recognized standards of obstetric and pædiatric care throughout Alberta. The committee believes that the continuation of this study will inevitably lead to an improved perinatal mortality rate.

REFERENCES

1. *Instructions to registrars of births, deaths and marriages in the Province of Alberta,* Queen's Printer, Edmonton, p. 14.
2. KENDALL, N. AND ROSE, E. K.: *Pediatrics,* **13**: 496, 1954.

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RÉSUMÉ

Les recherches dans le domaine de la mortalité infantile sont intimement liées aux données anatomopathologiques que fournit l'autopsie des enfants morts. L'étude d'un tel problème dans la province d'Alberta se heurte à la difficulté que crée le petit nombre de pathologistes dans cette région du pays. En effet sur plus de 100 hôpitaux dans toute la province, seulement les huit plus grands possèdent un service d'anatomopathologie. Environ 53% des infants qui meurent au cours de la première année succombent dans la semaine qui suit la naissance. Les cas référés au comité sur la mortalité néo-natale et infantile de la province d'Alberta sont documentés à l'aide d'un questionnaire que l'on envoie au médecin traitant. Dans les cas où il y a eu autopsie, la cause du décès est enregistrée d'après une modification de la classification du Dr Edith Potter. Après étude du cas, le comité de l'hôpital ou du district rural, selon le lieu, cherche à établir la responsabilité, et à déterminer les moyens qui auraient pu prévenir le décès. Les résultats sont formulés d'après le code modifié de Kendall et Rose. Le médecin intéressé en est informé par lettre et la compilation des statistiques est envoyée aux hôpitaux. Au cours des deux années qui se sont écoulées depuis la fondation du comité, le taux de mortalité néonatale en Alberta s'est maintenu à 23.9 par année. Il est à remarquer que le taux de mortalité des prématurés (dont le poids à la naissance est inférieur à 2500 g.) est 21 fois plus élevé que celui des enfants nés à terme, ou de poids normal. En dépit de la situation décrite plus haut, le taux des autopsies augmente graduellement. Les résultats obtenus jusqu'à présent, bien que modestes, semblent néanmoins encourageants.