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OBSTETRIC MORTALITY*

An Analysis of the Cases at the Lying-In Hospital in 1924

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It is with considerable trepidation that this paper is presented, for the figures are high and the report not very encouraging, but at the same time, presenting facts which warrant discussion. It is based on the service of the New York Lying-In Hospital for the year 1924.

As a preliminary, it is necessary to emphasize certain fundamental facts, well known as they undoubtedly are, for a proper interpretation of the figures and remarks:

1. The City Health Department requires a stillbirth certificate for every case where an embryo or fetus is expelled, whether the period of gestation be three months or ten months.

2. A stillbirth differs from a death of baby in the absence of respiratory movement; thus, a fetus, born with the heart beating even for an hour or more, if no respiratory effort be made, is considered a stillbirth.

3. A premature baby has been arbitrarily considered where the time factor was not available, as a fetus weighing 1600 grams or less. The term premature and its application is being considered by a committee from several of the maternity hospitals and the criteria for the classification are not yet determined.

4. Finally, in analyzing the figures it must be remembered that a hospital with public wards has a greater proportion of abnormalities and operations, hence, a greater incidence of morbidity and mortality.

During the year, there were in an indoor and outdoor service, a total of 5,457 confinements, among which there were 227 stillbirths and 152 infant deaths. During this period there were 23 adult deaths.

Considering the maternal deaths first, and eliminating one, a surgical case in a patient who was not pregnant, there were 22 obstetric deaths, a mortality of 0.4 per cent, or 4 per thousand. Among these cases there were:

1. Two patients with syphilis dying antepartum, after the administration of salvarsan. The symptoms indicated an encephalitis.

2. One case of antepartum sepsis where the patient had been ill for two weeks, had a high temperature on admission, and died within a half hour of the spontaneous delivery of a stillborn fetus.

3. One patient with postpartum sepsis, admitted three days after delivery by an outside physician, and dying five days later.

4. Two cases of endocarditis with decompensation, one patient in the fifth month, and the other in the seventh month of pregnancy. In both of these a vaginal hysterotomy was done for the cardiac conditions; both died within a few hours after the operation.

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While these six deaths occurred in the hospital, in the effort to arrive at a figure directly applicable to our institutional care it might be feasible for the time to subtract them from the 22 maternal deaths, thus leaving 16 in 5,457, a percentage of 0.3 or 1 in every 341 cases. In this connection the figures of the New York Health Department for the entire city, for 1923, indicate a death rate of 623 in 135,183 births,—a percentage of 0.46, or 46 per thousand, or 1 in 217 cases; and for 1924, a death rate of 678 in 136,884 births,—a percentage of 0.5, or 50 per thousand, or 1 in 202 cases.

It may be well for a moment to refer to the deaths due to salvarsan. The two patients were in the last month of gestation and had been treated for syphilis for some time because of a positive Wassermann. Both were given neosalvarsan intravenously with the usual precautions, only 0.45 grams being administered. Both developed toxic symptoms, became drowsy, and died within a week. No autopsies were permitted. Whether these cases occurring within a short time warrant the assumption of increased danger of salvarsan administration in the antepartum period, or were due to some coincidence either in the patients or the drug is a matter for discussion. Such an experience, however, in the hands of an expert with all the safeguards has made the staff at the Lying-In Hospital timorous about forcing this treatment at such a period.

In the sixteen cases of our remaining adult deaths, there were nine cesarean sections, three internal podalic versions, and four spontaneous deliveries.

Cesarean section was done 190 times during the year, an incidence of 3.48 per cent, or 1 in 28.7 cases, with a mortality of 4.7 per cent. Death was due to the following causes: general peritonitis in three, embolism in two, postpartum hemorrhage in one, postpartum sepsis in one, lobar pneumonia in one, and shock and relaxation of the uterus in one.

Internal podalic version was done 149 times during the year, an incidence of 2.73 per cent, or 1 in 36 cases with a mortality of 3 per cent. Death was due to postpartum hemorrhages from placenta previa in one, from premature separation of the placenta in another, and from ruptured uterus and general peritonitis in a third case.

It is, of course, to be remembered that while this represents a fatality where the operation of internal podalic version was done, death was due to the placenta previa and premature separation of the placenta, so that our real death rate is only one, the last, where the operation was done for a generally contracted pelvis.

In the remaining cases, in which the deliveries were spontaneous, there were three cases of eclampsia and one of embolism.

There were 13 cases of eclampsia during the year, an incidence of 1 in 419, and a mortality of 23 per cent.

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Now, considering the fetal and infant death rates, there were in the total confinements of 5,457, with 5,508 babies:

Stillbirths	227 or 4.1 per cent or 41 per 1000
Infant deaths	152 or 2.8 per cent or 28 per 1000

In all of these 379 deaths and stillbirths there were 159 autopsies.

With the definitions already outlined, these stillbirths are classified under the headings of full term, premature, and macerated, in Table I.

TABLE I

	NO. OF CASES	PER CENT OF TOTAL CONFINEMENTS (5,457)
Macerated	94	1.7
Premature	48	0.9
Full term, operative	59	1.0
Full term, spontaneous	26	0.5

Thus, it is seen that in 94 cases or 41 per cent of the stillbirths the fetus was already macerated at the time of delivery. Among these, there were:

Positive Wassermann in mother	15
Negative Wassermann in mother	60
No Wassermann taken	19

In more than half of the macerated fetuses (64 per cent), there was neither clinical nor laboratory evidence of lues in the mother, nor was there any evidence in the stillborn fetus at the postmortem examination. Excluding the 15 positive cases, in the 79 remaining macerated fetuses definite causes were found in 35 cases as follows: toxemia and eclampsia, 13; previous stillbirths, 5; diabetes, 4; fall or blow, 2; tight cord, 3; placenta previa, 2; hydrocephalus monster, 2; pyelitis, 1; premature separation of placenta, 1; fibroid uterus, 1; and general peritonitis in mother, 1.

In the remaining 44 cases, including the 19 in which no Wassermann was made, the causes were not ascertainable.

As stated above, the premature infants among the stillbirths numbered 48 and included all embryos or fetuses under 1,600 grams. Many of these were cases properly called abortions of three to five months, but 5 were anencephalics, and will be referred to later.

In considering the deaths of babies, all cases were included where the child breathed and where death occurred either immediately or at any time in the hospital stay of ten days. For purposes of classification these were subdivided into premature or full term, as here shown:

Premature	73 or 1.3 per cent of total confinements
Operative delivery	19
Spontaneous delivery	54
Full term	79 or 1.4 per cent of total confinements
Operative delivery	28
Spontaneous delivery	51

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A consideration of the full-term baby and the method of delivery is of interest:

	Stillbirth	Deaths
Operative delivery	59	28
Spontaneous delivery	26	51

In other words, a total of 164 full-term deaths and stillbirths occurred in 5,457 confinements.

An interesting study of the important causes in these full-term cases is given in Table II.

TABLE II

	OPERATIVE	SPONTANEOUS
Atelectasis and asphyxia	28	18
Cerebral hemorrhage	28	15
Fracture or separation of vertebrae	8	3
Craniotomy	6	
Anomalies	4	11
Inanition		5
Bronchopneumonia		3
Hemorrhagic disease		4
Other causes	13	18
Total	87	77

The incidence of cerebral hemorrhage in almost one-third of the operative and one-fifth of the spontaneous deliveries is noteworthy. Next to this is the occurrence of anomalies, including congenital malformations, almost all incompatible with life; four of which were in the operative and eleven in the spontaneous deliveries.

Table III deals with the congenital anomalies most of which came to autopsy.

TABLE III

	DEATH		STILLBIRTH			TOTAL
	FULL TERM	PREMATURE	MACERATED	FULL TERM	PREMATURE	
Anencephaly			1	3	5	9
Monstrosity	1					1
Congenital heart	2					2
Umbilical hernia	3					3
Hydrocephalus			1			1
Hydrocephalus and spina bifida	1	1			1	3
Eventration	1					1
Stricture of esophagus	1					1
Absence of intestine	2					2
Diaphragmatic hernia	1					1
	12	1	2	3	6	24

The study of the mortality records for the year has afforded the opportunity to obtain the rates for the more common obstetric procedures and conditions and so has developed some significant figures. These are noted in Table IV, which excludes the macerated fetuses from consideration.

With regard to the six craniotomies, in three cases perforations were performed where internal podalic version had been done. One

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was a full-term and two were macerated fetuses. The other three were craniotomies on full-term fetuses; one of these was already dead at the time of delivery, congenital lues being present.

TABLE IV

	ADULT DEATH	TOTAL NO. CASES	% MATER. DEATH	BABY					INCI-DENCE 1 IN	% FETAL MOR-TALITY
				FULL TERM		PREMATURE		TOTAL		
				DEATH	STILL-BIRTH	DEATH	STILL-BIRTH			
Placenta previa	1	23	4.3	1	4	6	2	13	237	56
Premature separation of placenta	1	11	9.0	1		1	1	3	495	27
Prolapsed cord		29		1	3			4	188	14
Cesarean section	9	190	4.7	1	5	4	3	13	29	6.8
High forceps		27			5			5	202	22
Craniotomy		6			6			6	909	

The striking figures in Table IV are the 4.7 per cent maternal and 6.8 per cent stillbirth and infant deaths in the cesarean cases, the high baby rate for high forceps, and the comparatively low rate for prolapsed cord. Hofmeier[1] reports regarding placenta previa, an incidence of 1 in each of 79 obstetric cases, with a death rate of 7.5 per cent. Kellogg,[2] reporting on the mortality of placenta previa for the last twenty-five years at the Boston Lying-In Hospital, refers to a total of 218 cases with 38 maternal deaths or 13.5 per cent. To be fair, however, the figures range from 17 per cent (1895-1900), and 24 per cent (1905-1910), and 6 per cent (1915-1920), with a fetal mortality in 1910-1915 of 44 per cent and for 1915-1920 of 48 per cent. Lynch,[3] reporting on placenta previa at the Boston City Hospital, states an incidence of about 1 in 100 cases, with a maternal mortality of 19 in 91 cases, or 20 per cent, and a fetal and baby mortality of 51, or 55 per cent; excluding macerated fetuses and nonviables, he has a corrected fetal mortality of 25 per cent.

The breech deliveries are indicated in Table V.

TABLE V

	DEATHS	STILLBIRTHS	TOTAL
Premature	4	5	9
Full term	9	8	17
Macerated		10	10
	13	23	36

The total number of breech cases was 140, which results in an incidence of 1 in 39 cases and a mortality of 26 per cent. Although this is the gross mortality in the breech cases, if the ten macerated fetuses are excluded it becomes 18 per cent.

An analysis of the causes of death in the 17 full-term breech cases referred to above gives the following: Anencephaly, 2; hydrocephalus and spina bifida, 1; separation or fracture vertebrae, 3; as-

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phyxia, 5; cerebral hemorrhage, 5; and hemorrhagic disease, 1. If the three congenital anomalies are eliminated from the 26 breeches there is a mortality of 23, or 16.4 per cent for the breech cases.

The figures quoted and the tables outlined indicate a maternal mortality per 1000 of 4, a stillbirth rate of 41 and a baby death rate of 28. How these compare with figures published elsewhere is shown in the statistics quoted by Dr. Dublin,[4] of the Metropolitan Life Insurance Co., who says, in an address before the American Child Hygiene Association,[4] "There are born alive each year in the United States approximately 2,620,000 babies. Of this number about 7.6 per cent, or 199,200, die before they are a year old. Early infant mortality accounts for about 109,000 of these deaths. These deaths are, for the most part, due to the following conditions: malformations, prematurity, congenital debility, syphilis, and injuries at birth. To this number must be added an almost equal number of fetal deaths at or near full term, which properly belong to this group. These are the stillbirths, which number about 100,000."

In a discussion of Dr. W. J. Bell's paper on maternal mortality read before the same association, Dublin further refers to a maternal death rate of close to 8 per 1,000 in the United States, and in New York City, a little under 5 per 1,000. In other words, in 2,620,000 births there were about 109,000 early infant deaths (under one month) and 100,000 stillbirths; a percentage for the latter of 3.8, and for the former 4.1, a total of 7.9.

Bell, at the same meeting, reported a maternal mortality, in Ontario, of 4.52 per 1,000, in 1919, and 6.75 per 1,000, in 1925. The rates for England and Wales were 4.12 per 1,000, in 1919.

In the city of New York, the last figures obtainable, for 1923 and 1924, are as follows:

	1923	1924
Total birth rate	135,183	136,884
Stillbirths	6,023—4.4 %	6,448—4.7%
Total deaths under 1 month	4,132—3.1 %	4,346—3.2%
Maternal deaths	625—0.46%	678—0.5%

Kickham,[5] in a series of 1,000 consecutive obstetric cases at St. Elizabeth's Hospital, reports a maternal mortality of 5 or 0.5 per cent, and 55 infant deaths or stillbirths. Haven Emerson,[6] in a study of "Maternal and Infant Mortality in Physicians' Families," reports that in 1,974 pregnancies, there were 1,910 living children and 9 maternal deaths.

As showing the influence of prenatal care, a report on "Prenatal Work in Detroit"[7] indicates a mortality of 3.1 per 1,000 in 1,599 cases under the care of the prenatal clinic; for the entire city, in 1922, in 27,277 confinements, there was a maternal mortality of 6.8 per cent per 1,000, and a stillbirth rate of 53.

A bulletin from the Department of Commerce, at Washington,

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shows for the Birth Registration Area of 1915 (constituted by 10 states and the District of Columbia) a maternal mortality of 6.4 per 1,000, in 1923. Of 30 states with available figures the rate varies from 5 (in Utah) to 9.7 (in South Carolina).

The one hundred and second annual report of the New York Nursery and Child's Hospital for 1924 gives some parallel statistics which are of interest. In their service, including 1,833 indoor deliveries with 1,852 births, and 444 outdoor deliveries with 447 births, there were:

Maternal death rate of	9, or 0.4 per cent,	i.e., 1 in	252.
Stillbirth rate of	107, or 4.4 per cent,	i.e., 1 in	22.4
Baby death rate of	30, or 1.3 per cent,	i.e., 1 in	76.

A total of 24 macerated fetuses occurred, representing about one-fourth of the stillbirths. Breech presentation was encountered 88 times; placenta previa, with 1 maternal death and 4 stillbirths, 11 times; high forceps, 25 times; and craniotomy, 4 times. Among the stillbirths anencephaly occurred 5 times and other defects of development 6 times. Among the deaths of babies congenital anomalies occurred 4 times and premature separation of the placenta, with 7 stillbirths, occurred 12 times.

A study of the figures quoted from the New York Lying-In Hospital and a comparison with those from other places, leaves one with a discouraging sense of the inevitability of certain figures. High as is the stillbirth and baby death rate, and the loss of mothers, one must be struck by the fact that a certain cost must be paid. It is true that, considering the infants, there should not have been 3 craniotomies on living babies, or 10 fractures or separated vertebrae, or 43 cerebral hemorrhages, yet there can never be eliminated the 24 congenital anomalies, the premature babies, miscarriages or abortions, or in great measure, the occurrence of macerated fetuses.

What should be done, however, is to concentrate more on the full-term fetuses, by watching for abnormalities; not to permit a woman who has gone through more or less distress for ten months to have a stillborn baby because interference was not instituted until too late. The fetus should be observed closely for signs of distress as evidenced by a passage of meconium, turbulent movements, or by rising, slowing, or irregularities of the heart. The obstetrician should interfere, and not alone where there is fetal distress but even before this state is reached.

REFERENCES

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[5]Boston Med. and Surg. Jour., Dec. 11, 1924, cxci, 1110-1111.
[6]Am. Jour. Hygiene, July, 1924, iv, 365-385.
[7]Jour. Am. Med. Assn., Dec. 22, 1923, lxxxi, 2121.

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