MATERNAL MORTALITY

(A Review of Maternal Mortality in N. W. Maternity Hospital, Bombay, during the Period of 5 Years from 1953-1957

by

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This paper is written not with an object of showing the reduction in maternal mortality, occurring over the past years, but to come to some conclusion, as to how some of the fatal results, might have been averted.

An effort is made to evaluate the data, in relation to preventability and non-preventability of the deaths.

The two greatest enemies to progress, which one constantly comes across, are poverty and ignorance. Poverty not only of the patient which is responsible for her malnutrition, which prevents her from buying certain essential drugs, which prevents her from taking the much needed rest, but also of the State which cannot provide adequate facilities. Hospitals are overcrowded, large number of patients have to be refused admission though their condition requires hospitalisation, all drugs cannot be supplied to the patients free of charge, and patients have to be discharged earlier to make room for others.

Next is ignorance, which prevents the patients from realising the great danger which they are facing due to their non-cooperation and can only be overcome by better lay education.

The United States is the first large nation to push its maternal mortality rate slightly below the apparently irreducible minimum, of one maternal death per 1000 live births. Dickinson and Welker, in reviewing maternal mortality in the U.S. in 1949, rightly point out that since all maternal deaths are included in the number of maternal deaths, whether the pregnancy was terminated by an abortion, a still-birth, or a live birth, there is, admittedly, some inconsistency in using only live births in the denominator. Maternal mortality is

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defined as the number of deaths due to complications of pregnancy, childbirth and the puerperium per 1000 total (live and still) births. Again there is no uniform practice as regards inclusion of deaths from abortion.

From 1953 to the present time (1957) the maternal mortality rate in N. W. Maternity Hospital, Bombay, has remained more or less stationary, at the level of 4.5/1000 deliveries, without demonstrating any tendency to decrease (Table I).

This state of affairs may be attributed to:

(1) Irregular attendance in the ante-natal O.P.D. Many patients refuse to attend the O.P.D. regularly, quite satisfied at receiving a registration card during the first visit, which they feel is sufficient to gain admission during delivery. Some come first time only during delivery. This mistake is well illustrated in the fact that 68.8% of the patients who died had never made even a single visit to the O.P.D.

(2) Large number of emergency cases, referred from other hospitals, came very often too late for any medical help. This shows the great need for post-graduate training in obstetrics of larger number of young doctors and their wider distribution throughout the country.

Table II shows that the maximum number of patients came and died within 24 hours.

The causes of death may be grouped as under:

Anaemia continues to claim the highest toll; following closely are deaths due to haemorrhage and infections (other than puerperal sepsis). Then follow deaths due to toxaemia,

TABLE I

Year	1953	1954	1955	1956	1957
Total full-term confinements ..	8271	8872	8970	8327	9363
Abortions	661	778	770	806	995
Total number of deliveries ..	8932	9650	9740	9133	10358
Deaths	40	45	50	35	48
Deaths/10,000 deliveries	44.7	46.6	51.3	38.3	46.3
Deaths/1000 deliveries	4.4	4.6	5.1	3.8	4.6

TABLE II

No. of days stay in the hospital	24 hrs.	1-2 days	2-3 days	3-5 days	5-7 days	Week or over
No. of patients in—						
1953	22	4	5	6	2	1
1954	26	1	5	5	5	3
1955	22	6	3	4	7	8
1956	14	2	3	3	8	5
1957	26	3	6	3	4	6
Total number of patients	110	16	22	21	26	23

TABLE III

Causes of Death

Year	1953	1954	1955	1956	1957
Anaemia	10	10	15	8	14
Toxaemia	6	6	6	4	4
Post-partum haemorrhage ..	4	6	2	1	4
Placenta praevia	2	2	2	—	1
Accidental haemorrhage ..	1	2	4	1	1
Shock	1	2	2	6	8
Puerperal sepsis	2	2	5	—	1 (2 included in anaemia)
Jaundice	6	4	6	4	6
Other infections	3	3	3	3	6
Cardiac cases	1	4	2	3	2
Miscellaneous	4	4	3	5	1
Total	40	45	50	35	48

shock and puerperal sepsis. Cardiac cases account for the least number of deaths.

Anaemia, as already mentioned, takes an alarming toll in this country. England and Wales (1950) report 'O' deaths due to anaemia.

TABLE IV

Haemoglobin Percentage of Patients who Died of Anaemia

	10-20%	21-30%	31-35%	36-40%
1953	6	4	—	—
1954	5	5	—	—
1955	9	5	1 (Asso. with toxaemia)	—
1956	3	3	1	1 (transfusion reaction)
1957	5	9	—	—
Total	28	26	2	1

In N. W. Maternity Hospital there were 218 maternal deaths during the 5-year period from 1953-57. Out of these, 57 were due to anaemia giving a percentage of 26.1 of deaths due to anaemia. Out of 57 deaths 42 were emergency cases, not having paid even a single visit to the hospital. Their haemoglobin ranged from 10% to 28%. Among the 15 booked cases, only 3 were in-patients for more than 7 days. One died after a fourth transfusion, Hb. 18%, the second collapsed and died soon after delivery, and was in-patient only for 9 days; the third one did not respond to any form of treatment, general condition deteriorated and patient thus died in spite of all possible treatment. The 12 remaining booked cases were in-patients from few hours to 5 days, a

very short period indeed for treatment of anaemia. Amongst all these booked cases, not a single patient had paid more than three visits to the O.P.D. The term booked therefore hardly suggests proper ante-natal care.

TABLE V

Total no. of deaths from anaemia	Preventable deaths	Non-preventable deaths
57	56	1

Fault of the patient	Fault of the doctor (Transfusion reaction)
55	1

The tragedy is thus all the greater as we have to list practically all cases under preventable deaths.

Anaemic patients cannot stand the slightest loss of blood, it is therefore essential to start the treatment as early as possible, admitting all cases, where the haemoglobin percentage is below 40 and keeping blood transfusion ready during delivery.

Patients with haemoglobin below 30% may be given small slow transfusions, even before delivery, with care. Parenteral iron-therapy is a satisfactory alternative to blood transfusion, even late in the third trimester.

It is well known that there is commonly an iron deficiency in pregnancy due to increased blood volume, demand of the foetus for iron, associated with an inadequate intake of iron in the diet; it is therefore necessary that iron preparation be given as a routine to every pregnant woman.

Toxaemia. Majority of the deaths included in toxaemia are those due to eclampsia.

In England and Wales (1950), toxaemia of pregnancy accounted for 25% of deaths or 0.21/1000 births (live and S.B.).

Klein et al, reporting maternal mortality in Bronx County, New York, during 1946-57, state that toxaemia is responsible for 9.3% of deaths.

In N. W. Maternity Hospital toxaemia accounted for 11.9% of deaths during 1953-57. These included:

1. Pre-eclampsia .. 4
2. Eclampsia .. 22
3. Toxaemia superimposed on kidney disease .. nil

Out of 26 cases, 21 cases came as emergency and 15 died within 24 hours; among the 6 remaining emergency cases, 3 cases, though they lived from 5-8 days, were admitted in an unconscious state, failed to respond to treatment and died of pulmonary oedema; 3 remaining cases died of uraemia within 4-8 days. All these could be classed as preventable deaths.

Among the 5 booked cases, 2 patients had paid only one visit. A third patient had no signs of toxaemia during her ante-natal visits. She

was brought in a comatose state with history of fits, B.P. 210/150 mm. of Hg., Urine—Alb. loaded and diéd within 48 hours. A fourth patient had paid only 2 visits. A fifth case, during ante-natal visits, had showed no signs of toxaemia, came in labour with signs of toxaemia, collapsed after delivery and died.

All these 5 booked cases, had they come regularly to the hospital for ante-natal check-up, would have been admitted at the earliest signs of developing toxaemia and could have been saved. (Table VI)

To bring down the mortality rates from toxaemia, it is of the utmost importance to bring home to the patient the necessity of properly spaced visits to the hospital and the early diagnosis and treatment of its principal symptoms.

As far as choice of treatment is concerned, nothing definite can be mentioned as long as its etiology remains elusive.

Haemorrhage. Deaths from haemorrhage may be divided into following groups. (Table VII)

Obstetric patients are young patients and usually in good health (apart from the anaemic and toxaemic patients), they can therefore tolerate a great deal of blood loss, unless it is very severe and sudden, or if, with repeated episodes of bleeding, they have been allowed to approach a state of exsanguination. Early blood replacement is therefore imperative, associated with timely intervention and may be life saving.

How true is the above statement can be gauged by going through the following case reports.

TABLE VI

Total no. of deaths from toxaemia	Preventable deaths	Non-preventable deaths
26	26	nil

Fault of the patient	Fault of the doctor
26	nil

TABLE VII

Causes	No. of patients	Preventable deaths			Non-preventable deaths
		Total	Fault of the patient	Fault of the doctor	
Abortion	nil	nil	—	—	nil
Vesicular mole	2	2	2	—	nil
Placenta praevia	7	7	4	3	nil
Accidental haemorrhage ..	9	9	8	1	nil
Post-partum haemorrhage ..	17	13	8	5	4 (jaundice)
Ruptured uteri	8	8	2	6	nil
Total	43	39	24	15	4

Abortion. There were no deaths from haemorrhage due to abortion, mainly due to (1) the patients, being in an early gestational period, were in a better state of health to tolerate blood loss than those in an advanced stage of pregnancy. (2) Cases of bleeding during the first half of pregnancy are rarely treated by private nursing homes, as they often require surgical intervention. (3) Patients tend to report earlier for fear of miscarriage.

Vesicular Mole. There were 2 deaths from vesicular mole; both were emergency cases, came pulseless, one bleeding for seven days at home, the other for 4 days; one died within 28 hours and the second one within 48 hours.

Placenta Praevia. There were seven deaths due to placenta praevia, of these, 4 came as emergency cases in an exsanguinated condition and died within 24-48 hours.

Three booked cases died due to injudicious delay in operation. Patients were observed for a much longer period than was necessary and thus, when taken up, were in too poor a state to stand the operative procedure.

Reid writing on "Shock in Obstetrics" makes the following statement which aptly describes the above state of affairs. "In recent years", he says, "there has been a tendency to treat patients suspected of having placenta praevia expectantly. The objective of this policy is laudable, for it hopes to postpone definitive obstetrical interference until the foetus attains a state of maturity which will insure its survival". While conservative or expectant treatment is the preferred method of management until the last month of pregnancy in patients suspected of placenta praevia, the mother's welfare must never be jeopardized in a desperate and sometimes futile effort to salvage an immature infant.

Accidental Haemorrhage. There were 9 deaths due to accidental haemorrhage. Six emergency cases came in a state of shock, artificial rupture of membranes done, blood given, but patients died within 2-8 hours. Seventh emergency case came with signs of toxaemia, delivered normally, but went into anuria and died. The eighth emergency case was an VIII para with 32 weeks' amenorrhoea, came with signs of toxaemia and bleeding per vaginam in a collapsed state. Her death was due to shortcoming in diagnosis, a transverse lie with an arm presentation was missed. One booked case died due to failure of timely intervention.

In the above cases, the patients were ill-prepared for delivery through loss of blood and, in the last case, a coagulation defect may have also been present. These two hazards in accidental haemorrhage can be overcome by prompt replacement of blood and examination of blood for fibrinogen if facilities are available, or by the rapid test of clot formation and retraction which gives an idea of the severity of the condition, measures can thus be taken to deal with the emergency.

Post-partum Haemorrhage. There were seventeen cases of post-partum haemorrhage. Five cases delivered outside and were admitted in a collapsed state with post-partum haemorrhage. Out of these, 2 had retain-

ed placentae; they did not recover from shock and died within few hours of admission. Four cases had associated toxaemia, 1 was a case of eclampsia with accidental haemorrhage. 4 cases had jaundice and one patient had hydramnios. One booked case, XIII para Rh-ve with 3 living children, died of post-partum haemorrhage and probably had an associated coagulation defect. Another patient had a normal delivery and severe atonic post-partum haemorrhage which could not be controlled by oxytocics nor an uterine plug. Where uterine atony cannot be controlled after a limited trial of oxytocics and uterine plug, supracervical hysterectomy seems to be the only justified procedure. Whatever para the patient may be, a living patient without an uterus is better than a dead patient with an intact one.

Ruptured Uterus. There were 8 cases of ruptured uteri, out of which 5 were transferred from private nursing homes, in 2 cases craniotomy and forceps were attempted outside, one case was of an undiagnosed hydrocephalus. Two cases were transferred for prolonged labour. One of them had a transverse lie. All the patients were in a collapsed state and although blood was given and immediate laparotomy done, none recovered from shock. Two emergency cases came after being in labour for 2 days, both had ruptured uteri; subtotal hysterectomy was done but patients did not survive.

Klein et al state that in Bronx County, New York, during the years 1946-57, haemorrhage was the cause of death in 18.9% of cases. In this series, during the 5 years 1953-57, haemorrhage was the cause of death in 19.7% of the cases. Out of these, 90% were preventable. In 61.5% of the cases, the fault was with the patient, while in 38.5% the preventable factors were in control of the physician, which reflects sadly on our medical education.

Despite the commendable reduction in maternal mortality in recent years, deaths from haemorrhage have not decreased proportionately.

Transfusion Reaction. There was one death following transfusion reaction, in 3 other cases, death was probably precipitated by transfusion reaction.

Hall and Hellman describe four types of transfusion reactions.

The two most serious complications of a haemolytic transfusion reaction are a bleeding diathesis and impairment of renal function. Most of the errors occur due to haste and carelessness.

Even after proper cross matching, reactions occur either due to (1) ABO incompatibility as 'O' blood group is often given to 'A', 'B' or 'AB' groups, as the blood of latter groups is not available in sufficient quantities; (2) blood being old or not being kept at the proper temperature; (3) lack of trained personnel as detailed attention is mandatory whenever a transfusion is to be given.

Infection. Since the introduction of sulfonamides in 1935 and shortly thereafter of penicillin and other antibiotics, the death rate from sepsis has fallen much more rapidly than that from other causes, so that in 1950 the maternal mortality in United States was only 8.3 per 10,000 live births,

truly a striking contrast to the 67.3 per 10,000 live births 20 years previously.

Puerperal Sepsis. In this series there were 15 cases of puerperal sepsis, i.e. 6.8% of the maternal deaths were due to puerperal sepsis. Seven of these cases had delivered at home and came later with fever, pain in abdomen and foul lochia. Out of the remaining 8 cases, 2 cases were admitted as septic abortions and died within 36 hours, 4 cases were transferred from nursing homes for obstructed labour. Lower segment caesarean section or hysterectomy, as was found necessary, was done, but patients developed peritonitis and died.

Out of the 2 remaining cases, 1 was admitted in an unconscious state. Craniotomy was done but patient developed severe peritonitis. Post-mortem revealed something unique. Perforation of oesophagus, transverse colon and diffuse haemorrhagic necrosis of liver, organs were sent to chemical analyser — no poison was detected.

Second patient had a normal delivery in the hospital. Patient had fever but took discharge against medical advice; she was readmitted after 2 days in a collapsed condition, severe distension of abdomen and died within 14 hours. Post-mortem showed diverticulitis with perforation and purulent peritonitis. Thus all the cases had developed sepsis elsewhere than in the hospital. (Table VIII)

There were other cases of different types of infection. There were 25 cases of jaundice; all of them died within few hours to seven days of admission. Seventy-five per cent of the cases were brought in a moribund condition. The treatment of jaundice still leaves much to be desired.

There were 3 cases of bilateral pulmonary tuberculosis (2 emergency and 1 treated in the O.P.D. collapsed after delivery and died), 2 cases of purulent meningitis, 1 case of small-pox, 1 of acute bacillary dysentery, 1 of cerebral malaria, 1 died of acute septicaemia (petechiae on the body, subconjunctival haemorrhages, high fever). Two cases were of bronchopneumonia with influenza, which did not respond to penicillin or streptomycin.

Heart Disease. There were 11 cases dying from heart disease. Out of these, 7 were emergency cases, came in failure between Gr. III and IV.

Out of 4 booked cases, 1 was a case of mitral stenosis Gr. III with previous caesarean section, who refused admission during the ante-natal period and came in labour with

TABLE VIII

Total no. of deaths due to puerperal sepsis	Preventable deaths	Non-preventable deaths
15	15	nil
	Fault of the patient: 11	Fault of the doctor: 4

failure; after the operation, patient went into left ventricular failure and died.

Second booked case was of double mitral Gr. III, after 20 days stay in the hospital. She went home against medical advice and later came in labour with failure, developed high temperature after delivery, passed into coma and died.

A third case was being treated for failure in the ward, a case of double mitral Gr. IV. Patient was improving but aborted and after 12 days went into failure and died. Fourth booked case of mitral stenosis died after puerperal sterilisation.

Deaths with Operative Interference. Although there are very few cases where death can be attributed directly to operative interference, in the following table are included cases of maternal deaths, where some sort of operative interference, either vaginal or abdominal, was undertaken. (Table X).

85% of the above deaths come under preventable deaths and in 50% the doctor is at fault. Majority of the above deaths have occurred because the patients have either come or been sent too late to the hospital, as in practically all cases of ruptured uteri. Cases of forceps which have

TABLE IX

Total no. of deaths due to heart disease	Preventable deaths	Non-preventable deaths
11	10	1

Fault of the patient	Fault of the doctor
9	1

TABLE X

Operations	No. of patients	Preventable deaths			Non-preventable deaths
		Total	Fault of the patient	Fault of the doctor	
Digital evacuation or curettage ..	6	4	3	1	2
Forceps	7	5	5	—	2
Craniotomy	4	4	4	—	nil
Perforation of central placenta praevia	1	1	—	1	nil
Manual removal of placenta ..	5	4	—	4	1
Int. version	1	1	1	—	nil
Lower segment caesarean section including hysterotomy ..	7	7	1	6	nil
Suturing of ruptured uteri ..	2	2	—	2	nil
Hysterectomy	7	6	4	2	1
Puerperal sterilisation	2	2	—	2	nil
Total	42	36	18	18	6

died, are either those with severe anaemia or eclampsia. While anaemia is preventable, cases of eclampsia sometimes die in spite of all possible treatment; in the treatment of eclampsia, the last word has still to be written. Large number of patients of manual removal of placenta go into shock and a few even die after an operation which appears so simple and harmless.

It has been observed that too many attempts are made to expel the placenta, a procedure which is mainly responsible for the shock and secondly attempting manual removal when the patient's general condition is too low.

The following operative deaths occurred due to faulty medical judgment.

A case of mitral stenosis, who had gone into ventricular fibrillation after delivery, was taken up for puerperal sterilisation on the 15th day, rather an early period. Not only is the patient not in a fit condition to stand any operative procedure, however minor, but there is an additional risk of post-operative bacterial endocarditis and pulmonary embolism.

Another was a case of cervical fibroid where myomectomy was done along with lower segment caesarean section, a most hazardous and dangerous procedure; patient went into shock and died. Ian Donald rightly points out that although one is tempted in the course of performing caesarean section to avail oneself of the opportunity of removing a fibroid, the temptation should be resisted, even though the fibroid presents directly in line of the uterine incision. There are several difficulties which one comes across. Removal of fibroids, some months after delivery, not only minimises the blood loss and the risk to the patient but the exercise of this forbearance may abolish the need for operating at all.

Next was a case of retained placenta; patient, a primipara, was taken up for exploratory laparotomy, for a suspected uterine rupture, without a vaginal exploration of the uterus (due to low condition of the patient). Exploratory laparotomy revealed an atonic uterus full of blood clots.

With blood transfusion going and a fair degree of B.P., a fast pulse alone should not deter one from attempting manual removal or exploring the uterus, if a rupture is suspected, otherwise a vicious circle sets in.

Another interesting case was a patient who came in labour with high temperature which responded to penicillin and streptomycin. On the fifth day, patient was taken up for puerperal sterilisation with disastrous results. Screening showed bilateral pulmonary tuberculosis. Patient expired on 5th day of the operation. Routine screening before any operative procedure, however minor, and less indiscriminate use of penicillin and streptomycin may have saved this patient.

For puerperal sterilisation, however minor the procedure may appear to be, patients should be selected with care, especially cardiac cases, anaemic patients and those with sepsis.

Deaths following Anaesthesia. There were 2 deaths following anaesthesia. One was a case of ectopic who was in a very low condition, and

the second was a patient where version and breech extraction was followed by manual removal of placenta. Anaesthesia may be only a complicating factor in a badly traumatised and therefore a shocked patient. Faison, reviewing the maternal mortality in New York city during 1948-49, makes the following remarks which describe the situation in a nut-shell. He says, "it was remarkable how varied was the training of the personnel who administer obstetric anaesthesia. This is at variance from the practice in all hospitals, of securing qualified anaesthesiologist, even for minor procedure in general surgery. The medical profession seems inclined to overlook the fact that in obstetrics there is usually the safety of at least 2 lives to be considered in each case", besides the fact that obstetric anaesthesia is usually an emergency procedure.

Miscellaneous Causes of Deaths

Embolism. There were 7 deaths from embolism. In 3 cases, diagnosis was established by post-mortem. Two patients had delivered at home and were brought in an unconscious state. The third patient suddenly collapsed after a normal delivery. Out of the remaining 4 cases, in one case embolism followed thrombophlebitis (white leg); patient had delivered at home. The second case had delivered in another hospital and was admitted in the N. W. Hospital in an unconscious state with hemiplegia; patient died within 24 hours. Diagnosis of cortical thrombophlebitis was made by the consulting physician. The third case of embolism followed manual removal of placenta, and the fourth case, one of mitral stenosis, was being treated for failure—suddenly became unconscious and died.

Other miscellaneous causes of death were:

Glioma of the brain (post-mortem diagnosis) ..	1 case
Intracranial haemorrhage	1 „
Rupture of pulmonary aneurysm and haemopericardium (post-mortem diagnosis) ..	1 „
Pontine haemorrhage (post-mortem diagnosis)	1 „
Coronary thrombosis (post-mortem diagnosis)	1 „
Massive collapse of the lungs (post-mortem diagnosis)	1 „
Barbiturate poisoning (post-mortem diagnosis)	1 „
Oedema of the lungs (post-mortem diagnosis)	1 „

Out of these, last 3 cases could be classed as preventable deaths.

Discussion

In assessing the factors responsible for maternal deaths, it can be seen from the previous Tables that 98% of the deaths are preventable as far as anaemia and toxaemia are concerned. In practically all these deaths, the fault can be attributed to the patient, that is either (1) failure to take advantage of the facilities available, or (2) too late arrival, and (3) ignorance of the value of regular

factors of responsibility for maternal deaths, 98% of the deaths were considered preventable as far as anaemia and toxaemia were concerned, while 87% were considered preventable in haemorrhage and operative deaths.

An effort is made to come to some conclusion, as to how some of the fatal results might have been averted.

Suggestions for reducing maternal mortality are submitted.

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