

MATERNAL MORTALITY RATIO AT THE ROYAL MEDICAL SERVICES HOSPITALS: HOSPITAL-BASED DATA

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ABSTRACT

Objective: To calculate and analyze of the maternal mortality ratio at the Royal Medical Services hospitals.

Methods: The data were obtained from the annual statistics reports of the Royal Medical Services, death certificates, medical records, and labor ward records. Over a 5 years period (2000-2005).

Results: Nineteen cases were identified. The maternal mortality ratio was calculated to be 17.08 per 100,000 live births. Age, parity and socio-economic class were the main factors affecting the ratio. Obstetric hemorrhage and thromboembolic disorders were the two major causes of maternal deaths.

Conclusions: Maternal mortality rate is a reflection of health care system of the country. In the absence of a national register for maternal mortality ratio, hospital-based statistics will be a valuable alternative. The available maternal mortality ratio of 17/100,000 live births at the Royal Medical Services hospitals is an acceptable figure and compares favorably with the international figures, with similar contribution of different causes.

Key words: Jordan, Maternal death, Maternal Mortality Ratio

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Introduction

Approximately 500,000 to 1 million women die each year worldwide because of pregnancy complications.⁽¹⁻⁴⁾ The vast majority of these deaths occur in developing countries. According to the World Health Organization, 55% of maternal deaths occur in Asia, 40% occur in Africa, and only 1% occurs in developed countries.^(5,6) The available statistical data most likely underestimate the actual numbers of deaths because of underreporting and misclassification.⁽⁴⁻⁶⁾

Maternal mortality is defined by the World Health Organization (WHO) as the death of a woman while pregnant or within 42 days of termination of

pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Maternal mortality is notoriously difficult to measure.⁽⁷⁾ The most widely used measure, the Maternal Mortality Ratio (MMR), expresses maternal deaths per 100,000 live births and it rarely exceeds 1,000 or one per 100 live births.

Direct deaths are those that result from obstetric complications of the pregnant state (pregnancy, labour and puerperium) including deaths from interventions, omissions, inappropriate treatment, or from a chain of events resulting from any of the above.

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Indirect deaths are those which result from pre-existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiological effects of pregnancy.

The aim of this study was to identify the causes of maternal mortality, and the risk factors which could be related to the deaths or to the pregnancy itself.

Methods

Data were collected for a period of five years between 1st April 2000 to 1st April 2005 from the seven hospitals of the Royal Medical Services; these hospitals serve around 1.5 million of the Jordanian population. The largest of these hospitals is King Hussein Medical Center, which is a referral center for these hospitals and also receives referrals from any hospital in Jordan. There is an average of 22,000 deliveries per year in all RMS hospitals. During this time, we identified nineteen cases of maternal deaths that occurred in the Royal Medical Services hospitals. The data obtained from the annual statistics reports of the Royal Medical Services, death certificates, and medical records, and labor ward records were vigilantly studied. In our study, we used the maternal mortality ratio.

We tried to find out the risk factors that may be related to the death. We identified patients by personal characteristics such as age, parity, socioeconomic status, site of residence, and also by pregnancy factors such as, gestational age antenatal care, mode of delivery, place of delivery, history of medical diseases and time of death.

Results

Over a five year period there were 111,198 deliveries, which resulted in 111,230 live births and 19 maternal deaths, giving a maternal mortality ratio of 17.08 per 100,000 live births.

Table I shows the distribution of maternal deaths by age, the women's ages at the time of death were grouped into standard 10-year intervals. The pregnancy-related mortality ratio differed by maternal age; the risk for pregnancy-related death increased substantially among women aged above 40 years. Women aged above 40 years had a pregnancy-related mortality ratio that was approximately three times higher than that among women aged 20-30 years and approximately 4 times higher than women aged under 20 years.

Table II shows the relation of maternal mortality with parity.

Table I. Maternal mortality and age

| Maternal age | Live births | No. of deaths | MMR |
|--------------|-------------|---------------|--------------|
| <20 | 12329 | 1 | 8.1/100.000 |
| 20-30 | 47211 | 6 | 12.7/100.000 |
| 30-40 | 42266 | 9 | 21.2/100.000 |
| >40 | 9424 | 3 | 31.8/100.000 |

Table II. Maternal mortality and parity

| Parity | Live births | No. of deaths | MMR |
|--------|-------------|---------------|--------------|
| 0-2 | 38217 | 7 | 18.3/100.000 |
| 3-5 | 41615 | 6 | 14.4/100.000 |
| 6-8 | 19650 | 5 | 25.4/100.000 |
| ≥9 | 11748 | 1 | 85.1/100.000 |

The parity of patients in our study ranged between zero and 10. There were relatively less deaths among females with their third through fifth pregnancy and a greater number of deaths in females in their sixth pregnancy and above. The gestational age was 10-42 weeks. Only four patients were less than 28 week. Six patients (31.5%) died before delivery. Cesarean section was associated with 69.2% (9/13) maternal deaths and vaginal delivery was associated with (30.8%) of maternal deaths. The causes of death for those who died before 28 weeks were HELLP syndrome, encephalitis, sickle cell crisis and intracranial hemorrhage.

Most of those patients died at King Hussein Medical Center, as it is the referral center for the other six hospitals of the Royal Medical Services or from hospitals throughout Jordan. Only 47.3% (9/19) were booked to our hospitals, though many of them may be booked to private doctors or to other hospitals. Two cases were referred to our hospitals on a ventilator. All cases were delivered in hospitals. We did not have any cases of home delivery.

The sociodemographic profile included degree of education, family income and employment. The highest number of deaths occurred in women whose education was below elementary school (57.8%, 11/19), their family income was less than 200 Jordanian Dinars (JD) per month (68.4%, 13/19), and were unemployed (84.2%, 16/19). During this period, the causes of direct maternal deaths were hemorrhage, preeclampsia and pulmonary embolism. While the causes for indirect maternal

deaths were cardiovascular diseases, malignancies, sickle cell anemia, encephalitis, hepatitis, and intracranial hemorrhage (Table III).

Table III. Causes of death

| Causes of death | No. of cases | % |
|---|--------------|------|
| Hemorrhage | 5 | 26.3 |
| Pulmonary embolism | 3 | 15.8 |
| Preeclampsia and Eclampsia | 2 | 10.5 |
| Cardiovascular diseases | 2 | 10.5 |
| Malignancies | 2 | 10.5 |
| Infections (Hepatitis, Encephalitis) | 2 | 10.5 |
| Amniotic fluid embolism | 1 | 5.3 |
| Intracranial Hemorrhage | 1 | 5.3 |
| Blood transfusion reaction (Haemolysis) | 1 | 5.3 |

Table IV. (Maternal Mortality Ratio by country) ^(5,8)

| Country | (MMR per 100,000 live births) |
|--------------|-------------------------------|
| Australia | 7 |
| UK | 6.7 |
| USA | 7.5 |
| Israel | 5.2 |
| Italy | 12.4 |
| New Zealand | 20.4 |
| Chile | 21 |
| Mexico | 60 |
| Saudi Arabia | 18 |
| Yemen | 1040 |
| Sudan | 522 |
| Pakistan | 279 |
| Nigeria | 800 |

Discussion

With the lack of a national register for maternal deaths in Jordan, hospital based statistics will remain the only source of information regarding maternal mortality as a reflection of maternal care in Jordan.

Royal Medical Services hospitals serve more than 1.5 million of the Jordanian population. The MMR in our statistics was 17.08/100,000 live births, which is higher than some developed countries, and but much less than many developing countries including Arabic countries as shown in Table IV.

Maternal mortality varies with age, and this is probably best explained by the increased frequency of hypertension and tendency for uterine bleeding with age. The risk increases for the ages of 30-40, and increase dramatically after age of 40, where 63.1% of maternal deaths occur in women older

than 30 years of age. This finding of increased MMR by age is the same in both developing countries like Saudi Arabia,⁽⁹⁾ or developed countries like USA where MMR is 10 times more common between 40-44 years age group than 20-25 years age group.⁽¹⁰⁾ Although in different countries MMR is very high among teenage mothers,⁽¹⁰⁾ we had one death before 20 years of age and this is probably due to the Jordanian law that does not legitimize marriage before the age of 18.

The risk of maternal death is high in the first two pregnancies, where the risk decreases in the third, fourth and fifth pregnancies and start to increase thereafter.^(11,12) This trend of variation of MMR with different parity is wide spread in developing countries of Asia and Africa where parity above four is common compared to parity of 2-4 in other developed countries like USA and Sweden where a 15% reduction in MMR was attributed to fewer births and lower parity.⁽¹³⁾ In our report 69.2% of maternal mortalities were delivered by caesarean section, this probably can be explained by the fact that high parity and older patients were exposed more to surgical intervention because of hypertension, diabetes, large babies, abnormal presentation and prolonged labor. The increased risk posed by caesarean on MMR is universal in both developed and developing countries.^(9,14)

Education was an important factor in MMR with more than 57% of deaths occurring in patients whose education was limited to primary education. Education will influence the level of antenatal care considering 78% of females in Jordan with university degrees use prenatal services, compared to only 24% of illiterate females.⁽¹⁵⁾ MMR in Zaire is 720 in non-educated patients compared to 130 in patients with some education.⁽¹⁰⁾

Unemployment and low-income levels had the same effect on MMR as the education level; this can be explained by the same fact of low attendance to antenatal care.⁽¹⁶⁾ Compared to other countries obstetric hemorrhage is still the leading cause of maternal deaths in Jordan, as it is the major cause of maternal deaths world wide.⁽⁸⁾ Reducing maternal deaths from hemorrhage requires expensive facilities and sophisticated skills.

In China a 50% reduction in MMR due to obstetric bleeding has been achieved in urban hospitals compared to rural areas (25% compared to 50%).⁽¹⁰⁾ Thromboembolic disorders were the leading cause of maternal mortality in developed

countries.⁽¹⁷⁾ This cause ranks the second in our report, and is still under reported in many countries probably due to lack of autopsy information in developing countries.⁽¹⁸⁾ Hypertensive disorders in pregnancy and their complications caused two deaths, making them responsible for 10.5% of the deaths (both of them were unbooked patients who presented with eclampsia). This fact shows the effectiveness of antenatal care in early detection of pre-eclampsia and prevention of associated maternal mortality.⁽¹⁷⁾

Indirect causes were responsible for more than 30.6% of the cases. Unfortunately, some of them were preventable like the one case with blood transfusion reaction. The other deaths were due to non-obstetric causes, but pregnancy may have accelerated their diseases to cause death. Multidisciplinary team work in managing these cases is of great importance in prevention such deaths.

Conclusion

Maternal Mortality ratio is a reflection of the health care system of the country. In the absence of national register for MMR in Jordan, hospital based statistics will be a valuable alternative. The available MMR of 17/100,000 live births at RMS hospitals is an acceptable figure and compares favorably with the international figures, with almost the same contribution from different causes.

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