

**Original article:**

## Severe maternal morbidity and critical care

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**Abstract:**

**Introduction:** Aim of our study was to determine the incidence of severe acute maternal morbidity (SAMM) at the Al Qasimi hospital (A tertiary referral centre) in Sharjah UAE and to investigate the factors that are associated this severe complication and suggest an acceptable management pathway.

**Methodology:** A retrospective study of all obstetric patients admitted to the Intensity Care Unit (ICU) between January 2008 and December 2008 inclusive. Data included demographics, disease responsible for critical illness, complications that led to the ICU admissions, interventions required, length of ICU stay and maternal outcome.

**Results:** Over the study period, there a total of --- deliveries a total of 23 admissions for SAAM to the ICU giving an incidence of /1000 deliveries. The mean age of the patients who were all expatriates was 28 years 73.8% booked for antenatal care at our hospital. Hypertensive disorders of pregnancy were the most common reason for admission (47.8%) followed by postpartum hemorrhage (34.7%). A hysterectomy was performed in six (26%), cases; 4 of these cases had placenta praevia and the other 2 had placenta accreta. One patient was diagnosed with cardiac disease. Invasive ventilation was required in most cases. SAMM followed normal vaginal delivery in 26% of cases were and caesarean sections in 73.9% of cases. . There was no maternal death during the study period.

**Conclusion:** Severe maternal morbidity cases constitute a significant burden on health resources. Most maternal admissions into the ICU were postpartum, and in more than two third of the cases the reasons for transfer were hypertensive disorders of pregnancy and haemorrhage. SAMM can be reduced by meticulous adaptation of safe motherhood initiatives, provision of separate high dependency unit/ICU services for critically ill obstetrical patients and early assessment and aggressive intervention through a team.

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**Introduction:**

Severe acute maternal morbidity (SAMM) is increasingly being used as a new quality indicator of obstetric care.<sup>1-2</sup> This is primarily because over the last four decades, maternal mortality in the more resourced (high income) countries has become low, and therefore analysis of SAMM has been included in confidential enquiries into the causes of maternal deaths. The most often used definition of SAMM is that by Mantel as who defines it as “a very ill pregnant or recently delivered woman who would have died had it not been but luck and good quality

care that was on her side”<sup>6</sup>. There are, however, different classifications in use and these are often guided by disease-specific criteria (such as eclampsia, organ-system based criteria (such as respiratory, liver or renal insufficiency) or by management-based criteria (such as hysterectomy, arterial embolisation or intensive care unit (ICU) admission). Most cases of SAAM are commonly transferred to an ICU, one of the modern innovations, which has resulted in several lives being saved.

The AL-Quasimi hospital is a tertiary maternity unit in Sharjah, UAE with the only intensive care unit in the country serving the population of Sharjah. The objective of the study was therefore to determine the frequency, risk factors, indications for admission, intervention required and maternal outcome of critically ill obstetric patients who required transfer to an ICU over a period of time. This will enable the identification of areas of substandard care and help define failures the priorities in maternal health care provision by Ministry of Health.

#### **Methodology :**

This was a retrospective case series study of those obstetrics patients who were admitted into the maternity unit of Obstetrics Unit of the Al-Qasimi Hospital (AQH), a tertiary hospital which caters a large population of northern emirate and were subsequently transferred to general ICU, from January 1st to 31<sup>st</sup> December 2008. Critically ill patients who required ventilatory support or were hemodynamic ally unstable even after preliminary administration of intravenous fluids, oxygen and inotropes and may need ventilator support anytime in the near future were admitted to ICU. Although, anaesthetist usually manage patients on the ICU at the AQH, obstetric admissions are jointly managed with the obstetric team. Where indicated, other specialties such as medical and surgical opinions are involved. Where there is unavailability of beds in the ICU, cases of SAMM will be admitted on to the obstetrics unit where they will be jointly managed with the anaesthetists. These women when discharged from the hospital are followed up until 6 weeks postpartum were included in the study, hence this period was included in the study.

Medical records were obtained and reviewed by the principal investigator and information extracted from

these notes onto a predesigned Performa included maternal age, obstetrics history, disease responsible for critical illness, complications that prompted ICU admissions, intervention required, length of ICU stay and the resulting maternal mortality and morbidity. The complications prompting ICU admissions were categorized as hemodynamic instability, respiratory compromise or neurological dysfunction. Statistical analysis was performed using SPSS version 10.0. Results are presented as Mean  $\pm$  SD or number and percentages.

#### **Results:**

Over the 12 months period, there were a total 4668 deliveries. Out of these, 23 (0.492%) had SAMM and required ICU admissions. The incidence of SAMM was therefore 4.9/1000 deliveries in our unit. The mean age of the women with SAMM was 28 years (SD...). All those patients with SAMM were expatriates (i.e. not from the UAE). A significant number of them ? 7 (30.4%) were not booked at the AHQ but were referred from the private sector.

Hypertensive disorders were the most common reason for ICU admission (47.8 %). Delivery was by caesarean section was performed in 73.9% of cases while 26% had normal deliveries. In six cases ended a caesarean hysterectomy had to be performed to control massive haemorrhage. There were 4 (17.4%) cases with placenta praevia and 2 (8.6%) of these had in addition, placenta accreta. Only one patient was diagnosed with a cardiac disease. There was no maternal death in the study period. Invasive ventilation was required in a majority of cases. There was a significant ( $P < 0.05$ ) association observed between postpartum haemorrhage and SAMM, irrespective of whether this occurred during a normal delivery or at caesarean section.

**Table 1.** Age distribution in obstetric patients admitted to the ICU

Age (years)	Number	(%)
< 17	0	0%
17 – 20	1	4.3%
21 – 25	3	13.04%
26 – 30	10	43.4%
31 – 35	5	21.7%
36 – 40	4	17.3%
> 40	0	0%

**Table 2 .** No. Of Patients/ The diagnosis at time of admission and duration of stay in ICU

Diagnosis	No. Of Patients (%)	Duration of stay in ICU (Days)
Pregnancy Induced Hypertension (Pre-eclampsia)	47.8	3
Obstetric haemorrhage	34.7	3.2
C. hysterectomy	26	3.5
Placenta Praevia	17	1.5
Placenta Accreta	8.6	3.5
Cardiac disease	4.3	5.0

**Table 3.** Intervention required during ICU Admission

Interventions	No. Of Patients	%
Mechanical Ventilation		
< 24 hours	20	86.96
> 24 hours	3	13.04
<b>Invasive Monitoring</b>		
CVP	8	20
Arterial Line	15	37.5
Blood Transfusion	13	32.5
Inotropic Support	4	10

**Discussion:**

Care of critically ill patients is a unique challenge in Obstetrics. Haemorrhage, pre-eclampsia, anaemia and septicemia are common causes of mortality and morbidity in the patients.<sup>4</sup> Obstetric patients requiring ICU admission may reflect near-miss maternal mortality.<sup>5</sup> Separate intensive care units have been developed for cardiac, burns, respiratory, pediatric and neonatal care but ICU for obstetric patients is not yet widely available in developing countries. The mean age of the women in our cohort was 28 years which was same as Turkish study<sup>6</sup>, 26±6 years in Us study<sup>7</sup> and 25.5± 4.6 years in India.<sup>8</sup>

A close look at our cases showed that all the women were expatriates, with approximately 30% of them receiving their antenatal care in the private sector. These expatriates are also more likely to be poorer highlighting the fact that those most disadvantaged are most likely to experience severe morbidity<sup>12</sup>. For those who were un-booked at the AQH, several reasons could be advanced for their increase risk of SAAM. These are multifactorial and include ability to pay for care at a well-equipped centre, the decision to seek care, the perception of the risk by the woman and no proper backup by the appropriate health personnel wherever they initially opted for care<sup>13</sup>.

The most common reason for ICU admission were hypertensive disorders especially pre -eclampsia and obstetrical haemorrhage a finding similar to those of other published studies worldwide. Tang et al (1997) in their review of critically ill patients found massive haemorrhage as the single most common cause of ICU admission (53%) followed by pre-eclampsia and eclampsia. The consequences of these complications especially where poorly managed can be fatal, but early detection will lead to optimal outcome<sup>7,8,9</sup>. A diagnosis of pre-eclampsia alone may have initiated

the admission to the ICU in the other studies<sup>6</sup>, but in our hospital patients were only admitted when there was the requirement for either respiratory or cardiovascular support. Invasive ventilation was required in most of the cases. Ventilatory support was required in more than 50% of patients, mostly in women with pre-eclampsia. This rate is almost similar to the 45% reported by Selo-Ojene (ref).

There was a significant association observed between SAMM and postpartum hemorrhage, irrespective of when this happened (following a normal delivery or caesarean section).<sup>3</sup> In our study all patients with postpartum haemorrhage received massive transfusion (defined as more than 10 units of red cell concentrate)

The limitation of our study was that data were collected retrospectively and the sample size was small. Moreover, difference in access to health care, limitation on ICU admission because of space/beds hence comparison with other studies is difficult.

Future research should therefore be directed at undertaking prospective studies. Attention should focus on preventative factors that increase the risk of SAMM such as lack of appropriate ante-natal care, failure to optimize haematocrit levels and improper referral system from the private sector.

There is also the need for a separate ICU or high dependency unit (HDU) for the obstetric population. Each ICU/HDU has been reported to meet the needs of only half the obstetric population requiring high quality care. This should be situated near the labor ward so as to prevent delay in patient's transfer to ICU. Maternal morbidity and mortality can also be minimized by early assessment and aggressive intervention by a team work involving Obstetricians, Physicians and anaesthetist. Preparation for such emergencies and organization of resources may reduce the threat to maternal health and obviate the need for complex and expensive critical care.

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