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PATTERN AND OBSTETRIC RISK FACTORS OF SEVERE ACUTE MATERNAL MORBIDITY (SAMM) AND MATERNAL DEATH IN TERTIARY CARE HOSPITAL KARACHI

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ABSTRACT

Objective:To determine the pattern and associated obstetric risk factors of severe acute maternal morbidity and maternal death in tertiary care hospital so that guideline can be formed for health personnel in an attempt to reduce the incidence of SAMM & maternal death .

Methods:A prospective descriptive study was conducted in gynecology & obstetric department civil hospital Karachi. All the women admitted in gynaecology & obstetric department with case history fitting the definition of severe acute maternal morbidity and all maternal death were included in the study. Both groups were comparatively analyzed for demographic characteristic and obstetric risk factors in each case.

Results:A total of 420 women 393(93.57%) were cases of severe acute maternal morbidity and 27(6.42%) were maternal death. Mean age was 27.24 ± 52 SAMM & 28.15 in maternal death group (p = 0.38). Most women were in parity group 1-4, 56% & 70.4% respectively in SAMM and maternal death cases. Referred cases were 24.9% & 56.6% (p- 0.002) in cases of SAMM & maternal death respectively. In SAMM & maternal death groups haemorrhage was present in 46.85% & 81.5%, (p =0.001), Hypertension was present in 9.9% & 7.4%, infection 1.5% & 22.2%, anemia in 24.17% & 48.1% cases of SAMM & maternal death respectively. Dystocia (40.2%) was present only in SAMM group. There were 5 and 1 case of perforated viscera in SAMM & maternal death group respectively.

Conclusion:Cases of SAMM in addition to audit of maternal death give more information regarding quality of maternity care system available in our country.

Key Words: Severe acute maternal morbidity, Maternal death.

INTRODUCTION

Severe acute maternal morbidity (SAMM), also known as "near miss", is defined as "A very ill pregnant or recently delivered woman who would have died had it not been that luck and good care was on her side" [1,2].It appears along a health continuum that extends from normal pregnancy and delivery to organ failure and maternal death. [3]Maternal mortality is considered an important measure of quality in maternal care. Global maternal mortality rate is 400| 100,000 live births [4]. However this event is rare in high income countries in recent years [5]. Around 10 to 20 maternal deaths per 100 000 live births are reported from European countries and few cases are observed England, Wales and Scotland.

The prevalence of severe acute maternal morbidity in high income countries is between 3.8 and 12 per 1,000 births which is five times more common than maternal mortality. Analysis of severe acute maternal morbidity has therefore been added to confidential

enquiries into the causes of maternal deaths as the recommendation based on interpretation of small data may not be helpful to provide effective critical maternal care. Over 99% of maternal deaths occur in developing countries but due to fear of litigations true facts regarding cause of death are not revealed most of the time [1]. An audit of severe acute maternal morbidity or 'near miss' has been suggested as an alternative or supplement to maternal mortality review as in addition to the larger number of cases available for analysis Survivors could be interviewed to get more detailed and relevant information regarding her illness and to determine risk factors, delay in diagnosis or substandard care. It has therefore been shown to identify priorities in maternal care more rapidly. [6] Including SAMM in maternal death audits increases the rapidity with which health system problems can be identified. [7] Near-miss cases could also be considered as controls for death and the ratio of deaths to near-misses can be calculated and could be compared between regions or over time. The major drawback at the moment is the lack of universal definitions of severe acute maternal morbidity; the definitions used are based on management, clinical signs and symptoms, or organ systems [8].

Definitions based on clinical signs and symptoms are usually preferred in developing countries as it is easy to get information from hospital record and easy to interpret and tend to mirror the main causes of maternal death, such as haemorrhage, hypertensive disorders and sepsis. However these definitions ignores other problems such as pulmonary embol; which is an important cause of maternal death in developed countries [9] and are not always straightforward as for example, the same threshold for severe haemorrhage could have different consequences in women with normal haemoglobin levels or those with severe anaemia. [10]. As there is no universal definition of SAMM most appropriate approach to use will depend on local context [11]. In the absence of effective national system of audit of maternal mortality and morbidity in many developing countries tertiary care referral hospital can contribute their part in achieving MDG 5 by assessing quality of their health system and taking steps to improve them. We therefore conducted a study to determine pattern and associated obstetric risk factors of SAMM and maternal death in tertiary care hospital so that guideline can be formed for health personnel working at private or primary & secondary care government hospital in an attempt to reduce the incidence of near miss death & maternal death.

MATERIAL AND METHOD

A prospective descriptive study was conducted in gynecology & obstetric department civil hospital Karachi from .1st January 2008 till 31 december 2009.This is a tertiary care centre providing health facilities to Karachi as well as to other areas of Sindh & Balochistan..The annual delivery rate is 2471 & cesarean section rate of 32%. all times there are trainee obstetrician, midwives, staff nurse, a neonatologist and an anaesthetist in our hospital and a senior obstetrician, neonatologist and anaesthetist are on call. ICU care facilities are available for critically ill patients. All the pregnant or recently delivered women admitted in gynecology & obstetric department through emergency room or outpatient department were seen. Women with case history fitting the definition of severe acute maternal morbidity were evaluated and included in the study group.

Inclusion criteria:

1 - Pregnant or delivered women (upto 42 days following termination of pregnancy) with presence of one or more obstetric risk factors like severe hemorrhage, severe hypertension , dystocia, severe anemia , severe infection and injury to viscera following induced abortion

2 - All maternal deaths during study period. The study group included all booked, nonbooked and referred cases.Maternal death was the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

The principal obstetric risk factors were defined as: severe haemorrhage leading to >4 unit of blood transfusion; caesarean section; hysterectomy or death; It included cases of placenta previa & increta , placental abruption, ectopic pregnancy, abortion, postpartum haemorrhage , acute inversion and retained placenta.

severe hypertensive disorder include imminent eclampsia and eclampsia. severe sepsis (peritonitis, septicaemia, foul smelling or purulent disharge) following delivery or abortion leading to hospitalization; visceral injury(uterine and or gut perforation) following induced abortion. Dystocia included (a) obstructed labour leading to caesarean section, uterine rupture, or death. (b) impending uterine rupture(scar tenderness, rising pulse rate, thinned out lower uterine segment) (c) uterine rupture.

A proforma was completed for recording data of each case information was recorded for socio demographic profile including age, parity, booking status, gestational age and residence. Obstetric high risk factor and maternal outcome were noted. Event time (whether complication occur before admission or during hospitalization) was recorded . Causes of organ failure and or dysfunction in cases of SAMM were analyzed. Patients attendant in case of maternal death and attendant and survivor herself in case of maternal morbidity was interviewed to collect relevant information. All results were analyzed by computer soft ware SPSS 15.

RESULT

Total number of deliveries in gynecology & obstetric department were 3141 and 3728 in 2008 & 2009 respectively. During this period 420 women were included in the study group admitted through emergency room or out patient department, of which 393 (93.6%) women fitted the definition of severe acute maternal morbidity based on the presence of obstetric risk factors . Twenty seven (6.4%) maternal death were observed during study period . Table (1) showed 149 (37.9%) women with

TABLE 1
A COMPARISON OF THE DEMOGRAPHIC CHARACTERISTICS OF WOMEN WITH SAMM AND MATERNAL DEATH.

Characteristics	Near-miss cases (n = 393) n (%)	Maternal deaths (n = 27) n (%)	p- value
Age (years)			
= 20	55(14)	3(11.1)	
21–25	121(30.8)	6(22.2)	
26–30	149(37.9)	12(44.4)	
31–35	46(11.7)	4(14.8)	
>35	22(5.6)	2(7.4)	
Range	18–40	16–44	
Mean ± SD	27.24 ± 5.2	28.15 ± 5.7	0.38
Parity			NS
0	90(22.9)	1(3.7)	
1–4	222(56.5)	19(70.4)	
= 5	81(20.6)	7(25.9)	
Range	0–14 0–10		
Median	2 3		
Booking status			0.002
Booked	44(11.2)	3(11.1)	
Unbooked	251(63.9)	9(33.3)	
Reffered	98(24.9)	15(56.6)	
Gestational age (weeks)			NA
<13	38(9.7)	2(7.4)	
13–24	3(0.8)	3(11.1)	
25–37	22(5.6)	5(18.5)	
>37	330(83.96)	17(63.0)	
Residence of women			0.024
Karachi	336(85.5)	18(66.6)	
Outside Karachi	57(14.5)	9(33.3)	

NS: Not statistically significant; NA: Chi square test is not applicable due to less cell count;

TABLE 2.

COMPARISON OF RISK FACTORS AND TREND OF SAMM AND MATERNAL DEATH IN YEAR 2008 AND 2009

Risk factors	SAMM (n = 393)			Maternal Death (n = 27)			p-value
Year	2008 n (%)	2009 n (%)	Total n (%)	2008 n (%)	2009 n (%)	Total n (%)	
Hemorrhage (n = 206)	90(43.5)	94(50.5)	184(46.8)	8(80.0)	14(82.4)	22(81.5)	0.001
Hypertension(n = 42)	34(16.4)	5(2.7)	39 (9.9)	0(0.0)	2(11.8)	2(7.4)	NS
Dystocia(n = 158)	81(39.1)	77(41.1)	158(40.2)	0(0.0)	0(0.0)	0(0.0)	<0.001
Infections (n = 12)	2(1.0)	4(2.2)	6(1.5)	1(10.0)	5(29.4)	6(22.2)	<0.001
Anemia (n = 108) 49(23.6)	46(24.7)	95(24.17)	5(29.4)	8(47.1)	13(48.1)	0.006	
Perforated viscera (n = 7)	0(0.0)	6(3.2)	6(1.5)	0(0.0)	1(5.8)	1(3.7)	NS
Time of event							
Before hospitalization	186(89.9)	177(95.2)	363(92.4)	8(80.0)	14(82.0)	22(81.4))	0.02
During hospitalization	21(10.1)	9(4.8)	30 (7.6)	2(20.0)	3(18.0)	5(18.5)	
SAMM/ 1000 deliveries	65	49	57	-	-	-	
MMR/ 100,000 deliveries	-	-	-	318	456	393	
Maternal death to SAMM ratio			-	1:20	1 : 11	1 : 14	
NS: Not statistically significant							

TABLE 3.

CAUSES OF ORGAN-SYSTEM DYSFUNCTION/FAILURE IN SAMM CASES

Organ-system	n = 20	Obstetric risk factors
Cardiac (pulmonary oedema)	4 (20)	hypertension (2)
		Cardiomyopathy (1)
		Severe anemia (1)
Hellp syndrome	4(20)	hypertension (4)
Coagulation	6 (30)	hypertension (2)
		hemorrhage(3)
		infection (1)
Cerebral	2 (10)	hypertension (2)
Renal	4 (20)	hypertension (1) hemorrhage(3)

SAMM and 12 (44.4%) women who died were in age group 26-30years.225 women(56.5%) of SAMM and 19 women (70.4%) of maternal death group were in 1-4 parity group. Non booked cases were 251 (63.9%) and 9 (33.3%) respectively in SAMM and maternal death group where as referred cases were 98(24.9%) and 15 (56.6% respectively) in SAMM & maternal death group. 330 (83.6%) women of SAMM & 9 (33.3%) 0f maternal death group had pregnancies at gestational age > 37 weeks. 336(85.5%) women of SAMM were from Karachi & 57 women of (14.55%) were from outside Karachi . Of maternal death group 18 (66.7%) were from Karachi and 9 (33.3%) were from outside Karachi. Event occurred before admission in 363 (92.4%) cases of SAMM & 22(81.48%) cases of maternal death . Event occured during hospital stay in 30(7.6%) of SAMM & 5 (18.51 %) of maternal death cases as shown in table 2. Table 2 also revealed that in SAMM & maternal death groups haemorrhage was present in 184 (46.85%) & 22 (81.5%) women, Hypertension was present in 39 (9.9%) & 2 (7.4%), infection in 6 (1.5%) & 6 (22.2%), anemia in 95 (24.17%) & 13 (48.1%) cases of SAMM & maternal death respectively. Dystocia (40.2%) was present only in SAMM group. Four (1.01%) cases of perforated uterus and 2 cases (0.5%) of perforated uterus & gut were present in SAMM group and 1(0.25%) case of perforated uterus & gut was found in maternal death group. SAMM/1000 deliveries was 57, MMR| 100,000 deliveries was 393 and maternal death to SAMM ratio during the study period was 1: 14 Organ failure (5.08%) in cases of SAMM (Table 3) were cadiac (pulmonary oedema) 4 (20%), Hellp syndrome in 4 (20 %) , coagulation failure 6 (30%) , SAMM cerebral 2 (10%) and renal failure in 4 (20%). /1000 deliveries was 57.

DISCUSSION

The incidence of SAMM was 57|1000 deliveries in our study much higher than European countries [12, 13] , even higher than 3.3|100 reported from Dehli India [14]. However comparable to lower income countries reported by WHO [10]. Maternal death to SAMM ratio during the study period was 1: 14 the studies conducted in Niger, Benin and Malaysia give the morbidity to mortality ratio as 11–12 [15, 16, 17] while this is 117–223 in studies conducted in Europe in the category where disease-specific criteria are used [13, 18]. these findings suggest that an indicator that relates SAMM to maternal deaths could be a useful method in assessing the care SAMM cases receive. However, the definitions and identification of cases should be standardised at least for similar settings and the indicator needs to be clearly defined. comparison of the demographic characteristic of women with SAMM & maternal death revealed insignificant difference between mean age of two group (p= 0.387) .Mean age 0f 27.24 + 52 in SAMM cases was comparable to age group reported from Dehli India [14].Similarly difference was not significant in parity of women in both group (p-0.064). Parity group 1-4 which is usually considered low risk pregnancy was found to be more vulnerable in both groups showing that any pregnancy which do not receive standered antenatal care can end up in disaster Comparatively referral cases were more in maternal death (p-0.002) and these cases could have been saved if patient would have come earlier. Delayed referral was a frequent preventable factor in maternal death as also pointed out in an article [19] therefore changes in provider behavior should result in better outcomes for women, particularly early in any maternal complication, Mostly women in both groups had term pregnancies 83.96% women in SAMM and 63% in maternal death group. Hence demographic factors were similar between the groups as shown in the study of R.C. Pattinson et al [20] Regarding residence of women proportion of women facing death were high in group coming from outside Karachi due to long distance and lack of basic health facilities in these areas. Karachi city has 18 towns & has highest literacy rate compared to other cities of the countries still 85.5% of SAMM were from Karachi mainly from Lyari , new Karachi and liaqatabad town . In these areas factor responsible apart from poverty, lack of education is improper functioning of most primary and secondary health care hospital leaving population to unregistered maternity homes run by unqualified staff. Other factors leading to critical delay as also shown in survey in Ugenda [21] are deeply rooted in culture and gender relationship and demand culturally accepted maternal health information to be provided to the population in these areas. There are therefore opportunities for quality improvement by targeting specific disadvantaged groups [22]. hence even in the absence of proper population based study referral centres like ours can by analyzing SAMM & maternal death point out deficiencies in our health care system and contribute their part in achieving MDG5.

The primary obstetric risk factors of SAMM and maternal death did correlate in our study A logical assumption is that the underlying disease processes causing SAMM are the same as those that cause maternal death. It is therefore possible that studying the circumstances surrounding women with SAMM could act as a proxy for maternal death and allow for a more rapid assessment of deficiencies in maternal health care system [20]. Hemorrhage was leading cause of SAMM (46.8%) and maternal death (81.5%) in our study but there was significant difference in frequency of hemorrhage (p- 0.001) in two groups as comparatively large proportion of women are dying due to hemorrhage. A population-based study from the United Kingdom [13] defining severe haemorrhage with a blood loss more than 1500 ml, reported a prevalence of 0.03%. The same criteria used in France by Girard [18].There was significant difference in frequency of hemorrhage (p- 0.001) in two groups reported a ten times higher prevalence of haemorrhage - 0.39% and 3 times higher case-fatality ratio.These studies reflect that obstetric haemorrhage is still a major threat to women s lives globally.

Dystocia was the second frequent cause in SAMM (40.2%) in our study.These cases were successfully managed with no maternal death but certainly these preventable morbidities were burden on a tertiary care centre. A study from West Africa similarly reported dystocia (30%) as the second most common cause after haemorrhage [2]. Dystocia and cesarean section as a cause of severe morbidity reported only from studies conducted in developing countries, as they are less threatening conditions in developed countries.

The second most frequent cause of maternal death was infection. Anemia remain a frequent co morbidity in both group increasing maternal morbidity and mortality.Risk distribution and trend of SAMM & maternal death over two year period revealed that there was no case of visceral injury due to induced abortion during 2008 but addition of SAMM to maternal death

audit pointed toward the emergence and magnitude of this risk factor in 2009 supporting the view that SAMM provide additional information regarding quality and failure of maternal health and can be used as complementary to maternal death audit.

Unfortunately disaster do occur at tertiary care centre as event occur in hospital in 30 (7.6%) cases of SAMM and 5 (18.51%) cases of maternal death . Although multiple risk factors were present in some of these cases of maternal death few before hospitalization but one of the factor leading to failure to provide standered management was overburden of tertiary care centre by low risk cases which could have been managed at secondary care hospital.Hence Severe maternal morbidity is associated with increased risk of maternal death and may result in substantial costs to the health care system and to society.[3]Commonest cause of organ dysfunction in cases of SAMM was coagulation disorder (30%). Most common risk factor leading to organ dysfunction was hypertension as also shown in study from Pakistan that hypertensive disorders were responsible for 50% obstetric ICU admission [23].

CONCLUSION

The obstetric and demographic factors in SAMM and maternal death cases did correlate in our study to a large extent. Therefore review of cases of SAMM in addition to audit of maternal death gives more and rapid information regarding quality and failure of health care system available in our country.

We recommend a National audit system of maternal death & SAMM. Private maternity homes should be registered. Primary & secondary care hospital should be made more functional and accountable and refresher courses should be arranged for health professionals.

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