

Clinical profile and outcomes of obstetric patients requiring intensive care: An audit of patients admitted to a tertiary care hospital in Riyadh, Saudi Arabia



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ABSTRACT

Although required infrequently, intensive care for obstetric patients is challenging due to its un-predictive nature, knowing the etiology and consequent therapeutic management of such patients is very important for obstetricians and intensivists to improve the quality of care related to such conditions. The objective of this study was to study the spectrum of disease, required interventions and outcome of the obstetric patients admitted to Surgical Intensive Care Unit (SICU) of King Khalid University Hospital, Riyadh, Saudi Arabia. In this retrospective study, the medical records of obstetric patients admitted to SICU over a period of 5 years (January 2011 to December 2015) were reviewed. Of the 18,695 obstetric patients, only 50 (0.267%) required SICU admission. Two (4%) patients were admitted from the emergency, 28 (56%) from obstetric ward, 20 (40%) from labor room. Comorbid conditions were present in 20 (40%) patients. The commonest cause for SICU admission was obstetric hemorrhage (54%) followed by hypertension (16%) and pulmonary embolism (8%). Cesarean section was performed in 34 (68%) patients. There was no mortality. Mean lengths of stay in SICU and hospital were 3.08 ± 3.99 (range: 1-25) and 12.7 ± 12.6 (range: 3-90) days, respectively. A very low SICU admission rate with no mortality among our obstetric patients could be related to good antenatal care, early admissions of patients and employing a multidisciplinary approach.

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1. Introduction

Death of a woman during pregnancy or within 42 days of termination of pregnancy is called Maternal Death, from any reason aggravated by or linked to the pregnancy or its management but not from incidental or accidental reasons (Mahutte et al., 1999; WHO, 2010; Taylor, 2012). Even though pregnancy and delivery are associated with physiological changes, majority of mothers can tolerate such changes because they are fit and healthy (Chawla et al., 2013). Hence, most pregnancies and deliveries are uneventful. However,

physiological changes of pregnancy have the potential to cause catastrophic events, leading to morbidity and mortality (Keizer et al., 2006; Orsini et al., 2012). According to estimates from the United Nations (UN) there are about 350,000 maternal deaths every year, worldwide (WHO, 2010; Hogan et al., 2010; Lozano et al., 2011). These estimates also indicate that 99% of these deaths occur in low and middle resource countries (Okafor and Aniebue, 2004; Al-Suleiman et al., 2006; Hogan et al., 2010; Lozano et al., 2011). Mortality rates have shown significant decrease in many countries over the last 40 years (WHO, 2012), even though there are still uncomfortably high in developing countries; they have plateaued in the developed ones. In India, for instance, the maternal mortality ratio (MMR) in 2004 was 440/100,000 live births. However, a recent study by Garg and Tripatti (2018) showed that the MMR in Obstetric ICU was 6.34% which is

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similar to that reported by an Australian in 2010 (Karnad and Guntupalli, 2004).

A resource-rich country, such as Australia has a low MMR of 6.8 deaths per 100,000 live birth (Zwart et al., 2010). One of the primary reasons for improvement in the MMR in Australia has been an understanding of the etiology of maternal deaths and a subsequent improvement in clinical care (Jayaratnam et al., 2011; Lawton et al., 2010). Confidential Enquiries into Maternal Deaths (CEMI) has therefore been a valuable tool, providing a thorough evaluation of the quality of health care and recommending improvements (AIHW, 2010). In the UK, the MMR is 10/100,000 live births (Van den Broek and Falconer, 2011). In the Kingdom of Saudi Arabia however, the MMR in 2012 was reported to be 14/100,000 live births (MOH, 2013).

Worldwide, it has been estimated that up to 1.4 million women suffer from life threatening obstetric events annually (Jain and Modi, 2015). The causes of maternal morbidity are many and complex. Probably the most common cause of maternal mortality/morbidity is the hypertensive disorders of pregnancy, which complicate 5-10% of all pregnancies (Stegers et al., 2010; Hutcheon et al., 2011; Agarwal et al., 2017; De Greve et al., 2016). These conditions include preeclampsia, preexisting hypertension or super-imposed hypertension secondary to medical illnesses in the woman. Preeclampsia results in between 6300 and 7200 deaths each year (Stegers et al., 2010; Hutcheon et al., 2011; Pattnaik et al., 2015). Secondly, obstetric hemorrhage is a major cause of death especially in developing countries (Lalonde, 2012; Rossi et al., 2010; Pollock et al., 2010; Ebirim and Ojum, 2012). The process of childbirth from conception to puerperium can be complicated by severe maternal morbidity in the form of hypertensive disorders, haemodynamic instability and shock necessitating critical care support and admission to SICU (Lawton et al., 2010; Orsini et al., 2012; Ebirim and Ojum, 2012; Bajwa and Kaur, 2014). The incidence of intensive care admissions for obstetric patients in developed countries has been estimated to be very less whereas in developing nations, it is about 2-13.5/1000 deliveries (Pollock et al., 2010; Okafor and Aniebue, 2004; Lataifeh et al., 2010; Rathod and Malini, 2016). In countries where obstetric mortality is rare, the major morbidities serve as a more valuable indicator of the quality of health care. One indicator of pronounced maternal morbidity is transfer to an intensive care unit (Pollock et al., 2010). Several studies have assessed the etiology, clinical profile and outcomes of obstetric complications admitted to SICU (Mjahed et al., 2006; Cheng and Raman, 2003; Ng et al., 2014). These studies are important for clinicians in predicting the various pathologies that may be complicating pregnancy and their therapeutic management. In addition, they will help in early identification of complications and help in devising appropriate preventative strategies.

Three studies have evaluated SICU admissions in Saudi Arabia. Al-Jabari et al. (2001) showed that SICU admissions were 0.48% of all deliveries over a 3-year assessment period (1994 to 1997). Of these admissions, 24% were for obstetric hemorrhage and 17% for hypertension. Anwari et al. (2004) on the other hand in 2004, had estimated SICU admissions to be 0.2% of all deliveries with obstetric hemorrhage being responsible for 32% and hypertension 29% of those admissions (1997 to 2002). Another study by Aldawood (2011), reported over a ten year period (1999 to 2009) that 0.75% of SICU admissions were of critical obstetric patients. To the best of our knowledge, ours is the latest study from Saudi Arabia which reports data until 2015 and was conducted on a large scale by including more than 18000 obstetric subjects and evaluated their clinical outcomes and post admission to the surgical intensive care (SICU). Therefore, the current study was aimed to determine the etiology, clinical profile and outcomes among obstetric patients admitted in the SICU of a teaching hospital in Riyadh.

2. Methods

This retrospective cohort descriptive study was carried out at the Department of Obstetrics and Gynecology of King Khalid University Hospital (KKUH), Riyadh. The study covered a period of 5 years, from January 2010 to December 2015. The study was approved by the institutional review board at the King Khalid University Hospital (KKUH, King Saud University). All obstetric admissions to SICU during the three maternity phases; pregnancy, delivery and the puerperium were included. Women presenting in early pregnancy (the first trimester of pregnancy), Hydatidiform mole, Gestational trophoblastic disease and women presenting with a complication after 42 days of delivery, were excluded.

All obstetric admissions were identified through the computerized database code of Medical Records plus hand search from the Registry book of the SICU, labor room, obstetrics and gynecology wards. The demographic variables of these women were obtained. In addition, obstetric data, medical and surgical histories, co-morbidities, mode of delivery and reason for surgical ICU admission were also retrieved. Vital signs on admission and Glasgow Coma Scale (GCS) were assessed. Other data retrieved pertaining to SICU interventions included; mechanical ventilation, use of central or arterial lines, blood and blood products transfusions, hemodialysis, radiological imaging, medication used including MgSo₄ and inotropic support. Furthermore, the length of stay in SICU and its outcome on subjects was also assessed. Data was analyzed using Statistical Package for Social Sciences (IBM SPSS statistics for Windows) version 20. Numerical, variables were presented as Mean \pm Standard Deviation while categorical variables were presented as frequencies and percentages.

3. Results

A total of 18,695 obstetric patients who visited our hospital were retrospectively evaluated from medical records. Only 50 (0.267%) subjects required admission to SICU during the study duration of 5 years. Out of 50 patients, two (4%) patients were admitted from emergency, 28 (56%) from the obstetric ward, 20(40%) from labor room. None of the patients was admitted in SICU from another hospital. History of caesarian sections, abortion and deep venous thrombosis were present in 11(22%) [mean±SD:2.81±1.07 (Range: 1-5)], 27(54%) [mean±SD:1.51±0.89 (Range: 1-3)] and 7(14%) patients, respectively. Varicose veins was present in one (2%) patient. The mode of delivery was emergency caesarian section in 17(34%) patients, elective caesarian section in 17(34%), laparotomy in 6 (12%), suction and evacuation in 2(4%), Spontaneous vaginal delivery in 3(6%), instrumental vaginal delivery in 3(6%) patients and 3(6%) patients were managed medically. There was no mortality. The mean lengths of stay in SICU and hospital were 3.08±3.99 (range: 1-25) and 12.7±12.6 (range: 3-90) days, respectively. The commonest SICU intervention was central venous line 64% followed by blood and blood products transfusion 64%. Spiral chest CT scan was the most common radiological investigation i.e., 80% Obstetric hemorrhage and Pregnancy-induced hypertension are the two main causes in our study 54% and 16% respectively. Among causes of obstetric hemorrhage, uterine atony was found the commonest cause 37.03% followed by placenta previa i.e., 14.81% and ruptured ectopic pregnancy i.e., 14.81%. Characteristic of patients those were admitted in SICU, interventions done in SICU and causes of admission to SICU were shown in Tables 1, 2 and 3 respectively. Causes of obstetric hemorrhage are shown in Fig. 1.

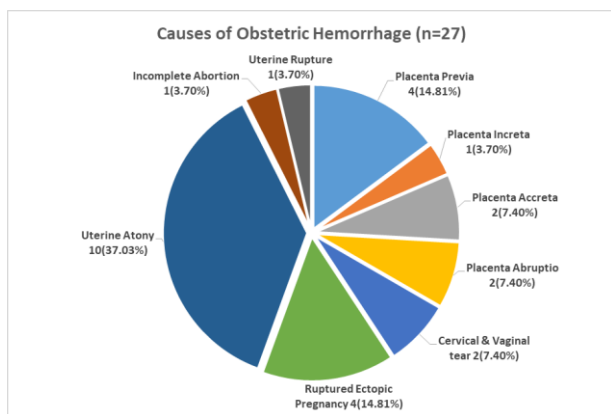


Fig. 1: Causes of obstetric hemorrhage

4. Discussion

Maternal physiology is very complex during pregnancy. Not frequently, but some patients may land in SICU which requires multidisciplinary approach and may result in variable outcome. Our study is the first study from Saudi Arabia to be

conducted on such a large scale including more than 18000 obstetric subjects and evaluating the etiologies, clinical profile and outcome of obstetric subjects admitted to SICU.

Table 1: Characteristics of patients admitted to SICU

Characteristic	Mean ± SD	Range
Mean Age (Years)	34.34 ± 5.63	21-45
Mean Height (cms)	158.38 ± 7.42	146-183
Mean Weight (kg)	77.16 ± 13.27	54-120
Mean BMI (Kg/m ²)	30.82 ± 5.30	20.7-48.1
Mean parity	3.06 ± 2.58	1-11
Mean gestational age (weeks)	32.18 ± 10.35	6-40
Mean pulse rate (min.)	126.07 ± 11.47	109-134
Mean GCS	13.01 ± 2.11	12-15
Nationality (n=50)	Number of patients (n)	Percentage (%)
Saudi	44	88
Egyptian	3	6
Indian	1	2
Pakistani	1	2
Syrian	1	2
Comorbid conditions (n=20)	Number of patients (n)	Percentage (%)
Hypertension	6	30
Diabetes mellitus	7	35
Valvular heart disease	2	10
Rheumatic heart disease	2	10
Cardiomyopathy	1	5
Hypothyroidism	3	15
Hyperthyroidism	1	5
Bronchial asthma	3	15
Idiopathic thrombocytopenic purpura	1	5
Sickle cell disease	4	20
Multiple sclerosis	1	5
Systemic Lupus Erythematosus	1	5

Table 2: SICU interventions (n=50)

Interventions in SICU	n (%)	Mean ± SD	Range
Mechanical ventilation	15 (30%)	17.05±6.11 days	4-23 days
Central venous line	32 (64%)	9.78±1.88 days	3-13 days
Arterial line	19 (38)	13.23±3.34 days	5-19 days
MgSo ₄	8 (16)		
Inotropes	4 (8%)		
Blood and blood products transfusions n=32 (64%)			
pRBC	31 (96.87)	9.93 ± 9.34 units	2-53 units
Fresh frozen plasma	28 (87.5)	8.21 ± 3.54 units	4-18 units
Platelets	20 (62.5)	11.75±11.3 units	4-47 units
Cryoprecipitate	12 (37.5)	8.34 ±5.66 units	4-19 units
Factor VIII	1 (3.12)		8 units
Radiological investigations n=25 (50%)			
Chest X-Ray	9 (36%)		
Spiral Chest CT scan	20 (80%)		
CT scan Brain	1 (4%)		
MRI brain	1 (4%)		

In this large study including over eighteen thousands patients, we found a very low SICU admission rate of 0.267%, which is quite acceptable in a tertiary care unit, which also receives referrals from other hospitals. This is comparable to some other studies from developed countries (Rathod and Malini, 2016; Pollock et al., 2010). However, literature search also documents a very high admission rate in the developing countries ranging

from 1 – 10% (Pollock et al., 2010; Lataifeh et al., 2010; Karnad and Guntupalli, 2004; Gatt, 2003). This variation in frequency of SICU admissions may be attributed to many factors like socioeconomic status, geographical areas, referral systems, and hospital policies and protocols of admission.

Table 3: Causes of SICU admissions (n=50)

Causes of SICU admission	Frequency	Percentage (%)
Obstetric hemorrhage	27	54
Pregnancy induced hypertension	8	16
Anaphylactic shock	2	4
Septic shock	1	2
Acute exacerbation of asthma	1	2
Atrial fibrillation	1	2
Cardiomyopathy	1	2
Diabetic ketoacidosis	1	2
Delayed recovery from general anesthesia	2	4
Aspiration pneumonia	1	2
Pulmonary embolism	4	8
Acute respiratory acidosis	1	2
Morbid obesity	1	2

Several authors in the literature have previously described the causes of SICU admission in gynecological and obstetrical patients and there was differences in the results because of socioeconomic and cultural variations (Leung et al., 2010; Motiang, 2017; Verma and Rathore, 2014; Qureshi et al., 2016; Mowafy and Mashhour, 2010).

The mean age of our patients 34.34 ±5.63 years was high as compared to other studies. The mean age of patients in other studies ranged between 25-34 years (19-22) (Leung et al., 2010; Motiang, 2017; Verma and Rathore, 2014; Qureshi et al., 2016; Mowafy and Mashhour, 2010). In our study the mean height, weight and BMI were 158.38±7.42cm, 77.16±13.27 Kg and 30.82±5.30 Kg/m², respectively. Antepartum and fetal complications can be the result of maternal obesity because obese pregnant female has higher risk of developing pregnancy-induced hypertension and gestational diabetes (Sharara et al., 2014).

The mean parity in our study was 3.06±2.58, which was much higher than the study by Leung et al (0.61±0.79) (Leung et al., 2010). The mean gestational age in our study was lower (32.18±10.35 weeks) than that reported by other studies where a range of 25-37 weeks was found (Karnad and Guntupalli, 2004; Leung et al., 2010). However, a study by Motiang showed a much lesser mean gestational age of 25.33±6.56 weeks (Motiang, 2017).

In our study, the majority of patients were Saudi national citizens, while others were Egyptian, Indian, Pakistani and Syrian. Majority of our patients 76% were booked, while 24% were unbooked. This observation was also similar to those described by others. Leung et al. (2010) reported that booked and unbooked cases were 72% and 38% respectively (Leung et al., 2010). Verma and Rathore (2014) reported that 12% patient were unbooked and 85% patients were booked.

The main portal of admission to SICU was from Obstetric Ward (56%) followed by labor ward and emergency room. None of the patient was referred from any other hospital. However, in a study by Sujata et al. (2016) 64% patients were referred from other hospital. In a study by Leung et al, the mode of admission was elective in 12% and emergency in 88% patients (Leung et al., 2010). Qureshi et al reported, the source of admission was the emergency department in 38.14% and obstetrics and gynecology department in 61.85% patients (Qureshi et al., 2016). Although, our SICU is a tertiary care unit, which receives referrals from other hospitals, there was no outside referral during the said study period. This probably could be due to the presence of other multispecialty tertiary care units in the neighborhood. A less number of patients was admitted from the emergency department also reflects that our prenatal care and counseling has been effective, so patients were timely admitted in the obstetric or labor wards.

The comorbid conditions were present in 40% of our patients. In a study by Mowafy and Mashhour (2010) KS, 25% patients had comorbid conditions. The most frequent comorbid condition in our patients was diabetes mellitus 35%. However, in a study by Leung et al. (2010) none of the patient had diabetes mellitus. Hypertension was present in 30% of our study while it was in just 2% in Leung et al. (2010). Mowafy and Mashhour (2010) reported that cardiac problems 76.74% were the most common comorbid disease; Cardiac diseases; valvular heart disease, rheumatic heart disease and cardiomyopathy were present in 10%, 10% and 5% respectively in our study. In Leung et al. (2010) study, chronic rheumatic heart disease was present in 2% patients. In our study, blood disorders; sickle cell disease and idiopathic thrombocytopenic purpura were present in 20% and 5% patients, respectively while in a study by Leung et al. (2010) none of the patient had hematological disease. Endocrine disorders; Hypothyroidism in 15% and Hyperthyroidism in 5% patients, Bronchial Asthma 15%, Multiple Sclerosis 5% and Systemic Lupus Erythematosus 5% were also observed in our study.

In observed in our study that, significant past medical (deep venous thrombosis) history of caesarian sections and history of abortion were present in 14%, 22% and 54% patients, respectively.

In this study, the commonest mode of delivery was emergency and elective caesarian section (CS) 34% each. However, in a study by Leung et al. (2010) emergency CS was the commonest mode of delivery 64% and elective CS was only observed in 12% patients. The laparotomy was performed in 12% and suction and evacuation in 4% patients. Spontaneous and instrumental vaginal delivery were seen in 6% patients each and 6% patients were managed medically. While in a study by Leung et al. (2010) normal vaginal and instrument assisted delivery were performed in 18% and 6% patients, respectively. Motiang, reported that the CS was the commonest mode of delivery 88.6% followed by

normal vaginal delivery 11.4% (Motiang, 2017) where as Verma and Rathore (2014), stated that 50.4% patients had CS an section and 41.7% had vaginal delivery.

In this study, the commonest cause of SICU admission in obstetric patients was obstetric hemorrhage 54% followed by pregnancy-induced hypertension 16%. Leung et al. (2010) also reported obstetric hemorrhage and pregnancy induced hypertension as the leading causes of SICU admission in their obstetric patients. 38% and 14%, respectively. However, in a study by Motiang (2017) the commonest cause of SICU admission was cardiac diseases 44.3% followed by pregnancy-induced hypertension 20% and obstetric hemorrhage 16.2%. Obstetric hemorrhage 56.16% and hypertension 19.8% were also common causes in the study by Verma and Rathore (2014). Qureshi et al. (2016) found that obstetric hemorrhage and hypertensive disease of pregnancy were seen in 41% and 17.5% patients, while Sharma et al. (2016) stated that hemorrhage was the commonest cause 39.7% followed by hypertension 16.17%. However, Sujata et al. (2016) found that hypertension was the most common indication of SICU admission 28% followed by obstetric hemorrhage 20%. Similarly, the common cause of admission was pregnancy-induced hypertension 56.21% followed by obstetric hemorrhage 17.75% in the study done by Mowafy and Mashhour (2010).

The commonest non-obstetric cause of SICU admission in our study was pulmonary embolism 8% followed by cardiac diseases and anaphylactic shock 4% each. However, pulmonary embolism was an indication of SICU admission in only 1.2% of patients by Mowafy and Mashhour (2010) and heart failure 13.6% was the commonest non-obstetric cause of admission. In a study by Leung et al. (2010), cardiomyopathy was the cause of admission in 2% patients. In a study by Verma and Rathore (2014), cardiac diseases was the cause of admission in 3.6% patients. Other causes of SICU admission were; septic shock 2%, acute respiratory acidosis 2%, morbid obesity 2%, delayed recovery from general anesthesia 4%, aspiration pneumonia 2% and diabetic ketoacidosis 2% in our study. In a study by Motiang (2017), sepsis and anesthetic complications were causes of admission in 0.5% and 1.4 % patients, respectively. Septic shock and anesthesia complication were the causes in 12.3% and 2.9% patients in a study by Verma and Rathore (2014). In a study by Qureshi et al. (2016), septic shock and anesthesia complication were seen in 56% and 4.2% patients, respectively. Whereas, septic shock was seen in 2.94% of patients in a study by Sharma et al. (2016).

In our study, the commonest cause of obstetric hemorrhage was uterine atony 37.03%. Placenta Previa was the cause of hemorrhage in 14.81% patients. In our study, placenta accrete increta and placenta abruption were the cause of hemorrhage in 7.40%, 3.70% and 7.40% patients, respectively. Hemorrhage due to cervical and vaginal tear was

seen in 7.40% of patients in our study. Ruptured ectopic pregnancy, ruptured uterus and incomplete abortion were the causes of hemorrhage in our study 14.81%, 3.70% and 3.70% patients, respectively. In a study by Motiang (2017), ectopic pregnancy and ruptured uterus were observed in 1.9% and 2.4% patients, respectively. Ectopic pregnancy was present in 16% of patients in a study by Sujata et al. (2016). Qureshi et al. (2016) found that the causes of obstetric hemorrhages were placenta accrete 33%, uterine atony 27%, placenta previa 19%, placental abruption, retained products of conception 13%, cervical trauma, uterine rupture 11% and pelvic trauma 2.8%. Whereas Shrama et al. (2016) reported that placenta previa, placenta accrete, ectopic pregnancy and uterine rupture were the causes in 4.4%, 1.47%, 8.8% and 5.8% patients, respectively.

It was found in this study, that blood and blood products were transfused to 64% patients. Packed red blood cell, FFP, platelets, cryoprecipitate and factor VIII were transfused to 96.87%, 87.5%, 62.5%, 37.5% and 3.12% patients, respectively. In a study by Verma and Rathore (2014), 64.12% patients needed between five to ten units of transfusions. Red cells were transfused in 56% patients in a study by Sujata et al. (2016). In a study by Sharma et al. (2016), blood was transfused in 51.5% patients. Packed RBCs were transfused in 21.9% patients in a study by Mowafy and Mashhour (2010).

In our study, mechanical ventilation was given to 30% patients. In a study by Leung et al. (2010) mechanical ventilation was given to 58% patients. Ventilator support was required in 86.2% patients in a study by Qureshi et al., 2016. However, in a study by Sujata et al. (2016) 26% patients required mechanical ventilation. Mechanical ventilation was required in only 8.8% patients in a study by Sharma et al. (2016). In another study by Mowafy and Mashhour (2010), mechanical ventilation was required in 12.4% patients (Mowafy and Mashhour, 2010).

Central venous and arterial catheter were passed to 64% and 38% patients, respectively in our study. Similar results were observed in a study by Leung et al. (2010) central venous and arterial catheter were passed into 52% and 66% patients, respectively. In a study by Sharma et al. (2016) central line was required in 31% patients. Central venous monitoring was done in 91.1% of patients in a study by Mowafy and Mashhour (2010).

MgSo₄ and inotropes were required in 16% and 8% patients, respectively in our study. In a study by Leung et al. (2010) MgSo₄ and inotropes were injected in 8% and 16% patients. Inotropes were required in 25% patients in a study by Sharma et al. (2016) ²⁹MgSo₄ was given to 25.44% patients in a study by Mowafy and Mashhour (2010). In our study, none of patient required renal dialysis while in a study by Leung et al. (2010) 2% patients underwent renal dialysis.

In our study, radiological investigation required by the obstetric patients in SICU were chest X-Ray 36%, Spiral CT scan 80%, CT brain 4% and MRI

brain 4%. In a study by Leung et al. (2010) CT chest, CT brain and MRI brain were done in 6%, 12% and 2% patients, respectively. None of our patient underwent angiogram however in a study by Leung et al. (2010) 26% patients required it.

The mean lengths of stay in SICU and hospital were 3.08 ± 3.99 (range: 1-25) and 12.7 ± 12.6 (range: 3-90) days, respectively, in our study. In a study by Leung et al. (2010) median length of SICU and hospital stays were 2 and 10 days, respectively. The median SICU stay was 27 days in a study by Qureshi et al. (2016). In a study by Sujata et al. (2016), the mean duration of ICU stay was 4.12 days. The mean SICU stay was 5.6 days in a study by Sharma et al. (2016). The mean length of SICU stay was 3.32 ± 3.6 days (range: 1-24) in a study by Mowafy and Mashhour (2010).

Patients were transferred from SICU to obstetric 80% and gynecology wards 20%, there was no mortality. However, 19.1% mortality rate was observed in a study by Verma and Rathore (2014). In a study by Qureshi et al. (2016) the mortality rate was 21.64%. Mortality was 12% in a study by Sujata et al. (2016). In a study by Sharma et al. (2016) mortality rate was 5.8%.

Our study did not show any mortality or significant morbidity. Knowledge of the physiological changes of pregnancy with specific pregnancy-related disorders is necessary for optimal management. A better understanding of the spectrum, characteristics, outcomes of the disorders involving this group of patients is the first step towards achieving prevention and hence reduction of maternal mortality and morbidity (Leung et al., 2010).

This also highlights the adequacy of expertise among our multidisciplinary care team. Majority of the patients were admitted in a planned manner from obstetric wards or labor room, instead of being rushed from emergency room. Diversity of management options were utilized depending upon situations and need of the patients.

The study had some limitations. It was a single center study. Although, we used a large sample size, the sample population was representative of a posh area of the town. It was not representative of the whole population of the nation, where the results and outcome may be variable among suburban or rural population.

5. Conclusion

In our setup, SICU admission rate was very low among obstetric patients. Hypertension and postpartum hemorrhage were the commonest causes. No mortality can be attributed to early admission, good antenatal care, and effective multidisciplinary approach. It is highly recommended that routine audit of SICU admissions should be done among obstetric patients in every setup. Obstetricians and intensivists should be familiar with the routine causes and management

options. This will reduce the mortality or morbidity among obstetric patients admitted to SICU.

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

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