CURRENT STATE OF MANAGEMENT OF SEVERE PRE-ECLAMPSIA AND ECLAMPSIA USING MAGNESIUM SULPHATE IN DIFFERENT HEALTH FACILITIES OF MID WESTERN DEVELOPMENT REGION

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EXECUTIVE SUMMARY

According to the Nepal Maternal Mortality and Morbidity Study (2009), pre-eclampsia/eclampsia is the second leading cause of maternal mortality in Nepal—accounting for 21% of all maternal deaths. For management of severe pre-eclampsia and eclampsia (SPE/E), WHO has identified magnesium sulphate as the most effective and low cost medication. This global evidence-based practice is also the national medical standard in Nepal. Despite this, many health facilities in Nepal are not using this drug for the management of SPE/E. This study helps to explore in detail the current situation of SPE/E management using magnesium sulphate in selected health facilities of Mid Western Development Region (MWDR).

To explore this situation in some peripheral primary and tertiary health facility, the Principal Investigator of this study worked to identify the current situation of SPE/E management using magnesium sulphate and strengthened its use in 10 different health facilities from MWDR. These health facilities were 5 hospitals—regional hospital, zonal hospital and district hospitals and 5 PHCCs, one PHCC from five districts. The study was conducted under the regional grant of Nepal Health Research Council (NHRC) for MWDR.

From Poush to Phalgun 2066, PI and Co-PI reviewed the records of FY 2065/66 BS from these 10 health facilities. Both observed maternity ward and store to identify the availability and stock outs of emergency drugs and equipment needed for management of SPE/E and interviewed maternity ward incharge to figure out the availability of BEOC and CEOC services. Interviewing with maternity ward staffs, they conducted two rounds of assessments using the relevant standards from the Maternal and Newborn Care (MNC) Quality Improvement (QI) Tools developed by National Health Training Center (NHTC). In pre-test, the current knowledge and skills of maternity ward staffs in diagnosing, managing and monitoring SPE/E was assessed. Immediately after pre-test, clinical update was done by using in-service education package developed by PI and ACCESS developed job aids. At the same time, on-site coaching was conducted to support maternity ward staffs. After 10 days of this intervention, post test of those staffs using the same tool used in pre-test was conducted. In both assessments, each provider's performance was scored 0–3 (0–100%), and then these were averaged to create the facility score. The score is intended to reflect the health facility's readiness and ability to manage SPE/E appropriately.

From the health facility record, it was identified that:

- More cases were recorded in health facilities from Terai districts—23 SPE/E cases in Bheri Zonal Hospital and 20 cases in Dang Sub Regional Hospital.
- In most of the hospitals, these cases were managed with the national standard drug i.e., magnesium sulphate. Among these 10 health facilities, no facilities were using other treatment modalities for SPE/E management.
- In Dang Sub Regional Hospital and Pyuthan District Hospital, only 50% and 25% cases were managed with magnesium sulphate. Staffs feel hesitant in using magnesium sulphate for severe pre-eclampsia cases, they only administer depin, an antihypertensive drug for these cases.
- Except one PHCC from Surkhet district, other 4 PHCC were not using this drug for SPE/E case management. They refer those cases without providing loading dose of magnesium sulphate. Mehelkuna PHCC from Surkhet district is good in managing SPE/E cases with this national standard drug. The caseload was also high in this PHCC.
- The maternal and neonatal outcome of SPE/E cases was found good; only one maternal mortality was recorded due to SPE/E in Bheri Zonal Hospital.

While observing the availability and stock outs—most of the health facilities had this life saving drug and related supplies there. Some of the supplies which were not found were—ambu bag, reflex hammer and calcium gluconate. Some of the BEOC and CEOC sites were not providing standard services due to lack of human resources.

Health facility's readiness in managing SPE/E cases was identified through staff assessment of knowledge and skills in SPE/E diagnosis, management and monitoring. In pre-test, none of the health facility was able to get standard score—meaning the majority of the facilities were not ready or able to effectively diagnose, manage and monitor SPE/E using magnesium sulphate. After clinical updates, on-site coaching and dissemination of job aids, health facilities had made significant improvements. Because of this, 50% health facilities were performing at 80% or higher during post-test.

Making national standard and providing training is not sufficient to improve maternal and neonatal health. Regular follow up with on-site coaching and competency based training is essential to implement these standards.

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ABBREVIATION

ANM	Auxiliary Nurse Midwife
BEOC	Basic Emergency Obstetric Care
CEOC	Comprehensive Emergency Obstetric Care
DH	District Hospital
FHD	Family Health Division
$MgSO_4$	Magnesium Sulphate
MRT	Midwifery Refresher Training
NHRC	Nepal Health Research Council
NHTC	National Health Training Center
NMMMS	Nepal Maternal Mortality and Morbidity Study
PE	Pre-Eclampsia
PHCC	Primary Health Care Center
SBA	Skilled Birth Attendant
SN	Staff Nurse
SPE	Severe Pre-Eclampsia
SRH	Sub Regional Hospital
WHO	World Health Organization

INTRODUCTION

Pre-eclampsia is a condition that pregnant women can get generally in the second half of their pregnancies although it can occur earlier. Pre-eclampsia is marked by high blood pressure accompanied with a high level of protein in the urine. When pre-eclampsia is left untreated, it can progress to become severe pre-eclampsia, with complications of the lungs, kidney and liver, or can progress to the more serious and life-threatening condition of eclampsia. Eclampsia can occur before, during or after child birth[1].

Among pregnant women worldwide 7-15% women develop pre-eclampsia (high blood pressure with proteinuria). Approximately 1-2% will develop eclampsia[2]. Eclampsia is defined as the development of convulsions or coma in a woman with pre-eclampsia. While the exact cause is unknown, pre-eclampsia and eclampsia (PE/E) is one of the leading causes of maternal deaths in the world—contributing between 8–25% of maternal mortality worldwide[3]. Ranking second only to hemorrhage as a specific direct cause of maternal mortality, PE/E contributes to 12% of all maternal deaths (>60,000 deaths annually) worldwide[4] and infants of women with pre-eclampsia are five times more likely to die compared with infants of mothers without the disorder[5].

Pre-eclampsia/eclampsia is the leading causes of serious morbidity and mortality both in developed and developing countries. The burden of PE/E disproportionately affects developing countries, where incidence of PE is seven times higher (2.8% of live births) than in developed countries (0.4% of live births). Further, estimates suggest that of pre-eclamptic women in the developing world, 2.3% develop eclampsia, compared to 0.8% in developed countries. A woman in a developing country is seven times more likely to develop pre-eclampsia, three times more likely to progress to eclampsia, and 14 times more likely to die of eclampsia. Overall case fatality rate for pre-eclampsia and eclampsia are reported by WHO to be between 0.1% and 4.0%[6].

Nepal Maternal Mortality and Morbidity Study (2009) has shown that pre-eclampsia and eclampsia is the second most common cause of maternal mortality which accounts for 21% of deaths. It was increased from 14% in 1998 to 21% in 2008[7]. There are limited studies conducted about pre-eclampsia and eclampsia in Nepal. A study done in Koshi Zonal Hospital showed that the overall incidence of pre-eclampsia was 0.7%, mild pre-eclampsia 0.4%, severe pre-eclampsia 0.3% and eclampsia was 1.3%[8]. One study done in Paropakar Maternity and Women's Hospital found that the incidence of eclampsia was 2.9 per 1000 deliveries i.e., 0.29%[9].

For most cases of severe pre-eclampsia, eclampsia can be prevented by introducing magnesium sulphate (also known as Epsom salt) and immediately initiating labor. In women with severe pre-eclampsia, magnesium sulphate was found to reduce the occurrence of eclampsia by more than 50% and maternal deaths by 46%. If instituted immediately without delay, for majority of patient's single dose magnesium sulphate will suffice, making treatment of pre-eclampsia/eclampsia possible at the community level[10].

Several research trials have identified magnesium sulfate as the most effective treatment for preventing the onset of deadly seizures. In fact, the maternal mortality rate was reduced by 55% in the 33-country Magpie Trial, which was conducted in 1995. Similarly, in the Collaborative Eclampsia Trial (2002), magnesium sulfate was proven to be more than twice as effective at preventing recurrent seizures as the two drugs (diazepam and phenytoin) that had been the drugs of choice for this problem in most countries. Treating mothers with magnesium sulfate improved outcomes not only for mothers, but for their babies as well[11].

Based on the scientific evidence, WHO identified magnesium sulfate as the most effective and low-cost medication for treatment of pre-eclampsia and eclampsia[12]. Unfortunately, magnesium sulfate continues to be underutilized,

especially in countries where pre-eclampsia and eclampsia remains one of the main causes of maternal mortality and morbidity[13].

Nepal revised its National Medical Standard Volume III in 2007 to list magnesium sulphate as the choice of drug for treatment of severe pre-eclampsia and eclampsia [14]. It also has been added to the essential drugs list[15]. The drug, although inexpensive and listed in essential drug list of Department of Drug Administration (DDA), has limited availability in different health facilities for a variety of reasons. It was stated in Nepal Maternal Mortality and Morbidity Study (NMMMS) 2009 that 73% BEOC facilities and 18% birthing centers only had stocks of magnesium sulphate[16]. In this context, this study was helpful to identify the incidence of pre-eclampsia and eclampsia, explore the availability of magnesium sulphate, assess the knowledge and skills of involved staff in managing these cases, and suggest gaps in various processes.

RATIONALE/JUSTIFICATION

Mortality and morbidity associated with PE/E has shown very little decline in most developing countries. But in Nepal, while maternal mortality declined, PE/E proportionately increased among maternal deaths from 14% in 1998 to 21% in 2008. One of the most common, yet treatable, causes of maternal death is pre-eclampsia/eclampsia which, if untreated, can lead to seizures (eclampsia), kidney and liver damage, or death. About 63000 women worldwide die every year because of severe pre-eclampsia and eclampsia, both of which are also associated with neonatal death[17].

In Nepal, it is associated with 21% of maternal deaths and number one killer within the health facility (30%)[18]. Nepal revised its National Medical Standard for Reproductive Health in 2007 to list magnesium sulphate as the choice of drug for treatment of severe pre-eclampsia and eclampsia (SPE/E). Magnesium sulphate is a part of the national essential drugs list since 2008. Although there was an existing standard in SPE/E management using magnesium sulphate in national standard, many health care providers were not comfortable using this drug for management of SPE/E[19].

Magnesium sulphate is the only drug, for which there is extensive and compelling evidence of efficacy, safety and cost effective treatment of severe pre-eclampsia and eclampsia. Despite the high mortality associated with pre-eclampsia and eclampsia (which is also associated with neonatal death), magnesium sulphate is still unavailable in many health facilities in the setting where most deaths occur. Therefore by managing SPE/E with the use of magnesium sulphate, 21% of maternal deaths can be reduced.

DDA has listed magnesium sulphate in its Essential Drug List and clearly mentioned that it should only be used for eclampsia. Nepal's Skilled Birth Attendance (SBA) training also emphasized the use of magnesium sulphate for SPE/E cases. Besides these efforts, different health facilities were not using this life saving drug, mentioned in ACCESS Nepal report. This study helps to explore why they were not using this life saving drug for the management of SPE/E.

OBJECTIVES

General

To describe the situation in management of severe pre-eclampsia/eclampsia (SPE/E) using magnesium sulphate in different health facilities

Specific

- To identify total cases of severe pre-eclampsia and eclampsia in health facilities of MWDR within one year.
- To find out the total cases managed by magnesium sulphate and other treatment modalities.
- To find out the time of initiation of magnesium sulphate after the patient's arrival in the health facility.
- To identify the maternal and neonatal outcome of severe pre-eclampsia and eclampsia cases.
- To assess knowledge and skills of involved staff in managing severe pre-eclampsia and eclampsia.
- To check/observe the availability and stock outs of magnesium sulphate in selected health facilities.
- To assess the change in level of knowledge in pre-test and post-test.

METHODOLOGY

This is a descriptive study designed to explore the situation of management of SPE/E using magnesium sulphate in different health facilities of Mid Western Development Region (MWDR).

Dang and Pyuthan districts from Rapti zone and Bardiya, Surkhet and Banke districts from Bheri zone were taken as study site because it has plain accessible areas to remote hilly areas which have inaccessibility of transportation services. Regional, Zonal, District Hospitals and one PHCC from each districts (see **annex 6** for selected health facilities) providing 24 hour maternity service were selected for the study. The study setting covered Terai as well as hilly areas—as maternal mortality and morbidity study 2008 cited that SPE/E is higher in Terai regions than hilly regions. These study sites were selected purposively from Poush 2066 to Phalgun 2066.

Data on the number of SPE/E cases and available maternal and newborn health service within a year was obtained from reviewing records of fiscal year 2065/66 BS from maternity register. Similarly by interviewing with care providers', current BEOC and CEOC services provided by the health facility was identified. With observation, the availability and stock outs of magnesium sulphate and other necessary equipments were assessed. The magnitude of problem, actual gaps in delivering service to the SPE/E case, and other non quantifiable problems was explored using qualitative technique.

Two rounds of assessment (pre test and post test) from all the available health care providers from maternity wards in selected health facilities were done, using the relevant standards from the Maternal and Newborn Care Quality Improvement (QI) Tools developed by National Health Training Center (NHTC). Post test was done 10 days after the pre-test and updating of staffs. Each provider's performance was scored 0–3 (0–100%) according to QI tool standard, and then these were averaged to create the facility score.

The current knowledge and skills of staff in magnesium sulphate was identified in the pre test. After pre-test, PI and Co PI provided extensive update by using educational intervention package developed by PI (see **annex 2** for content) and using job aids developed by ACCESS program in 2009. On site coaching to the

maternity ward staffs on specific skills like checking patellar reflex was also demonstrated.

Data analysis was done by using Statistical package for Social Sciences (SPSS) version 11.5 for windows. Non parametric test i.e., Wilcoxon Signed Ranks Test was used to examine the relationship between pre-test and post-test scores.

RESULTS

This section presents the analysis and interpretation of data obtained from different health facilities of MWDR.

Severe Pre-eclampsia and Eclampsia Cases Vary in Different Districts and Health Facilities

While reviewing the data from different selected health facilities, it was found that SPE/E cases vary in different districts and different level of health facilities. The more cases were found in Terai districts than hilly districts. But the exception is, no cases were recorded in Guleria District Hospital and Khajura PHCC, from Terai regions.

Table 1. Distribution of SPE/E Cases in Different Level of Hospitals within the FY 2065/66

SN	Hospitals	Number	Percentage	Total hospital admissions
1	Mid Western Regional Hospital	3	0.2	1924
2	Dang Sub Regional Hospital	20	0.5	4019
3	Bheri Zonal Hospital	23	0.4	5593
4	Guleria District Hospital	0	0	617
5	Pyuthan District Hospital	2	0.5	367

Table 1 presents the total number of SPE/E cases in different level of health facilities—regional hospital to district hospitals. The highest numbers of cases (23) were recorded in Bheri Zonal Hospital (BZH) followed by 20 cases in Dang Sub Regional Hospital (SRH). According to hospital overall maternal morbidity, it represents 0.4% in BZH and 0.5% in Dang SRH.

In Guleria District Hospital, no cases were recorded in the maternity register during that fiscal year. Exploring the reason with maternity staffs, they were not sure whether the SPE/E cases come there or not or they refer those without recording. Sometimes they suspects SPE/E who have high BP but because of unavailability of other diagnostic measures and CEOC services, they refer those cases without recording in the maternity register. They also did not write the referral note for that patient.

Table 2. Distribution of SPE/E Cases in Different PHCCs within the FY 2065/66

SN	Hospitals	Number	Percentage	Total admissions
1	Lamahi PHCC	2	0.3	592
2	Khalanga PHCC	0	0	130
3	Khajura PHCC	0	0	61
4	Rajapur PHCC	2	0.5	406
5	Mehelkuna PHCC	5	0.9	528

As seen in table 2, the highest number of SPE/E cases (5) in Mehelkuna PHCC of Surkhet District. Similarly, 2 cases were diagnosed in Rajapur PHCC of Bardiya District and Lamahi PHCC of Dang District. It represents 0.9% in overall obstetric morbidity due to SPE/E in Mehelkuna PHCC, 0.3% in Lamahi PHCC and 0.5% in Rajapur PHCC. No cases of SPE/E were diagnosed in Khalanga PHCC and Khajura PHCC during that fiscal year so that no cases were recorded in maternity register.

Figure 1. Distribution of Cases Managed by Magnesium Sulphate in Different Levels of Hospitals

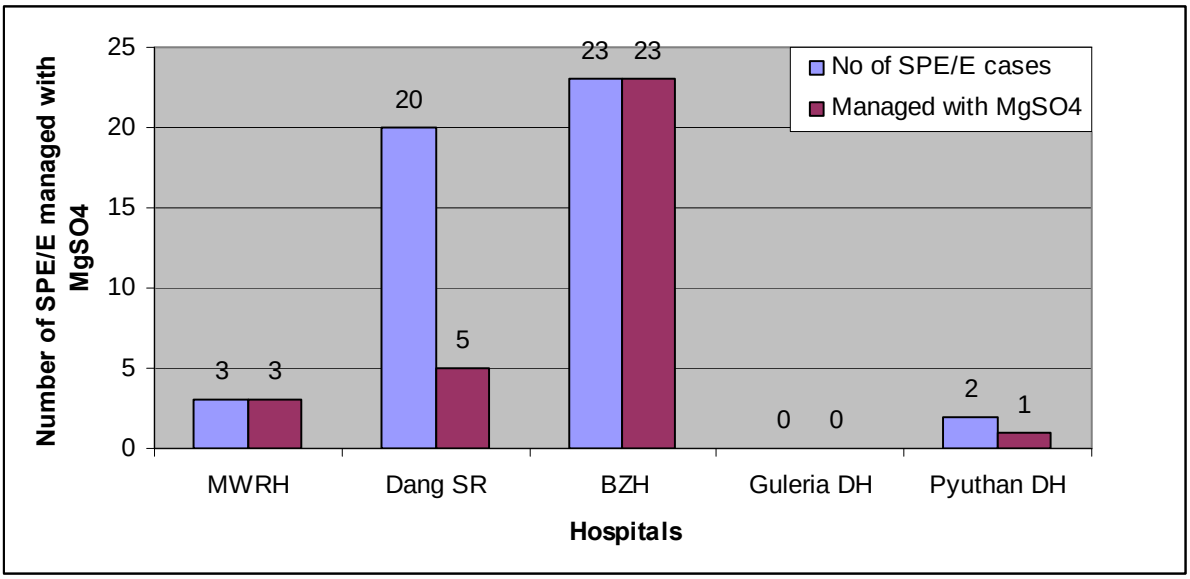

Figure 1 shows that among the total diagnosed cases of SPE/E, all diagnosed cases of SPE/E were managed with magnesium sulphate in BZH and MWRH. In Pyuthan District Hospital, among 2 SPE/E cases, one case was managed with this drug. In Dang SRH, only 5 SPE/E cases among 20 were managed with magnesium sulphate. Service providers were not using other treatment modalities than magnesium sulphate in these facilities.

Figure 2. Distribution of Cases Managed by Magnesium Sulphate in Different PHCCs

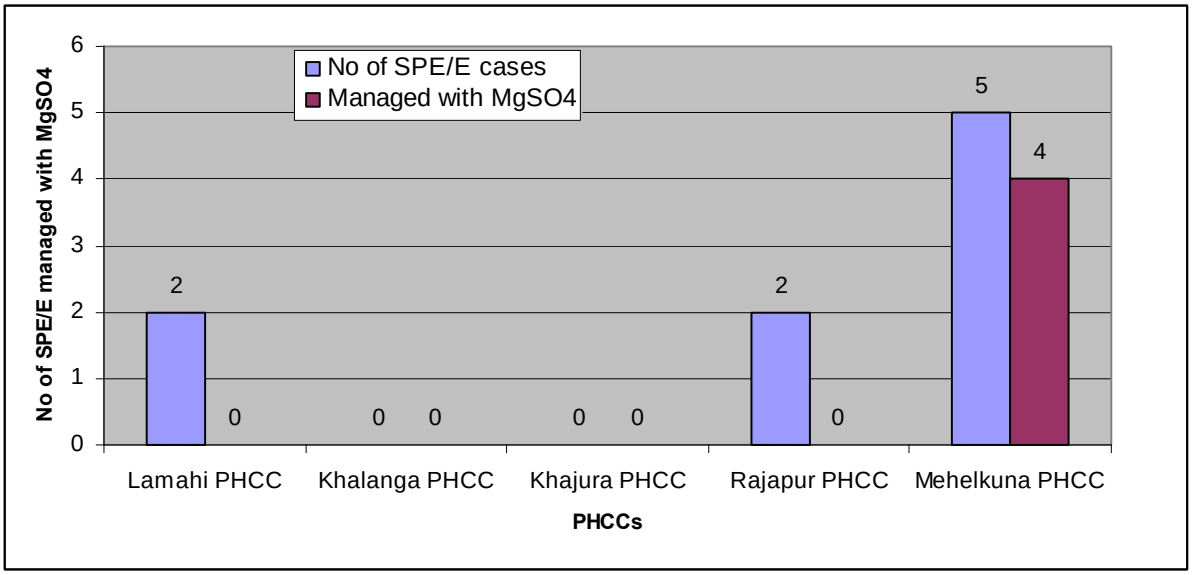

Figure 2 reveals that only Mehelkuna PHCC is managing most of the SPE/E cases (4 cases among 5) with magnesium sulphate. In other 4 PHCCs, magnesium sulphate drug was not administered to SPE/E cases. While referring the diagnosed cases to other health facilities, they did not administer even loading dose of magnesium sulphate.

Initiation of Magnesium Sulphate after Patient's Arrival

In most of the hospitals, staffs administer magnesium sulphate within ½ an hour to one hour to SPE cases. The staffs from MWRH and BZH administer this drug to SPE/E cases within ½ hour of patient's arrival. They have magnesium sulphate tray ready for those cases.

But in other hospitals i.e., Dang SRH and Pyuthan Hospital, it takes 1 hour to 2 hours to manage eclampsia cases. In Guleria District Hospital, staff didn't have this idea because they never diagnosed and managed such cases in their facility during that fiscal year. In most of the PHCC, staffs refer these cases immediately to larger facilities when they suspect the case of SPE/E. In Mehelkuna PHCC, staffs manage SPE/E cases within ½ an hour to 1½ hour.

Maternal and Neonatal Outcome of Severe Pre-eclampsia and Eclampsia Cases

The record from all SPE/E cases in the FY 2065/66 was analyzed from all facilities to find out the maternal and neonatal outcome of SPE/E cases that were hospitalized and treated in those facilities.

Table 3. Maternal and Neonatal Outcome

Item	Dang	Lamahi	Pyuthan	Khalanga	BZH	Khajura	Guleria	Rajapur	MWRH	Mehelkuna
Neonatal Outcome										
Alive baby	5	1	1		22			0	3	4
Still birth								0		
Intrauterine fetal death								0		
Macerated baby								0		
Outcome of Mother										
Improved	5	1	1		22			0	3	4
Worsened/ Referred										
Maternal deaths	0	0	0		1			0	0	0
Neonatal deaths	0	0	0		0			0	0	0

Table 3 illustrates that only 1 maternal death among 23 SPE/E cases was recorded in BZH. No maternal mortality was observed in FY 2065/66 in all other facilities due to SPE/E. There was no neonatal death found in all facilities. Almost all SPE/E mother gave birth of normal alive baby. Improvement after magnesium sulphate administration was seen in almost all mothers, except death of one mother in BZH.

Knowledge and Skills of Involved Staff in Managing Severe Pre-eclampsia and Eclampsia

The staffs from each health facility were interviewed to identify their current knowledge and skills in SPE/E diagnosis, management and monitoring. The following table shows its results. The individual health worker's performance score were averaged to create facility score.

Table 4. Analysis of Score in Different Types of Hospitals

SN	Facilities	Pre-test	Post test
1	Dang Sub Regional Hospital	50	89
2	Pyuthan District Hospital	8	84
3	Bheri Zonal Hospital	19	81
4	Guleria District Hospital	0	56
5	Mid Western Regional Hospital	19	89

According to table 4, Dang SRH got highest score (50%) than other 4 hospitals including Zonal and Regional Hospital in pre-test. The two larger hospitals—MWRH and BZH only got 19% score during pre-test. Guleria DH got zero percent score during pre-test. All of the hospitals were able to increase their score in post-test. Among five hospitals, four hospitals were able to increase their score to standard level according to NHTC QI tool scoring guidelines that is 80%. Only Guleria DH was not able to increase its score to standard level.

Table 5. Analysis of Score in Different PHCC

SN	Facilities	Pre-test	Post test
1	Lamahi PHC	67	67
2	Khalanga PHC	0	84
3	Khajura PHC	0	50
4	Rajapur PHC	0	33
5	Mehelkuna PHC	0	67

Table 5 shows that among five PHCCs, four PHCCs got zero percent score in pre-test. Only Lamahi PHCC was able to get 67% score during pre-test. All five PHCCs were able to increase their score in post-test but only one Khalanga PHCC was able to increase it in standard level.

Table 6. Analysis of Score according to District

District	Facility Name	Pre-test	Post-test
Dang	Dang Sub Regional Hospital	50	89
	Lamahi PHC	67	67
Pyuthan	Pyuthan District Hospital	8	84
	Khalanga PHC	0	84
Banke	Bheri Zonal Hospital	19	81
	Khajura PHC	0	50
Bardiya	Guleria District Hospital	0	56
	Rajapur PHC	0	33
Surkhet	Mid Western Regional Hospital	19	89
	Mehelkuna PHC	0	67

Table 6 indicates that the two health facilities from Dang District got the highest score, 50% and 67% respectively during pre-test but not to the standard level. In post test, two health facilities from Pyuthan District and one from Surkhet District were able to got standard score i.e., 80% and above. In Dang and Banke District, only one health facility was able to got standard score but in Bardiya District, no facility was able to increase its score to standard level.

Table 7. Analysis of Score in Different Level of Health Facilities

SN	Level of Facility	Pre-test	Post-test
1	Regional Hosp	19	89
2	Sub Regional Hosp	50	89
3	Zonal Hospital	19	81
4	District Hospital	4	70
5	PHCCs	13	60

According to table 7, Sub Regional Hospital got the higher score in comparison with other health facilities but not to the standard level in pre-test. In post-test, Regional Hospital, Sub Regional Hospital and Zonal Hospital were able to increase their score to standard level. District Hospitals and PHCCs couldn't be able to increase their score in the same way.

Table 8. Analysis of Score by Type of Training Staff Attended (N=44)

SN	Training Attended	Pre-test	Post-test	p value
1	SBA (20)	25	90	0.000
2	MRT (12)	8	61	0.004
3	No Training (12)	17	67	

Table 8 shows that SBA trained staffs got higher score but not in the standard level during pre-test (25%). Similarly, they were able to achieve standard score during post-test also. There is significant differences in score achieved during pre-test and post-test among SBA and MRT trained health care providers ($p < 0.05$). This means SBA and MRT trained staffs have higher chances of catching and retaining the knowledge and skills after intervention.

In SBA and MRT trainings, staffs are taught and practiced management of SPE/E using magnesium sulphate during their training course. Besides this, they were not able to get higher scores in pre-test.

Table 9. Analysis of Score by Educational Attainment (N=44)

SN	Education	Pre-test	Post-test	p value
1	Staff Nurse (20)	28	85	0.000
2	ANM (24)	11	67	0.000

According to table 9, staff nurses had higher knowledge during pre-test. In post test, they were able to get standard score than ANMs. But after intervention, there is significant changes in score in pre-test and post-test among both staff nurse and ANMs ($p < 0.005$).

Table 10. Analysis of Score by Years of Working Experience (N=44)

SN	Work Experience	Pre-test	Post-test	p value
1	Less than 1 year (9)	15	52	0.015
2	1-5 years(18)	24	83	0.001
3	5-10 years (11)	12	85	0.004
4	More than 10 years (6)	22	67	0.038

From table 10, the staffs who had working experience of 1-5 years and 5-10 years had better ability to manage SPE/E cases with magnesium sulphate.

Availability and Stock Outs of Magnesium Sulphate and Other Accessories

The research team observed the maternity ward and its store to identify the availability and stock outs of magnesium sulphate drug and other accessories which are needed to manage SPE/E cases properly. The observation was based on pre-developed checklist.

From the direct observation, it was identified that IV cannula of no. 18 size, syringes (10 ml, 5 ml), Lignocaine 2%, Normal Saline, Ringer's Lactate, Fetuscope, Thermometer, ambu bag and mask and O_2 was available in all selected health facilities. Magnesium sulphate injection (50%) was also available in all health facilities except Guleria District Hospital. This hospital has 25% magnesium sulphate only. Calcium gluconate and reflex hammer was not available in most of the facilities. For details, please refer **annex 3**: availability and stock outs of magnesium sulphate and other accessories.

Availability and Stock Outs of Emergency Drugs

While observing the availability and stock outs of emergency drugs in maternity ward, it was found that most of the health facilities had adequate stocks of most of the emergency drugs. But calcium gluconate was not available in 6 health facilities among 10 and depin 5 mg was also not available in 3 health facilities among 10. For details, please refer **annex 4**.

Availability of 24 Hours BEOC and CEOC Services

Among the total 10 health facilities taken for the study, 6 health facilities (all PHCC and Pyuthan District Hospital) were BEOC sites and 4 health facilities were CEOC sites. In all these health facilities, staffs in charge were interviewed to find out the availability and accessibility of BEOC/CEOC services according to its service category.

Among BEOC health facilities, all the health facilities were not administering magnesium sulphate for SPE but 50% health facilities were managing eclampsia with magnesium sulphate. The MVA for incomplete abortion service was not available in Khajura PHCC but the other health facilities were providing this. The vacuum delivery for prolonged labor was not in practice in Pyuthan District

Hospital, Khalanga PHCC and Khajura PHCC. Other BEOC services were available there.

The four CEOC sites were Dang SRH, Guleria District Hospital, BZH and MWRH. Among these sites, all the CEOC services were available in BZH and MWRH. In Dang SRH, all CEOC services were available except management of SPE with magnesium sulphate. In Guleria District Hospital, caesarean section service was not available for the last one and half years because of unavailability of doctor. Other CEOC services were available in these facilities. For details, please refer **annex 5**: availability of 24 hours BEOC and CEOC services.

DISCUSSION

The nationwide incidence of pre eclampsia and eclampsia cases were not recorded in national data. The Nepal Maternal Mortality and Morbidity Study 2008/09 show that 21% of maternal deaths in Nepal are due to pre-eclampsia and eclampsia and it is more common in Terai Region. The same study found that approximately 30% facility based maternal deaths are due to pre-eclampsia and eclampsia. In this study, it was found that the incidence of severe pre-eclampsia and eclampsia cases vary in different regions according to review of record from 10 different health facilities. More cases were found in Terai districts—23 cases (0.4%) were recorded in Bheri Zonal Hospital and 20 cases (0.5%) were recorded in Dang Sub Regional Hospital. Both hospitals are from Terai Regions. But the exception is no cases were recorded in the Guleria District Hospital. Probable reason being on assessment, the staff knowledge and skills in diagnosing severe pre-eclampsia and eclampsia, its management and monitoring was found zero in this hospital. So the staffs in this hospital do not have the knowledge and skills in diagnosing these cases. In Mid Western Regional Hospital, only 3 cases were recorded and in Pyuthan District Hospital only 2 cases were recorded in the fiscal year of 2065/66. From this finding we can conclude that severe pre-ecalmpsia and eclampsia is more common in Terai Districts than that of Hilly District, supporting the national level study. Mehelkuna PHCC from Surkhet district had higher caseload for SPE/E (5 cases total) than other PHCCs. It is higher than the total SPE/E cases in MWDR. This PHCC is located in very convenient place for receiving cases from most of the rural parts of Surkhet and Jajarkot district.

In Bheri Zonal Hospital and Mid Western Regional Hospital, 100% cases were managed with magnesium sulphate. These two health facilities are also national level Skilled Birth Attendant (SBA) training centers. Most of the staffs in this hospital who were currently working in the maternity ward were SBA trained. Severe pre-eclampsia/eclampsia management using magnesium sulphate is one of the core skills taught in SBA trainings. In Dang Sub Regional Hospital, as less as 25% while in Pyuthan District Hospital, 50% cases were managed with magnesium sulphate. In Dang, most of the severe pre-eclampsia/eclampsia cases were referred to other centers like Bheri Zonal Hospital and Lumbini Zonal Hospital, but the data was not found whether they refer the cases with or without

loading dose. The reason for referring those cases was not recorded specifically in the maternity register. Only mentioned there was for betterment of care. The same data was lacking even in Pyuthan District Hospital. In these both hospitals, severe pre-eclampsia cases were not managed with magnesium sulphate drugs. For these cases, only depin 10 mg is provided for controlling blood pressure. Even SBA trained staffs felt hesitant in administering magnesium sulphate to severe pre-eclampsia cases. Possible reasons might be difficulty diagnosing SPE cases and unavailability of urine protein test kit to measure level of protein in the urine. Among 5 PHCCs, only Mehelkuna PHCC from Surkhet District had been administering magnesium sulphate. In that PHCC, 80% severe pre-eclampsia/eclampsia cases were managed with magnesium sulphate. Twenty percent cases were severe pre-eclampsia and the staffs were not comfortable administering this drug to severe pre-eclampsia. In other 4 PHCCs, this life saving drug was not administered to severe pre-eclampsia/eclampsia cases, those cases were referred without loading dose. During assessment, it was found that staffs had inadequate knowledge and skills in diagnosing, managing and monitoring those cases.

In all health facilities, maternal and neonatal outcome after magnesium sulphate administration was found good. Among all health facilities, only one maternal death was recorded in Bheri Zonal Hospital. This case was referred from other facility (name not mentioned in the record) and came there in very critical condition. So this facility could not save the life of both mother and baby.

The staff knowledge and skills in diagnosing severe pre-eclampsia/eclampsia, management with magnesium sulphate and monitoring of those cases were identified and scored according to standard from the staffs of maternity ward from each facility. This score helps to reflect the health facility's readiness and ability to manage severe pre-eclampsia/eclampsia appropriately. During pre-test, it was found that all health facilities were not able to get standard score. It means that majority of the facilities were not ready or able to effectively diagnose, manage and monitor SPE/E using magnesium sulphate. After pre-test the staffs were updated on it using job aids and pre developed orientation package. In post-test, five health facilities (4 hospitals and one PHCC) were able to get standard score (80% or higher). This would reflect that 50% of health facilities are now ready to diagnose and manage severe pre-eclampsia/eclamsia cases properly. But there

needs to regular update and on site coaching by concerned authorities and ensure they are correctly practicing their skills.

Since all the selected PHCC were BEOC sites, they should be ready to diagnose, manage and monitor SPE/E cases in their facility. At least they should be able to diagnose those cases and administer loading dose of magnesium sulphate before referring to higher facilities. This was found severely lacked in 4 of 5 PHCCs. Only one PHCC was able to provide this service. Staffs in these PHCC should be frequently followed up by Family Health Division and recommend for competency based training of SPE/E management. Post training follow up is also needed to ensure they are correctly practicing their skills in SPE/E management.

Being CEOC sites, Guleria District Hospital was not able to provide caesarean section to emergency obstetric cases. From the last one and half years, no doctor trained in caesarean section was posted there. This hospital also does not have any record of SPE/E within the fiscal year of 2065/66. Since being an ethnically diverse and Terai district, we can not assume any cases in whole year were not come for treatment there. Possible reasons might be staff do not have knowledge and skills in diagnosing those cases, unavailability of diagnostic measures including urine test kits or they refer those cases without recording in maternity register. The family health division including concerned district public health office should take initiative to identify the possible reason and try to resolve immediately. So that no pregnant women could die because of under diagnosis and under treatment

CONCLUSION

Most of the health facilities had poor recording system and it was very difficult to figure out the exact incidence of pre-eclampsia and eclampsia from these health facilities. The highest number of cases was found in Bheri Zonal Hospital and Dang Sub Regional Hospital, both are from Terai regions. No cases of pre-eclampsia and eclampsia was recorded in Guleria District Hospital, staffs also had inadequate knowledge and skills in diagnosis and management of severe pre-eclampsia and eclampsia (got zero percent in pre-test). Among all PHCCs, Mehelkuna PHCC of Surkhet district had higher caseloads than other PHCCs.

In Bheri Zonal Hospital and Mid Western Regional Hospital, all cases of severe pre-eclampsia and eclampsia were managed with magnesium sulphate. In Mehelkuna PHCC of Surkhet District, staffs managed 80% of these cases with magnesium sulphate. The conclusion is that though the magnesium sulphate was listed in essential drug list by Department of Drug Administration; it was not used by all staffs in managing severe pre-eclampsia and eclampsia. Staffs of any of these facilities were not using other treatment modalities other than magnesium sulphate. Most of the staffs were following standard regimen now.

During pre-test, most of the staffs had inadequate knowledge and skills in diagnosing, managing and monitoring of severe pre-eclampsia and eclampsia. But after orientation and providing job aids, the level was increased to optimum level in most of the health facilities. In most of the health facilities, staffs were confident and comfortable using magnesium sulphate to eclampsia cases. In the presence of convulsion, it is very easy to diagnose eclampsia and administer magnesium sulphate. But still, providers were not comfortable to use magnesium sulphate to manage SPE in most of the facilities. They don't have urine test kits in their wards so it is very difficult to measure urine protein level to diagnose severe pre-eclampsia. The diagnostic criteria of SPE depend on week of gestation, blood pressure and level of protein in the urine.

While it was originally thought availability of magnesium sulphate would be a problem, other key drugs and equipment for monitoring and resuscitation were found missing. Calcium gluconate, hammers for checking patellar reflex and complete resuscitation including ambu bag and mask were not available in a number of health facilities.

RECOMMENDATIONS

1. The recording and reporting systems that identify the SPE/E incidence, management, maternal and neonatal outcomes are not properly managed. The separate database system or separate register should be maintained to record all the details of management of SPE/E cases, including referred cases.

2. Most of the health facilities are facing difficulty in diagnosing SPE/E cases either because of unreliability of urine protein testing by lab or unavailability of urine testing kit in their ward. So it is strongly recommended that each ward should have urine test kit and maternity staffs should have knowledge and skills in using this kit and interpreting results for proper diagnosis.

3. Staff at PHCCs needed repeated orientation on proper management of SPE/E. So regular drills should be needed to keep them up to date.

4. All health facilities would benefit from regularly conducting SPE/E emergency drills to simulate rapid patient assessment, treatment and monitoring.

5. Since no significant difference in knowledge and skills were found among the staffs that were trained and untrained. The NHTC and related external development partners should take this finding for post training follow up of these staffs and ensure they are demonstrating skill competencies in SPE/E management along with other skills.

6. Despite the magnesium sulphate being listed in essential drug list by Department of Drug Administration; it was not used by all staffs in SPE/E. There is strong need of reinforcement of SPE/E management skill using magnesium sulphate in SBA trainings.

7. Availability of magnesium sulphate in a regular basis should be ensured so that no patients in any health facility refer without treatment. Similarly all logistic such as calcium gluconate, hammers for checking patellar reflex and complete resuscitation including ambu bag and mask should be available in all health facilities for monitoring of treatment and managing complications.

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ANNEXES

Annex 1: Informed Consent and Questionnaire on Current State Management of Severe pre-eclampsia/Eclampsia (SPE/E) Using Magnesium Sulphate

Informed Consent

Namste, my name is----------. I came from Nepal Health Research Council (NHRC) to explore the situation of severe pre-eclampsia/eclampsia (EPE/E) using magnesium sulphate in different health facilities of Mid Western Development Region.

If you are interested, I request you to participate in this interview. I will ask you some questions regarding SPE/E diagnosis, management and monitoring using pre-developed tools. The information which you provide will be kept confidential and your identity will not be disclosed. The information provided by you will be used for the purpose of this study only. Approximately 30 minutes is needed to take your interview.

Participation in this study would depend upon your interest. If you are not interested in participating in the interview, please say no. If you don't want to answer any question that is also ok. I will not force to you. If you want you can stop anytime between the interviews.

Part A: Observation of Health Facility Store on Availability of Emergency Drugs

District:

Name of Health Facility:

Type of Health Facility:

Information Taken by:

Date:

Availability of Emergency Drugs	**Survey Day**		**Observation/interaction (write notes and elaborate problems of quality/state of repair if any)**
	Yes	**No**	
1.Oxytocin			
2. Magnesium sulphate			
3. IV Cannula			
4. Ringer's Lactate/Normal Saline			
5. Calcium Gluconate			
6. Ampicillin			
7. Metronidazole			
8. Gentamycin			
9. Nifedepin			
Availability of 24 hour BEOC services for complication management (*for BEOC centers*)			
1. Management of PPH with parenteral oxytocin			
2. Eclampsia with MgSO4			
3.Management of Sepsis with parenteral antibiotic			
4. Management of SPE with MgSO4			
5. MRP			
6. MVA for incomplete abortion			
7. Vacuum delivery for prolonged labor			
8. Newborn resuscitation			
Availability of 24 hour CEOC services for complication management (*for CEOC center*) (if the hospital if CEOC)			
1. Management of PPH with parenteral oxytocin			
2. Eclampsia with MgSO4			
3. Management of Sepsis with parenteral antibiotic			
4. Management of SPE with MgSO4			
5. MRP			
6. MVA for incomplete abortion			
7. Vacuum delivery for prolonged labor			
8. Newborn resuscitation			
9.24 hr C/S or Laparatomy			
10. 24 hr Blood transfusion			

Part B: Health Facility Records by Types of Deliveries for Last 12 Months

(Record review from……to……)

Check from ANC/PNC register, admission register, maternity register, discharge register, HMIS-10 of HP and PHCC

Year and Months	Total ANC visits		Total Institutional Delivery			PNC first visit (in numbers)	New Born Care Services (in numbers)	Referred Out (where)
	1st	4th	Normal (ND/SVD)	Complicated*	(LSCS)			
Shrawan								
Bhadra								
Asoj								
Kartik								
Mangsir								
Poush								
Magh								
Falgun								
Chaitra								
Baishakh								
Jestha								
Ashadh								
Total								

Utilization of MNH Services

** APH, PPH, ectopic pregnancy, prolonged/obstetric labour, rupture uterus, severe pre-eclampsia, eclampsia, retain placenta, puerperal sepsis and abortion complication*

Part C: Records of SPE/E Cases and Its Management

S.N.	Description	Numbers/year
1	Total no of SPE/E cases diagnosed in this facility	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
2	Total no of SPE/E cases admitted in this facilities	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
3	Total SPE/E cases managed in this facility	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
4	Total SPE/E cases referred to other centre (Where?) *Reason for referral	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
5	No. of cases managed with MgSO4……	Shrawan 2065..... Bhadra..... Ashoj.....

S.N.	Description	Numbers/year
		Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
6	Improvement of cases from that treatment modality	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
7	No of cases discontinued with MgSO4 after developing complication	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
8	No of maternal death due to severe pre eclampsia	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....
9	No of maternal death due to eclampsia	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra.....

S.N.	Description	Numbers/year
		Baishakh 2066..... Jestha..... Ashadh.....
10	No of neonatal deaths (birth given by SPE/E cases)	Shrawan 2065..... Bhadra..... Ashoj..... Kartik ..... Mangsir ..... Poush..... Magh..... Falgun..... Chaitra..... Baishakh 2066..... Jestha..... Ashadh.....

*Reason for referral……

13. Type of treatment modalities used for managing SPE/E cases…….
……

14. Development of magnesium sulphate toxicity and its management

Toxicity	Y	N	Management
Absent patellar reflex			
RR less than 16/min			
Urine output <30 mL/hour			
Respiratory arrest			

15. Neonatal outcome of SPE/E cases (in number)

- Alive baby…….
- Still birth…….
- Intrauterine foetal death……
- Macerated baby……

16. Outcome of mother after treatment (in number)

- Improved ……
- Worsened/Referred…….
- Death……..

Part D: Questionnaire on Knowledge and Skills of Involved Staff

Staff position……. Age:……(in years) Sex: M/F Education:……..

Years of working at the current health facility:……. Responsibility:……..

Training awarded: SBA/MRT/non SBA

PERFORMANCE STANDARDS	DEFINITION (VERIFICATION CRITERIA)	Y/N	NA
Severe pre-eclampsia or eclampsia: *Interview a provider who is likely to manage severe pre-eclampsia or eclampsia.*			
13. The provider correctly describes the signs and symptoms of severe pre-eclampsia and eclampsia.	Ask the provider "What are the signs and symptoms of severe pre-eclampsia and eclampsia?"		
	• Severe pre-eclampsia:		
	— Diastolic BP equal to or more than 110 mm Hg		
	— 20 weeks or more gestation		
	— Proteinuria 3+		
	• Eclampsia:		
	— Convulsions		
	— Diastolic BP equal to or more than 90 mm Hg		
	— 20 weeks or more gestation		
	— Proteinuria 2+ or greater		
	All Y=1point Any N=0point		
14. The provider describes the correct management of severe pre-eclampsia and eclampsia.	**Ask the provider "How would you manage severe pre-eclampsia and eclampsia?"**		
	• Administer initial (loading) dose of magnesium sulphate:		
	— Administer 4 grams of 20% magnesium sulphate in solution (20 mL) IV over a 5-minute period.		
	— Administer 5 grams of 50% magnesium sulphate solution (10 mL) with 1 mL of 2% lidocaine IM deep in each buttock (total 10 grams).		
	• In the event of a second convulsion after 15 minutes, administer 2 grams of 50% magnesium sulphate IV over a 5-minute period.		
	• Administer maintenance dose:		
	— Administer 5 grams of 50% magnesium sulphate solution with 1 mL of 2% lidocaine deep IM alternately in each buttock every 4 hours, providing there are no complications.		
	— Continue with magnesium sulphate for 24 hours following birth or the most recent convulsion (which ever occurs last).		
	• Catheterize bladder.		
	• Monitor Intake and output.		

PERFORMANCE STANDARDS	DEFINITION (VERIFICATION CRITERIA)	Y/N	NA
	• Monitor vital signs of women.		
	• Monitor fetal heart rate (FHR).		
	• If there were convulsions, birth must take place within 12 hours following the convulsion or, in the absence of convulsions, within 24 hours.		
	• Provide antihypertensive treatment (if diastolic BP is 110 mm Hg or more if no convulsion; 90 mm Hg if convulsion):		
	— Plan 1: Hydralazine 5 mg IV slowly every 5 minutes or 12.5 mg IM every 2 hours, until diastolic BP stabilizes between 90 and 100 mm Hg **OR**		
	— Plan 2: Nifedipine 5 mg sublingual, repeating the dose if the diastolic BP is still >110 after 10 minutes		
	All Y=1point Any N=0point		
15. The provider correctly describes followup.	Ask the provider "What is the correct follow up for woman with severe pre-eclampsia or eclampsia?"		
	• Monitor hourly:		
	— BP		
	— Pulse		
	— Temperature		
	— Respiratory rate		
	— Patellar reflex		
	— FHR		
	— Intake and urine output		
	— Signs and symptoms of pulmonary edema		
	• Suspend or postpone use of magnesium sulphate if respiration <16/minute, patellar reflexes absent or output <30 mL/hour.		
	• If urine output less than 30/hour, magnesium sulphate withheld and patient infused with ringer's lactate 1 L IV over 8 hours, with monitoring for pulmonary edema.		
	• In the event of respiratory arrest:		
	— Perform assisted ventilation.		
	— Administer calcium gluconate 1 g (10 mL of a 10% solution) IV slowly (over 10 mins) until calcium gluconate begins to antagonize the effects of magnesium sulphate and respiration begins.		
	All Y=1point Any N=0point		

Scoring Method:

1. All Providers were assessed using each tool. A provider received 100% if all answers were correct, 33% if only one was correct, and zero if none of the answers were correct.
2. To get a perfect score for a standard, the provider has to answer all sections of the standard correctly. If even one section is incorrect, the provider scores zero for the entire standard.

The score of the site is based upon the average score of the providers.

Part E: Observational Checklist on Availability and Stock Outs of Magnesium Sulphate and Calcium Gluconate and other Accessories

Item needed for one case	Quantity	Yes	No	Remarks (if y, mention amount available)
IV cannula no. 18	2 piece			
Depin 5 mg	10 caps			
Magnesium sulphate	50 ampules			
Water for injection	12 mL + 20 mL			
Syringe 20 mL	1 piece			
Syringe 10 mL	10 pieces			
Syringe 5 mL	1 piece			
Lignocaine 2%	1 vial			
Calcium gluconate	2 ampules			
Foleys catheter with urine bag	1 pc			
Normal saline/Ringers Lactate	2 bottle			
Fetuscope	1pc			
Thermometer	1pc			
Reflex hammer	1pc			
Ambu Bag and mask	1 pc each			
O_2 if available				
Interview with staff (Explanation)				
Is above mentioned supply of drugs and equipment from facility store adequate in terms of regularity and adequacy?				
Does DPHO store regularly supply above mentioned drugs and equipments adequately?				
Is the used drugs and equipment replaced and replenished in time?				

* The amount of drugs and equipments will vary in regional, zonal and district hospitals and PHCC

Annex 2: Educational Intervention Package

What is severe pre eclampsia and eclampsia?

It is a condition that pregnant women can get, generally in the latter part of their pregnancies, the second or in the third trimesters, although it can occur earlier.

Sign and symptoms of severe pre eclampsia

- Diastolic BP equal to or more than 110 mm Hg
- 20 weeks or more gestation
- Proteinuria 3+

Sign and symptoms of eclampsia

- Convulsion
- Diastolic BP equal to or more than 90 mm Hg
- 20 weeks or more gestation
- proteinuria

Managing Severe Pre-eclampsia and Eclampsia Using Magnesium Sulphate

STEPS OF GIVING MAGNESIUM SULPHATE

Before Administering Magnesium Sulphate, Ensure that the Ampule Contains 50% $MgSO_4$ (1 ampule =1 gm=2 mL $MgSO_4$):

Loading Dose

- Draw 4 ampules of $MgSO_4$ in 20 mL syringe.
- Add 12 mL water for injection in that syringe.
- Give IV slowly over 5 minutes.

Follow promptly with 10 ampules of $MgSO_4$ deep IM:

- Draw 1 mL Lignocaine in 10 mL syringe.
- Add 5 ampules of $MgSO_4$ in that syringe.
- Give deep IM in one buttock.
- Take another 10 mL syringe and draw 1 mL Lignocaine.
- Add 5 ampules of $MgSO_4$ in that syringe.
- Give deep IM in the other buttock.
- **If further fits occur, give further 2 ampules of $MgSO_4$ IV slowly over 5 minutes.**

Maintenance Dose
5 ampules of $MgSO_4$ deep IM in alternate buttocks every 4 hourly:

- Draw 1 mL Lignocaine in 10 mL syringe.
- Add 5 ampules of $MgSO_4$ in that syringe.
- Give deep IM in alternate buttocks every 4 hourly.
- Continue same treatment for 24 hours after delivery or the last convulsion, whichever is the last.

Before Repeating Magnesium Sulphate, ensure that:

- Respiratory rate is at least 16 per minute.
- Patellar reflexes are present.
- Urinary output is at least 30 mL/hour or 120 mL in 4 hours.

MONITORING OF SEVERE PRE-ECLAMPSIA AND ECLAMPSIA

- Monitor hourly:
  - BP
  - Pulse
  - Temperature
  - Respiratory rate
  - Patellar reflex
  - Fetal heart rate
  - Intake and urine output
  - Signs and symptoms of pulmonary edema—shortness of breath, rales, etc.
- Suspend or postpone use of magnesium sulphate if respiration <16/minute, patellar reflexes absent or urine output <30 mL/hour.

When should we stop Magnesium Sulphate if there are no signs of toxicity?

- 24 hours after the last convulsion or 24 hours after delivery, whichever is later.

What are the signs of Magnesium Sulphate toxicity?

- Respiratory rate <16 per minute
- Urine output less than 30 mL per hour
- Absent patellar reflex

MANAGEMENT OF MAGNESIUM SULPHATE TOXICITY

Urine Output Less than 30 mL per Hour:

- Delay next dose of magnesium sulphate, until urine output is adequate.
- Infuse with RL 1 litre over 8 hours.
- Monitor urine output.

Absent Patellar Reflex:

- Delay next dose of magnesium sulphate until reflex returns.
- Check patellar reflex one hourly.

RESPIRATORY RATE LESS THAN 16/MIN:

If respiratory depression (RR<16/min)

- Delay next dose of magnesium sulphate
- Give calcium gluconate 1 gm (10 mL of 10% solution) IV slowly (over 10 minutes)
- Give oxygen by mask
- Maintain airway

If respiratory arrest (stopped respiration)

- Stop magnesium sulphate
- Give calcium gluconate 1 gm (10 mL of 10% solution) IV slowly (over 10 minutes), Repeat dose until calcium gluconate begin to antagonize the effects of magnesium sulphate
- Intubate and ventilate immediately
- Ventilation should be continued until the resumption of normal spontaneous respiration
- Give oxygen by mask
- Maintain airway

BE PREPARED: SET UPMAGNESIUM SULPHATE TRAY IN YOUR WARD

- Set up $MgSO_4$ tray in your organization (admission/emergency room) for easy access
- Replace $MgSO_4$ and syringes after use
- Check the expiry date and replace with new

Requirements for MgSO4 Tray—Get Ready for case management:

ITEMS NEEDED ON TRAY	QUANTITY
IV cannula no. 18	1 piece
Depin 5 mg	10 caps
Magnesium sulphate	46 ampules
Water for injection	12 mL + 20 mL
Syringe 20 mL	1 piece
Syringe 10 mL	10 pieces
Syringe 5 mL	1 piece
Lignocaine 2%	1 vial
Calcium gluconate	2 ampules
Foleys catheter with urine bag	1 pc
Normal saline/Ringers Lactate	2 bottle
Fetuscope	1pc
Thermometer	1pc
Reflex hammer	1pc
Ambu Bag and mask	1 pc each
O_2 if available	

Annex 3: Availability and Stock outs of MgSO4 and Other Accessories

Item needed for one case	Quantity	Dang	Lamahi	Pyuthan	Khalanga	BZH	Khajura	Guleria	Rajapur	MWRH	Mehelkuna
IV cannula no. 18	2 piece	√	√	√	√	√	√	√	√	√	√
Depin 5 mg	10 caps	√	√	**X**	√	√	√	**X**	√	√	**X**
Magnesium sulphate 50%	50 ampules	√	√	√	√	√	√	*√	√	√	√
Water for injection	12 mL + 20 mL	√	√	√	√	√	√	√	√	√	√
Syringe 20 mL	1 piece	√	√	√	√	√	√	**X**	**X**	√	√
Syringe 10 mL	10 pieces	√	√	√	√	√	√	√	√	√	√
Syringe 5 mL	1 piece	√	√	√	√	√	√	√	√	√	√
Lignocaine 2%	1 vial	√	√	√	√	√	√	√	√	√	√
Calcium gluconate	2 ampules	√	√	**X**	**X**	√	**X**	**X**	**X**	√	**X**
Foleys catheter with urine bag	1 pc	√	√	√	√	√	√	**X**	√	√	√
Normal saline/Ringers Lactate	2 bottle	√	√	√	√	√	√	√	√	√	√
Fetuscope	1pc	√	√	√	√	√	√	√	√	√	√
Thermometer	1pc	√	√	√	√	√	√	√	√	√	√
Reflex hammer	1pc	√	**X**	**X**	**X**	√	**X**	**X**	**X**	√	**X**
Ambu Bag and mask	1 pc each	√	√	√	√	√	√	√	√	√	√
O_2 if available		√	√	√	√	√	√	√	√	√	√
*25% only											

Annex 4: Availability and Stock outs of Emergency Drugs

Availability of Emergency Drugs	Dang	Lamahi	Pyuthan	Khalanga	BZH	Khajura	Guleria	Rajapur	MWRH	Mehelkuna
Oxytocin	√	√	√	√	√	√	√	√	√	√
MgSO4 50%	√	√	√	√	√	√	*√	√	√	√
IV cannula	√	√	√	√	√	√	√	√	√	√
RL/NS	√	√	√	√	√	√	√	√	√	√
Ca gluconate	√	√	**X**	**X**	√	**X**	**X**	**X**	√	**X**
Ampicillin	√	√	√	√	√	√	√	√	√	√
Metronidazole	√	√	√	√	√	√	√	√	√	√
Gentamycin	√	√	√	√	√	√	√	√	√	√
Nifedepin 5 mg	√	√	**X**	√	√	√	**X**	√	√	**X**
* 25% only										

Annex 5: Availability of 24 hours BEOC and CEOC services

Availability of 24 hr BEOC for complication mgmt for BEOC sites	**Dang**	**Lamahi**	**Pyuthan**	**Khalanga**	**BZH**	**Khajura**	**Guleria**	**Rajapur**	**MWRH**	**Mehelkuna**
Mgmt of PPH with parenteral oxytocin		√	√	√		√		√		√
Mgmt of sepsis with parenteral antibiotic		√	√	√		√		√		√
Mgmt of SPE with MgSO4		**X**	**X**	**X**		**X**		**X**		**X**
Mgmt of E with MgSO4		√	√	**X**		**X**		**X**		√
MRP		√	√	√		√		√		√
MVA for incomplete abortion		√	√	**X**		√		√		√
Vacuum delivery for prolonged labor		√	**X**	**X**		**X**		√		√
Newborn resuscitation		√	√	√		√		√		√
Availability of 24 hour CEOC services for complication management for CEOC sites										
Mgmt of PPH with parenteral oxytocin	√				√		√		√	
Mgmt of sepsis with parenteral antibiotic	√				√		√		√	
Mgmt of SPE with MgSO4	**X**				√		**X**		√	
Mgmt of E with MgSO4	√				√		√		√	
MRP	√				√		√		√	
MVA for incomplete abortion	√				√		√		√	
Vacuum delivery for prolonged labor	√				√		√		√	
Newborn resuscitation	√				√		√		√	
24 hour CS	√				√		***X**		√	
24 hour blood transfusion	√				√		√		√	
* doctor unavailable for CS for more than 1 year										

Annex 6: Selected Health Facilities

Surkhet district:

Mid Western Regional Hospital (MWRH)

Mehelkuna Primary Health Care Center

Banke district:

Bheri Zonal Hospital (BZH)

Khajura Primary Health Care Center

Bardiya district:

Guleria District Hospital

Rajapur Primary Health Care Center

Dang district:

Dang Sub Regional Hospital

Lamahi Primary Health Care Center

Pyuthan district:

Pyuthan District Hospital

Khalanga Primary Health Care Center

Annex 7: Numerator and Denominators used for this calculation

A. **Percentage of SPE/E cases in each facility =** SPE/E cases within FY 2065/66 in that facility* 100 / Total deliveries within that FY in that facility

B. **Percentage of SPE/E cases admitted in each facility =** SPE/E cases admitted in FY 2065/66 in that facility *100 / Total SPE/E within that FY in that facility

C. **Percentage of SPE/E cases managed in each facility =** SPE/E cases managed whole FY*100 / Total admitted SPE/E within that FY in that facility

D. **Percentage of SPE/E cases referred from each facility =** SPE/E cases referred from that facility during FY 2065/66 *100 / Total SPE/E within that FY in that facility

E. **Percentage of SPE/E cases managed with MgSO4 in each facility =** SPE/E cases managed with MgSO4 in that facility during FY 2065/66 *100 / Total admitted SPE/E within that FY in that facility

F. **Percentage of SPE/E cases improved with MgSO4 in each facility =** SPE/E cases improved with MgSO4 in that facility during FY 2065/66 *100 / Total admitted SPE/E within that FY in that facility

G**. Percentage of maternal deaths due to SPE/E among total diagnosed SPE/E cases within one FY**
= maternal deaths due to SPE/E in that facility during FY 2065/66 *100 / Total SPE/E within that FY in that facility