

# Pre-referral Intervention on Severe Preeclampsia/Eclampsia Patients

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## Abstract

**Objectives:** To describe the pre-referral intervention on patients with severe preeclampsia/eclampsia before getting referred to Dr. Soetomo Hospital Surabaya as top referral hospital in east Indonesia in 2017

**Method:** A retrospective descriptive observational study was performed in 2017. Data from medical records at Dr. Soetomo Hospital from January to December 2017. The subjects of this study are patients with severe preeclampsia/eclampsia who were referred to Dr. Soetomo Hospital in 2017 included both pregnant and postpartum patients

**Results:** There are 357 patients suffered from severe preeclampsia among all obstetric 1588 patients at Dr. Soetomo Hospital. In 2017, 77 patients (21.57%) were treated conservatively while the remaining 280 patients (78.43%) were terminated directly or postpartum patients. Of the 280 patients, 258 (92.14%) were referred patients and 22 patients (7.86%) are self-referred patients. More than 50% of referred patients had been given some intervention such as O<sub>2</sub> installation, urinary catheter insertion, and iv line administration. In this study, 151 patients (58.53%) were given MgSO<sub>4</sub> while those according to administration were only 78.15%. The number of maternal deaths in severe preeclampsia/eclampsia patients were 18 patients and fetal complications that often occur are IUFD 29 babies and 25 babies born with IUGR

**Conclusion:** More than 50% of severe preeclampsia/eclampsia referred patients in Dr. Soetomo Hospital had done a referral preparation but only 58.53% of referred patients given MgSO<sub>4</sub> as a form of pre-referral intervention.

*Keywords: Preeclampsia, Pre-referral intervention*

## Introduction

One of the indicators of success in the health sector is the maternal mortality rate (MMR). Indonesia's MMR in 2007 was 228 people and increased to 359 in 2012. This

number is still far from the Sustainable Development Goals (SDGs) target which is 70 per 100,000 people in 2030. Preeclampsia is an obstetric problem in the world especially in developing countries that it's increasing morbidity and mortality in both mother and fetus. The range incidence of preeclampsia in the world is 2% to 8% of all pregnancies. Preeclampsia-eclampsia is one of the causes of maternal death in Indonesia, which is around 12%.<sup>1</sup> In 2007, 117 of 414 maternal deaths at East Java were caused by pre-eclampsia while in Dr. Soetomo Surabaya Hospital there was an increasing number of maternal deaths due to preeclampsia from 57% in 1999 to 60% in 2007.<sup>2</sup> Pre-referral intervention

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is expected to reduce maternal and infant mortality rate due to preeclampsia-eclampsia. In Surabaya, especially in Dr. Soetomo Surabaya Hospital, there are no data regarding the pre-referral stabilization in patients with severe preeclampsia/eclampsia referred to the Dr. Soetomo Surabaya Hospital. This study tried to provide an overview of pre-referral intervention on referred patients with severe preeclampsia / eclampsia in Dr. Soetomo Surabaya Hospital and how the maternal and neonatal outcome was.

## Method

This is a retrospective descriptive observational study by using medical records conducted at Dr. Soetomo Surabaya Hospital from January to December 2017. The population of this study were total pregnant or postpartum patients referred to Dr. Soetomo Surabaya Hospital in 2017 with severe preeclampsia/eclampsia.

## Results

### Characteristics of referred patients with severe preeclampsia/eclampsia

**Table 1. Characteristics of referred patients with severe preeclampsia/eclampsia in Dr. Soetomo Surabaya Hospital in 2017**

Characteristics	n	%
Age (years old)		
Mean	30,43	-
<16	2	0,78
17-34	176	68,22
>35	80	31,01
Numbers of Pregnancies		
Primigravida	81	31,40
Multigravida	177	68,60
BMI (kg/m <sup>2</sup> )		
<18,5	1	0,39
18,5-24,9	63	24,42
25,0-29,9	87	33,72
30,0-34,9	55	21,32
35-39,9	23	8,91
>40	29	22,48
ANC		
Yes	251	97,29
No	7	2,71
ANC Place		
Midwife	148	-
Public Health Centre	93	-
Obstetrician	152	-
Number of ANC		
<4 x	43	17,13
>4 x	208	82,87

Gestational age when admitted		
<28 weeks	23	10,27
28-33 weeks	52	23,21
>34 weeks	149	66,52
Mode of delivery		
Spontaneous	45	-
Vacuum Extraction	1	-
Forcep Extraction	22	-
Cunam Muzeaux	7	-
Cesarean Section	180	-

During 2017, the total number of patients who came to the Dr. Soetomo Hospital was 1588 patients with 357 cases with severe preeclampsia/eclampsia both pregnant and postpartum. There were 77 patients (21.57%) were treated conservatively (giving fetal lung maturation, waiting until 34 weeks gestational age by monitoring fetal and maternal well being), while the remaining 280 patients (78.43%) were terminated directly (due to poor fetal condition, maternal condition and time to deliver) or postpartum patients. From all of the patients who directly terminated or postpartum, 258 patients (92.14%) were referred patients and 22 patients (7.86%) came by themselves to Dr. Soetomo Hospital.

The average age of these patients was 30.43 years old with the highest number in 17-34 group, which was on 176 patients (68.22%). Multigravida patients is more than primigravida with 177 (68.60 %) compare to 81 (31.40%).

About the BMI, the highest BMI group was 25.0-29.9 (overweight). Almost all of the referred patient underwent antenatal care during pregnancy, only 7 patients (2.71%) did not undergo antenatal care. Mostly, the referred patients who did antenatal care were examined by an obstetrician and 208 patients (82.87%) did the antenatal care more than 4 times.

Most of the patients came from Surabaya (51,55%) and referred by secondary health facilities (72,48%) and 72,48% patients were treated only in one facility before reaching Dr. Soetomo Hospital. Twelve patients came by themselves to Dr. Soetomo Hospital, and never had been diagnosed with preeclampsia before. The transport time ranged from 8 to 443 minutes (mean: 70,07 minutes) and the distance ranged from 2,8 km to 274 km (mean: 45,25km).

**Table 2. Characteristics of referred patients with severe preeclampsia/eclampsia based on reference data**

	n	%
Referral Origin		
Outside Surabaya	125	48,45
Surabaya	133	51,55
Referral agent		
Midwife	17	6,59
1 <sup>st</sup> level of health facility	50	19,38
2 <sup>nd</sup> level of health facility	187	72,48
Obstetrician	4	1,55
Numbers of providers before refers to Dr Soetomo Hospital		
1	187	72,48
2	62	24,03
3	9	3,49
How to come to Dr. Soetomo Hospital		
With transporter	246	95,35
Came by themselves	12	4,65
Mean of travel time (minutes)	70,07	-
The fastest time	8	-
The longest time	443	-
Mean of distance between last referral place and Dr. Soetomo Surabaya Hospital (km)	45,25	-
The nearest distance	2,8	-
The farthest distance	274	-

**Pre-referral interventions**

The patients had some interventions before getting referred. There is a standard procedure of prereferral management in Indonesia which every health care providers should follow which are providing oxygenation, urinary catheter insertion, infusion insertion, MgSO<sub>4</sub> administration as eclampsia prophylaxis including loading dose and maintenance dose.

There were 107 patients (41.47%) not given MgSO<sub>4</sub> before getting referred. Patients who were not given MgSO<sub>4</sub> included patients who were referred without transporter, patients with complications such as lung edema and patients not given MgSO<sub>4</sub> without information. Two patients were given a loading dose but did not match the procedure because the dose given only 2 grams intravenously. Patients who were not given maintenance doses including patients who came by themselves bringing referral note, patients with

complication such as lung edema and patients who were not given according to procedure and level of health facilities.

**Table 3. Mentions about the interventions that those patients got before getting referred.**

Characteristics	n	%
Oxygen Equipment applied		
Yes	152	58,91
No	106	41,09
Urinary catheter installation		
Yes	219	84,88
No	39	15,12
Infusion applied		
Yes	245	94,96
No	13	5,04
MgSO <sub>4</sub> administration		
Yes	151	58,53
No	107	41,47
Suitability of MgSO <sub>4</sub> administration		
Suitable		
Not suitable	118	78,15
	33	21,85
Loading dose		
Yes	144	55,81
No	114	44,19
Suitable	142	98,61
No suitable	2	1,39
Maintenance Dose		
Yes	128	49,61
No	130	50,39
Suitable	117	91,41
No suitable	11	8,59

**Maternal and Neonatal Outcomes**

There were 102 patients (39.53%) need ICU facilities. Most patients treated in ICU using a ventilator are patients with complications such as lung edema and eclampsia. Patients with length of stay more than 1 week are complicated patients such as eclampsia and acute kidney injury, HELLP syndrome, and DIC and all of these patients were died.

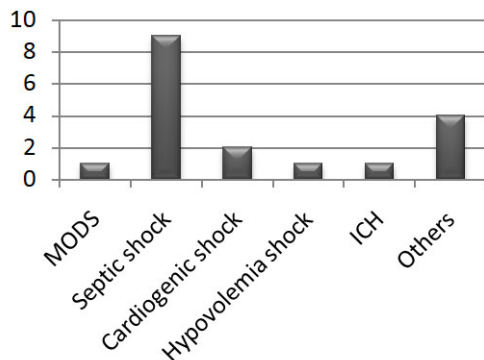
**Table 4. Maternal Outcomes of Referred patients with severe eclampsia/eclampsia**

Maternal care	n	%
ICU/ROI		
Yes	102	39,53
No	156	60,47
Ventilator		
Yes	70	68,63
No	32	31,37
Length of stay in ICU		
<48 hours	63	61,76
48 hours-1 week	36	35,29
>1 week	3	2,94
Maternal complication		
Lung edema	75	-
Eclampsia	43	-
HELLP syndrome	51	-
Cerebral hemorrhage	4	-
Acute Kidney Injury	31	-
DIC	2	-
PPCM	19	-
Without complication	81	-

It was found that the number of maternal deaths in severe preeclampsia/ eclampsia patients were 18 patients. From these patients, only 7 patients received MgSO<sub>4</sub> injection with appropriate procedure, 3 patients were given MgSO<sub>4</sub> but the method was not appropriate, and 8 patients were not given MgSO<sub>4</sub> that had complication such as of lung edema, 1 patient with suspected cardiac abnormalities, 1 patient came by herself, and 1 patient with post cesarean section 25 days ago.

**Causes of Maternal Death**

**Causes of Maternal Death**



**Figure 1. Causes of Maternal Death in severe preeclampsia/eclampsia cases at Dr. Soetomo Hospital in 2017.**

**Table 5. Neonatal Outcomes of Referred patients with severe preeclampsia/eclampsia**

	n	%
Baby born weight (gram)		
Mean	1990,52	-
<1500	58	21,40
1500-1999	42	15,50
2000-2499	53	19,56
2500-2999	56	20,66
>3000	62	22,88
Apgar score		
0-3	52	19,19
4-6	100	36,90
7-10	119	43,91
Fetal complication		
IUGR	25	-
IUFD	29	-

The heaviest birth weight was more than 3000 grams which was 62 patients (22.88%). This data illustrates that referred patient with severe preeclampsia/eclampsia with a gestational age more than 34 weeks or late onset is more than early onset preeclampsia. The most common complication in severe preeclampsia/eclampsia patients is IUFD as many as 29 infants.

**Discussion**

During 2017, there were 357 cases of severe preeclampsia/eclampsia cases at Dr. Soetomo Hospital, both pregnant and postpartum. Study in Dr. Kariadi Semarang Province Hospital there were 1030 cases of preeclampsia/eclampsia during the 2013-2016, while in Dr. Soetomo Hospital in 2013-2014, Wardhana (2018) found that there were 1106 cases of preeclampsia/ eclampsia (21%) from 5266 deliveries.<sup>3,4</sup>

Based on the age, 31.01% patient with advanced maternal age. Too young or too old is a risk factor for preeclampsia. Maternal age more than 35 years old has risk of 1.5 times greater to be preeclampsia. At this age, women are more susceptible to systemic diseases such as hypertension, diabetes mellitus, and others.<sup>5</sup>

From the number of pregnancies, most of severe preeclampsia/ eclampsia patients were multigravida compared to primigravida. Study by Erliana (2016) obtained more cases of severe preeclampsia happened in multigravida compared with primigravida. It is because many maternal factors influence such as maternal age, comorbidities, history of hypertension, etc.<sup>6</sup> However,

ametanalysis study by Bartsch et al (2016), 25 studies showed nullipara was a risk factor to increased preeclampsia and found 32.2% in the preeclampsia population.<sup>7</sup>

Obesity is one of the factors that can increase preeclampsia incidence. In this study, the total number of obese patients was more than overweight and normal. One of the mechanism that links obesity with preeclampsia is inflammation. Adipose tissue produces several inflammatory mediators that can alter endothelial function.<sup>8</sup>

From the antenatal care, 7 patients did not undergo antenatal care during their pregnancy and all of them came from outside Surabaya. This was probably due to the public health centre is far from patient's house or the patient's awareness was low to get antenatal care. Antenatal care is an attempt to prevent preeclampsia. Initial information on antenatal care such as blood pressure before pregnancy can be used to distinguish between chronic hypertension and preeclampsia. Karima's study at Padang Public Hospital found that there was no significant relationship between the number of antenatal care and the incidence of severe preeclampsia.<sup>9</sup>

The gestational age when admitted will affect the outcome of the baby and affect the decision that will be taken in severe preeclampsia/eclampsia patients. In this study, most of gestational age of the referred patients with severe preeclampsia/eclampsia was more than 34 weeks. This shows that most of the referral cases of severe preeclampsia/eclampsia in Dr. Soetomo Hospital are late onset. This is consistent with the theory that the incidence of late onset of preeclampsia is 75% of all numbers.<sup>10</sup> Late onset of preeclampsia is associated with abnormalities in the maternal side such as obesity or gestational diabetes and according to the results of this study where the number of severe preeclampsia/eclampsia patients with obesity and overweight is more than normal BMI.

Dr. Soetomo Hospital as a tertiary hospital receives referrals from various health centers. The most frequent health facilities that made referrals were 2<sup>nd</sup> level of health facilities. This condition is in accordance with the referral pathway that if the patient requires further treatment which 2<sup>nd</sup> level of health facilities cannot handle, so the patient must be referred to the 3<sup>rd</sup> level of health facility immediately to get better services.

However, if the case is too difficult to handle in 2<sup>nd</sup> level of health facilities, direct referrals to higher health facilities are carried out. This is expected to reduce the referral time so that patients get proper treatment immediately.

Almost 50% patients referred to Dr. Soetomo Hospital were not oxygenated. Catheter insertion is needed to determine the patient's urine because in severe preeclampsia/eclampsia patients, the amount of fluid must be arranged so that there will be not overload condition causing further complications such as lung edema. From those who did not have a urine catheter, they included patients who came by herself and only given a referral note because they did not diagnosed with severe preeclampsia/eclampsia before.

The administration of MgSO<sub>4</sub> is a kind of pre-referral stabilization in patients with severe preeclampsia/eclampsia. MgSO<sub>4</sub> is drug of choice to prevent eclampsia. This drug is superior to diazepam and phenytoin. Compared with placebo or without anti-seizures, MgSO<sub>4</sub> can reduce 59% of the risk of eclampsia, 36% reduce placental abruption.<sup>11</sup> The main purpose of giving MgSO<sub>4</sub> in severe eclampsia patients is to prevent eclampsia. In addition, MgSO<sub>4</sub> can also reduce maternal and perinatal mortality and morbidity even in severe eclampsia patients who do not experience seizures. Some studies found that administration of MgSO<sub>4</sub> prophylaxis given to severe eclampsia patients was associated with a significant reduction in the incidence of eclampsia.<sup>12</sup>

The most common maternal complications that occurred in referred patients with severe preeclampsia/eclampsia in Dr. Soetomo Hospital in 2017 was lung edema and 39.53% of patients had to undergo treatment in the ICU and needed a ventilator in their care. Lung edema is one indication of ventilator used in these patients. As in Wardhana's study, there were 50 cases (81%) of lung edema needed ICU and 37 cases (60%) needed a ventilator.<sup>4</sup> In preeclamptic patients, endothelial dysfunction causes increasing in systemic vascular resistance and the proteinuria and systemic inflammation also cause decreasing in plasma oncotic pressure. This condition will make fluid extravasation into the surrounding tissue and lung edema can be happened easily. Acute Kidney Injury is one of the complications that can occur during the conservative treatment in severe preeclampsia patients. In this patients, the glomerulus becomes large and swollen. This event, together with the presence of overall vasoconstriction that occurs in

preeclamptic patients, cause 25-30% reduction in plasma flow and glomerular filtration compared to normal pregnancies. This condition will usually improve after labor.<sup>13</sup>

### Conclusion

More than 50% of referred patients with severe eclampsia/eklampsia during 2017 have been prepared properly by the referrer but not all patients are given MgSO<sub>4</sub> as a form of pre-referral interventions. Mismanagement about the administration procedure of MgSO<sub>4</sub> is still found

### Conflict of Interest

This articles has no conflict of interest. This article has no source of funding

### Ethical Clearance

This article had ethical clearance from Dr. Soetomo Hospital ethical committee number 0483/KEPK/VIII/2018

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