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# THE ROLE OF ANESTHESIA TRAINERS IN MONITORING PREANESHETICATION IN CAESAREAN SECTION (CS) PATIENTS WITH PREECLAMPSIA

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## ABSTRACT

Patients undergoing CS for preeclampsia with high-risk multisystem disorders can increase the risk of maternal and perinatal morbidity and mortality. Close pre-anesthetic monitoring is essential for proper anesthetic management and a safe delivery for both mother and baby. Objective to explore the role of anesthesiologists in conducting pre-anesthetic monitoring in cesarean section (CS) patients with preeclampsia at Udayana Class II Hospital. This research is an exploratory multiple case study. It was conducted at Udayana Hospital Level II from April to May 2026. The population consisted of all seven anesthesiologists at Udayana Hospital. Three anesthesiologists participated in the study. Data triangulation was conducted by involving one anesthesiologist. This study used a purposive sampling technique. This study used in-depth interviews conducted verbally and face-to-face with participants. Furthermore, this study employed document analysis by randomly selecting one medical record from a CS patient with preeclampsia. Anesthesiologists play a role in conducting pre-anesthetic monitoring in cesarean section patients with preeclampsia, including assessing medical and obstetric history, evaluating supporting examination results and fetal condition, conducting a physical examination, and comprehensively assessing therapy and medication history. Maintaining physiological stability and patient safety by conducting hemodynamic monitoring to ensure blood pressure does not fluctuate by more than 20%, administering a preload of 500 cc of RL for fluid management, and providing psychological education; conducting pre-anesthetic monitoring using a bedside monitor and manual examination, recording every 15 minutes or as needed, and documenting monitoring results as a basis for continuity of care in the CPPT. The role of anesthesiologists in pre-anesthetic monitoring in caesarean section patients with preeclampsia includes comprehensive assessment, hemodynamic monitoring, fluid management, education, and continuous documentation, thus supporting the stability of the patient's condition and improving the safety and quality of perioperative anesthesia services.

Keywords: anesthesiologist; cesarean section; pre-anesthetic monitoring; preeclampsia

## INTRODUCTION

Preeclampsia is a complication of pregnancy characterized by high blood pressure and proteinuria after 20 weeks of gestation (Karrar et al., 2024). Severe preeclampsia usually requires Caesarean section (CS). Patients undergoing CS for preeclampsia with high-risk multisystem disorders can increase the risk of maternal and perinatal morbidity and mortality. Preeclampsia can have serious consequences if not treated properly. Some complications of eclampsia include Microangiopathic Hemolysis in smears, Elevated Liver Enzyme and Low Platelet Count (HELLP syndrome), placental abruption, acute renal failure, cerebral hemorrhage, neurological deficits, aspiration pneumonia, pulmonary edema, Disseminated Intravascular Coagulation (DIC), preterm labor, fetal distress, asphyxia, and fetal death (Akbar, 2024). Strict perianesthetic monitoring is essential for effective anesthetic management, stabilizing the mother's condition, managing potential complications, and ensuring a safe delivery for both mother and baby.

According to World Health Organization (WHO) data, preeclampsia is the third leading cause of maternal death, accounting for 16% of all maternal deaths (Cresswell et al., 2025). In Indonesia, preeclampsia ranks second (Balai Litbangkes Baturaja, 2020). According to Macedo et al., 2020, the overall prevalence of preeclampsia in adolescent pregnancies is 6.7%. The global prevalence of preeclampsia is 4.43% (Vera-ponce et al., 2025). The incidence of preeclampsia leading to

eclampsia is 0.6%, while preeclampsia without anticonvulsant prophylaxis can lead to eclampsia in 2-3% of cases (Akbar, 2024). A study conducted by Bahri & Suheimi (2019) at Arifin Achmad Regional Hospital in Pekanbaru showed that the prevalence of severe preeclampsia reached 14.54% and eclampsia 3.28%. This is supported by Mariah et al. (2025), who found that 38.8% of mothers with severe preeclampsia ultimately required a CS.

Perianesthetic monitoring is performed to detect physiological changes in patients undergoing anesthesia, allowing interventions to be initiated before these changes become harmful (Rehatta et al., 2019). Careful perianesthetic monitoring of CS patients with preeclampsia requires careful pre-anesthesia, intra-anesthesia, and post-anesthesia monitoring. This monitoring is crucial to prevent an increased risk of pharyngolaryngospasm. However, the implementation of anesthetic monitoring, both pre-anesthesia, intra-anesthesia, and post-anesthesia, in CS patients with preeclampsia remains understudied. A study conducted by Nawafleh et al., 2022, in Jordan found that 36.4% of anesthesiologists had never used depth of anesthesia (DoA) monitoring, and only 6.5% used it in their daily practice. Even in Bangladesh, 5% of cases still had intraoperative monitoring parameters (heart rate, blood pressure, oxygen saturation, and end-expiratory carbon dioxide levels) that were not consistently documented (Rahman & Azad, 2024). Furthermore, in five hospitals in Australia, 51.8% of patients had low perioperative temperature monitoring rates, and 32.7% of patients did not have temperature monitoring data before admission to the Post-Anesthesia Care Unit (PACU) (Munday et al., 2023). Despite the lack of temperature monitoring data, 68.5% of patients still received active rewarming measures during surgery. The average knowledge score of anesthesiologists and anesthesiologists regarding safe anesthesia monitoring was also found to only reach 68.40 with a minimum score of 50 and a maximum score of 85 (Pratama & Pambayun, 2024).

Perianesthetic monitoring is one of the roles of anesthesiologists in reducing maternal complications in CS patients with preeclampsia, namely hypertension management; strategies to maintain the function of the brain, heart, liver, kidneys, hematology and coagulation systems, and placenta (Dennis et al., 2025). Considering that perianesthetic monitoring is not only limited to looking at a screen or monitoring device, but also requires understanding the parameters to be monitored, so that awareness and professional behavior of anesthesiologists are needed. Udayana Class II Hospital is ranked third in the hospital with the largest number of anesthesiologists in Denpasar City (Directorate of Health Human Resources Planning, 2026). In addition, Denpasar City is the Regency/City with the lowest Maternal Mortality Rate (MMR) in Bali Province (BPS Bali Province, 2023). This indicates that labor management, including CS, has been carried out optimally and this experience is important to know. Therefore, research on the role of anesthesiologists in conducting preanesthetic monitoring in Caesarean section (CS) patients with preeclampsia needs to be conducted at Udayana Class II Hospital. It is hoped that the results of this study will provide an overview of the professionalism of anesthesiologists in conducting pre-anesthetic monitoring, thereby increasing the safety of CS patients with preeclampsia during anesthesia. The aim of this research is to explore the role of anesthesiologists in conducting pre-anesthetic monitoring in cesarean section (CS) patients with preeclampsia at Udayana Class II Hospital.

## METHOD

This research is an exploratory multiple case study. It was conducted at Udayana Hospital Level II from April to May 2026. The population consisted of all seven anesthesiologists at Udayana Hospital. Three anesthesiologists participated in the study. Data triangulation was conducted by involving one anesthesiologist. This study used a purposive sampling technique. The inclusion and exclusion criteria for this study. Inclusion Criteria is anesthesiologists working at Udayana Hospital Level II, anesthesiologists with at least three years of experience monitoring anesthesia in Caesarean section patients with preeclampsia and anesthesiologists with an active Anesthesiologist Registration Certificate (STR). Exclusion Criteria is anesthesiologists who refused to participate in

the study and anesthesiologists not registered in the Medical and Health Personnel Planning Data of the Ministry of Health of the Republic of Indonesia. This study used in-depth interviews conducted verbally and face-to-face with participants. Furthermore, this study employed document analysis by randomly selecting one medical record from a CS patient with preeclampsia. This study used interview guidelines and patient medical records. This study was approved by the Bali Health Research Ethics Committee under Number: 04.203/KEPITEKES-BALI/III/2026. This study used single-case and cross-case analysis for data analysis.

## RESULT

### Participant Characteristics

This study involved four participants: three anesthesiologists (PA1, PA2, and PA3) as primary participants and one anesthesiologist (DA1) as triangulation source participant. All participants were male, aged 36–57 years. The three primary participants had a Diploma IV in Anesthesiology Nursing, while the triangulation participant had a Master's degree (S2) and worked as an anesthesiologist. Based on length of service, the primary participants had a relatively long work experience, ranging from 21–33 years. PA1 had 21 years of service, while PA2 and PA3 had each worked for 33 years. Meanwhile, the triangulation participant had 3 years of service. The complete data can be seen in Table 1.

Table 1.
Participant characteristics

| Participant Code | Gender | Age | Education | Length of Service | Experience in Managing CS with Preeclampsia | Profession |
|---|---|---|---|---|---|---|
| PA1 | Man | 46 | DIV | 21 | > 10 | Anesthesiologist |
| PA2 | Man | 56 | DIV | 33 | > 10 | Anesthesiologist |
| PA3 | Man | 57 | DIV | 33 | > 30 | Anesthesiologist |
| DA1 | Man | 36 | S2 | 3 | - | Anesthesiologist |

### The Role of the Anesthesiologist in Pre-Anesthesia Monitoring in CS Patients with Preeclampsia

#### Anesthesiologist 1

The anesthesiologist conducts comprehensive pre-anesthesia monitoring, which includes a review of the patient's medical and obstetric history, a physical examination using the B1–B6 approach (Breathing, Blood, Brain, Bladder, Bowel, and Bone), monitoring of Vital Signs (VST) using a bedside monitor, evaluation of supporting test results (complete blood count, platelets, urea, creatinine, Bleeding Time/Clotting Time (BT/CT), and proteinuria), assessment of fetal condition through handover from the Verlos Room/Comprehensive Emergency Obstetric Neonatal Services (VK/PONEK), and assessment of the risk of clinical deterioration using the Early Warning Score (EWS). In addition, the anesthesiologist performs airway assessment, fluid management through crystalloid preload administration, monitoring magnesium sulfate use prior to spinal anesthesia, and providing psychological education to reduce anxiety and support the patient's hemodynamic stability. This is as expressed by the following participant.

"*...in pre-anesthesia, we still conduct anamnesis, for example, previous medical history, previous pregnancy history, whether there is a history of high hypertension or preeclampsia... then the usual vital signs using B1-B6... we check the urine for proteinuria... we monitor the results of supporting examinations, platelets, complete blood count, urea, creatinine, BT/CT... here we use EWS... we also perform airway assessment*." (PA1)

Anesthesiologists conduct monitoring during the pre-anesthesia phase because it is a crucial step in identifying the patient's clinical condition, anticipating the risk of complications, and ensuring the readiness of the patient, equipment, and anesthetic procedures to ensure the procedure proceeds safely. In CS patients with preeclampsia, pre-anesthetic monitoring focuses on cardiovascular stability, particularly blood pressure control and intravascular volume status, given the relative

hypovolemia and the risk of hypotension due to vasodilation following spinal anesthesia. Furthermore, airway assessment is still performed in anticipation of the need for conversion to general anesthesia due to a failed spinal block or other emergency. This statement is supported by the following quote:

"*All these assessments are important in the pre-op for this pre-eclamptic patient. Because everything will go well if the preparation is good and safe if the preparation is complete... we must primarily monitor the blood pressure to ensure it does not fluctuate more than 20%. We continue to assess the airway because we anticipate conversion if the spinal block is unsuccessful."* (PA1)

Anesthesiologists conduct monitoring during the pre-anesthesia phase through direct clinical examination and the use of monitoring equipment. The examination is performed by combining bedside monitoring results with manual confirmation, such as palpating the pulse after measuring it on the monitor. Monitoring is performed upon patient arrival in the preoperative room and repeated depending on the patient's condition and the waiting time before the procedure. If an abnormal result is found, such as an increase in blood pressure, the measurement is repeated two to three times to confirm the results. All monitoring findings are documented in the Electronic Medical Record (E-RM), while airway assessment is performed using the LEMON method as part of the anesthetic preparation.

"*In pre-op, the examination can be done manually with the aid of a monitor. For example, in addition to looking at the pulse on the monitor, we also feel its strength. If the blood pressure reading is high, we usually repeat it two or three times. We input all the monitoring results into the E-RM. We use LEMON for airway assessment*." (PA1)

Table 2.
Themes and subthemes of the role of anesthesiologists in conducting pre-anesthetic monitoring in CS patients with preeclampsia in anesthesiologist 1

| Thema | Subthema |
|---|---|
| Assessing the patient's clinical condition during the pre-anesthetic phase | Medical and obstetric history review |
| | Physical examination |
| Efforts to maintain patient stability and safety | Evaluation of supporting examinations and fetal condition |
| | Clinical risk assessment |
| | Airway assessment |
| Assessing the patient's clinical condition during the pre-anesthetic phase | Hemodynamic monitoring |
| | Fluid management and therapy |
| | Psychological education |
| Efforts to maintain patient stability and safety | Anticipation of complications |
| Implementing systematic pre-anesthetic monitoring | Monitoring methods |
| | Frequency of monitoring |
| | Confirmation of abnormal results |
| | Documentation |

The results of this study produced three themes, namely "assessment of the patient's clinical condition in the pre-anesthetic phase," "efforts to maintain patient stability and safety," and "implementation of systematic pre-anesthetic monitoring."

**Anesthesia Technician 2**

Anesthesia technicians conduct pre-anesthetic monitoring of the patient's hemodynamics, neurological status, organ function, and respiratory status. Monitoring includes measuring blood pressure, pulse rate, Mean Arterial Pressure (MAP), oxygen saturation, level of consciousness, and monitoring for edema as a sign of impaired organ function. In addition, anesthesia technicians evaluate laboratory test results, particularly proteinuria, attach an ECG monitor as part of routine pre-anesthetic monitoring, and assess airway and respiratory status through observation of breathing patterns and lung auscultation to detect possible pulmonary edema or respiratory distress. The patient's hydration status is also assessed as part of the anesthetic preparation. This was expressed by the following participants.

"*The first thing we monitor is blood pressure, meaning consciousness, whether there's edema in the legs, and then the labs check for positive protein... Blood pressure, pulse, including MAP... Saturation is also checked... Before surgery, we install monitoring equipment, including an ECG, during pre-anesthesia. As for airway assessment... we check for shortness of breath, whether there's any pulmonary edema, and we listen for wheezing or rhonchi... We also assess the patient's hydration status*." (PA2)

Anesthesiologists conduct monitoring during the pre-anesthesia phase to identify the patient's clinical condition early on, ensure that any elevated blood pressure is related to preeclampsia, and differentiate it from other causes, such as pain from contractions. Monitoring is also conducted to obtain information about any history of hypertension during pregnancy through the history taking so that the patient's condition can be accurately assessed before the anesthetic procedure is performed. This was conveyed by a participant as follows.
"*Preeclampsia is an increase in blood pressure after 20 weeks of pregnancy. So, when a CS patient has preeclampsia, we immediately check their blood pressure to see if it's high. We also ask if they had high blood pressure during their pregnancy, ma'am. This way, we can differentiate whether the high blood pressure is due to preeclampsia or contraction pain*." (PA2)

Anesthesiologists conduct monitoring during the pre-anesthetic phase by combining manual examination and the use of bedside monitors. Physiological parameters such as blood pressure, pulse rate, oxygen saturation, respiratory rate, and temperature are monitored using monitoring equipment and confirmed through manual examinations when necessary to ensure the accuracy of the results. Fluid balance is assessed through observation of the patient's condition and information regarding fluid therapy obtained during handover. Monitoring is continuous throughout the patient's stay in the pre-operative room, with results recorded every 15 minutes or as clinically necessary. All findings are then documented in the E-RM through the Integrated Patient Progress Record (CPPT). This statement is supported by the following quote.
"*All of these parameters are monitored manually or with a device, from a bedside monitor... If the monitor is in good condition, we trust it, but if not, we feel the pulse while looking at the monitor to be sure... For fluid balance, sometimes we ask the midwife, what IV is this patient on and when the IV was installed... In pre-op monitoring, a bedside monitor is installed, so we can see the changes at any time and document them every 15 minutes. Now the recording uses E-RM, there is a CPPT for the anesthesiologist and everything is recorded there*." (PA2)

Table 3.
Themes and subthemes of the role of anesthesiologists in conducting pre-anesthetic monitoring in CS patients with preeclampsia in anesthesiologists 2.

| Thema | Subthema |
|---|---|
| Assessing the patient's clinical condition during the pre-anesthetic phase<br>Efforts to maintain patient stability and safety | Medical and obstetric history review |
| | Physical examination |
| | Evaluation of supporting examinations |
| | Clinical risk assessment |
| | Airway assessment |
| Assessing the patient's clinical condition during the pre-anesthetic phase<br>Efforts to maintain patient stability and safety | Hemodynamic monitoring |
| | Fluid management and therapy |
| | Psychological education |
| | Anticipation of complications |
| Implementing systematic pre-anesthetic monitoring | Monitoring methods |
| | Frequency of monitoring |
| | Confirmation of abnormal results |
| | Documentation |

The results of this study produced three themes, namely "assessment of the patient's clinical condition in the pre-anesthetic phase," "efforts to maintain patient stability and safety," and "implementation of systematic pre-anesthetic monitoring."

**Anesthesiologist 3**

Anesthesiologists conduct pre-anesthesia monitoring of the patient's clinical condition to assess readiness for anesthesia in cesarean section patients with preeclampsia. Monitoring includes assessing hypertension history, physical examination, supporting tests, airway assessment, fluid status, and monitoring vital signs (vital blood pressure, pulse rate, respiratory rate, oxygen saturation, temperature, level of consciousness, and edema). This was expressed by a participant as follows:

"*...the first thing we ask is whether the patient has a history of hypertension... the pre-op physical examination revealed blood pressure above the standard. Supporting tests must also confirm preeclampsia, for example, urine albumin... we also check for edema... in addition to blood pressure, pulse, respiratory rate, oxygen saturation, temperature, assessment of consciousness, laboratory tests, airway assessment, ASA, and fluid status are also monitored... so only vital signs are relevant for specific monitoring in the operating room.*" (PA3)

Anesthesiologists conduct pre-anesthesia monitoring because the condition of patients with preeclampsia is dynamic, so changes in hemodynamic and physiological conditions can occur at any time. Monitoring aims to detect early clinical changes, maintain maternal stability, meet maternal and fetal oxygen needs, anticipate fetal distress, and control fluid therapy according to procedure to prevent fluid overload, which can worsen the patient's condition. This was expressed by a participant as follows:

"*...we cannot ignore preeclampsia because it is constantly changing. For example, pre-operative blood pressure will increase due to anxiety, and the pulse rate can also increase, affecting the patient's physiology intraoperatively. The respiratory rate must also be continuously monitored because the mother's oxygen needs increase to meet the needs of the baby. If oxygen needs are not met, fetal distress can occur. That's what we continuously monitor pre-operatively to assess the condition of the mother and baby. Fluid monitoring is also important because excessive fluid administration should not be given...*" (PA3)

The anesthesiologist performs pre-anesthesia monitoring using a combination of monitoring equipment and manual assessments. Parameters such as blood pressure are monitored using a bedside monitor and recorded every 15 minutes in the electronic medical record. Pulse and respiratory rate are confirmed through manual assessments to ensure accuracy. Oxygen saturation is monitored using a monitor, body temperature is measured manually, and the level of consciousness is assessed using the Glasgow Coma Scale (GCS). Monitoring also includes evaluation of laboratory test results, assessment of edema, hydration status, airway clearance, and information on fetal condition during the handover with the midwife. All monitoring results are documented as part of the pre-anesthesia monitoring. This was expressed by a participant as follows:

"*...a monitoring device that can be set every 15 minutes...blood pressure is checked every 15 minutes...pulse is also manual...respiratory rate (RR) is checked manually because it's more accurate...oxygen saturation is measured using a monitor, and temperature is measured manually...consciousness is assessed using the GCS...urine, edema, and airway assessment...during the handover, the midwife monitors the baby's heart rate (FHR)...hydration status is calculated based on the patient's fluid needs*." (PA3)

The results of this study yielded three themes: "assessment of the patient's clinical condition during the pre-anesthesia phase," "efforts to maintain patient stability and safety," and "implementation of systematic pre-anesthesia monitoring."

Table 4.
Themes and subthemes of the role of anesthesiologists in conducting pre-anesthetic monitoring in CS patients with preeclampsia in anesthesiologists 3.

| Thema | Subthema |
|---|---|
| Assessing the patient's clinical condition during the pre-anesthetic phase<br>Efforts to maintain patient stability and safety | Medical and obstetric history review |
| | Physical examination |
| | Evaluation of supporting examinations |
| | Clinical risk assessment |
| | Airway assessment |
| Assessing the patient's clinical condition during the pre-anesthetic phase<br>Efforts to maintain patient stability and safety | Hemodynamic monitoring |
| | Fluid management and therapy |
| | Anticipation of complications |
| | Monitoring methods |
| | Frequency of monitoring |
| | Confirmation of abnormal results |
| | Documentation |

The overall themes derived from interviews with anesthesiologists (PA1, PA2, and PA3) were confirmed by the anesthesiologist (DA1) and supported by the results of the medical record review. The anesthesiologist confirmed that pre-anesthesia monitoring includes assessment of the patient's clinical condition, assessment of anesthetic risk, and evaluation of patient readiness as the basis for determining the anesthetic technique and management plan. The medical record review also supported the documentation of several monitoring parameters, such as blood pressure, pulse rate, and level of consciousness. Although several other parameters were incompletely documented, no substantial differences were found regarding the implementation of pre-anesthesia monitoring between the interviews and the document observations. These findings strengthen the credibility of the three themes: assessment of the patient's clinical condition during the pre-anesthesia phase, efforts to maintain patient stability and safety, and implementation of systematic pre-anesthesia monitoring.

**Comparison of the Role of Anesthesiologists in Pre-Anesthesia Monitoring in CS Patients with Preeclampsia**

This analysis shows that all cases share three main themes: assessing the patient's clinical condition during the pre-anesthesia phase, maintaining patient stability and safety, and implementing systematic pre-anesthesia monitoring. However, there are variations in several sub-themes depending on the patient's clinical condition, service policies, and the clinical considerations applied by the anesthesiologist. A comparison of the analysis results between cases is presented in Table 5.

Table 5.
The role of the anesthesiologist in conducting pre-anesthetic monitoring in caesarean section patients with preeclampsia between cases

| Tema | Subtema | PA1 | PA2 | PA3 |
|---|---|---|---|---|
| Assessing the patient's clinical condition during the pre-anesthetic phase<br>Efforts to maintain patient stability and safety | Medical and obstetric history assessment | ✓ | ✓ | ✓ |
| | Physical examination | ✓ | ✓ | ✓ |
| | Evaluation of supporting examinations and fetal condition | ✓<br>✓ | ✓<br>x | ✓<br>✓ |
| | a. Evaluation of supporting examinations | ✓ | ✓ | ✓ |
| | b. Evaluation of fetal condition | ✓ | ✓ | ✓ |
| Assessing the patient's clinical condition during the pre-anesthetic phase<br>Efforts to maintain patient stability and safety | Clinical risk assessment | ✓ | ✓ | ✓ |
| | Airway assessment | ✓ | ✓ | ✓ |
| | Hemodynamic monitoring | ✓ | ✓ | X |
| | Fluid management and therapy | ✓ | ✓ | ✓ |
| Implementing systematic pre-anesthetic monitoring | Psychological education | ✓ | ✓ | ✓ |
| | Anticipation of complications | ✓ | ✓ | ✓ |
| | Monitoring methods | ✓ | ✓ | ✓ |
| | Frequency of monitoring | ✓ | ✓ | ✓ |

Based on the table above, all anesthesiologists stated that their role in conducting pre-anesthetic

monitoring in CS patients with preeclampsia includes assessing medical and obstetric history, conducting physical examinations, evaluating supporting examinations and fetal condition, assessing clinical risk, assessing the airway, hemodynamic monitoring, fluid management and therapy, anticipating complications, monitoring methods, monitoring frequency, confirming abnormal results, and documenting them. All anesthesiologists conducted a comprehensive assessment through evaluating medical history, obstetric history, chief complaint, and a physical examination. The examination included blood pressure, pulse rate, MAP, respiratory rate, oxygen saturation, body temperature, and level of consciousness. This was supported by the anesthesiologist who stated:
*"...we re-evaluate the SOAP to see if the patient has any complaints, such as dizziness, blurred vision, seizures, nausea, chest pain...*" (DA)
"*...we check their vital signs, blood pressure, level of consciousness, respiratory rate, heart rate, saturation... in addition to blood pressure, pulse, including MAP, RR, and temperature, we also check...*" (DA)

Furthermore, PA1, PA2, and PA3 also review the results of supporting examinations and condition evaluations, such as laboratory tests, especially those related to preeclampsia, and conduct a clinical risk assessment to determine the patient's readiness for anesthesia. This was supported by the anesthesiologist as follows:
"*...supporting examinations are usually just cross-checked because they have already been performed previously*." (DA)
"*...the patient's condition can often change...we need an evaluation to confirm the patient's condition, determine the anesthetic procedure and its risks...*" (DA)

These findings indicate that reviewing supporting examination results and evaluating the clinical condition is an important part of pre-anesthetic monitoring in CS patients with preeclampsia. However, PA2 does not emphasize fetal evaluation. In some cases, airway assessment is also part of the assessment as a basis for anticipating potential airway management difficulties if general anesthesia is required. The three anesthesiologists monitored the patient's blood pressure, pulse rate, MAP, and overall clinical condition. This was supported by the anesthesiologist as follows:
"*...we also check blood pressure, pulse rate, including MAP, RR, and temperature...*" (DA)

In addition, all participants noted the patient's ongoing therapy, including the administration of magnesium sulfate ($MgSO_4$) and antihypertensive therapy, and evaluated fluid balance as part of efforts to maintain the patient's physiological stability. This was supported by the anesthesiologist as follows:
"*...if the patient has $MgSO_4$, we evaluate for signs of toxicity...*" (DA)

The three anesthesiologists also emphasized the importance of early detection of signs of worsening conditions, such as increased blood pressure, decreased consciousness, neurological disorders, or other complaints that suggest complications of preeclampsia, so that collaborative action can be taken immediately. This was supported by the anesthesiologist as follows:
"*...if the patient starts to become restless, vomits, or has seizures... then we can prepare the medication dosage, the medications to be used, and determine whether the patient requires a regular ward or the ICU*." (DA)

PA1 and PA2 also provided psychological education to patients prior to anesthesia. However, PA3 did not emphasize the importance of the anesthesia provider's role in providing psychological education. Education was provided by explaining the upcoming anesthetic procedure, the patient's position during the procedure, the sensations that may be experienced during spinal anesthesia, and guiding the patient to remain calm and cooperative throughout the anesthesia process. All anesthesia providers explained that monitoring was performed using a bedside monitor to obtain objective data

regarding the patient's physiological condition. This was supported by the anesthesiologist as follows:
"*...basic vital signs are monitored only with the monitor... Temperature checks are performed using the bedside monitor*." (DA)

The frequency of monitoring is adjusted to the patient's clinical condition. Stable patients are monitored upon admission and before entering the operating room, while patients with emergency conditions are monitored immediately upon arrival in the prep room. This was supported by the anesthesiologist as follows:
"*...If the patient is stable, it is usually done upon arrival and before entering the operating room. For emergency patients, it may only be done once before entering the operating room*." (DA)

All three anesthesiologists also stated that monitoring results are always confirmed with the patient's clinical condition before being used as a basis for anesthetic decisions. All assessment and monitoring results are then documented in the medical record or anesthesia monitoring sheet as part of continuity of care and communication between members of the perioperative team. This is supported by the anesthesiologist who stated:
"*...if the monitor has been calibrated, we can trust it, but all readings on the monitor must be confirmed by the patient's clinical condition*." (DA)

Based on the above data, it can be concluded that the anesthesiologist's role in pre-anesthesia monitoring includes conducting a comprehensive assessment of the patient's condition before anesthesia, maintaining physiological stability and patient safety, systematically conducting pre-anesthesia monitoring, and documenting monitoring results as a basis for continuity of care.

## DISCUSSION

The results of this study found that the role of anesthesiologists in pre-anesthetic monitoring includes conducting a comprehensive assessment of the patient's condition before anesthesia, maintaining physiological stability and patient safety, conducting systematic pre-anesthetic monitoring, and documenting the monitoring results as a basis for continuity of care. Anesthesiologists conduct a comprehensive assessment of the condition of CS patients with preeclampsia before anesthesia because it is a mandatory procedure in anesthesia services. Anesthesiologists collect and evaluate all clinical information to determine the patient's current condition, the severity of preeclampsia, anesthetic risk factors, and determine the patient's readiness for anesthesia. This comprehensive assessment is not only performed on CS patients with preeclampsia, but also on all patients undergoing anesthesia. This is consistent with (Indra & Kulsum, 2020), which states that a comprehensive assessment of the patient's condition is conducted immediately in the operating room due to limited time available for this assessment.

This comprehensive assessment before anesthesia is crucial for anesthesiologists to ensure the patient's readiness for the CS procedure, determine the type and technique of anesthesia, and minimize the risk of complications that may arise during the perianesthetic period. This is consistent with (Pang et al., 2021), which states that a comprehensive pre-anesthesia assessment of the patient's condition can optimize the patient's condition during the perioperative period. This is especially true for CS patients with preeclampsia who have received prior medical treatment, which is inherently high risk, so special and detailed consideration is essential. This appropriate clinical decision can be made when the anesthesiologist conducts a comprehensive assessment of CS patients with preeclampsia. This comprehensive assessment includes: reviewing medical and obstetric history, evaluating supporting test results and fetal condition, a physical examination, and a history of therapies and medications. This review of medical and obstetric history includes a history of hypertension, preeclampsia in previous pregnancies, and other obstetric complications that could potentially increase risk. Furthermore, the anesthesiologist also reviews the current

medical history, including the timing of the onset of elevated blood pressure and previous labor history. This information helps assess the severity of preeclampsia, predict potential complications, and determine the need for appropriate anesthetic monitoring and management. The anesthesiologist also performs an evaluation of the fetus's condition, which includes examining fetal movement and fetal heart rate (FHR) using a Doppler. The fetus's physiological condition provides an overview of its well-being and helps the perioperative team determine the readiness and urgency of the procedure. Meanwhile, evaluation of supporting examination results such as a Complete Blood Count (CBC), Complete Urine Count (UCT) to detect proteinuria, Bleeding Time/Clotting Time (BT/CT), and an ECG (Electrocardial Infarction) examination using a 12-lead ECG connected to a bedside monitor or receiving information from the previous ward.

The physical examination focused on B1-B3. B1 (Breathing) focused on evaluating airway patency, observing breathing patterns, auscultating the lungs to detect pulmonary edema or respiratory distress, measuring oxygen saturation, and assessing difficult intubation with LEMON. B2 (Blood) physical examination was conducted to confirm increased blood pressure associated with preeclampsia by measuring blood pressure, pulse, MAP, assessing hydration status and fluid balance through observation and information on fluid therapy during patient handover, including ensuring the presence or absence of edema in the patient's lower extremities and checking for blurred vision. B3 (Brain) physical examination was conducted, such as assessing the patient's level of consciousness with GCS and a history of seizures. B6 (Bone) physical examination was also conducted by checking for edema in the patient's lower extremities. The results of this study are supported by (Setiabudi et al., 2023), which states that anesthesiologists need to conduct a medical history assessment (chief complaint, other complaints, medical diagnosis, and surgical plan), a 6B physical examination, an evaluation of supporting examination data, and the patient's current therapy.

Anesthesiologists also assess the therapy administered before the patient enters the operating room, including fluid therapy, medication use, and other medical procedures that may affect the patient's condition and the administration of anesthesia. The data obtained will then be used to assess the patient's response to the therapy, identify potential risks, and determine a safe anesthetic strategy. The assessment includes an evaluation of ongoing fluid therapy, preload requirements, and the use of specific medications in preeclampsia patients, such as magnesium sulfate (MgSO4). Anesthesiologists also consider the potential pharmacological effects of the therapy, as it can affect the patient's hemodynamics during anesthesia. MgSO4 is the primary choice for controlling seizures and thus preventing neurological complications in preeclampsia patients. These results are consistent with (Rehatta et al., 2019), which stated that MgSO4 is the most effective seizure prophylaxis in preventing new-onset and recurrent seizures in the anesthetic management and reanimation of CS patients with preeclampsia. In fact (Amalia, F.F., 2020), also revealed that the use of MgSO4 as seizure prophylaxis in preeclampsia has been shown to have a significant effect in reducing cases of eclamptic seizures, reducing the use of antihypertensives, lowering systolic blood pressure and as a neuroprotective agent in the fetus. Anesthesiologists must ensure that MgSO4 is still administered, but care must be taken to ensure the drip is not too fast to match the planned therapy. Considering that MgSO4 intoxication was found in 1% of preeclampsia cases receiving MgSO4 therapy, and the risk of fatal complications for the mother and fetus (Akbar, M.I.A., et.al., 2020).

A comprehensive assessment of medical and obstetric history, evaluation of supporting examination results and fetal condition, physical examination, and therapy and medication history is essential. These results will serve as the basis for collaboration with the anesthesiologist in determining the appropriate type and technique of anesthesia. The prescribed anesthetic procedure also takes into account complicating factors that may present obstacles during the perianesthetic period. Therefore,

this assessment is conducted to reduce post-anesthesia complications, reduce surgical cancellations, and even reduce patient anxiety (Kristoffersen et al., 2022).

In addition to assessing the above data, anesthesiologists also play a role in maintaining physiological stability and patient safety. Anesthesiologists systematically monitor pre-anesthetic patients with preeclampsia during CS to assess the stability of the mother's condition and detect early any disorders that could increase risks during anesthesia. Monitoring focuses on physiological parameters that can indicate the development and severity of preeclampsia, such as blood pressure, pulse rate, hydration status, neurological function, and signs of other organ disorders. Blood pressure monitoring is performed because blood pressure should not fluctuate by more than 20% as an indicator of hypotension requiring immediate intervention, although this limit is not a specific recommendation in preeclampsia guidelines. This study's findings are supported by Luther, D.G.P., et.al., 2020, who stated that the recommendation for vasopressor management in spinal anesthesia for CS is to maintain systolic blood pressure (SBP) ≥ 90% of baseline blood pressure, so that the blood pressure decrease is no more than approximately 10%.

Efforts to maintain hemodynamic stability are closely related to the anesthesiologist's fluid management prior to spinal anesthesia. Prior to spinal anesthesia, the anesthesiologist administers a crystalloid fluid preload, such as approximately 500 mL of lactated Ringer's, to reduce the risk of hypotension after spinal block. Physiologically, spinal anesthesia causes sympathetic nerve blockade, resulting in peripheral vasodilation, decreased systemic vascular resistance, and redistribution of blood volume to the periphery, resulting in a sudden decrease in blood pressure. In preeclampsia patients, although the incidence of hypotension after spinal anesthesia is generally lower than in normotensive pregnant women due to increased vascular tone, the risk of decreased blood pressure that can compromise maternal and uteroplacental perfusion must still be anticipated. The goal of preloading is to maintain maternal perfusion, maintain uteroplacental blood flow, and improve maternal and fetal safety during anesthesia and surgery.

However, administering crystalloids as preload causes a significant amount of fluid to shift into the interstitial space, thus limiting their ability to prevent hypotension caused by sympathetic blockade. This is important in preeclampsia patients because increased capillary permeability facilitates fluid shift into the extravascular space. Excessive fluid administration can actually increase the risk of pulmonary edema, so fluid therapy must be carried out cautiously and based on hemodynamic monitoring results. Compared with preloading, crystalloid co-loading is more effective in reducing the incidence of hypotension after spinal anesthesia in women undergoing CS (Baboker, P., et al., 2026). Given the effectiveness of crystalloid co-loading, hospitals may consider evaluating and updating their Standard Operating Procedures (SOPs) regarding perioperative fluid management in light of the latest scientific evidence.

Providing psychological education is one way to maintain physiological stability and patient safety. The anesthesiologist will provide information about the planned type of anesthesia, the risks and complications of the anesthetic procedure, alternative procedures, and patient rights. This education is crucial because anesthesia takes over the functions of consciousness, breathing, and nervous system. Clear two-way communication with the anesthesiologist can reduce patient anxiety and ensure they fully understand what is happening in the operating room. These results align with those of (Tadesse, M., et.al., 2022), who found that preoperative anxiety affects patients' blood pressure and pulse rates before arriving in the operating room and during anesthesia. However, education must be provided one day before surgery, during the visit, so the anesthesiologist still faces obstacles in psychological preparation (Maharyawan, I.W.A., et.al., 2023). This presents a challenge for anesthesiologists to continue conveying essential information, establishing therapeutic communication, and reducing patient anxiety without delaying necessary actions for the safety of the mother and fetus. Therefore, pre-anesthesia services need to optimize the implementation of

psychological education as early as possible, especially for high-risk patients, such as those undergoing preeclampsia. Hospitals can develop structured pre-anesthesia education protocols, for example through the use of educational sheets, audiovisual media, or educational checklists, so that important information can still be conveyed comprehensively, even when preparation time is limited.

Anesthesia technicians also play a role in systematically implementing pre-anesthesia monitoring. Monitoring is carried out by combining manual examinations and bedside monitoring to ensure more accurate measurement results. Parameters monitored include blood pressure, pulse rate, respiratory rate, oxygen saturation, body temperature, and level of consciousness. The combination of these two methods allows anesthesia technicians to validate measurement results, minimizing instrument reading errors and ensuring that the data accurately reflects the patient's clinical condition. Monitoring is carried out continuously throughout the patient's stay in the preoperative room, with recordings taken every 15 minutes or as needed depending on the patient's clinical condition. In CS patients with preeclampsia, the monitoring frequency can be increased if changes in hemodynamics, increased blood pressure, decreased oxygen saturation, or signs of worsening preeclampsia are detected. Regular monitoring allows anesthesiologists to detect changes in a patient's condition early, allowing immediate intervention before more serious complications develop. If an abnormal reading is found on the bedside monitor, the anesthesiologist reconfirms the readings through manual examination, particularly for blood pressure, pulse rate, and respiratory rate. Reconfirming the bedside monitor readings demonstrates that the anesthesiologist is not relying solely on technology but is also applying clinical judgment through manual examination before making clinical decisions. This approach increases the validity of monitoring results and supports patient safety, particularly in patients with preeclampsia, who require accurate hemodynamic assessment.

All monitoring results are documented in the electronic medical record through the Integrated Patient Progress Note (IPP) as part of the continuity of anesthesia care. Complete documentation not only serves as evidence of care provided but also serves as a means of communication between healthcare professionals in planning anesthesia procedures, evaluating patient progress, and ensuring patient safety during the perioperative period. However, not all parameters are fully documented in the IPP. This situation has the potential to result in important clinical information, such as re-evaluation results, confirmation of abnormal findings, or changes in the patient's condition during the pre-anesthetic phase, being underdocumented. The results of this study are consistent with those of Taye, M.G., et.al., 2022, who found that the completeness of perioperative anesthesia records in hospitals in the Amhara regional region of Ethiopia is still relatively low, with a basic preoperative history recorded in less than 80% of anesthesia record sheets, and a physical examination and basic supporting examination results recorded in less than 75% of anesthesia record sheets. Therefore, hospitals need to standardize pre-anesthesia monitoring documentation by improving the CPPT format or developing an electronic form that contains all pre-anesthesia monitoring parameters in a more structured manner, such as vital signs, airway evaluation results, anesthesia risk assessment, supporting examination results, therapy provided, psychological education, and follow-up on abnormal monitoring results.

## CONCLUSION

The anesthesiologist plays a role in pre-anesthetic monitoring of CS patients with preeclampsia. This involves conducting a comprehensive assessment of the patient's condition prior to anesthesia, including: reviewing medical and obstetric history, evaluating supporting examination results and fetal condition, a physical examination, and a history of therapy and medications. The anesthesiologist plays a role in maintaining physiological stability and patient safety by conducting hemodynamic monitoring, including: ensuring blood pressure remains stable at >20%, pulse rate, hydration status, neurological function, and signs of other organ dysfunction; performing fluid

management by administering a preload of 500 cc of lactating fluid; and providing psychological education regarding the anesthetic procedure. The anesthesiologist plays a role in systematic pre-anesthetic monitoring, using bedside monitors and manual checks, with recordings every 15 minutes or as needed according to the patient's condition. The anesthesiologist is responsible for documenting monitoring results as a basis for continuity of care during the CPPT.

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