

Factors to improve the quality of comprehensive emergency obstetric and newborn care

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ABSTRACT

This study aimed to explore healthcare team members' perspectives towards the factors that can contribute to the quality improvement of comprehensive emergency obstetric and neonatal care (CEmONC) services at a tertiary hospital. This qualitative descriptive study used convenience sampling to collect the sample. The inclusion criteria were the health workers who have worked for at least one year, in which a total of 119 participants took part in this study. The data were obtained from an online questionnaire, and the collected data were then analyzed with qualitative thematic analysis. This study revealed that three key aspects affecting the success of CEmONC services: i) health human resources (high-quality healthcare workers, in adequate proportion, with excellent teamwork, and commitment to being on time); ii) facilities and infrastructure (the availability of the intensive care unit and 24-hour laboratory, and the access to the obstetric/neonatal ward), and iii) the hospital service system (well-integrated external referral system and internal consultation). As the highest referral healthcare center, hospital managers should monitor and evaluate these three factors periodically to ensure that high-risk mothers and babies can acquire appropriate subspecialty care in the hospital and further can reduce maternal and neonatal mortality rates.

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1. INTRODUCTION

One of the goals proclaimed by the United Nations in 2015 through the sustainability development goals (SDGs) agenda is to ensure healthy lives and promote well-being for all ages. One of the targets to achieve this goal is to reduce the global maternal mortality rate (MMR) to less than 70 per 100,000 live births and recede the global infant mortality rate (IMR) to less than 12 per 1,000 live births by 2030 [1]. In Indonesia, it is also becoming a government priority for health development by targeting MMR in the nation to be 183 per 100,000 live births and IMR to 16 per 1,000 live births in 2024 [2]. However, this target is still far from being achieved, where the MMR is 305 per 100,000 live births, and the IMR is 24 per 1,000 live births [3].

Maternal deaths occur due to complications during pregnancy, childbirth, and postpartum. The main complications that account for about 75% of maternal deaths are severe bleeding, infection, and high blood pressure during pregnancy (preeclampsia and eclampsia) [4]. While the main causes of death in newborns are

prematurity, birth asphyxia and trauma, and congenital abnormalities [5]. Given that neonatal mortality also has a close relationship with the quality of maternal care, the delivery process and newborn care must be carried out in an integrated system at the national and regional levels. One form of regional-level service is comprehensive emergency obstetric and newborn care (CEmONC) in hospitals as part of the maternal and neonatal emergency referral system, which aims to prevent maternal and neonatal death [6]. The CEmONC services consist of life-saving treatments and procedures that must be available for 24 hours, which include: i) parenteral antibiotics, anticonvulsants, or uterotonics administration; ii) manual placenta removal; iii) manual vacuum aspiration, dilatation, or curettage; iv) assisted vaginal delivery; v) neonatal resuscitation; vi) emergency delivery with cesarean section; and vii) blood transfusion for obstetric hemorrhage [7].

The CEmONC services allow women with complications in their pregnancy to have access to high-quality obstetric care in a hospital that can provide the level of care based on their needs, where each hospital has a different scope of service according to the criteria based on clinical and management performance standards [8], [9]. A tertiary hospital becomes the highest level of healthcare facility in the referral system, which provides specific subspecialty care to handle high-risk maternal and neonatal emergency cases [6], [9]. This type of hospital holds the highest responsibility to recede maternal and infant morbidity and mortality, as they should have the most advanced treatment for severe emergency obstetric cases within the region [9]. Therefore, the quality of CEmONC services provided in a tertiary hospital should be tightly controlled, and its quality of care should be a keynote by the managers to support the government strategies in combating the incidents of death among pregnant women and babies [10].

Hospital service quality is the degree of fulfillment of the needs for health services according to service standards by using the resources available at the hospital efficiently and effectively [11]. Considering that the quality of healthcare services in a hospital has a significant association with patient safety, healthcare workers (HCWs) also play critical roles in emergency medical services that can affect the quality of care they provide [12]. Moreover, patient safety is a global health priority because it has become the most important indicator in the health care system. The better service quality, the lower medical errors that can occur; thus, the mortality cases in the health facility will be lower [13]. This is in line with the aim of the CEmONC services implementation in the hospital. Hence, the hospital management team should be acknowledged about what aspects can contribute to improving CEmONC service quality based on the actual performance. Therefore, this qualitative study was conducted to explore the factors that can contribute to improve the quality of the CEmONC services at a tertiary referral hospital based on the HCWs' perception.

2. METHOD

2.1. Study design

This qualitative descriptive study was conducted in a tertiary referral hospital in West Sumatera, Indonesia. This study explored the healthcare team members' perceptions towards the factors that can contribute to the quality improvement of CEmONC services at the hospital. The data were obtained from an online questionnaire using Google Form (Google LLC, USA) from June to July 2022.

2.2. Participants

The population of this study was all healthcare workers who provide CEmONC services in the hospital, with a total of 198 people. The sample in this study was selected using a convenience sampling method. The inclusion criteria were as follows: i) more than one year of work experience, ii) agreement to participate in this study, iii) able to use online survey tools. The exclusion criteria were that they had a working period of less than one year. A total of 129 participants submitted the questionnaire, of which 119 were eligible to be included in the analysis. Ten participants who have worked in CEmONC services for less than a year were excluded in this study.

2.3. Data collection

Before providing a link to the online questionnaire, the researchers approached the participants with a detailed explanation of the research, and they signed an online informed consent. After participants agreed to be involved in this study, they filled out a Google Forms survey consisting few questions related to their characteristic data (age, gender, professional background, and length of work experience) and three question items to explore their perception about the implementation of the CEmONC services in the hospital, including its supporting and inhibiting factors. The questions were as follows:

- (1) Do you think the implementation of the CEmONC services at your hospital is already optimal?
- (2) What obstacles did you find in providing the CEmONC services at your hospital?
- (3) What things can support you as a member of the CEmONC team so that the implementation of the CEmONC services at your hospital can be more optimal?

Participants were allowed to answer the questions in their own words in as much depth as they would like to write, but at least 200 characters for each question. An online questionnaire allowed participants to truthfully and flexibly address their views and experiences regarding a particular issue, which can reduce the probability of information bias [14]. Besides, this method is cost-effective and ideal for being conducted during the COVID-19 pandemic [15]. The survey was opened until data saturation occurred. After the data collection periods ended, all responses were then analyzed.

2.4. Data analysis

The collected data were analyzed using thematic analysis within a critical realist framework. Thematic analysis is a type of qualitative analysis that classifies the data according to the theme and connects it to a certain code [16]. The data processing stages in this qualitative study consisted of three steps: data reduction, data display, drawing conclusions and verifying data [16], [17]. The analysis method used in this study could identify patterns of participants' perspectives from their subjective views regarding the maternal and neonatal emergency care they provide and the factors that might affect the success of this healthcare service.

2.5. Ethical consideration

This research was approved by the Health Research Ethics Committee of Dr. M. Djamil Padang Hospital (Ethical Approval no. LB.02.02/5.7/151/2022). Informed consent was gained from every participant after explaining the study. All data remain confidential and will not be disclosed outside the study, and subjects have the right to withdraw from this study at any stage.

3. RESULTS AND DISCUSSION

3.1. Participant's demographic characteristics

The characteristics of health workers who provide the CEmONC services at the hospital were assessed based on age, gender, professional background and the length of work experience. Age was divided into four categories (20-30 years, 31-40 years, 41-50 years, and >50 years); Gender was divided into two categories (male and female); Professional background was divided into 15 types of professions; and length of work was divided into three categories (1-5 years, 5-10 years, and >10 years). The distribution of participants' characteristics in this study is presented in Table 1. The majority of the participants: i) aged 31-40 years old (48.74%), ii) female (84.03%), iii) have a professional background as a midwife (32.77%), and iv) have experienced providing the CEmONC services at X hospital for more than ten years (48.74%).

Table 1. Characteristics of participants (n=119)

Characteristics	Groups	n (%)
Age, years	20 – 30	23 (19.33)
	31 – 40	58 (48.74)
	41 – 50	22 (18.49)
	> 50	16 (13.45)
Gender	Male	19 (15.97)
	Female	100 (84.03)
Professional background	Obstetricians (consultant fetomaternal)	2 (1.68)
	Obstetricians (consultant non-fetomaternal)	5 (4.20)
	Obstetricians (general)	1 (0.84)
	Pediatricians (consultant neonatology)	1 (0.84)
	Pediatricians (consultant non-neonatology)	4 (3.36)
	Pediatricians	1 (0.84)
	Anesthesiologists	4 (3.36)
	ER general practitioners	5 (4.20)
	Midwives	39 (32.77)
	ER nurses	2 (1.68)
	Neonatal nurses	33 (27.73)
	Nurse anesthetists	10 (8.40)
	Laboratorians	10 (8.40)
	Administration staff	1 (0.84)
	Electromedic staff	1 (0.84)
Length of work, years	1 – 5	34 (28.57)
	5 – 10	27 (22.69)
	> 10	58 (48.74)

ER: emergency room

3.2. Determinant factors of CEmONC services quality at the tertiary hospital

From the data analysis, three themes emerged that define the key factors affecting the quality of CEmONC services at the tertiary hospital. They are: i) health human resources, ii) facilities and infrastructure, and iii) the referral system. Table 2 summarizes the relevant sub-themes and themes.

Table 2. Theme and dimension

Theme	Sub-theme
Health human resources	Quality
	Quantity
	Teamwork
	Timeliness
Facilities and infrastructure	Intensive care unit
	24-hours laboratory
Service system	External referral system
	Internal communication

3.2.1. Theme 1: health human resources

The CEmONC team members consist of essential HCWs (obstetricians, paediatricians, emergency doctors, midwives, and nurses) and non-essential HCWs (anaesthesiologists, laboratorians, radiology officers, administrative officers, lactation counsellors, and electromedical personnel) [6]. Competence in handling maternal and neonatal emergency cases is essential for all CEmONC team members. In the tertiary hospital, the quality of HCWs is expected to be higher than those who work in other hospitals. HCWs in a tertiary hospital are responsible for providing subspecialty care for emergency cases with a higher risk of morbidity and mortality. However, the HCWs' competence in this hospital is still lacking.

"...The capacity of human resources for the management of high-risk neonates is still limited..."
– S, Neonatal nurse

"...There are still many healthcare human resources in the neonatology department who do not understand the operation of CEmONC support devices." – SM, Neonatal nurse

"I can say that the quality of neonatal nurses is still lacking. The fact is nurses who have received neonatal resuscitation training are even just less than half of the current total number of NICU nurses. It can increase the risk to the babies." – ML, Neonatal nurse

One of the possible causes of this issue is the lack of support from hospital management in providing capacity-building training facilities. This might contribute to limiting the number of skilled healthcare workers, and those who are not qualified can increase the risk of adverse medical events at the hospital.

"As part of the CEmONC team members, the hospital rarely supported us to update our knowledge and skills. So, we just able to learn about the procedure of neonatal resuscitation autodidact from paediatricians." – RR, Midwife

"I think that the training in Emergency Obstetric Care Service or neonatal resuscitation provided by this hospital is still lacking. Whereas, it is the key to improve the quality of human resources and needed to support my profession." – MS, Midwife

"As neonatal nurses, we need to be provided with knowledge about neonatal management and training on mechanical ventilation for infants with respiratory failure..." – MF, Neonatal nurse

All CEmONC team members are required to have active competency training certificates, including neonatal resuscitation, especially for those who worked as essential health workers. Hospital administrators should periodically facilitate maternal and neonatal healthcare emergency training to maintain and improve health service quality.

"...Always updated with knowledge and skills in emergency maternal and neonatal healthcare. However, periodic evaluation is needed to follow up on the success of the program." – MY, Midwife

“...The hospital should do regular monitoring, evaluating and updating the knowledge and skills of all team members.” – HY, Obstetrician (consultant non-fetomaternal)

In addition to having qualified competence, hospital managers also need to consider the number of healthcare providers because the availability of health workers will be related to the workload. The limited number of workers will cause a high workload, making the service inefficient and ineffective and further affecting patient safety.

“.... shortage of nurses in the neonatal room causes the high-risk babies cannot be monitored properly sometimes” – B, Neonatal nurse

“The number of midwives in the obstetrics ward is still lacking, it is not proportional to the number of patients who are currently under treatment. It was significantly causing negative impact to the patient’s care particularly when there are several emergency procedures at the same time” – NA, Midwife

Coordination and communication among HCWs from different professional backgrounds or between departments are important to support the success of CEmONC services as it needs a multidisciplinary team. Each professional background has its capacity to handle the care of patients. Even HCWs with the same profession might have different skills and experiences that might impact their level of competence. So all HCWs who provide CEmONC at the hospital should be coordinated to prevent miscommunication.

“...Teamwork and coordination among healthcare providers in implementing CEmONC is important to provide good quality care for the patients treated.” – MS, Obstetrician (consultant non-fetomaternal)

“I see that there is still miscommunication among teams from different departments. For example, midwives are often involved in conflicts with other professions especially when there is emergency caesarean section.” – MF, Midwife

“...Sometimes there is still miscommunication between nurses or doctors-nurses.” – NS, Neonatal nurse

“...It is important to minimize communication through mediators, avoid miscommunication that can result in delays and errors in providing service for patients.” – EY, Paediatrician (consultant neonatology)

In addition to effective communication, good teamwork can also support the success of the CEmONC services at the tertiary hospital. Teamwork is needed to maintain performance stability to achieve the same goal. Effective collaboration requires good communication practices between health workers because the patients' care requires the roles and responsibilities of the entire team. In addition, tolerance is also needed to support the establishment of good cooperation between teams. They should respect and trust others, not blame one another.

“What can support the health workers in implementing the CEmONC services in the hospital is a comprehensive emergency management with the cooperation of all team members who are responsible. Teamwork is a key” – MW, Neonatal Nurse

“...It is important to have good cooperation among team members, active roles from all lines, and no one blames each other.” – LS, Laboratorian

Committing to always being on time is one of the important characteristics that health workers must hold. Moreover, in the tertiary hospital, most cases are complicated and need to be treated quickly and intensively. If there is a delay in service or the response time is not achieved, it will significantly harm the patients.

“All CEmONC team members must be on time, especially health workers in the essential team such as obstetric emergency team, neonatal emergency team, emergency unit team, and central surgical installation team.” – RS, Obstetrician (consultant non-fetomaternal)

“All teams are always on time, having good communication without barriers, and the relevant sub-specialist doctors handle all high-risk cases according to their competence.” – FF, Pediatrician (consultant non-neonatology)

However, based on participants' perspective, the response time for emergency maternal and neonatal services at hospital does not meet the standard, which is perceived to be a factor that can reduce the services quality.

“The length of time since the doctor's first call to report a patient that will undergo the operating procedure until the patient is transferred at the operating room can wait up to two hours. It can definitely delay the service.” – AN, Nurse anaesthetists

“Consultation inter-departments takes a long time, especially for patients with comorbid who need to be consulted to the specialist doctor in internal medicine, cardiovascular, surgery.” – OL, Midwife

3.2.2. Theme 2: facility and infrastructure

Adequate facilities and infrastructure in a hospital can support the implementation of the CEmONC services. One of the essential facilities that must be available in a tertiary hospital is the Intensive Care Unit (ICU) and Neonatal Intensive Care Unit (NICU) capacity. This is because the healthcare services provided in a tertiary hospital are mainly focused on treating pregnant women with complicated cases with a risk of delivering high-risk babies who need intensive care.

“What can support a health worker in providing CEmONC is an adequate facility that is essential to support the live of mothers and babies. As this hospital is the highest referral health facility so that it is needed to add the availability of intensive care unit to facilitate high-risk patients” – KS, Midwife

“...It is needed to add more beds in NICU room at the hospital.” – SM, Neonatal nurse

In contrast, the limited capacity and facilities of intensive care units for high-risk mothers and newborns become one of the factors that can inhibit the CEmONC services at the hospital.

“The lack of equipment and the limited capacity of the NICU room become a significant barrier. Midwives are often involved in conflicts due to the expectation for midwives to provide full supporting equipment or find a room for babies if the NICU is full, especially during consecutive Caesarean Sections.” – MF, Midwife

“...The NICU capacity at the hospital is still lacking so that some critical newborns must be referred to the other hospital. It should not be happening as this hospital have the responsibility to provide subspecialty care for emergency patients” – NR, Paediatrician (consultant non-neonatology)

“...Facilities for high-risk neonatal such as incubators, monitors, ventilators, infusion pumps are limited.” – ML, Neonatal nurse

Not only does having a limited healthcare facility, but the hospital infrastructure is also less appropriate. The NICU location is also too far from the operating room and obstetric ward, so the transfer of the newborns took a long time and made them at risk of hypothermia. Therefore, easy access to the CEmONC's supporting facilities would make this healthcare service more optimal.

“...The NICU room is too far away. This long-distance condition will affect the baby's survival.” – F, Nurse anaesthetists

“The maternal and neonatal emergency room distance should be close to the supporting facilities, such as a pharmacy or laboratory, so that the response time in saving the emergency patients' lives can meet the standard.” – IH, Nurse anaesthetist

In addition, the 24-hour laboratory in the hospital also plays a critical role in supporting the implementation of CEmONC services at the hospital. The laboratory examination result must be immediately provided to determine the next step of treatment for the emergency patient. The blood supply for transfusion, particularly for the patient with severe hemorrhage, also needs to be available as soon as possible. However, in this hospital, the waiting time for laboratory services does not meet the standard and, consequently, delays the CEmONC services.

“...Response time for the result of laboratory tests and blood crossmatch is so long.” – RS, Obstetrician (consultant fetomaternal)

“Laboratory results, including blood crossmatch, are not informed immediately, and the availability of blood supply cannot be ready quickly. It becomes a problem if there’s a patient with severe bleeding.” – SE, Nurse anaesthetists

However, some laboratorians also complained about this issue. They perceived that limited human resources, access to the laboratory, and some technical problems were the causes of delays in laboratory services.

“From our point of view, the workload of laboratory staff is very high. It is because the blood samples from all patients in this hospital (including pregnant women and newborns) are sent to a 24-hour lab. We have limited concentration, so when there is a lot of samples, there will be a probability of making a mistake.” – EN, Laboratorian

“When the test for samples is running, sometimes the equipment becomes error, which can interfere and affects the waiting time of the laboratory service.” - LS, Laboratorian

“...The access from the obstetric ward and operating room to the 24-hours laboratory is quite far. Therefore, I think that the hospital should consider to make the access to the laboratory to be easier and closer.” – M, Laboratorian

3.2.3. Theme 3: hospital service system

The success of a health service in a hospital will depend on the effectiveness of the supporting system used. An effective and integrated service system, both within and outside the hospital, will support the continuity of these health services. The proper internal team communication, such as giving clear instructions from one person to another, will certainly support the effectiveness of the CEmONC services. In addition, while working, the HCWs should always refer to the applicable guidelines or standard operating procedures.

“...The other healthcare team should send the forms and samples to the laboratory according to the standard operating procedure to minimize possible error.” – M, Laboratorian

“...The hospital needs to provide clear SOPs. Besides, the clinical team also have to work based on system, and give clear instructions and information to the laboratory team.” – NV, Laboratorian

The success of a hospital health service also depends on the effectiveness of the technical system applied. A hospital with CEmONC services should have a well-integrated system that connects to the other hospitals in the form of an effective referral system. It aimed to provide the best service for patients, especially those who require treatment from a subspecialist doctor in a tertiary hospital.

“It is important to improve the communication system related to the information regarding the availability of facilities needed by referral patients, and the management team could provide alternative approaches if the facility needed is not available.” – CM, ER general practitioner

“...Referral system should be used effectively and efficiently.” –SF, ER general practitioner

“...Communication system that supports the referral of patients from the other hospital must work well.” – TE, ER general practitioner

After exploring the healthcare team members' perception, this study's findings revealed that three major aspects affect the quality of CEmONC services at a tertiary hospital, which is required to be considered by the hospital administrators. These factors are: i) the quality, quantity, teamwork and timeliness among healthcare providers; ii) hospital facilities and infrastructures, particularly ICU and NICU; and iii) internal and external hospital service systems.

For patient safety, all health workers who work for the CEmONC services should be competent in handling maternal and neonatal emergency cases [18]. To meet the needs of high-quality HCWs, the hospital management should provide training facilities regularly to increase the capacity of the CEmONC team members, including training on emergency maternal and neonatal care and neonatal resuscitation course [18], [19]. It is important to support thermoregulation management in newborns to prevent the risk of hypothermia, which can increase the IMR in the hospital [20].

The availability of health workers will be related to the workload. The limited number of workers will cause a high workload, making the service inefficient and ineffective [21]. The study results of Kainama *et al.* [22] show that a lack of nurses at a hospital led to an excessive workload that impact to worse nursing performance. However, performance will improve as the number of nurses responsible for treating patients increases. Thus, hospital managers should analyze the appropriate number of health human resources based on their functions and the actual workload to prevent the negative impacts that may arise from over-workload [23].

In addition, every health worker in a hospital must also have effective communication skills, both with patients and their partners, in providing healthcare [24]. One study reported that life-threatening problems in a healthcare facility most likely result from ineffective communication between medical personnel [25]. Lack of coordination in an emergency action may cause the response time not to meet the standard, which indicates that the healthcare team members are indisciplined [26], [27]. Whereas, some of the CEmONC quality indicators use time units as targets: response time for cesarean section (<30 minutes), response time for blood availability (<60 minutes), and time for the operating room team to be ready before time out [9]. In addition, other indicators, which are maternal mortality rates, neonatal mortality rates, and the incidence of hypothermia in newborns, are also related to the healthcare services' response time [9], [20]. Therefore, this study emphasizes the importance of hospital policies to improve the discipline of health workers in meeting response time standards.

The findings of this qualitative study also indicate that adequate facilities and appropriate infrastructure of a tertiary hospital are one of the influencing factors of the CEmONC services. Although the health workers who provide the CEmONC services are sufficient and competent according to standards, the service can run ineffectively if the supporting facilities are below the standard [28]. In the tertiary referral hospital, hospital managers should periodically monitor and evaluate the availability of ICU and NICU to optimize the function of providing subspecialty care for high-risk pregnant women and newborns [29]. Besides, as safe blood transfusion is one of the life-saving interventions to treat life-threatening maternal or neonatal bleeding cases, a CEmONC hospital should have a 24-hour laboratory that could provide adequate blood supplies with easy access and fast response [30].

The success of a hospital health service depends on how integrated is the service system applied, both internally and externally. A fast and precise response, as well as clear instructions from one person to another, even from a different department or professional background, will support the success of the healthcare service [31]. One example is when the ER general practitioner consults with a specialist doctor for further treatment decisions. If the specialist in charge gives a slow response, it will delay the treatment of emergency patients, as well as postpone the decision to accept the referral [32]. Besides, a hospital needs to have an integrated referral system to provide the best service for patients from other hospitals who need further treatment. Therefore, the referral process between the referring and the referred hospital should be well-integrated to optimize the function of CEmONC services [8], [31].

4. CONCLUSION

CEmONC in a tertiary hospital holds the highest responsibility to recede the maternal and neonatal mortality rate. To improve the quality of the services, hospital managers should recruit high-quality healthcare workers in adequate proportion based on the actual workload. Besides, all healthcare team members should build excellent teamwork, be committed to being on time, and finish their duties based on standard operating procedures applied. In addition, healthcare facilities and infrastructures are also becoming the key components that could support the success of CEmONC services. As the highest referral healthcare center, the availability of the intensive care unit should be monitored and evaluated periodically so that high-risk mothers and babies can acquire appropriate subspecialty care. However, the hospital service system should also be well-integrated to optimize internal and external communication regarding emergency

obstetric and newborn care. By stressing these three key factors, it is hoped that the quality of CEmONC services at the tertiary hospital could be improved.

However, this study had several limitations. First, this study used a self reported questionnaire, in which participants might not fully understand the question and causing information bias. Second, this study was also only conducted in one hospital in Indonesia, which could not be generalized to the actual situation in all tertiary referral hospitals in the country. Further studies, such as multi center research with in-depth interview, are suggested to better acknowledge.

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