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Original Article

Hospital Performance Indicators in Provision of Perinatal Services: A Qualitative Study

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Abstract

Objective: Perinatal mortality is an indicating factor in social development, and international measures have been taken to reduce maternal and perinatal mortality. This study aims to collect the experts' opinions about hospitals performance in providing perinatal services and emerge the key indicators for evaluation.

Materials and methods: This is a qualitative study using the Delphi technique and based on the focus group discussion sessions with twelve experts, including pediatricians, perinatologists, neonatologists, neonatal care nurses, and midwives with at least five years of work experience. A coordinator managed the sessions, and the discussions continued until saturation. Thematic analysis was performed to extract the major themes and sub-themes.

Results: Three main themes of input/structure, process, and outcome are extracted. The input/structure theme consists of human resources, physical space, equipment, and technical support and information. In human resources, the number and proficiency of healthcare providers and mental health problems are expressed. In terms of physical space, the areas and infrastructure facilities are discussed. The proper purchase and allocation of equipment are emphasized in the equipment sub-theme. The need to establish a Health Information Service in level-one centers is mentioned in the support sub-theme. The process theme consists of medical staff retraining and empowerment, referral, follow-up, education, and audits. The maternal and neonatal mortality and morbidity indices are cited in the outcome theme.

Conclusion: Our findings provide a wide range of context-specific challenges the healthcare systems face in provision of perinatal health services. As a result of this study, the primary indicators for assessing the hospitals' performance in providing perinatal services are emerged.

Keywords: Health Care Delivery; Health Services Research; Maternal Mortality; Neonatal Care; Perinatal Mortality

Introduction

Maternal and perinatal mortality are among the primary features representing society's health system development and socio-economic status (1). Perinatal levels of care are integrated to improve pregnancy outcomes and provide a comprehensive assessment of risk factors, high-risk pregnancies, and appropriate

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maternal and neonatal care (2). Various studies have shown the effectiveness of implementing perinatal levels of care in reducing neonatal mortality (3, 4). Many strategies are suggested to improve the desired outcomes, including perinatal regionalization, which has shown positive improvements in perinatal outcomes (5, 6). In addition, proper interventions and special care might help prevent perinatal mortality (7).

World Health Organization (WHO) reports that around 295,000 women lost their lives during or after pregnancy and childbirth in 2017 (8). As a developing country, Iran has a maternal mortality rate of 16 in 100,000 live births—above the average of high-income countries (11 per 100000) (9). In 2004, the Committee on Fetus and Newborn (COFN) of the American Academy of Pediatrics (AAP) issued a recommendation statement to uniform the nationally applicable definitions for levels of neonatal intensive care, which was further revised in 2012 (10). According to this statement, level one facilities provide health services to low-risk infants, level two facilities are responsible for caring for relatively-ill infants, and finally, a medical center with a neonatal intensive care unit (NICU) is defined as a level three center. Nevertheless, developing countries are still struggling to provide appropriate perinatal services.

Since providing appropriate criteria for perinatal health services is essential for composing and monitoring effective strategies, this study was conducted to provide a uniform estimation of essential indicators in perinatal hospital services.

Materials and methods

Study design and Participants: The study was performed with a phenomenological approach to the experts' opinions and reported according to the consolidated criteria for reporting qualitative research (COREQ) guidelines (11). Using the Delphi technique, a total of 12 experts with at least five years of related work experience, including pediatricians, perinatologists, neonatologists, midwives, and nurses working in a neonatal intensive care unit (NICU) and neonatal ward, were selected using purposive sampling and invited for participation in the face-to-face focus group discussion sessions. All invited experts accepted the invitation. Structured focus group sessions were held to let the experts share their perspectives and attitudes regarding the topics of interest (12). The panel of participants consisted of 12 experts (seven women and five men). Five participants were nursing and midwifery experts; the rest were pediatricians, perinatologists, and neonatologists. The ninety-minute sessions were held in the university setting, managed by a coordinator, and accompanied by a facilitator and an observer. The authors SAS (M.D.) and HJB (Ph.D.) were the coordinator and the facilitator, respectively.

Ethical considerations: The study protocol was approved by the Ethics Committee of Tabriz University of Medical Sciences, according to the Code of Ethics of the World Medical Association (Helsinki declaration). The participants were informed about the reasons for performing this research. The funding source had no role in the study.

Data analysis: The coordinator managed the sessions, and the discussion sessions were continued until the results were repetitive and saturation was reached. Respondent validation was used to increase credibility and ensure the study's rigor. The discussion sessions were recorded, and the recorded voice was used to complete the reports. A word-by-word content analysis was performed using thematic analysis. Finally, the results were tabulated, and the major themes and sub-themes were extracted and categorized. The participants were asked to provide feedback on the final findings.

Results

The panel of participants consisted of 12 experts (seven women and five men). Five participants were nursing and midwifery experts; the rest were pediatricians, perinatologists, and neonatologists. Using a process-based approach and adapting the Donabedian model, the obtained indicators were classified into three main groups: Input/structure, Process, and Outcome (Table 1).

Theme 1: Input/Structure

Regarding the participants' opinions, the "input/structure" indicators include human resources and medical staff skillfulness, physical space, equipment, and technical support and information.

1.1. Health Human Resources and Medical Staff Skillfulness: The number and proficiency of the medical doctors and other staff were prevalent issues of interest. The lack of medical staff at the primary level of care and non-optimal staff-to-patient and staff-to-bed ratios were mentioned.

"We have a problem with employment, which is always considered unsolvable", one of the participants stated.

Table 1: Identified themes, sub-themes, and health indicators for assessment of hospitals' perinatal services

Theme	Sub-theme	Indicators
Input/structure	Health Human Resources	Number of staff (midwife, nurse) per delivery
		Number of staff (midwife, nurse) per admission
		24-hour presence of a certified midwife for pregnancy assessment in the emergency department
		Access to a pediatrician as needed (in ≤ 30 minutes)
		Access to the gynecologist as needed (in ≤ 30 minutes)
		Access to anesthesiologist as needed
	Medical Staff Skillfulness	Basic nursing skills (venipuncture, oxygen therapy, etc.)
		Control of maternal bleeding
		Diagnosis of high-risk pregnancy
		Mothers' education about pregnancy/neonatal care and red flags
		Preparing the newborn for inter-hospital transfer
		Neonatal resuscitation (applies for both gynecologist and anesthesiologist)
		Teamwork
	Physical Space	Independent midwifery admission unit in the emergency department
		Number of beds per delivery room area
		Number of beds per postpartum care unit area
		Special operating room for emergency cesarean section
		Status of indoor access (elevator/standard stair)
		Space heating and cooling
		Room ventilation
		Full-staff clinic for postpartum visits and follow-up
		Full-staff clinic to visit and follow-up the newborns
	Equipment	Basic equipment for pregnancy examination (sphygmomanometer, scales, fetal monitors) in the emergency room
		Natural childbirth facilities
		Anesthesia facilities in the operating room
		Primary oxygen therapy facilities (bag valve mask, pulse oximetry) for mother and newborn (4-6 hours after birth)
		Neonatal resuscitation facilities
		Phototherapy facilities
	Technical Support and Information	HIS (hospital information system)
		Internet communication infrastructure to communicate with the guidance staff
		File registration and maintenance system
		Implementation of clinical care protocol
		Implementation of referral protocol
		Patient transfer form, containing the history of the neonatal clinical and paraclinical findings
		Follow-up protocol for the healthy and non-healthy neonates
		Checklists for periodic audits of the processes
Process	Medical Staff Retraining and Empowerment	Resuscitation workshop for the staff, pediatricians, gynecologists, and anesthesiologists
		Basic nursing skills
		Preparing the neonate for transfer
		Providing experienced staff to accompany the patient when transferring
		Educate mothers about pregnancy/neonatal care and red flags
	Admission	Admission by a midwife
		Initial assessment of the mother in an independent midwifery unit in the emergency department
		Considering the patient's conditions and grading system
	Patient Management	Educating the mother under pregnancy care on pregnancy red flags, expected delivery, and breastfeeding
		Simultaneous initiation of maternal care within the admission
		Completing the partograph for delivery
		Measuring the fetal heart rate during labor
		Managing the pregnant women based on protocols during and after delivery
		Initial examination of the newborn in the delivery room

Table 1: Identified themes, sub-themes, and health indicators for assessment of hospitals' perinatal services (continue)

Theme	Sub-theme	Indicators
Process	Referral	Completing the patient transfer form
		Accompanying the patient with expert medical staff during inter-hospital transfers
		Recording newborns' information during the transfer
		Recording newborns' information upon delivery
		Sending feedback on the transfer process and follow-up on the shortcomings of the transfer
	Follow-up and Education	Determining and informing the patients about the follow-ups of the mother and the newborn at the time of discharge
		Follow-up on future visits of both mother and neonate
		Educating mothers about breastfeeding
		Performing regular screenings
		Performing regular examinations of healthy infants based on the protocols
	Monitoring and Regular Audit	Performing regular audits and process reviews
Outcome	Mortality and Morbidity Indices	Number of maternal deaths per admissions
		Number of LBW births per live births
		VLBW number of births per live births
		Number of infant deaths per number of live births (by gestational age)
		Number of infant deaths per number of live births (by birth weight)
		Number of infant deaths per number of live births (by cause)
		Number of mothers in need of ICU per live birth
		Number of discharges with personal consent per admission (mothers)
		Number of neonatal nosocomial infections per neonatal admission
		Number of sepsis cases per neonatal admission

Here, the need for dedicated staff – commensurate with the number of deliveries in the medical center – was emphasized to follow the high-risk and complicated cases up after discharge.

"The level of knowledge and skills of physicians should be tested at intervals, and their licenses should be renewed accordingly," one participant stated. In this regard, one of the participants added, "Especially in primary and secondary medical centers, gynecologists should have resuscitation skills at the highest level. An anesthesiologist should also be available for resuscitation if a pediatrician were not accessible at the time".

Motivation and mental health were the last factors expressed by contributors as one of the issues in this sub-theme, "We should evaluate whether the staff is sufficiently motivated? Are they psychologically capable of providing services?"

1.2. Physical Space: In this sub-theme, the total area dedicated to the hospital and medical centers, the distance between beds, the area of corridors and stairs, and infrastructure facilities such as water, electricity, ventilation, heating, etc., were discussed. Providing accommodation near referral hospitals for people who do not have an indication for hospitalization but need close care was another point of discussion.

1.3. Equipment: In this subgroup, the proper allocation, distribution, and equipment purchase according to their efficiency for each level of service were emphasized.

"I know of one hospital that has 2-3 ventilators in the NICU per neonate, while one other does not have one ventilator per ten" one of the participants told.

"For our hospital, it is even difficult to buy a standard ambu [bag valve mask]. The type of equipment and even their brand is important. Primary and secondary care centers should benefit from oxygen-therapy facilities, reliable pulse oximetry settings, proper neonatal venipuncture, and the possibility of a convenient patient transfer". Another participant added, "The required features of each piece of equipment should be specified for each level of care; even the features of the neonatal beds should be defined for each level of care".

1.4. Technical Support and Information: This sub-theme cited the need to establish a Health Information Service (HIS) in primary centers as a vital referral system infrastructure. "The pregnant mother does not specify her previous medical

problems when admitted to level one [medical center]. Hence, these problems will not be reported to the higher level [medical center] if she is referred, and later, we will face the complications".

The presence of clinical performance protocols and guidelines was another considered indicator. One participant described its importance: "In managing patients, especially at levels one and two – that are not educational centers – disagreements are observed among the colleagues. To encounter this problem, academic centers should develop guidelines and integrated protocols. If we have the appropriate protocols and decisions based on them, the referral problems will also be solved".

Another participant added, "Since the patient transfer forms lack the required information about the neonate and the mother, we have to call the first hospital or ask the patient companion, if available, which slows down the process".

Theme 2: Process

The Process theme consists of the following sub-themes:

2.1. Medical Staff Retraining and Empowerment: Medical staff retraining and empowerment are significant issues for levels one and two centers. The participants believe the level three centers – educational hospitals/centers – naturally consist of up-to-date medical staff. One participant stated, "Since the university education is not entirely based on the population's needs and the community's health problems, retraining is essential, especially if done according to the guidelines".

2.2. Admission, Management, and Referral: Another emphasized issue in this theme was the failure to comply with the referral process. One participant said, "In my opinion, the problem is the management of patients at the time of admission. In this way, the ratio of patients to equipment and the staff is not observed in level 3 centers, and it causes a decrease in the quality of service. On the other hand, most patients are referred to level 3 centers, and as a result, the ratio of patient-to-equipment and staff is not met in level 3 centers, causing a decrease in the quality of services. Meanwhile, the peripheral centers [levels 1 and 2] are becoming more and more scientifically and practically incapacitated. We try to increase the space and improve the equipment in level 3 centers, while the real need is to improve the primary levels".

Completing the patients' transfer form with the infant's detailed history and tests was emphasized by many participants in this sub-theme; " The transfer itself is a risk, and staff with the neonate must be trained and skilled to make the transfer safe ", one of the participants stated.

2.3. Follow-up: Following up on the mother and the neonate was another important process in the participants' opinion. "A large proportion of maternal deaths occur after discharge", one of the participants specified, "Follow-up is especially important in mothers with underlying conditions, such as lupus or cardiac disorders".

2.4. Education: Informing the mothers about the pregnancy and neonatal red flags for an immediate hospital visit, and educating the mother about routine neonatal care was another mentioned sub-theme, "the level one centers are at the base of the service-providing pyramid. Education regarding the pregnancy, childbirth, and neonatal care should be considered at this level, and certainly, supported by the higher executive levels".

2.5. Monitoring and Regular Audits: Another discussed sub-theme in this theme was conducting regular audits and analyzing the results. A thorough review and correction of the defective processes should accompany this indicator.

Theme 3: Outcome

In this theme, neonatal mortality by the causes and gestational age, maternal mortality, the incidence of complications in mothers and infants, the need for hospitalization, the average length of hospitalization, the incidence of nosocomial infections, and sepsis were cited.

Discussion

Developing countries face technical, financial, and infrastructural difficulties in providing perinatal services. Participants of this study believed that the ratio of personnel to the number of admissions is a key feature. Previous studies have emphasized the importance of having enough nurses in NICUs and recommended a nurse-to-bed ratio of 1:1 in NICUs (13, 14). Also, a positive correlation between the case fatality rate (CFR) and the number of nurses was observed in several studies (15, 16).

Deployment of HIS at all levels is essential and can solve many problems in the process subgroup. Hospitals should have an integrated data entry system, which is vital for communication between different healthcare system levels and for improving the referral process (17). Patient management guidelines are developed to standardize functions and

as a reference for judgment. It has been shown that internal and external evaluations of hospitals according to instructions and protocols cause a more significant proportion of the patient management process to be performed (16).

Paying attention to transferring the critically-ill neonates and mothers by providing the prerequisites, including compiling a structured transfer (dispatch) form to record their data, mobilization of the ambulance with the appropriate equipment, and the accompaniment of trained and skilled personnel are necessary. Also, considering that most neonatal deaths occur among critically-ill infants (18), this is the goal of properly implementing the grading program. Furthermore, transfer to a higher-level center effectively improves the outcome of high-risk cases in premature infants weighing less than 1,500 grams (18).

Scientific and practical retraining of medical staff, especially in levels one and two centers is due to improving the quality of the provided services and preventing overflow of the capacity of level three centers. Studies show reduced neonatal mortality following staff training programs (19). In this regard, it is the responsibility of the university hospitals to provide appropriate educational resources and hold training workshops actively. Moreover, since most maternal deaths in developing countries are related to after-discharge events (20), a regular and compressive follow-up plan should be developed for each neonate and mother, especially complicated ones.

This study faced some limitations. First, a consensus does not necessarily mean that the correct opinion is presented. Furthermore, although the discussion sessions were repeated until saturation, the Delphi technique carries the risk of the individual opinions being influenced and affected by the dominant opinion of the group. Additionally, no practical way was available to determine the reliability of this study's results. Additional studies are required to demonstrate the reliability of this study's results.

Conclusion

The performance and effectiveness of perinatal services and the perinatal levels of care should be evaluated regularly. The results of the current study provide an appropriate and consistent estimation of the necessary indicators for the evaluation of perinatal services. Further studies should be performed to determine the efficacy and reliability of the presented assessment indicators, and develop a scoring-based tool to assess the performance of hospitals and healthcare centers.

Conflict of Interests

Authors declare no conflict of interests.

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