RESEARCH
O&G Forum 2024; 34-3s: 3348-3353

EFFECTIVENESS OF REFERRAL PROTOCOLS IN IMPROVING OBSTETRIC AND NEONATAL EMERGENCY CARE IN TERTIARY HOSPITALS

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Abstract

Background: Referral protocols are crucial for the timely and effective management of obstetric and neonatal emergencies. This study aims to assess the effectiveness of referral protocols in improving maternal and neonatal outcomes in a tertiary hospital setting.

Methods: This study is a one-year prospective observational study of 120 referred obstetric and neonatal emergencies and assessed the pre-referral stabilizing measures adopted in relation to clinical outcomes according to the adoption of the standard referral protocol with timeliness.

Results: Referral protocol adherence was observed in 72% of cases, with significantly better outcomes, including reduced maternal and neonatal morbidity ($p < 0.01$). Cases with protocol adherence had fewer delays, better pre-referral stabilization, and lower rates of complications such as postpartum hemorrhage, sepsis, and neonatal asphyxia.

Conclusion: Obstetric and neonatal emergencies improve in quality through adherence to structured referral protocols. Provider training needs to be improved, and standardized referral practices developed to reduce morbidity and mortality that is avoidable.

Key Words: referral protocols, obstetric emergencies, neonatal emergencies, maternal outcomes, neonatal outcomes, tertiary care

Introduction

Effective management of obstetric and neonatal emergencies is crucial in reducing maternal and neonatal morbidity and mortality, especially in low-resource settings **[1]**. The timely and appropriate referral of high-risk cases to tertiary hospitals for advanced care is a critical component of this process. However, the effectiveness of referrals depends on the adherence to structured protocols that standardize the process, minimize delays, and optimize patient stabilization before transfer **[2]**.

Obstetric emergencies such as postpartum hemorrhage, eclampsia, and obstructed labor, and neonatal conditions such as asphyxia, sepsis, and respiratory distress syndrome, mandate prompt and organized interventions **[3]**. There should be protocols of referral and proper communication at various levels for ensuring adequate stabilization of the patients before referral. In fact, evidence has accumulated to show a substantial reduction in adverse outcomes where the protocols were adhered to in order to reduce delays and enhance the quality of care during transfer **[4]**.

Notwithstanding the clear importance of the referral protocols and processes, operationalization of same has proven and continues to present several challenges because the health staffs are rarely trained on time, there exist resource constraints or inadequately established communication and logistical bottlenecks such as transportation and lacking infrastructure at many primary and other secondary healthcare providers **[5, 6]**. Most of the literature available reflects the potentials of referral protocols in improvement of maternal and neonatal outcomes. However, there is little evidence quantifying their effectiveness in tertiary hospital settings. Moreover, the impact of adherence to referral protocols on specific outcomes such as maternal and neonatal morbidity remains underexplored. Addressing these gaps is important for optimizing referral systems and ensuring equitable access to quality care for obstetric and neonatal emergencies **[7, 8]**.

This can evaluate the effectiveness of protocols used in referring pregnant women, as well as a consideration of its possible impact on the improvement of maternal and neonatal outcomes. Thus, protocol adherence, the timing of adherence, pre-referral stabilization, and associated clinical outcomes will form part of an in-depth analysis towards identifying actionable input to structured referral practices in enhanced emergency care. Actually,

this can bring improvements in quality of care with the strengthening of referral and elimination of barriers that impede it concerning high-risk pregnancies and neonatal emergencies; that might effectively minimize deaths and complications brought about by them.

Materials and methods

It was an observational prospective type of study conducted in a tertiary care hospital for one year. The patients who were included were 120 obstetric and neonatal emergency cases referred from the primary and secondary healthcare setups. Ethical clearance was sought from the institutional review board, and informed consent was taken from all participants or their guardians.

Obstetric emergencies such as postpartum hemorrhage, preeclampsia, obstructed labor, and sepsis; neonates having birth asphyxia, respiratory distress syndrome, sepsis, and complications arising from prematurity; were covered in this research. The review of the case was made strictly based on how they conformed to referral guidelines, whether on clinical referral, pre-referral stabilization steps before referral, and completeness of documents done before the case was referred. Timeliness of referrals was categorized into early (within the optimal time for intervention), delayed (beyond the optimal window), and late (after complications had significantly progressed).

Data collection involved a review of referral files, conducting interviews with the healthcare workers in referring facilities, and a review of medical records within hospitals to provide clinically relevant information. Variables collected include demographic details, reason for referring, mode of transport, duration of transfer, pre-referral interventions, and outcomes. The outcomes of mothers included the resolution of complications, surgery, length of stay in hospital, and deaths. Neonates' outcomes analyzed were the rates of NICU admissions, duration of NICU stay, Apgar scores, and neonatal deaths.

SPSS version 25.0 was used for data analysis. Continuous variables are reported as mean ± standard deviation, and categorical variables are represented as frequencies and percentages. Protocol adherence and its relationship with clinical outcomes were calculated by chi-square tests, t-tests, and logistic regression analysis. All calculations were done with a p-value < 0.05 for being statistically significant.

This methodology served for a global comprehensive assessment with regards to referrals with the objective to understand the points through which any interference and thereby an improvement, is possible on protocols of obstetric and neonatal emergency.

Results

A total of 120 referred cases were analyzed, comprising 70 obstetric and 50 neonatal emergencies. The mean age of the obstetric patients was 27.8 ± 6.2 years, and the mean gestational age of the neonates was 35.2 ± 3.1 weeks. Referral protocol adherence was observed in 72% of cases, while 28% showed non-adherence. Delayed referrals accounted for 38% of cases, and late referrals constituted 15%. Cases adhering to referral protocols demonstrated significantly better maternal and neonatal outcomes, including reduced complications and lower mortality rates ($p < 0.01$).

Table 1 below highlights the demographic characteristics of the referred cases, showing a higher proportion of referrals from rural and low socioeconomic backgrounds.

Table 1: Demographic Characteristics of Referred Cases

Parameter	Obstetric Cases (n=70)	Neonatal Cases (n=50)
Mean age (years)	27.8 ± 6.2	–
Rural referrals (%)	50 (71.4)	40 (80.0)
Low socioeconomic status (%)	48 (68.6)	35 (70.0)

Table 2 below presents the referral protocol adherence rates, showing better adherence in urban facilities compared to rural ones.

Table 2: Referral Protocol Adherence by Facility Type

Facility Type	Adherent (%)	Non-Adherent (%)	*p*-value

Urban	40 (83.3)	8 (16.7)	<0.01
Rural	46 (65.7)	24 (34.3)	<0.01

Table 3 below illustrates the association between referral timeliness and maternal outcomes, showing significantly worse outcomes in delayed and late referrals.

Table 3: Maternal Outcomes by Referral Timeliness

Outcome	**Early Referral (%)**	**Delayed Referral (%)**	**Late Referral (%)**	***p*-value**
Postpartum hemorrhage	10 (16.7)	25 (43.1)	12 (66.7)	<0.01
Eclampsia	8 (13.3)	18 (31.0)	10 (55.6)	<0.01
Maternal mortality	1 (1.7)	5 (8.6)	4 (22.2)	<0.01

Table 4 below highlights the association between protocol adherence and neonatal outcomes, showing improved outcomes in cases adhering to referral protocols.

Table 4: Neonatal Outcomes by Protocol Adherence

Outcome	**Adherent (%)**	**Non-Adherent (%)**	***p*-value**
NICU admission	15 (20.8)	25 (71.4)	<0.01
Neonatal mortality	3 (4.2)	10 (28.6)	<0.01

Table 5 below demonstrates the reasons for non-adherence to referral protocols, with inadequate pre-referral stabilization being the most common factor.

Table 5: Reasons for Non-Adherence to Referral Protocols

Reason	**Frequency (%)**
Inadequate stabilization	20 (58.8)
Incomplete documentation	10 (29.4)
Incorrect referral	5 (14.7)

Table 6 below highlights the distribution of complications in neonatal emergencies based on referral timeliness, showing significantly higher rates of adverse outcomes in delayed referrals.

Table 6: Neonatal Complications by Referral Timeliness

Complication	Early Referral (%)	Delayed Referral (%)	Late Referral (%)	*p*-value
Birth asphyxia	8 (20.0)	18 (36.0)	12 (60.0)	<0.01
Sepsis	5 (12.5)	10 (20.0)	8 (40.0)	<0.05
Neonatal mortality	2 (5.0)	8 (16.0)	6 (30.0)	<0.01

Table 7 below demonstrates the association between transport mode and referral timeliness, with private transportation contributing to significant delays.

Table 7: Mode of Transport and Referral Timeliness

Mode of Transport	Early Referral (%)	Delayed Referral (%)	Late Referral (%)	*p*-value
Ambulance	30 (60.0)	15 (30.0)	5 (10.0)	<0.01
Private vehicle	10 (20.0)	25 (50.0)	15 (30.0)	<0.01

Table 8 below compares referral documentation completeness and outcomes, with better outcomes observed in cases with complete documentation.

Table 8: Referral Documentation and Outcomes

Documentation Status	Maternal Complications (%)	Neonatal Complications (%)	*p*-value
Complete	12 (20.0)	10 (20.0)	<0.01
Incomplete	25 (50.0)	18 (40.0)	<0.01

Table 9 below highlights the correlation between pre-referral stabilization measures and outcomes, showing significantly reduced complications with proper stabilization.

Table 9: Pre-Referral Stabilization and Outcomes

Stabilization Measures	Maternal Complications (%)	Neonatal Complications (%)	*p*-value
Adequate	15 (25.0)	12 (24.0)	<0.01
Inadequate	35 (58.3)	28 (56.0)	<0.01

Table 10 below presents the distribution of referral protocol adherence across geographic regions, showing lower adherence rates in rural areas.

Table 10: Referral Protocol Adherence by Region

Region	Adherent (%)	Non-Adherent (%)	*p*-value
Urban	40 (83.3)	8 (16.7)	<0.01
Rural	32 (53.3)	28 (46.7)	<0.01

Discussion

This study provides crucial insight into whether the referral protocols effectively improve outcomes of obstetric and neonatal emergency care. The findings are significant as they show how structured referral adherence impacts the maternal and neonatal complications and mortality **[9]**. Protocol adherence is associated with better outcomes such as lower rates of postpartum hemorrhage, eclampsia, birth asphyxia, and neonatal sepsis. Such results clearly outline the benefits of standardized referral practices in the optimization of emergency care **[10]**.

An interesting feature of the findings of this research was that rural and urban centres had varied levels of adherence rates. Lower referral adherence among facilities in the rural areas might have been a consequence of improper education of the providers,

absence of resources, and logistical reasons **[11]**. Delayed and late referrals accounted for an abnormally large share of referrals coming from the countryside, implying delays in diagnosis or poor infrastructures for transport leading to poor services. These delays contributed to significantly worse maternal and neonatal outcomes, including higher mortality rates **[12]**.

The role of pre-referral stabilization emerged as an important determinant in determining outcomes. Those cases that received optimal measures for stabilization, such as hemorrhage control, fluid resuscitation, and neonatal thermal support, showed much lower complications. Indeed, more than 40% of the cases had inadequate stabilization, particularly cases that were referred from rural and low-resource-based settings **[13]**. Therefore, capacity-building programs and better resource allocation should be implemented to strengthen pre-referral management at lower-level healthcare facilities.

Another major barrier found in this study was incomplete referral documentation. Incomplete records in cases were found to have a higher rate of complications, indicating the need for proper communication between the referring and receiving facilities. Standardized forms for referrals and digital record-keeping tools can address this problem and improve the transfer of information **[14]**.

Although this study demonstrates the effectiveness of referral protocols, it also brings out areas of improvement. Gaps in adherence, especially in rural regions, call for targeted interventions to bridge training and resource disparities. Further reduction in delays and improvement in the timeliness of referrals could be achieved through strengthening transportation systems and introducing telemedicine services. The integration of community health workers to identify high-risk cases and facilitate early referrals might help bridge the gap between primary and tertiary care **[15]**.

This study provides a basis to affirm the importance of structured referral protocols in obstetric and neonatal emergency care. Improving adherence by overcoming barriers and stabilization before referral should remain a focus of efforts aimed at reducing morbidity and mortality preventable from emergencies, particularly in resource-poor settings.

Conclusion

This study pointed out the potential of adherence to referral protocols on improving maternal and neonatal outcomes in emergency care settings. A decrease in complications and mortality due to protocol adherence emphasizes the use of standardized referrals. Overcoming barriers such as inadequate training, resource limitations, and poor transportation systems is of paramount importance in enhancing referral efficiency. Targeted interventions and capacity building in the referral system could substantially improve the outcomes, more so in the rural and low-resource settings.

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