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Referral and Outcome of out Born Neonates to the Neonatology Unit of the Bamenda Regional Hospital, Cameroon

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Abstract

Introduction: Referral is the process of directing a patient to a higher level of care or to another health care provider for more specialized services. Optimum care of sick neonates often involves referral which is still a challenge in sub-Saharan Africa. Since their condition may deteriorate over time, attention needs to be paid to transportation care, condition on arrival and outcome of out born neonates.

Aim: To describe the referral system and outcome of out born neonates admitted at the Bamenda Regional Hospital (BRH).

Materials and Methods: A prospective descriptive study was conducted over 4 months: February 1st to May 31st 2024. Demographic, and clinical, data, and state after 24hours of admission of all out borns neonates referred to the (BRH), and their mothers were collected using a pre-tested questionnaire. Analysis was done using the statistical software SPSS (Statistical Package for the Social sciences) version 26.

Results: A total of 102 (of the 289 admitted) neonates were referred to the neonatology unit of BRH giving a proportion of 39.2%. The mean neonatal age was 5.3±6.2days. The mean maternal age was 27.6±6.3years. Most referrals were from health centers (39.2%), were less than 10km away (42.2%) and without prior communication (91.2%). Majority of neonates were transported inappropriately wrapped (88.2%), by public transportation (54.9%), received no feeding during transportation (46.1%) and came more than 24 hours after referral (62.7%). Most referred neonates suffered from neonatal infections (30.1%). As early outcome, majority had a stationary evolution (77.5%) and only a few died (8.8%).

Conclusion: This study showed that the proportion of referred neonates is high. The most common indications for referral were neonatal infections, prematurity and low birth weight. Overall, transportation care was inadequate which contributed to poor clinical conditions of neonates on admission.

Introduction

Referral is the process of directing a patient to a higher level of care or another healthcare provider for more specialized services [1]. The referral process of patients from one health facility to another for proper management is still a challenge in most countries. With most referral hindrances such as inadequate transportation, blockage of roads, insecurity, lack of communication, poor documentation, and lack of monitoring which have been established as factors impeding the stride toward reducing neonatal mortality in developing countries [2]. A well-established referral system is key to transferring neonates to a tertiary care facility [3].

The first month of life is the most vulnerable period for child survival, with 2.4 million neonatal deaths occurring worldwide in 2020 [4]. Globally, high neonatal mortality rates exist with 27 deaths per 1000 live births annually of which 98% of these deaths occur in developing countries where access to health care is low [5]. In Cameroon, infant mortality rate, though decreasing over the past decades is still high. As of 2022, Cameroon registered 55.436 deaths per 1000 live births [6,7].

The main means of transport are ambulances, private or commercial cars, bicycles, and motorcycles, which play a role in state of referred neonates. Consequences of inadequate transportation include risk of infection, poor oxygenation, hypothermia, and hypoglycemia resulting in a poor clinical state of the patient on arrival that significantly contributes to a bad outcome and subsequently death, thereby increasing the neonatal mortality burden [1-3].

In the developed world, better neonatal outcomes have partly been attributed to the organizational system of care, transfer of high-risk pregnancies and neonates at risk across three different levels of care with interventions for even sick newborns during the transfer process; to ensure they are clinically stable [8]. This improved neonatal outcome has equally been achieved by using specially trained transport teams which results in better physiological stability throughout the journey irrespective of distance [3]. In addition, considerable emphasis has been placed on the transport of sick newborns using transport mechanisms ranging from ambulances with transport incubators to helicopters to ensure that their conditions do not deteriorate during transfers [8-10].

A study conducted in India noted the average distance travelled by neonates to be 84.81 km with the leading causes of referral being: sepsis, prematurity with respiratory distress syndrome, perinatal asphyxia, and jaundice [3]. A similar study in Ghana reported neonatal sepsis and birth asphyxia as the most common reasons for referral [8]. A study done in Yaoundé, Cameroon found that 33% of newborns were referred to tertiary care centers of which prematurity and neonatal asphyxia were the commonest causes of death among the transferred cases [10].

This study had as aim to describe the referral system and outcome of out born neonates admitted at the Bamenda Regional Hospital.

Materials and Methods

Study design: It was a prospective hospital-based descriptive study.

Study period: This study was conducted for 4 months, from the 1st of February 2024 to the 31st of May 2024.

Setting: This study was carried out at the Neonatology unit of the Bamenda Regional Hospital, in the Northwest Region (NWR) of Cameroon. Bamenda is the capital of the Northwest Region of Cameroon and has an estimated population of 514,000 inhabitants. The Bamenda regional hospital (BRH) is the main referral hospital for the North West Region of Cameroon.

The Pediatric unit of the BRH admits children for various pathologies that come from the town and also from all over the region. The staff comprises a pediatrician, 3 medical doctors, 10 nurses, and 1 cleaner.

The Neonatology Unit offers services such as outpatient consultations, hospitalization of neonates, and kangaroo mother care service. The hospitalization unit is comprised of a nurse station and 4 rooms for the admission of newborns. Of these rooms, the first serves as the neonatal intensive care unit, the second for premature babies, the third for term babies below one month of age, and the last one for term babies between 1 month and 3months of age. It has a capacity of 08 incubators, 21 cradles, 18 beds for carers, 8 phototherapy machines, and 2 oxygen concentrators.

The BRH was chosen because it is the main state-owned tertiary hospital in the NWR that has a Neonatology Unit. It receives neonates born within the hospital, from private and public hospitals within and outside the town, and even those not born in health facilities.

Study population: The study population targeted all referred newborn neonates (0-28 days) to the Bamenda Regional Hospital within the study period. Exclusion criteria included all neonates whose mothers or caregivers refused to give consent.

Study Sampling: A consecutive non-probabilistic sampling technique was used involving neonates who met the inclusion criteria during the study period.

Study procedure: All relevant administrative authorizations were obtained, as well as ethical clearance from the Institutional Review Board of the Bamenda regional hospital. All participants were contacted individually at the Neonatology unit of the RHB. We explained the study to each participant to obtain informed and signed consent. We saw referred neonates at the neonatology unit of the BRH in a consecutive manner. A structured questionnaire was used to collect demographic characteristics of both mother and neonate; and transport factors including referral care were extracted from the referral documents and through interviewing caregivers or escorting persons/nurses. All enrolled neonates had a clinical assessment at admission and 24 hours post admission to determine admission clinical status and 24-hour' clinical outcome as either stationary, improved, or dead.

Data analysis: Data was inputted and analyzed using the Statistical Package for Social Sciences (SPSS) version 27. Categorical variables were expressed using frequencies, ratios, and proportions, while continuous variables were expressed as means and standard deviations.

Results

Prevalence of referrals: Out of 289 neonates admitted to the neonatology unit during the study period, 103 neonates were referred from other health facilities giving a health facility referral rate of 42.4. We excluded 01 neonate due to a decline to consent. So we finally enrolled 102 neonate for analysis.
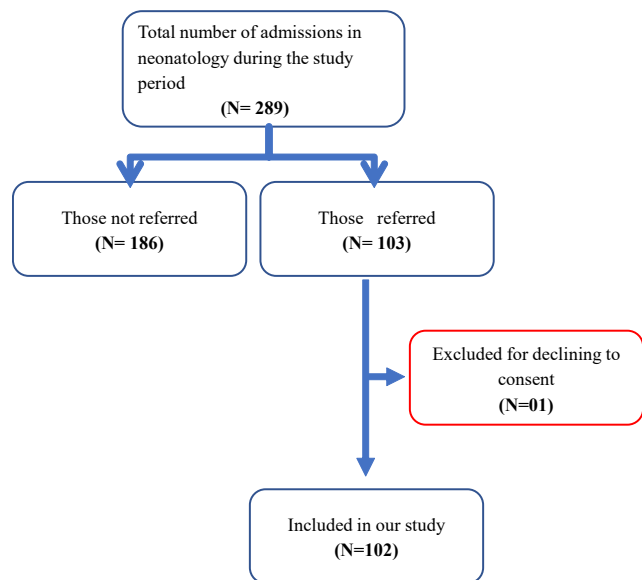
Figure 1: Recruitment flowchart.

Table 1: Maternal socio demographic characteristics (N=102).

Variables	Number (N)	Percentage (%)
Age (years)		
[20]	12	11.8
[20-35]	79	77.5
[35]	11	10.8
Marital status		
Single	36	35.3
Living as a couple*	66	64.7
Residence		
Rural	51	50.0
Semi-urban	23	22.5
Urban	28	27.5
Level of education		
Primary	26	25.5
Secondary	52	51.0
University	23	22.5
No formal	1	1.0
Occupation		
Liberal*	53	52.0
Non-liberal*	17	16.7
Unemployed	32	31.4
Religion		
Christian	85	83.3
Muslim	13	12.7
Others*	4	3.9
Socioeconomic status		
Upper class	2	2.0
Middle class	20	19.6
Lower class	80	78.4

*Liberal: Seamstress, hairdresser, farmer, business, driver.
*Non liberal: Teachers, civil servants, accountants, cashiers.
*Living as a couple: living together regardless of whether they are legally married or not.

Sociodemographic characteristics of the study population

Maternal sociodemographic characteristics: Of the 102 subjects we recruited, their maternal ages ranged from 15 to 46 years, with a mean of 27.6 ± 6.3 years. The majority were aged 20 to 35 years (77.5%), living as a couple (64.7%), and rural dwellers (50.0%). Also, most of the respondents had at least a secondary level of education (51.0%) with liberal occupation (52.0%), and of lower socioeconomic class (78.4%) (Table 1).

Sociodemographic characteristics of the neonates: Referred neonates at the neonatology unit of the BRH were aged 19 hours to 28 days with a mean age of 5.3 ± 6.2 days. And majority of the neonates were less than 7 days old (75.5%). Males were predominant (53.9%), giving a sex ratio of 1.2. The majority were born at pre-term (65.7%), with a birth weight <2500g (60.7 %) (Table 2).

Table 2: Socio demographic characteristics of the neonates (N=102).

Variables	Number (N)	Percentage (%)
Age (days)		
<7	77	75.5
≥7	25	24.5
Sex		
Male	55	53.9
Female	47	46.1
Term at birth (weeks)		
< 37	67	65.7
37-42	35	34.3
> 42	0	0.0
Birth weight (grams)		
< 1000	4	3.9
1000-1499	14	13.7
1500-2499	44	43.1
2500- 3999	36	35.3
≥ 4000	4	3.9

Referral System

Health- facility: Most referrals were made came from medicalized health centers (34.3%), followed by hospitals (33.3%) and clinics (27.5%) (Table 3).

Table 3: Health facility referring (N=102).

Variables	Number (N)	Percentage (%)
Health structure		
Medicalized health centers	35	34.3
Hospital	34	33.3
Private clinics	28	27.5
Health centers	5	4.9

Prior communication: The vast majority of referrals were made without any prior communication with the receiving hospital (91.2%) (Table 4).

Transportation

Mode of transportation: Most referred cases came using taxi or public transport (54.9%), followed by ambulances (19.6%) and personal cars (12.7%) (Table 5).

Table 4: Health facility referring (N=102).

Variables	Number (N)	Percentage (%)
Prior Communication		
Yes	9	8.8
No	93	91.2

Table 5: Mode of Transport (N=102).

Variable	Number (N)	Percentage (%)
Mode of transportation		
Taxi	56	54.9
Ambulance	20	19.6
Personal car	13	12.7
Bike	8	7.8
On foot	5	4.9

Distance travelled from referral: The majority of referrals were less than 10 km away (42.2%), followed by those ≥ 30km Most referred cases came more than 24 hours after they were referred (62.7%), with only 37.3% coming within 24 hours of referral time (Table 6).

Table 6: Distance travelled from referral (N=102).

Variables	Number (N)	Percentage (%)
Distance travelled from referral		
1 - <10km	43	42.2
10 - <20km	16	15.7
20 - <30km	12	11.8
≥ 30km	31	30.4

Person accompanying the patient: The majority were accompanied by their mothers as carers (77.5%) (Table 7).

Table 7: Accompanying carers (N=102).

Variables	Number (N)	Percentage (%)
Accompanying personnel		
Mother	79	77.5
Father	2	2
Friend	4	3.9
Relatives	17	16.7

Warmth: The majority were transported wrapped (88.2%), followed by normal clothing (11.8%), with none transported in an incubator (0.0%) (Table 8).

Table 8: Warmth during transportation (N=102).

Variables	Number (N)	Percentage (%)
Warmth		
Wrapped	90	88.2
Normal clothing	12	11.8
Incubator	0	0.0

Feeding during transportation: Regarding feeding during transportation, the majority received none (46.1%). Thereafter, they mainly received breast milk (39.2% (Table 9).

Table 9: Feeding during transportation (N=102).

Variables	Number (N)	Percentage (%)
Feeding during transportation		
None	47	46.1
Breast milk	40	39.2
Artificial milk	9	8.8
Sugar solution	6	5.9

Indications for referral of neonates: The majority of the referred neonates suffered from neonatal infections (30.1%), followed by prematurity (23.2%) and low birth weight (14.1%) (Figure 2).
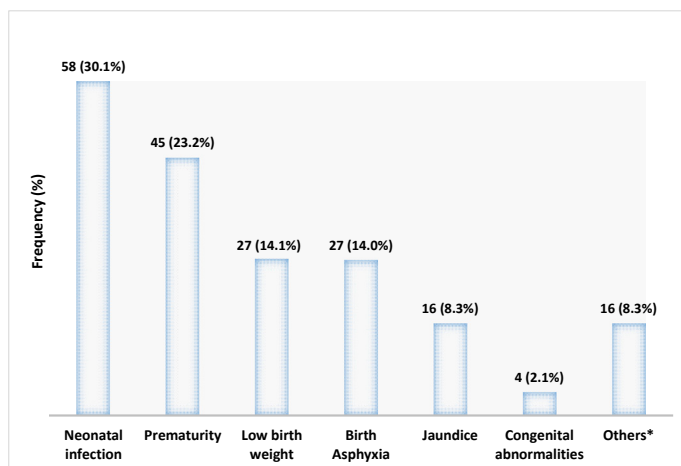

Figure 2: Indications of the referred neonates (N=102).
**Others; pseudo-bowel obstruction, epidermolysis bullosa, omphalocele, Bullous impetigo, Erb's palsy, caput succedaneum.
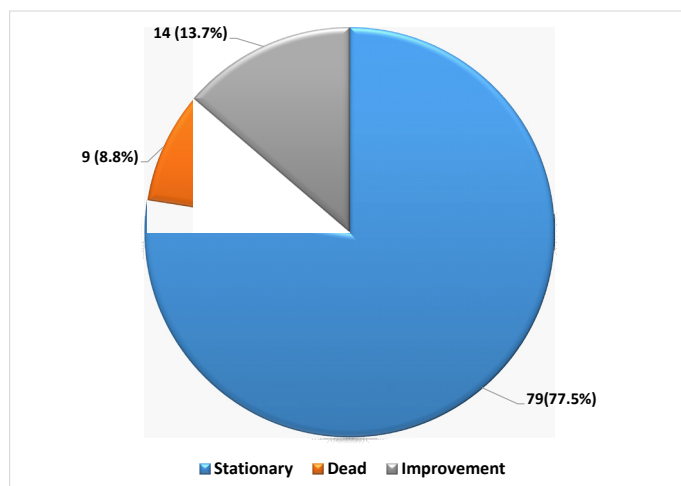

Figure 2: Outcome after 24 hours of admission (N=102).

Outcome within 24 hours of hospitalization: After 24 hours of hospitalization, the majority of referred neonates had a stationary evolution (77.5%) followed by improvement (13.7%). Of the 102 referred neonates, 9 died, giving a mortality of 8.8% (Figure 3).

Discussion

We found a proportion of referred neonates to the neonatology unit of 35.3%. This was higher than the prevalence obtained in other studies done in African countries [11-13]. This difference can be explained by differences in catchment areas of various hospitals with a higher one for the Bamenda Regional Hospital, as it is the only state-owned referral hospital in the region.

A mean maternal age of 27.6 ± 6.3 years was found, with the majority aged 20 to 35 years (77.5%). This was similar to the findings of a study conducted in Douala, Cameroon [9] where the majority of mothers were aged ≥ 20 years (96.9%). This can be explained by the fact that it is the most fertile period in the reproductive life of most women.

Also, most lived as a couple (64.7%). This was similar to the findings obtained in other studies (please say something about at least one of the studies and how it relates to this one [6,14]. Being in a couple might provide better resources and enough support to help in the treatment of a sick child and especially the sick neonate.

Regarding residence, half of participants resided in rural settings (50.0%). This was equally similar to the findings in a study in Nigeria [14]. However, it was contrary to the findings obtained from a study in Douala, Cameroon [6] with most being from urban settings (99.2%). This can be explained by the fact that our study was done in the lone referral hospital in the region, receiving cases from the hinterlands, as opposed to the one in Douala.

Also, the majority had a secondary level of education (51.0%), this was similar to the findings of a study in India [14] where the majority had primary and secondary levels of education.

Referred neonatal ages ranged from 19 hours to 28 days, with a mean of 5.3 ± 6.2 days and the majority were aged less than 7 days (75.5%). This finding is in line with observations of a study done in Tanzania [13] with most aged less than 7 days (93.1%). However, it was contrary to the findings of a study in in Ghana [15], where the majority were aged more than 7 days (50.3%).

The majority were males (53.9%), with a sex ratio of 1.2. This was similar to the findings in other studies [13,15,16].

Also, the majority of neonates were delivered premature (<37 weeks) (63.7%); similar to other studies [13,15,16]. This finding might be explained by the fact that preterm newborns often require specialized care due to their underdeveloped organ systems and increased risks of complications such as respiratory distress, temperature regulation, risk of infection, nutritional needs, and neuro-developmental concerns.

Furthermore, most newborns at birth (60.9%) were low birth weights (<2500g); similar to other studies [13,15,16]. This finding might be explained by the fact that peripheral health facilities do not usually have adequate infrastructure, specialized services and human resources to manage babies low birth weight babies and usually refer to higher level health facilities like the BRH. Such referrals ensures specialized care, monitoring, and interventions to optimize the health and development of these vulnerable infants who might be prone to increased risk of the same complications of premature babies.

Most referrals were made from medicalized health centers (34.3%), followed by hospitals (33.3%), clinics (27.5%), and health centers (4.9%). This was contrary to the findings of a study carried out in Yaounde, Cameroon [10], where the majority of referrals came from health centers (47%). This difference could be explained by the fact that in the latter study, health centres were not differentiated from medicalized health centres.

The vast majority of referrals were made without any prior communication with the receiving hospital (91.2%); similar to the findings in a study in Tanzania [13] where the majority of referrals were done without prior communication This may be due to the fact that referring health facilities may not have reliable access to phones, or internet, to contact the receiving center and referral systems for neonatal care are often informal or poorly structured. There are also no protocols in place for timely referral of newborn babies. As a result, neonates are often referred without prior notification or discussion with the receiving facility

The preponderance of neonates who were referred to our facility came using taxi or public transport (54.9%), followed by ambulances (19.6%) and personal cars (12.7%). This is comparable to the findings gotten in other studies [12,15]. However, contrary to the findings of other studies [10,13,16], in which the majority were transported through an ambulance. This can be explained by the fact that ambulance services in town are underfunded and insufficient to meet the demand for emergency transportation, particularly for neonates. In rural or remote areas, where healthcare facilities may be far away, there is often a lack of proper roads or infrastructure to support ambulance transportation. Poor road conditions, and difficult terrain, between healthcare centers may make it challenging or impossible to get an ambulance in a timely manner. Also, in certain communities, there may be a cultural tendency to rely on family and community networks for transportation in times of need. Taxi services or shared public transport may be more readily available and seen as a quicker solution, especially if the urgency of the situation is not fully understood or if the family believes that their neonate can be transported safely in a private vehicle or by public means In our setting, ambulance services are very costly in all government-owned facilities, and other ambulance services are privatized. They all require out-of-pocket payment, which many families cannot afford. Public transport, while not ideal for transporting critically ill neonates, offers a more affordable alternative for families who may not have access to financial resources for more appropriate transport. Hence many neonates were brought in using taxis or public transport given that the majority of our participants could not afford it because they were more of a low socio-economic class.

The majority of referrals were less than 10 km away (42.2%), followed by those ≥ 30km (30.4%). Most referred cases came more than 24 hours after they were referred (62.7%). This was comparable to the findings of a study in Ghana [15]. This long delay can be a result of multiple stops in lower health facilities, poor development of road infrastructure and insufficient finances.

The majority were accompanied by their mothers (77.5%); similar to findings obtained in a study in Ghana [15] but contrary to the findings of a study in Yaounde, Cameroon [10], a predominantly urban setting, where the neonates were mostly accompanied by a family member. This may be due to the fact that in most rural or low-resource settings, the mother is expected to be the primary guardian and caregiver of her child. The mother's role in neonatal care is often reinforced by strong cultural norms that emphasize maternal responsibility for the newborn. This cultural expectation may also explain why mothers are more likely to accompany their neonates during medical emergencies, as opposed to other family. In some settings, family members may not be able to accompany the neonate due to resource constraints, including financial limitations, distance, or

work commitments.

Regarding feeding during transportation, the majority received none (46.1%) followed by those who received breastmilk (39.2%). This could be because most of our participants came by public transport where there may be insufficient support for feeding during transportation. especially if the transport is long or involves multiple forms of transportation (e.g., public transport, taxi). The lack of a quiet, clean, and safe environment during transport can make breastfeeding inconvenient, difficult or impossible for the mother. Neonates, particularly those in need of urgent referral, may not be in a stable enough condition to tolerate feeding during transport. Also most neonates presented with the symptomatology of refusal to feed.

The majority were transported wrapped (88.2%), followed by normal clothing (11.8%), with none transported in an incubator, similar to the findings obtained in Tanzania [13] where the majority of neonates were equally wrapped. Although they were wrapped, the covering was not appropriate to prevent the risk of hypothermia in these newborns.

The majority of the referred neonates suffered from neonatal infections (30.1%), followed by prematurity (23.2%) and low birth weight (14.1%). A similar trend was seen in Douala, Cameroon [12], with neonatal infections (26.5%) and prematurity (23.5%) being the most frequent pathologies. However a study done in Yaounde, Cameroon [10] had as majority prematurity (45.2%), followed by birth asphyxia (35.3%). These differences could be attributable to variations in trends as well as variations in disease frequency across different geographical regions.

After 24 hours of hospitalization, the majority of referred neonates had a stationary evolution (77.5%) followed by improvement (13.7%). Of the 102 referred neonates, 9 died, giving a mortality of 8.8% which was similar to 7.8% obtained in a study in Ghana [8]. However, it was lower than the values obtained in other studies [9,10,12,16]. This can be explained by the fact we considered only 24 hours of hospitalization, as opposed to other studies who looked at the outcome in 48 hours or more. Also the fact that the majority of the newborns came from within the Bamenda municipality, with a distance of <10km, could explain the lower mortality rate obtained in our study.

Conclusion

In conclusion, the barriers affecting neonatal referral outcomes in our study can be broadly categorized into two key areas: healthcare system factors and patient-related factors. Healthcare system barriers often stem from issues such as limited access to health facilities, inadequate capacity of healthcare providers to manage complex cases, and the absence of proper referral protocols. These system-related challenges also include logistical issues like transportation, inadequate communication, poor quality of care, lack of standardized referral documentation, and deficiencies in monitoring and network infrastructure. On the other hand, patient-related barriers typically arise from socioeconomic and cultural factors that influence a patient's decisions. These include environmental constraints, limited awareness about the referral process, financial hardship, the health condition of the mother, and cultural beliefs that may hinder or delay seeking appropriate care. Addressing both system-level and patient-level barriers is essential for improving referral outcomes and ensuring better neonatal health outcomes in this setting.

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