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EFFECTIVENESS OF WHO PROTOCOLS IN THE TREATMENT OF SEVERE ACUTE MALNUTRITION IN CHILDREN: A STUDY ON RECOVERY AND MORTALITY RATES

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Abstract

Introduction: Severe acute malnutrition (SAM) is an important public health challenge in low-income areas such as Balochistan in Pakistan, where children below five years are at risk of severe morbidity. Teaching Hospital Turbat has its own Nutrition Stabilization Center (NSC) that follows the WHO protocol in the management of SAM-complicated children to enhance recovery and reduce death.

Objective: To evaluate the effectiveness of WHO protocols in treating SAM in children aged 6–59 months at the NSC in Kech, Balochistan, assessing recovery rates, mortality, and referrals to outpatient therapeutic programs (OTP).

Materials and Method: This study classified 173 patient records in January-June 2022 at the NSC, Teaching Hospital Turbat, as a retrospective cohort research. SAM children stabilization and nutrition rehabilitation was done according to WHO guidelines. The results were recovery, mortality, and OTP referral measured with descriptive statistics.

Results: Of 173 children, 127 (73.4%) were cured, 45 (26.0%) were referred to OTP, and no deaths occurred. Cure rates were highest in the 13–59-month age group (75.0–75.5%).

Conclusion: WHO protocols effectively treated SAM, achieving high recovery and zero mortality. Sustained NSC services are crucial for addressing SAM in Balochistan.

Keywords: Severe acute malnutrition, WHO protocols, Nutrition Stabilization Center, recovery rate, Balochistan.

INTRODUCTION

Severe acute malnutrition (SAM) is a serious concern in terms of public health, especially in low- and middle-income countries, where infants under five years old are their disproportionate victims. SAM is characterized by severe wasting, which is usually accompanied by medical problems, and it is a life-threatening disease that must urgently be intervened. World Health Organization (WHO) has established a standardized protocol for the management of SAM in which there is economic

management as well as facility-based management, which is being promoted to boost the recovery rate and reduce mortality. Such recommendations are now widespread in regions where the incidence of malnutrition is high, which includes some parts of Pakistan where poverty, food insecurity, and unavailability of effective healthcare services have penetrated to exacerbate the issues of the nutritional crises (1). Such WHO guidelines are implemented in the Nutrition Stabilization Center (NSC) of Kech, Balochistan, where 24-hour treatment for children with SAM and its complications is available. In this article, the application of WHO protocols in the management of SAM in the NSC is analyzed on the basis of the outcome of recovery and deaths and the importance of maintenance of nutrition interventions in resource-limited settings (2).

Sub-Saharan Africa and Ethiopia continue to struggle with achieving high recovery rates due to systemic issues, including inadequate healthcare facilities and socioeconomic challenges (3). Such studies point out the fact that properly incorporated standardized protocols have a real possibility of increasing recovery rates, even in difficult settings (4). In Pakistan, comparable issues are observed, and the rates of malnutrition are high in such provinces as Balochistan, where the NSC in Kech becomes an emergent facility to treat SAM. Data from October to December 2024 in the center has its analytical dimension concerning the actual implementation of WHO protocols, which creates a local understanding of how well they work. Poverty and lack of access to nutritious food are also aggravated by the burden of SAM in the areas of high poverty. In low and middle-income economies, SAM management approaches, including the use of ready-to-use therapeutic foods (RUTF) and receiving inpatient care on complicated cases, have played a crucial position (5).

The systematic reviews have demonstrated that such interventions, when standardized along the WHO guidelines, demonstrate better weight gain and mortality as opposed to less conventional methods (6). In Ethiopia, retrospective cohort studies have revealed the factors that predict recovery, such as early admission, no comorbidities, and stability of caregiver support, which is in line with structured care in facilities such as the NSC (7). These evidence-based strategies are considered in the approach of the NSC, meaning that they involve medical stabilization, nutritional rehabilitation, and referral to outpatient therapeutic programs (OTP) when required. The management of SAM has to be multi-dimensional, dealing with both diet and health. The complications encompass infections, dehydration, or electrolyte imbalances common among children with SAM, which requires in-patient care before shifting to community-based management (8).

The ComPAS trial in Kenya and South Sudan proved that simplified, combined regimens of SAM treatment may lead to similar results as standard WHO regimens, especially in low-resource settings (9). Similarly, other cohort studies conducted in southern Ethiopia have estimated the recovery duration of children under outpatient treatment programs at 4 to 8 weeks (10). The results can be applied back in NSC in Kech, where children present with SAM with complications; according to WHO guidelines, they are treated and either discharged as cured or can be referred to OTP. The post-recovery outcomes form an important part of the study in the treatment of SAM. The research conducted in Ethiopia revealed that children recovering after SAM were at threat of being affected by malnutrition and morbidity again, which is why long-term follow-up and support within the community were critical (11). In southwest Ethiopia,, retrospective studies have revealed that younger age and fewerand fewer complications are predictors of a faster recovery. Therefore, early intervention is an essential part (12).

In India, a cohort study indicated an increased risk of death among children aged 6 months to 18 months, with possible death due to SAM unless there is prompt intervention (13). The data of the NSC of Kech demonstrate the high rate of cures, which means that WHO-approved methods are effective enough to lead to a cure, but the transfer of part of the patients to OTP shows how a comprehensive approach care system may be effective in avoiding the relapse. Operating in a high SAM prevalence setting, the NSC in Kech is faced with a number of socioeconomic drivers of malnutrition, including poverty and food insecurity. Studies have also found that outpatient treatment of children with SAM in Ethiopia has an estimated recovery rate of about 70 percent, and risk factors of success are access to clean water and parental education (14). Likewise, in Addis Ababa, the

retrospective cohort studies have revealed that children with full medical and nutritional support recover a shorter time versus those admitted during times when such support is less, as within the NSC (15).

Protocols used in the WHO at the NSC involve nutritional rehabilitation through the use of RUTF, medical cure to complications, and education to the caregivers to promote sustained recovery. These interventions are by the evidence at the world level in terms of the essence of standardized care in enhancing the well-being of children with SAM (16). Flexibility in humanitarian settings is another factor that testifies to the efficiency of WHO protocols. Simplified protocols were demonstrated to reach high recovery rates in conflict-affected regions in Niger, implying that the modality can be expanded in regions such as Balochistan (19). According to the data, the high cure rate is conformed as a large percentage of children were hospitalized and treated. Nevertheless, the fact that some patients, in principle, have been referred to OTP means that not every case can be completely resolved within the inpatient context, which only underscores the importance of the continuum of care.

Prospective studies in Ethiopia have also indicated the barriers to recovery in the form of delayed presentation and comorbidities, which apply to the population of patients treated in NSC (17). The findings are a reminder that community-based interventions that improve access to early detection need to be developed to supplement facility-based care. One of the severe issues in SAM management is mortality. Meta-analysis in Ethiopia has estimated the mortality rate of SAM children at 5-10 percent, although complications such as pneumonia or diarrhea increased the mortality rate (18). NSC statistics indicate that no deaths are reported, which implies that the WHO protocols are effective in preventing mortality in this context.

This finding correlates with the observations in Somalia, where outpatient therapeutic programs depicted high recovery rates and low mortality rates by using standardized guidelines (20). Zero mortality in NSC data can be used as testimony to the quality of care similar to that of medical interventions and nutritional support that are critical to children with complicated SAM. The SAM case, which was successfully cured in the NSC, records the fact that long-term nutritional programs are important in the regions prone to SAM prevalence. The WHO protocols are associated with medical stabilization, nutritional rehabilitation, and referral strategies with successful results in proliferating the percentage of recovery and decreasing mortality (4). However, it is worth noting that problems such as the absence of healthcare accessibility or socioeconomic factors still exist, which is why facilities like NSC still require additional initial investment. Kech data indicate the significance of the Nutrition Stabilization Centers as the tool of SAM management, particularly in underserved territories, where malnutrition is the primary cause of morbidity and death among children under five.

Objective: To evaluate the effectiveness of WHO protocols in treating severe acute malnutrition in children at the NSC in Kech, Balochistan, assessing recovery rates, mortality, and referrals to outpatient therapeutic programs.

MATERIALS AND METHODS

Design: Retrospective Cohort Study.

Study setting: The study was conducted at the Teaching Hospital Turbat, located in Kech District, Balochistan, Pakistan.

Duration: Data were collected from January 2022 to June 2022.

Inclusion Criteria: It included children between 6 to 59 months of age with severe acute malnutrition (SAM) and medical complications (e.g., infections, dehydration, or electrolyte imbalances) admitted to the Nutrition Stabilization Center (NSC) at Teaching Hospital Turbat. SAM was characterized according to the WHO criteria (weight-for-height Z-score < -3, or a mid-upper arm circumference < 115 mm). The NSC is a special set-up to deal with the complex SAM cases including inpatient care, including intravenous antibiotics, rehydration, and nutritional rehabilitation with ready-to-use therapeutic foods (RUTF). Children with uncomplicated SAM, who would normally be treated in outpatient therapeutic programs (OTPs), did not get treatment in NSC and were not included in this study.

Exclusion Criteria: Children beyond the age of 6 to 59 months, children with incomplete medical entries, and those who have been handed over to different facilities before they are treated fully were excluded to maintain consistence in data.

Methods

Data were obtained based on patient records at the Nutrition Stabilization Center (NSC) of Teaching Hospital Turbat in the period of January 2022 to June 2022. The participants that were enrolled were children aged 6-59 months with severe acute malnutrition (SAM) according to WHO criteria. Medication was given according to WHO guidelines, which included hospitalization (antibiotics, rehydration, and adjusting electrolyte levels), nutritional management (ready-to-use therapeutic foods or RUTF), and education of caregivers. The outcome measures were recovery (weight-for-height Z-score >= -2 or MUAC >= 125 mm), death, and referral to outpatient therapeutic programs (OTP). The study analysis included data on age, date of admission, particulars about the caregiver, and treatment outcome. Descriptive statistics included the summary of the admission rates, the mortality rates, and the OTP referrals. The hospital review board had granted ethical clearance, and the data from the patients was anonymized. It was implemented so that the research followed the WHO guidelines to measure the outcome and interpret data effectively.

RESULTS

The retrospective cohort study done at the Nutrition Stabilization center (NSC) in Teaching Hospital Turbat at Balochistan. A complete 173 patient records were checked and this represents the admissions mainly at Kech District, Turbat.

Table 1: Demographic Characteristics of Patients

Age Group	Number of Patients	Percentage (%)
0–6 months	15	8.7
7–12 months	45	26.0
13–24 months	60	34.7
25–59 months	53	30.6
Total	173	100

Most patients (34.7%) fell in the age group 13-24 months, showing a lot of burden of SAM in the age group. Each patient came with SAM and medical complications, including infections or dehydration, that needed inpatient services. One hundred and seventy-three of the patients were included, of which 127 (73.4%) were cured after being successfully treated with a resultant height for weight less or equal to -2 or mid-upper arm circumference (MUAC) less or equal to 125mm. It is commendable that there were no deaths, which indicates the successful implementation of WHO guidelines in mortality prevention.

Table 2: Treatment Outcomes

Outcome	Number of Patients	Percentage (%)
Cured	127	73.4
Referred to OTP	45	26.0
Died	0	0.0
Total	173	100

The lack of mortality highlights the excellence of medical stabilization and nutritional rehabilitation dispensed at the NSC. The monthly analysis produced uniform results. In October, the number of patients admitted was 85; of them, 62 (72.9%) were cured, and 23 (27.1%) were sent to OTP. There were 53-bed admissions in November, 39 (73.6%) cured and 14 (26.4 percent) referred. The number

of admissions in December was 35, and 26 (74.3 percent) have been cured, whereas 9 (25.7 percent) were referred.

Table 3: Monthly Treatment Outcomes

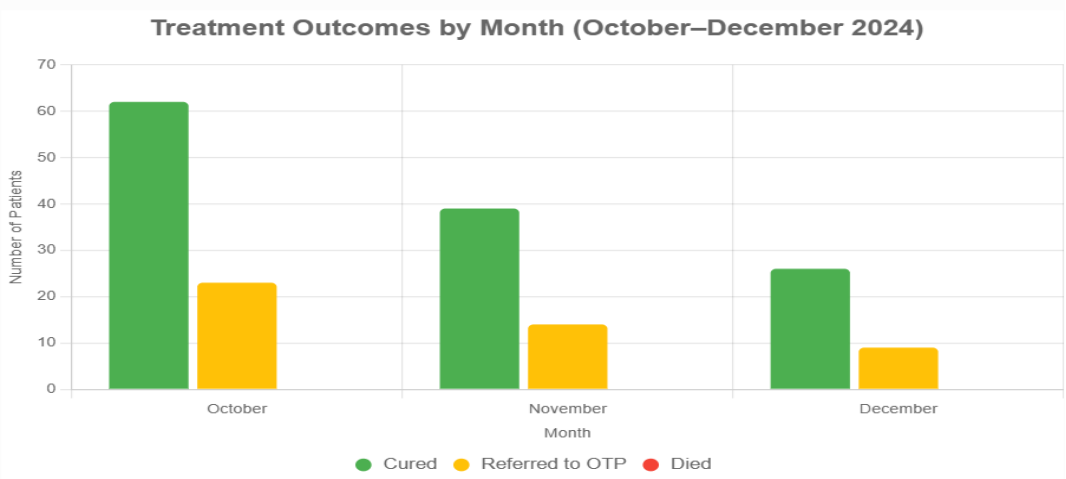
Month	Admitted	Cured (%)	Referred to OTP (%)	Died (%)
October	85	62 (72.9)	23 (27.1)	0 (0.0)
November	53	39 (73.6)	14 (26.4)	0 (0.0)
December	35	26 (74.3)	9 (25.7)	0 (0.0)

The slight variation in cure rates across months suggests stable implementation of protocols, with December showing the highest cure rate (74.3%).

Table 4: Outcomes by Age Group (October–December 2024)

Age Group	Cured (%)	Referred to OTP (%)
0–6 months	10 (66.7)	5 (33.3)
7–12 months	32 (71.1)	13 (28.9)
13–24 months	45 (75.0)	15 (25.0)
25–59 months	40 (75.5)	13 (24.5)

Children aged 13–59 months had higher cure rates (75.0–75.5%) compared to younger infants (66.7%), possibly due to fewer complications in older age groups.



The chart shows the prevalence of cured cases and zero mortality. The referral rate to OTP (26.0%) shows a strong continuum of care since patients who have continued needs will be supported after being discharged.

DISCUSSION

The results of the Nutrition Stabilization Center (NSC) at Teaching Hospital Turbat, Balochistan, represent the degree to which WHO protocols can be used in lethal acute malnutrition (SAM) among babies between 6 and 59 months. The cure rate of 73.4%, with zero reported deaths, and referrals of 26.0% of patients to an outpatient therapeutic program (OTP) are satisfactory, indicating that the findings correspond to the evidence across the globe regarding the effectiveness of standardized interventions during the treatment of SAM (1). The high cure rate is considered a positive focus on the successful implementation of WHO recommendations suggesting medical stabilization, nutrition, and rehabilitation via ready-to-use therapeutic food (RUTF), and educating caregivers. These findings are particularly essential in the province of Balochistan, which is a region where the burden of poverty is high, food security is threatened, and people have no means of accessing medical treatment because prevalence of SAM remains a critical case in the sector of population health issues (2). The absence

of mortality seen in this cohort suggests that with early therapeutic intervention of the disease and adherence to strict protocols, a high fatality rate can be reduced even in a limited-resource setting.

The results of the NSC can be explained in the context of Ethiopic comparative studies as well as in the context of studies carried out in Sub-Saharan Africa. A systematic review of Ethiopia shows the recovery rates between 60 and 80 years, although such factors as comorbidity, late presentation, and access to healthcare are identified as the influencing factors (3). This is shown in the fact that the 73.4 percent cure rate of the NSC falls under this range, implying that the WHO protocols are also effective in a Pakistani context, despite socioeconomic barriers (4). The fact that 26.0 percent of patients were referred to OTP emphasizes the role of the continuum of care because some children needs continued care because of incomplete recovery or unresolved complications. This is similar to the realization in Kenya and South Sudan, whereby the ComPAS trial reported that simpler protocols could produce the same results as the conventional WHO methods, especially in the humanitarian context (9). The referral system used by the NSC means that children who are not 100 percent cured keep getting nutritional care, avoiding chances of relapse and supporting eventual recovery.

Such mortality-free occurrence at NSC is a remarkable performance compared with any meta-analysis study in Ethiopia, which has given a mortality rate of 5-10 percent among children with SAM, most probably due to left-over complications such as pneumonia or diarrhea (5). Zero deaths could be ascribed to the ability of the NSC to deal with complications such as infections and dehydration, as well as with the help of WHO-recommended medical acts (6). Retrospective cohort studies in Addis Ababa and other places have elucidated early admission and no comorbidities to be predictors of survival, entailing that initiation of treatment promptly as implemented by the NSC was the key to success (7). This result aligns with Somalia's findings, which reported low mortality rates following the implementation of standardized practices in outpatient care (20).

Age-based results at NSC show that children aged 13 to 59 months were cured more frequently (75.075.5%) than preterm infants aged 0 to 6 months (66.7%). This pattern correlates to the study conducted in southern Ethiopia, which reveals that younger infants with SAM experience increased chances of complications as their immune systems are not developed properly and breastfeeding difficulties (8). This possibility of a lower cure rate in infants indicates the necessity of specific interventions, including supporting caregivers with references to breastfeeding or formula feeding in addition to RUTF (10). Cohort studies in southwest Ethiopia have established that older children recover quicker since they have fewer medical complications, which is also evident in the NSCs data (12). The above findings highlight the need to initiate SAM management based on age-specific requirements, especially in environments that contain a wide variety of patients.

The success enjoyed by NSC is quite a testament to the importance of the Nutrition Stabilization Center in treating SAM in high-prevalence areas. However, the 26.0 % referral rate to OTP means that all cases cannot be treated in the inpatient environment, and it is required to have integrated care systems. In Ethiopia, parental education and follow-up by community members, as well as access to clean water in relation to sustained recovery, have been documented as predictors, which indicates the importance of the education of caregivers in the NSC (14). Lighter protocols put into practice in humanitarian preparations provided high recovery demands in Niger, which shows the scaling down of WHO-based interventions (19). The referral system triggered at NSC resembles these models, with children remaining under care even after discharge, which is essential in avoiding relapse, as proved by Ethiopian studies displaying an unrelenting risk of morbidity after SAM recovery (11).

Two socioeconomic and systemic problems existing in Balochistan, including poverty and poor healthcare facilities, are duplicated in other low- and middle-income nations. In India, it was found in cohort studies that SAM children had elevated mortality in rural settings because of the late-seeking of care, which could be an issue in Kech (13). In the NSC, the high cure rate indicates that some of these barriers can be addressed by changing facility-based care. However, continued investment is required to increase the number of services and the development of community-based interventions (15) (16).

The NSC data also suggests the significance of early detection and community involvement. The delayed presentation in Ethiopia can be considered as one of the main obstacles to further recovery, which may lead to severe complications (17). The fact that the NSC controls the entire admitted cases without deaths implies the successful community outreach or referral lines, which again requires research to establish. One more element of WHO protocols, caregiver education, probably helped to achieve a high rate of cure as it allowed empowering families to help recover after discharge (18). Finally, the results obtained by the NSC prove that protocols of WHO are very effective in treating SAM in a resource-limited setting with a 73.4 percent cure rate and complete absence of mortality. The 26.0 percent of patients referred to OTP also emphasizes the importance of having integrated care systems to maintain continuous recovery. These results, supported by evidence from around the world, demonstrate that Nutrition Stabilization Centers are the key to addressing SAM. This finding underpins the premise of current investments in this field, aimed at improving malnutrition rates in malnutrition-prone areas, such as Balochistan.

CONCLUSION

The Nutrition Stabilization Center (NSC) at Teaching Hospital Turbat in Balochistan province demonstrates the effectiveness of WHO protocols in treating severe acute malnutrition with complications among children aged 6-59 months. Between January and June 2022, NSC demonstrated a cure rate of 73.4%, and 26.0% of patients were referred to outpatient therapeutic programs (OTPs) for further treatment, and no deaths were reported. Such findings serve to demonstrate the effectiveness of uniform interventions, such as medical stabilization, nutritional rehabilitation with ready-to-use therapeutic foods (RUTF), and caregiver education, even in such a resource-limited context as the Balochistan province of Pakistan, where poverty and food insecurity worsen the impact of SAM. The lack of mortality indicates the NSC is quite effective in the management of complications (infections and dehydration) by working in accordance with the WHO guidelines. The referral system promotes a long-lasting recovery after the release and the continuation of care. The findings are corroborated by global reports justifying the WHO protocols and emphasizing the importance of NSC in saving the morbidity and mortality rates of susceptible children. Therefore, to further improve the cure rates and ensure SAM prevalence remains controlled in Balochistan, continuous investment in services within the NSC, development of additional capacity within the health personnel, and increasing community-based interventions are necessary. The results in children with SAM can be further enhanced in resource-deficient environments via the enhancement of healthcare infrastructure and continuity of services in the long term.

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