Original Article

Nursing Management of Dehydrated Children Under Five Years Due to Acute Diarrhea in Kinshasa, DR Congo

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Abstract

Diarrheal diseases remain the second leading cause of death among children under five years globally. The main purpose of the current is to describe the management level of children under five suffering from diarrhea with acute dehydration at the Akram Hospital in Kinshasa. This is an exploratory descriptive research, which was conducted at Akram Hospital, Kinshasa, DRC. The target population was nurses and we interviewed 12 nurses. A questionnaire was used as a tool for data collection. The actions taken by nurses with children under five and consequently promote the quality of care of those children were observed. Descriptive statistics was used in terms of frequency and percentage. An informed consent was taken from respondents and we assured the confidentiality of respondents. The findings showed a predominance of female nurses and most are married. As to care elements, 83% of respondents use rehydration with ORS and administer infusions under Plan C. 92% of respondents treated the cause of dehydration while 33% provided personal hygiene. For monitoring elements, 92% are under frequent monitoring of stools and vomiting, For the health education elements, 75% advised the mother to give the baby at least one liter of drinking water regularly, and 83% advised the mother to give sufficient ORS. While 50% of respondents advised the mother to maintain regular handwashing. Diarrheal diseases are a major public health problem in Kinshasa, affecting mostly young children. Malnutrition remains the condition most frequently associated with diarrhea, and its prognosis is poor.

Keywords: Diarrhea, Children under five, Nurse, Management

Introduction

Diarrhea among children is defined as a disease with loose or watery stool three or more times during 24 hours or a decrease in the consistency of the stool from the patient [1, 2]. Diarrhea remains the second leading cause of death among children under five years globally after pneumonia. It accounts for nearly 1.3 million deaths a year among children under five years of age making it the second most common cause of childhood mortality globally [3]. In Africa, the burden of diarrhea remains high. It remains the third leading cause of disease and death in children younger than 5 years of age [4]. Diarrheal diseases in Africa were responsible for an estimated 30 million cases of severe diarrhea and 330,000 deaths in 2015 [5]. Where, the frequency and severity of diarrhea in Africa and South East Asia are aggravated by a lack of access to sufficient clean water, poor sanitation, and hygiene practices [2, 6].

In the Democratic Republic of the Congo (DRC), the United Nations Children's Fund revealed that diarrheal diseases were responsible for at least 13.5% of infant mortality in 2003 and the report of Multi Indicator Cluster Survey (MICS-DRC) discovered that the prevalence of diarrhea was 18% in 2010 [7]. In Kinshasa, it was noticed that in several health institutions, most children under five consult for severe dehydration, and more than 60% die from this concern. The main cause of this severe dehydration is acute diarrhea [8]. Diarrheal diseases are an important and urgent reason for pediatric consultation and a good number of infections and toxic agents can be transmitted by contaminated food [9, 10].

Moreover, among the five main causes of child death in the world, it is estimated that 17% of deaths are closely related to diarrheal diseases with dehydration [11, 12]. In developing countries, acute diarrhea with severe dehydration is a major cause of mortality in all age groups and morbidity in infants and young children where the environmental hygiene is often

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defective due to the current inventions of war [13-15]. Infectious diarrhea remains the second most common cause of hospital admission and the most frequent cause of consultation in pediatrics following dehydration on diarrhea [16-17]. Acute diarrhea with dehydration in children is a worldwide public health problem [18, 19]. Children under 5 years of age have 1.3 and 2.3 annual episodes of acute diarrhea with dehydration [20]. It was reported that about 40% of diarrhea hospitalizations in children under the age of five are caused by the rotavirus. While Campylobacter, *E. coli*, non-typhoidal *Salmonella*, and *Shigella* are some of the most frequent bacteria that cause diarrhea. On the other side, *Cryptosporidium*, *Entamoeba histolytica*, and *Giardia lamblia* are all common parasite causes of diarrhoeal diseases [21]. Opportunistic pathogens are also numerous in the environment, and the most important opportunistic pathogen is *Pseudomonas aeruginosa* [22]. Besides the contamination by bacteria, viruses, and parasites, in children under the age of five, malnutrition is one of the leading causes of illness and death [21].

The rehydration can induce iatrogenic ionic disorders that must be anticipated and prevented. These risks of ionic disorders are all the more important as the dehydration is severe. This imposes the need to perform a blood ionogram and other biochemical examinations, in particular when intravenous rehydration is to be undertaken [23]. Dehydration in children under 5 years of age is a frequent and serious pathology due to its multi-visceral consequences (loss of autonomy, anorexia, falls, renal failure, arterial vascular accidents, venous thrombosis, respiratory superinfections, bedsores, and death) [24]. Acute diarrhea has as an immediate consequence dehydration which can be life-threatening. More than 4 decades after the revolution in the management of dehydration by oral rehydration solution (ORS), diarrhea with dehydration continues to cause many deaths in the most vulnerable populations (children under 5 years) [25].

Furthermore, dehydration is the result of uncompensated water loss and has consequences for the body. The newborn whose age varies from less than 2 months to low weight and presenting dehydration can have catastrophic consequences and put at stake the vital prognosis [26]. Yet, dehydration is the main, rare but potentially serious risk of gastroenteritis. In case of vomiting and heavy diarrhea, the child indeed loses water and mineral salts (sodium, potassium, chlorine…), necessary for the proper functioning of his body [27]. Gastroenteritis is responsible for dehydration in children under 5 years of age. This issue leads to significant morbidity and mortality in the above-mentioned layer [28, 29]. It is caused by water loss due to diarrhea, vomiting, and/or fever. If left unchecked, dehydration can be fatal. Episodes of resistant diarrhea are often associated with deteriorating nutritional status and carry a considerable risk of death [30]. It should be noted that diarrheal diseases are a major cause of mortality and morbidity of children in developing countries and contribute to a large extent to malnutrition [21, 31, 32].

The prevention of diarrhea in young children has been the subject of numerous intervention studies in developing countries, a synthesis of these studies allows us to identify the most effective interventions to reduce overall mortality and particularly morbidity [12, 33, 34]. Diarrhea with dehydration is very common in pediatrics, many consultations and hospitalizations of children, as well as a large part of child mortality, are due to diarrhea. However, the prognosis can be greatly improved by adequate and early rehydration [35, 36]. Thus, WHO has developed a health service framework, one of which is in the book on child health services in hospitals, which contains guidelines for the management of sick children in hospitals by health workers, including nurses. Nurses as health workers can contribute in handling diarrhea according to their role, both in the service setting by providing parenteral fluids as a first step to rehydrating lost fluids so as to prevent hypovolemia, as well as in the community. Nurses can carry out their role in several ways, one of which is to provide education to parents regarding oral rehydration to treat diarrhea.

This study is of great relevance to nurses because it contributes to the improvement of care given to children with dehydration due to acute diarrhea. The research question was: is the nursing care sufficient for children under five dehydrated by acute diarrhea at the Akram health facility of Matété? The main aim of the current research was to describe the nursing management level of children under five suffering from acute diarrhea at the Akram health facility in Matété.

Materials and Methods

Study Area

This study was conducted at the Department of Pediatrics in Akram Hospital in Matété municipality, Kinshasa, DRC.

Study Design

This exploratory descriptive research aimed to describe the nursing care of children aged 0 to 5 years dehydrated by acute diarrhea.

Population and Sample Size

Our target population was nurses working in the Pediatric department of Akram Hospital and we interviewed 12 nurses.

Criteria

- Any nurse working in the pediatric department,
- Any nurse who is trained and treated at least one child under five years suffering from dehydration due to diarrhea,
- Be able to speak French and present during the study period, and
- Be available and willing to participate in the study.

Data Collection

In order to verify the quality of the instrument, a preliminary survey was carried out with three (3) nurses working in the maternity service who met the inclusion criteria. This pre-test

interview guide made it possible to readjust different questions that were used to create the final instrument of the study. The purpose of this pre-test was to correct the weaknesses of the instrument, after which the observation grid was accepted by the researcher. The pre-testing stage is essential to detect potential defects in the collection instrument and to make the appropriate corrections. A questionnaire was used as a tool for data collection from respondents. In this way, we were able to observe the actions taken by nurses with children under five and consequently promote the quality of care of those children. Descriptive statistics was used in terms of frequency and percentage using SPSS version 20.

Results and Discussion

Socio-Demographic Characteristics

Table 1 presents the socio-demographic characteristics of respondents.

Table 1. Socio-demographic characteristics of participants

Variable	Frequency (n=12)	Percentage (%)
Age		
≤29 years	6	50
≥30 years	6	50
Total	12	100
Gender		
Male	4	33
Female	8	66
Total	12	100
Education level		
A1	6	50
A2	6	50
Total	12	100
Marital status		
Married	7	58
Single	5	42
Total	12	100

From the table above, it was observed that there is a predominance of female nurses and most are married. Meanwhile, we observed equal frequency between respondents in terms of age and education level where both parties were 50/50.

Study Variables

Table 2 displays the care elements as dispatched by nurses.

Table 2. Distribution of respondents according to care elements

N°	Care elements	Frequency (n=12)	Percentage (%)
01	Rehydrate with ORS	10	83
02	Provide medications that facilitate absorption	8	66
03	Perfuse if necessary with Plan C	10	83
04	Ensure personal hygiene	4	33
05	Use sterile materials	9	75
06	Treat the cause	11	92
07	Feed the child	7	58
	Total	**59**	**70**

It was observed that 83% of respondents use rehydration with ORS and administer infusions under Plan C. Meanwhile, most of the nurses used drug administration to facilitate the absorption method and 75% used sterile equipment for this purpose. Furthermore, 92% of respondents treated the cause of dehydration while 58% fed the child, and 33% provided personal hygiene.

Following the monitoring elements, the **Table 3** below presents its distribution.

Table 3. Distribution of respondents according to monitoring elements

N°	Elements of care	Frequency (n=12)	Percentage (%)
01	Monitor fluid inputs and outputs	7	58
02	Monitor the frequency of stool and vomiting	11	92
03	Monitor weight	5	42
04	Monitor temperature	7	58
05	Monitor for signs of dehydration	11	92
06	Monitor diuresis every 6 hours	4	33
07	Monitor blood ionogram every 4-6 hours	5	42
08	Monitor nutritional status	9	75
	Total	**59**	**61**

It was observed that the majority of respondents (92%) are under frequent monitoring of stools and vomiting, along with the ability to monitor the signs of dehydration, followed by monitoring of their nutritional status (75%), to monitor the liquid inputs and outputs and the monitoring of temperature (58%). Moreover, monitor blood ionograms every 4 to 6 hours, monitor weight (42%), and monitor diuresis every 6 hours (36%).

The distribution of respondents follows the elements of health education is presented in **Table 4**.

Table 4. Distribution of respondents according to health education elements

N°	Elements of care	Frequency (n=12)	Percentage (%)
01	Advise the mother to take the child to a hospital if the diarrhea persists	7	58
02	Advise the mother to give her baby regularly drinking water of at least 1.5 liters	9	75
03	Advise the mother to keep hygiene by cleaning regularly their hands	6	50
04	Advise the mother to maintain the hygiene of the baby's bottle and teat	6	50
05	Advise the mother to give sufficient ORS	10	83
06	Advise the mother to take a wet bath in case of the presence of a fever	7	58
07	To advise the mother on food hygiene	4	33
08	Advise the mother on a balanced diet	5	42
	Total	54	56

From the **Table 4**, it was observed that 75% of respondents advised the mother to give the baby at least one liter of drinking water regularly, and 83% of respondents advised the mother to give sufficient ORS. In addition, 58% of respondents advised the mother to take the child to a hospital if diarrhea persists, 58% advised the mother to take a wet bath in the presence of fever, 50% of respondents advised the mother to maintain regular handwashing, 50% of respondents advised the mother to maintain the hygiene of the baby's bottle and teat. While 42% advised the mother to a balanced diet and 33% of respondents advised the mother on food hygiene.

Acute diarrhea is one of the main causes of morbidity and mortality in children aged 0-5 years. In 80% of cases, acute diarrhea is caused by infectious agents whose epidemiological characteristics vary from country to country [37, 38]. Acute diarrhea is more serious in developing countries because it most often occurs in areas that are weakened by malnutrition [13, 39]. In these countries, the problem remains significant because of factors such as dysfunctional health systems, high child malnutrition, low health budgets, and insufficient equipment and highly trained personnel to properly care for sick children. If diarrhea is not well treated, it can cause seizures, heart rhythm disturbances to bleeding in the brain, if severe dehydration (lack of body fluids) can cause death [40].

Socio-Demographic Characteristics

The majority of respondents were of female gender, there was no difference in age i.e. no age group was predominant. While the education level was A1 & A2 at the same proportion, and the majority was married. These findings are quite similar to Hind [41], who reported that the majority of nurses were female, the predominant age group was 30-39 years while in our case there were only two age groups and the proportion was equal. The majority of Hind's population had a technical level. Furthermore, Ntonku [42] reported that the majority of nurses were A2 (50%), A1 (30%), and A3 (20%), and noted that the majority of nurses surveyed were married.

Variables of the Study

The Elements of Care

The findings showed that 83% of respondents rehydrate children under five with ORS, compared to 83% who administer infusions under Plan C. In addition, 66% administer drugs that facilitate absorption and 75% use sterile equipment for this purpose. Tayou [43] reported that 46.2% of dehydrated children were correctly rehydrated under ORS, this insufficient rate could be explained by errors in the classification of dehydration by health workers secondary to a poor assessment of dehydration.

Furthermore, 92% of respondents treated the cause of dehydration 58% gave the child food, and 33% ensured personal hygiene. These findings are similar to Djadou *et al.* [44] who reported that 63.48%received venous rehydration with lactated Ringer's solution at a dose of 100 ml/kg; infants under one year of age (5.22%) received 30 ml/kg during the first hour and then 70 mL/kg during the following 5 hours. Children older than one year (58.26%) received 30 mL/kg over 30 minutes and then 70 mL/kg over the next 2.5 hours. Depending on the dehydration status at the end of the infusion, a second infusion of 30 mL/kg at the same rate was given. The amount of ORS to be given varies according to the intensity of dehydration, age, weight, and clinical condition of the child. The child drinks *ad libitum* according to their needs. It is also possible to aim at correcting the water deficit in 4 hours, based on knowledge of the weight loss, and then to administer 10 ml/kg per diarrheal stool or vomit [45].

Monitoring Elements

The findings showed that 92% of respondents are under frequent monitoring for stools and vomiting, while 92% are under monitoring for signs of dehydration. In addition, 75% of respondents monitor their nutritional status, while 58% monitor fluid intake and output, and 58% monitor temperature. On the one hand, 42% of respondents monitored blood ionograms every 4 to 6 hours, and on the other hand, 42% of respondents monitored weight, and 33% of respondents monitored diuresis every 6 hours.

Vierin *et al.* [46] found that dehydration was moderate in 46.9% and severe in 14%. Furthermore, the diarrhea was associated with vomiting (60.8%), fever (77.6%), colic (3.5%) or cough (25.2%). Thus, there is a need for nurses to monitor strategies in order to help children to be safe. Tickell *et al.* [47] stated that dehydration accompanies any acute diarrhea, but also from malnutrition, aggravated by each diarrheal episode and which also increases the risk of death

by diarrhea. For nutritional monitoring, Vierin *et al*. [46] report the importance of feeding during a diarrheal episode, stating that diarrhea may occur in the context of malnutrition or may be the cause of malnutrition, hence the need for appropriate feeding. Feeding should not be stopped during the diarrheal episode. Thus, this re-feeding reduces the weight of the stools and shortens the duration of the diarrhea.

Elements of Health Education

The findings showed that advised the mother to give her baby at least one liter of drinking water regularly, compared to 83% who advised the mother to give sufficient ORS. Nowadays, ORS is known to be one of the most important medical progress of the last century and is the capstone of fluid replacement in the body [22]. It helps reduce stool output and vomiting in children and replaces water and electrolytes, which are lost via liquid stools, vomit, sweat, urine, and breathing [30, 48]. These findings are consistent with Momoh *et al*. [22], who reported that 80% of mothers provided ORS for their children as treatment and rehydration during diarrhea episodes. While Vierin *et al*. [46] reported that a lot of mothers didn't accept the ORS as a nursing method.

Djadou *et al*. [44] emphasized that when dehydration was not corrected, some patients received ORS. 36.52% received ORS on admission, administered through a nasogastric tube at a maximum dose of 20 ml/kg/hr (due to the impossibility of venous perfusion because of collapse). The relay was taken by the ORS as soon as possible. Whenever possible, oral rehydration should be used as soon as the first diarrheal episode is passed, without waiting for the definition criteria to be met.

Furthermore, 58% of respondents advised the mother to take the child to a hospital if the diarrhea persists, 58% advised the presence of fever, 50% advised the mother to maintain regular hand washing, 50% advised the mother to maintain the hygiene of the baby's bottle and nipple. While 42% advised the mother for a balanced diet. On the other side, 33% advised the mother on food hygiene. Gerba [49] reveals that the prevention of the transmission of enteropathogenic agents through drinking water and food is an essential objective since the contamination route is almost always fecal-oral. Furthermore, it is known that the majority of people living in developing countries do not have access to safe drinking water [50]. It was reported that the maintenance of good feeding and hygienic practices may prevent the incidence and death from diarrhea in children under five [22]. Pure water, rice water, or Coca-Cola® type drinks are not suitable for the rehydration of infants. Sodas generally have a high osmolarity (up to 500 mOsm/l), linked to their high sugar content, insufficient sodium content, and, on the contrary, excessive potassium content [46].

Conclusion

Diarrheal diseases are a major public health problem in Kinshasa, affecting mostly young children. Malnutrition remains the condition most frequently associated with diarrhea, and its prognosis is poor. Nurses working at the Akram health facility in Matété do not properly manage children under five suffering from dehydration due to acute diarrhea. Thus, we suggest to the nurses that they (i) read enough books on the management of children with severe dehydration and (ii) evaluate the child's condition often in order to classify it according to the dehydration plan. To the parents of children under five, we recommend them to: (a) ensure hand hygiene before, during, and after meals as well as after defecation; (b) promptly refer to a hospital if the child has more than 3 stools; and (c) use ORS during the child's transport to the hospital. Further studies are needed to check the relationship between the nurses' knowledge and the quality of care provided to children under five through a correlational design.

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