The assessment of preventive measures in infants admitted with acute diarrhoeal disease to Pelonomi Tertiary Hospital in Bloemfontein, South Africa

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Background. Diarrhoeal disease is easily preventable and treatable. Despite proven interventions to prevent and treat the condition, it remains one of the leading causes of death in children under the age of 5 years.

Objectives. To assess whether preventive measures of childhood diarrhoea were applied in infants admitted with acute diarrhoea, and to quantify morbidity and mortality in infancy due to acute diarrhoea.

Method. This retrospective descriptive study was conducted at Pelonomi Tertiary Hospital in Bloemfontein, South Africa. Information on infants admitted with acute diarrhoeal disease was collected, namely their age in months, gender, length of stay, need for intensive care, the application of preventive measures of childhood diarrhoeal disease, such as breastfeeding, up-to-date immunisations, appropriate complementary feeds and their nutritional status.

Results. A total of 297 infants met the inclusion criteria over the 2-year period. The prevalence of acute diarrhoea was 24.8%. A total of 67% of the infants were not breastfeeding. Of the 67%, 52.2% had stopped breastfeeding before the age of 6 months, while 14.8 % were never breastfed. The average length of stay was 9.7 days. Severe malnutrition was noted in 29.3% of the infants. Of these, 8.42% had severe malnutrition with oedema, while 20.9% had severe malnutrition without oedema. Appropriate complementary feeds were provided to 79.5% of participants, and 61 (20.5%) were not provided with appropriate complementary feeds. Of these 61 infants, 48 were undernourished. Although most infants were discharged home, 4% (*n*=12) died. Five of the 12 infants (41.7%) who died did not receive the rotavirus vaccine.

Conclusion. Acute diarrhoeal disease in infancy remains an important contributor to morbidity and mortality within this setting. This study suggests the implementation of preventive measures such as exclusive breastfeeding, appropriate complementary feeds, immunisations and early identification of undernourished infants to reduce infant mortality.

Keywords: diarrhoea, breastfeeding, infants, nutrition, immunisations

Diarrhoeal disease (which is both preventable and treatable) remains a significant cause of mortality in children under the age of 5 years, contributing to 9% of all deaths in this age group, and resulting in approximately 525 000 deaths annually worldwide. Globally, it is the second leading cause of death in infancy.[1,2]

Diarrhoeal disease is accountable for 90% of mortality cases in children in South Asia and sub-Saharan Africa.[3] In South Africa (SA), 20% of deaths in children under 5 occur due to diarrhoea.[4] An association between socioeconomic factors and the environment has been reported.[5] The Global Heath Observatory reported that 75% of diseases leading to death in children under 5 are associated with the environment.[6] Among these deaths, 22% were attributed to diarrhoea.[7]

Illness during infancy and early childhood is especially detrimental as this is a crucial phase in cognitive development. Throughout this phase, linear and brain growth transpires more rapidly than during any other period, and many critical cognitive pathways are established by 18 months of age. Diarrhoeal disease causes enteric dysfunction and limited absorption of essential nutrients, which negatively affects growth in early childhood. The disturbance of these critical processes by episodes of diarrhoea can lead to death as an immediate consequence. Long-term consequences include reduced cognitive development, missed schooling, reduced economic productivity as an adult and a predilection to develop metabolic diseases later in life.[8,9]

Diarrhoea is an easily preventable and treatable disease. However, it remains a significant contributor to mortality among adults and children globally, with deaths occurring almost exclusively in the developing world. Reducing deaths can be achieved by applying proven preventive measures of diarrhoeal disease, and providing proven effective interventions against diarrhoeal disease and its complications.[10]

Oral rehydration solution (ORS) and zinc are well-established interventions that reduce morbidity and mortality due to diarrhoea. These interventions are also very inexpensive.[10] The preventive measures of childhood diarrhoeal disease are founded on evidence-based medical science and public health interventions. Table 1 lists the preventive measures.[11]

Intersectional co-operation is an important requirement to ensure that health systems (Department of Water and Sanitation, Department of Education) provide for the essential needs of the community for healthy outcomes.

Table 1. Preventive measures	
General public health measures	Access to safe drinking water Use of improved sanitation Use of latrines and safe disposal of stools
Socioeconomic factors	Food safety Safe housing
Health issues	Immunisations, particularly against rotavirus Vit A supplementation Early identification of malnutrition, and intervention
Maternal education and empowerment	Good hand hygiene with soap Breastfeeding Suitable complementary foods Food hygiene Education on how infection spreads

Breastfeeding as a preventive measure

Globally, breastfeeding has been identified as a cost-effective way to reduce diarrhoeal disease in the first year of life. The World Health Organization (WHO) conducted a systemic review in 2013 assessing the effect of breastfeeding on diarrhoeal morbidity and mortality among children under the age of five. It was proven that breastfeeding decreased the risk of hospitalisation from diarrhoeal disease with a relative risk of 0.28, and decreased the risk of dying from diarrhoeal disease with a relative risk of 0.23.[12] Breastfeeding protects infants against infections such as diarrhoeal disease, mainly through secretory immunoglobulin A (IgA) antibodies and other bioactive factors.[2]

Evidence has shown breastfeeding to be protective against lower respiratory tract infection, sudden infant death syndrome, otitis media, obesity in adulthood, allergic diseases such as atopic dermatitis and asthma, auto-immune conditions such as celiac disease and type 1 diabetes mellitus. Furthermore, breastfeeding is associated with superior cognitive outcomes for preterm and term infants.[13]

Vaccination as a preventive measure

In developing countries, rotavirus and *Escherichia coli* remain the most important causative pathogens in acute diarrhoea in children under five. Rotavirus remains the most common causative agent of diarrhoeal disease leading to death in children under five. Additionally, group A rotavirus is the most common pathogen causing diarrhoea in infancy worldwide, responsible for ~20% of diarrhoeal disease-related mortality in children under five. By eliminating and reducing disease severity, the rotavirus vaccination programme has made a profound impact globally in reducing hospitalisation and mortality due to diarrhoeal disease.[14]

Adequate nutritional status and appropriate adequate complementary feeds as preventive measures

Diarrhoeal disease commonly causes malnutrition in children under the age of five. In turn, children with malnutrition are more susceptible to diarrhoea, creating a vicious cycle.[12]

Adequate nutrition during infancy is essential to ensure optimal growth and development. A normal nutritional status serves as proof that a growing child is receiving the required daily macronutrients and micronutrients. Micronutrient deficiencies that are often found in malnourished children include iron and zinc deficiency.[15]

It is well recognised that the intricate immune system of a human being requires various micronutrients at each phase of the immune response. Zinc and vitamins C and D show the most substantial evidence as micronutrients that provide immune support.[15]

The introduction of complementary feeds from the age of 6 months, as recommended by the WHO, is an important period of transitioning in an infant's life. Complementary feeds are introduced to meet the increasing nutritional requirement of the growing infant. Breastfeeding alone no longer sufficiently meets the nutritional needs of the infant. Complementary foods must be nutritious and safe to meet the energy and nutrient requirements of the infant. Current evidence suggests that appropriate complementary feeds and an adequate micronutrient intake have been associated with a 6% reduction in all child deaths, including from pneumonia and diarrhoea.[16]

Vitamin A supplementation as a preventive measure

Vitamin A is critical to support accelerated growth, as observed in early childhood. It also plays an essential role in combating infections during early life. Vitamin A deficiency in childhood is linked to an increased risk of morbidity and mortality from diseases such as diarrhoea and measles. A reduction of 23% in all causes of mortality in children <5 years of age following vitamin A supplementation has been shown.[17]

Hand washing as a preventive measure

Handwashing with soap remains essential in preventing the spread of diarrhoeal disease. A meta-analysis done in the early 2000s found that the promotion of handwashing led to an average decrease of 47% in diarrhoeal disease.[17] A more recent systematic review supports the evidence, finding the proven risk reduction of diarrhoeal disease by washing hands with soap to be 48%.[12]

Maternal education as a preventive measure

Maternal education has been proven to be an important determinant of childhood diarrhoea. A systematic review of diarrhoeal disease in children conducted in 2021 demonstrated that improved maternal education was linked to a lower rate of childhood diarrhoea. The association is likely due to an improved understanding of proper hygiene practices, and insight into appropriate feeds and feeding practices.[18]

Despite proven interventions to prevent and treat diarrhoeal disease, it remains one of the leading causes of death in children aged under five globally and locally. It contributes significantly to the burden of disease suffered in resource-limited settings such as SA. Given the proven preventive measures, more significant gains should have been made.

The present study aimed to assess whether preventive measures of childhood diarrhoea were applied in infants aged 1 - 12 months admitted with acute diarrhoea, and to quantify the burden of disease created by acute diarrhoea in infancy in this setting. The study population is the most vulnerable to diarrhoeal disease. A study conducted in Cape Town, SA, on diarrhoea in children under 5 found that the highest prevalence of diarrhoeal disease was in infants aged 6 - 11 months in both formal and informal settlements.[19] This study triggered an interest in investigating the reasons for this high rate and the assessment of existing preventive measures.

Methods
Study design
This was a retrospective descriptive study.

Study setting
The study was conducted at Pelonomi Tertiary Hospital's general paediatric ward and paediatric intensive care unit. Pelonomi Tertiary Hospital is a referral centre for several district hospitals and

other primary healthcare facilities from the surrounding catchment areas.

Study population/sample

The study population consisted of patients with acute diarrhoea aged 1 - 12 months, admitted to the general paediatric ward and the paediatric intensive care unit (PICU) at Pelonomi Tertiary Hospital between 1 January 2019 and 31 December 2020.

Exclusion criteria

Any incomplete records with missing information concerning the primary and secondary outcomes were marked as such on the data capture sheet, and excluded.

Any cases of acute diarrhoea in children aged <1 month or >12 months were excluded. Any instances of acute diarrhoea that did not require the child to be admitted but treated on an outpatient basis were excluded.

Data collection

Infants meeting the inclusion criteria were identified using the in-house paediatric database at Pelonomi Tertiary Hospital, in which patient details, including name, hospital file number, age and diagnosis of all admissions to Pelonomi general wards and Pelonomi PICU, were recorded.

The electronic records were obtained from the local electronic record-keeping system, and patient files from the Medical Records Division at Pelonomi Tertiary Hospital, using the name or hospital number.

Each patient was assigned a unique identifier code on a separate coding sheet. This unique identifier code, the study number, was used on the data capture sheet where the necessary data for answering the primary and secondary objectives were recorded. The researcher and the study leader had exclusive access to the coding sheet during the study to preserve the confidentiality of patients.

The study collected information on infants admitted with acute diarrhoeal disease, namely their age in months, gender, length of stay, need for intensive care and the application of preventive measures, such as breastfeeding, up-to-date immunisations (in particular, rotavirus vaccine), appropriate complementary feeds and a normal nutritional status. Appropriate complementary feeds were defined according to age in months. For those <6 months, it was defined as exclusively receiving milk feeds (breastmilk, formula milk or both). For those ≥6 months, appropriate complementary feeds were defined as correctly introducing solids at 6 months of age, continued use of milk feeds and a diet history listing protein (animal or plant), fruits, vegetables and carbohydrates. The nutritional assessment was done using WHO growth charts and definitions. Final nutritional status was based on rehydrated weight. Patients were weighed daily in the ward, and nutritional status was updated accordingly post rehydration. The data were manually entered on a data collection sheet.

Data analysis

Descriptive statistics, namely means, standard deviations, medians and percentiles, were calculated for continuous data. Frequencies and percentages were calculated for categorical data. The Department of Biostatistics at the University of the Free State analysed the data.

Ethical considerations

Ethical approval was obtained from the Health Science Research Ethics Committee (HSREC) at the University of the Free State (ref. no. UFS-HSD2021/0837/3108), as well as the Free State Department of Health. Permission was obtained from the head of the Department of Paediatrics and Child Health to access clinical records.

Results

Pelonomi Tertiary Hospital is in the city of Bloemfontein, SA, and is part of the Mangaung metropolitan area. It has a casualty department serving as a primary care centre for the surrounding neighbourhoods. It serves the City of Bloemfontein and neighbouring towns within the metropolitan area, as well as the district of Xhariep. The total population within the Mangaung metropolitan area is ~850 000, and the total population of the Xhariep district is ~125 000.

The total admissions during the study period were obtained from the Child Health Care Problem Identification Programme. In 2019, total admissions (<5 years old) were 1 791. Of these, 579 were children aged <1 year in the general ward, and 88 were in the PICU. A total of 140 infants <1 year were admitted for acute diarrhoeal disease, with 121 admissions in the general wards and 19 in PICU. During the period, 116 children were discharged alive from the general wards and 18 were discharged alive from PICU, 3 children died in the general wards, and none died in PICU. One child from PICU was transferred to another hospital, due to cardiac disease. The outcomes are unknown (Table 2).

In 2020, 1 480 children (aged <5 years) were admitted, of whom 448 were aged <1 year in the general ward, and 81 in PICU. Of these, 127 <1 year old were admitted with acute diarrhoeal disease in the general wards, while 30 were admitted in PICU. A total of 124 children were discharged alive from the general ward, and 3 were transferred to another hospital, owing to cow milk allergy, cardiac disease and unavailability of a PICU bed, respectively. However, their outcome is unknown. In PICU, 24 children were discharged alive, 3 died and there were no transfers to another hospital (Table 3).

This study only focused on acute diarrhoeal disease admissions. Total admission of infants with acute diarrhoeal disease to Pelonomi

Table 2. Demographic data and clinical characteristics (N=297)

Characteristic	n (%)
Gender	
Male	164 (55.2)
Female	133 (44.8)
Age, months	
1 - 3	81 (27.3)
4 - 7	109 (36.7)
8 - 12	107 (36.0)
Immunisations	
Yes	229 (77.1)
No	68 (22.9)
Breastfeeding	
Currently breastfeeding	98 (33)
Stopped breastfeeding	155 (52.2)
Never breastfed	44 (14.8)
Appropriate complementary feeds	
Yes	236 (79.5)
No	61 (20.5)
Nutritional status	
Normal	173 (58.2)
Moderate acute malnutrition	35 (11.8)
Overweight	2 (0.67)
Severe acute malnutrition with oedema	25 (8.42)
Severe acute malnutrition without oedema	62 (20.9)
Stunted	
Yes	105 (35.4)
No	192 (64.6)

Tertiary Hospital from 1 January 2019 to 31 December 2020 was 313. Of the total admission, 16 infants were excluded from the study due to missing information. In this study, a total of 297 infants met the inclusion criteria. There were more male (*n*=164) than female (*n*=133) participants. More infants aged between 4 and 7 months (36.7%) were admitted than the 8 - 12-month (36%) and 1 - 3-month group (27.3%). Most of the infants were immunised (77.1%), compared with those who were not (22.9%) (Table 2).

Only 33% of the study population was being breastfed, 52.2% had stopped breastfeeding, while 14.8% had never been breastfed. However, 236 (79.5%) infants had appropriate complementary feeds while 61 (20.5%) did not. Of the 61 who had inappropriate complementary feeds, 45 had stopped breastfeeding, 14 had never initiated breastfeeding and 2 were currently breastfeeding. This may be due to socioeconomic factors such as employment of mothers and the need to go to work daily, and incorrect preparation of formula feeds. In addition, inappropriate complementary feeds could arise from financial constraints in unemployed parents. The average length of stay for the complementary-fed group was 9 days.

Most (58.2%) of the infants had a normal malnutrition status, 11.8% had moderate acute malnutrition, 0.67% were overweight, 8.42% had severe acute malnutrition with oedema and 20.9% had severe malnutrition without oedema. A total of 35.6% of the infants were stunted.

Of the 49 PICU admissions, 18 infants were currently breastfeeding, 39 had appropriate complementary feeds, 36 were vaccinated and 16 were malnourished, of whom 10 had severe malnutrition without oedema, while 6 had moderate acute malnutrition.

The average length of stay was 9.7 days. The median length of stay was 7 days, with the shortest length of stay being 1 day and the longest 74 days. The participants who required admission to the ICU were 49, equating to 16.5% of the infants admitted with acute diarrhoeal disease. Of the participants, 95% were discharged home, 1% were transferred to the academic hospital and 4% died.

Discussion

Acute diarrhoeal disease in infancy significantly contributes to morbidity and mortality within this setting. The severity of acute diarrhoea in infancy is reflected by the severe malnutrition noted in many of the infants (29.3%). Of these, 8.42% had severe malnutrition with oedema, while 20.9% had severe malnutrition without oedema. The contribution of malnutrition to child mortality is well recognised, and almost 35% of young child deaths in poorer settings have undernutrition as a contributing factor.[2] To reduce morbidity and mortality due to diarrhoeal disease, interventions must be included to prevent and treat malnutrition.

Our findings are similar to a study in Bangladesh on severity of diarrhoea and malnutrition among children under 5 years. The study included 2 324 children under 5 with mild and moderate to severe disease, and the study discovered that malnutrition was significantly associated with moderate to severe diarrhoea compared with mild diarrhoea (*p*<0.001).[20] Furthermore, a study in Zambia reported that 67.3% of children with severe malnutrition aged 6 - 59 months had diarrhoea. More concerning findings were that children with diarrhoea were two times more likely to die than those without diarrhoea.[21]

The prevalence of acute diarrhoea in the current study was 24.8% over 2 years (2019 - 2020). These findings are similar to those of a study in Brazil in 2015. The study showed that 26.7% of children aged 0 - 12 months had at least one episode of acute diarrhoea.[22] The age group with the highest number of admissions due to acute diarrhoea in the current study was 4 - 7 months (36.7%). These findings are in keeping with a report from Namibia on factors associated with diarrhoea in children under 5 years, which showed that the highest prevalence of diarrhoea was in infants 0 - 12 months (33.2%) out of a total of 530.[23]

The current study found that 67% of the infants with diarrhoea were not being breastfed. Of the 67%, 52.2% had stopped breastfeeding before 6 months, while 14.8% had never been breastfed. Children who are not breastfed are more likely to develop acute diarrhoea compared with those who are.[24] In our study 33 % of the participants were still breastfeeding. To support these findings, Lamberti *et al.*[24] reported that breastfeeding or human milk is important to prevent diarrhoea in the first 2 years of life, as their results showed that infants who are not breastfed are more prone to develop diarrhoea from age 0 - 23 months.

Globally, breastfeeding has been identified as a cost-effective way to reduce diarrhoeal disease in the first year of life.[25] The SA

Table 3. Total admissions and outcome

Admission/outcome	2019, *n*	2020, *n*
Total general ward admissions <5 years old*	1 791	1 480
Total PICU admissions <5 years old†	227	230
>28 days - 1 year general*	579 (32.33%)	448 (30.27%)
>28 days - 1 year PICU†	88	81
Total acute diarrhoeal disease admissions (>28 days - 1 year old)	140 (24.18%)	157 (35.26%)
General ward		
Admissions	121 (86.43%)	127 (80.89%)
Discharged	116 (95.87%)	124 (97.64%)
Died	4 (3.31%)	3 (2.36%)
Transfer UAH	1 (0.83%) (cardiac disease)	0 (0%)
PICU		
Admissions	19 (13.57%)	30 (18.98%)
Discharged	18 (94.74%)	24 (80%)
Died	0 (0%)	5 (16.67%)
Transfer UAH	1 (5.26%) (cow milk protein allergy)	1 (3.33%) (cardiac disease/ unavailability of PICU bed)

PICU = paediatric intensive care unit; UAH = Universitas Academic Hospital.
*Child Health Care Problem Identification Programme data.
†PICU data set.

Demographic and Health Survey of 2016 found that contrary to the recommendation that infants under the age of 6 months should be exclusively breastfed, many infants in SA consume other liquids in addition to breast milk, such as plain water and other types of milk. One in four (25%) children aged under 6 months are not breastfed.[26]

Early introduction of complementary feeds increases the likelihood of diarrhoea due to micro-organisms found in different types of food.[27] In our study, appropriate complementary feeds were provided to 79.5% of participants, while 61 (20.5%) were not provided with appropriate complementary feeds. Of these 61 infants, 48 were undernourished. These findings are aligned with a study conducted in Tanzania where 3 355 mother-child pairs (children aged 6 - 24 months) were included. The study reported that 91.2% of the children were given semi-solid or solid foods before 6 months. Inappropriate complementary feeds such as early introduction of solid food (at 0 - 1 month) was significantly associated with wasting and being underweight for age. The study concluded that inappropriate complementary feeds increase the risk of undernutrition.[28] Complementary foods must be nutritious and safe to meet the energy and nutrient requirements of the infant.[10] Current evidence suggests that appropriate complementary feeds and adequate micronutrient intake have been associated with a 6% reduction in all child deaths, including from diarrhoea and pneumonia.[12]

Tadesse et al.[29] identified determinants of inappropriate complementary feeds as home deliveries, no postnatal follow-up visits, poor knowledge on infant feeding, food insecurity, no health education on complementary feeding and poverty. However, the current study did not include this information, as all data were obtained primarily from medical records. Early implementation of complementary feeds also decreases breastmilk intake, which is rich in antibodies that are important in the development of the child's immune system, resulting in low protective factors in the prevention of infections.[30]

In the current study, immunisations specific to the rotavirus vaccine were included. Of the 297 infants, only 77.1% had received the vaccination. The association of rotavirus with acute diarrhoea has been documented.[31-33] Rotavirus is one of the leading causes of diarrhoea and subsequent mortality in infants.[32] According to the WHO, 435 000 children die annually due to rotavirus globally, with an increase of infection noted after age 3 months.[34]

Although most infants were discharged home, 4% (n=12) died. Twelve deaths in infancy due to a preventable condition such as diarrhoeal disease are 12 deaths too many, considering the target set by the Sustainable Development Goals to end preventable neonatal and child deaths by 2030. Five out of the 12 infants (41.7%) who died had not received the rotavirus vaccine. In 2003, it was found that 352 000 - 592 000 deaths of acute diarrhoeal disease in children <5 years occurred globally.[35] Despite the staggering number of deaths noted in 2003, the same numbers are noted close to two decades later. According to the Johns Hopkins Bloomberg School of Public Health, 444 000 children died between 2000 and 2021 as a result of acute diarrhoeal disease.[36] These findings highlight the importance of increasing the coverage of the rotavirus vaccine in infants.

Stunting
Stunting is the most common type of malnutrition, and reflects chronic malnutrition.[2] SA data shows that 27% of children under five are stunted.[26] Children are defined as stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median.[36] Of the study participants, 36%

were stunted. Childhood stunting is one of the most significant impediments to human development. It remains a priority to address and prevent, as set out by the WHO in the global nutrition targets of 2025.[12]

Study limitations
A limitation of the study is that as a retrospective study, the outcomes and characteristics of interest are based on the review of summaries and files, which may be erroneous. The HIV status of participants was not included in this study, which is also a limitation as HIV is an important driver of diarrhoeal disease and malnutrition in childhood. In addition, other underlying conditions were not included in the data.

Underlying conditions, reasons for poor complementary feeding and reasons for voluntary cessation of breastfeeding were not included in the study data. Reasons provided in the results section were speculative.

Recommendations for improving and preventing acute diarrhoeal disease in infants
Acute diarrhoeal disease is a leading cause of morbidity and mortality among infants, particularly in low- and middle-income countries. Effective prevention and management strategies are essential to reduce its burden.

Promotion of exclusive breastfeeding
Exclusive breastfeeding for the first 6 months of life provides optimal nutrition and strengthens the infant's immune system, reducing the risk of infections, including diarrhoea.[37] Breastfeeding also protects against exposure to contaminated water and food during early infancy.

Improved access to safe water and sanitation
Ensuring access to clean drinking water and promoting good sanitation practices, such as proper disposal of waste and use of toilets, are critical to preventing diarrhoeal disease. Handwashing with soap can reduce diarrhoea incidence by up to 40%.[38]

Vaccination programmes
Vaccination against rotavirus, a leading cause of severe diarrhoea in infants, has significantly reduced diarrhoeal disease incidence in countries with high vaccine coverage. Expanding access to the rotavirus vaccine in underserved areas remains a priority.[40]

Improved nutrition
Adequate nutrition, including the provision of zinc and vitamin A supplements, strengthens immune responses and reduces both the incidence and severity of diarrhoeal episodes. Zinc supplementation has been shown to decrease the duration and frequency of diarrhoea.[41]

Community-based education and interventions
Community health programmes that educate caregivers about hygiene, breastfeeding, rehydration techniques and early recognition of danger signs can significantly improve outcomes and reduce mortality rates.[39]

Strengthened healthcare systems
Ensuring timely access to oral rehydration therapy and medical care is critical for treating dehydration and preventing complications. Training healthcare providers in managing diarrhoea is essential for effective case management.[42]

Implementing these strategies requires multisectoral collaboration involving health, education and infrastructure development to address the root causes of diarrhoeal disease comprehensively.

Recommendations for improving outcomes of infants with acute diarrhoeal disease in health facilities

To enhance outcomes for infants admitted with acute diarrhoeal disease, healthcare facilities must implement evidence-based interventions that address immediate clinical needs and prevent complications. The following recommendations focus on improving care quality and strengthening health systems.

Ensure prompt and accurate diagnosis
- Use standardised protocols, such as the WHO Integrated Management of Childhood Illness (IMCI), to identify the severity of dehydration and co-existing illnesses.[43]
- Incorporate laboratory testing, including stool analysis, when needed, to identify bacterial, viral, or parasitic pathogens and guide antimicrobial therapy appropriately.

Timely rehydration therapy
- Prioritise the use of ORS for mild to moderate dehydration. For severe dehydration, ensure access to intravenous fluids, with strict monitoring to prevent overhydration.[44]
- Train staff on the proper administration of rehydration therapies, focusing on early intervention to reduce mortality risks.

Zinc supplementation
- Provide zinc supplements to all infants admitted with acute diarrhoea to reduce the duration and severity of episodes and improve recovery rates. [41]

Comprehensive nutritional support
- Offer continued breastfeeding and age-appropriate feeding to prevent malnutrition, which exacerbates the severity of diarrhoea and slows recovery.[39]
- Address nutritional deficiencies by incorporating vitamin A supplementation and high-energy diets during recovery.

Infection prevention and control
- Adhere to infection prevention and control protocols, including hand hygiene, disinfection of shared surfaces and isolation of infants with highly infectious diarrhoeal pathogens, such as rotavirus or cholera.

Care for comorbidities
- Screen for and treat co-existing conditions such as sepsis, pneumonia and malnutrition, which are common in infants with severe diarrhoea.[43]

Strengthen health worker training and capacity
- Regularly train healthcare providers on updated diarrhoea management protocols, focusing on identifying danger signs and providing emergency care.

Community and caregiver engagement
- Educate caregivers on recognising early signs of dehydration, proper feeding practices and the importance of follow-up care to prevent readmission.[39]

Monitor and evaluate outcomes
- Establish routine audits of diarrhoea cases to identify gaps in

care, improve adherence to protocols and enhance resource allocation.

Conclusion
Acute diarrhoeal disease in infancy remains a significant contributor to morbidity and mortality within our setting. This study suggests that there is significant room for improvement as pertains to the application of preventive measures of childhood diarrhoea among infants admitted with acute diarrhoeal disease. These findings should inform future public health interventions. The study also highlights the importance of the rotavirus vaccination, as five of the 12 infants who died had not received the vaccine. In addition, breastfeeding is essential for the strengthening of the immune system in infancy, and should be emphasised at all levels of healthcare.

Future studies should assess the reasons behind the lack of application of these preventive measures of childhood diarrhoea, to outline patient-related factors v. system-related factors, and to guide public health interventions. A prospective study is also required to investigate why mothers do not exclusively breastfeed, stop breastfeeding or never breastfeed their babies, and reasons for the use of inappropriate complementary feeds.

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