AUDIT OF MANAGEMENT OF DIARRHOEA AMONG CHILDREN AGED 2-59 MONTHS ADMITTED TO GARISSA PROVINCIAL HOSPITAL.

DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE DEGREE OF MASTER OF MEDICINE PAEDIATRICS AND CHILD HEALTH, UNIVERSITY OF NAIROBI.

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DEDICATION

To my beloved husband Mark Gakuru who has been a pillar and an encouragement to me during my studies for a Master's degree of Medicine in Paediatrics and Child Health. It is also dedicated to my parents Dr. Daniel Weru Ichangi and Mrs. Mary M. Ichangi, for their prayers and encouragement.

To the children of Garissa County and in particular those who participated in the success of this study.

To the late Professor Nimrod O. Bwibo who supervised and encouraged me till the end of this challenging but satisfying journey. He passed on the 28th of September 2013 and could not be able to sign this final copy.

DECLARATION

This dissertation is my original work and has not been presented for the award of a degree in any other university.

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This dissertation has been presented with our full approval as supervisors.

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ABBREVIATIONS

AVPU- A consciousness scale (alert, responds to voice, responding to pain, unconsciousness)

ETAT – Emergency Triage Assessment and Treatment

GOK- Government of Kenya

GPH – Garissa Provincial Hospital

IMCI -Integrated Management of Childhood Illnesses

KDHS- Kenya Demographic and Health Survey

MDGs- Millennium Development Goals

MOH- Ministry of Health

ORS- Oral rehydration Solution

UNICEF- United Nations International Children's Fund

WHO – World Health Organisation

ABSTRACT

Introduction: One of the ways to ensure that the quality of hospital care is maintained is the utilisation of evidence based guidelines in managing clinical conditions.

Objectives: To audit and determine the adequacy of care of children aged (2-59months) with acute watery diarrhoea at Garissa Provincial Hospital.

Design: A retrospective cross-sectional study.

Setting: The Garissa Provincial Hospital (GPH) paediatric ward.

Methodology: A total number of 376 medical records of children admitted at the GPH during the period January 2010 to June 2012 were randomly selected and evaluated against the Ministry of Health Basic Paediatric Protocols. An inventory of supplies was done by interviewing 35 health workers and by observation and filling in of an inventory checklist by the principal investigator.

Results: Of the 376 children, 60.3% were male and 39.7% were female. The median age and duration of diarrhoea at presentation was 10 months (IQR 6 to 14) and 4 days (IQR 3-7) respectively. Out of the six clinical signs assessed, the most assessed sign was the level of consciousness and the least assessed sign was the capillary refill time with 48.1% and 17.6% of the patients having been assessed for it respectively.

One hundred and twenty four (57.7%) were treated with antibiotics with rehydration fluid being given as prescribed by the clinician in only 15.2 % patients. Twelve (19.7%) of the patients with a diagnosis of severe dehydration did not receive intravenous fluids.

Most of the items 14/17(82.35%) needed to manage acute watery diarrhoea were reported to be mostly available by more than half of the health workers.

Conclusions: There was poor assessment and documentation of the general clinical signs of children by the clinicians and inappropriate use of rehydration fluid therapy and antibiotics.

Recommendations: Regular in-house training with audit and regular feedback should be given to health workers.

1. BACKGROUND AND LITERATURE REVIEW

1.1 INTRODUCTION

The majority of deaths in children are attributable to a handful of illnesses which include diarrhoea, and that the quality of care provided to children in low-income countries is often poor.[1] [2] More than 80% of hospital deaths are due to preventable and treatable common childhood illnesses such as diarrhoea/dehydration, acute respiratory infections, measles, and malaria. In half of these cases illness is complicated by malnutrition.[3] [4] International and local case management guidelines have been in existence for over two decades. However, adherence to these guidelines has been a challenge and studies have shown wide variation of care.[5] This dissertation will therefore focus on the management given to children admitted with diarrhoea at the Garissa Provincial Hospital.

1.2 BURDEN OF DIARRHOEAL DISEASE

Diarrhoea remains the second most common cause of death among children under five globally, second only to pneumonia. Together with pneumonia it accounts for an estimated 40 percent of all child deaths around the world each year. Nearly one in five child deaths is due to diarrhoea, a loss of about 1.5 million lives each year. The toll is greater than that caused by acquired immune deficiency syndrome (AIDS), malaria and measles combined. Africa and south Asia are home to more than 80% of child deaths due to diarrhoea. A further fifteen countries Kenya included account for almost three quarters of all deaths from diarrhoea among children below five years.

In addition to this only 39 percent of children with diarrhoea in developing countries receive the recommended treatment, and there has been little progress since 2000.[6]

In Kenya, the Infant mortality rate is 52 per 1000 live births and the under five mortality rate is 74 per 1000 live births. This implies that 1 in every 19 children born in Kenya die before their first birthday while 1 in every 14 does not survive to the age of five years. Sixty percent of infant deaths in Kenya occur during the first month of life. In North Eastern Province (NEP), the Infant mortality rate is 57 per 1000 live births and the under five mortality rate is 80 per 1000 live births.[7]

This has remained so for the past ten years. These health indices are higher than the national health indices and are an area of concern if we are to achieve the Millennium Developmental Goal No. 4 of reducing child deaths by two thirds by 2015 from a baseline of 1990.

Diarrhoea has remained among the top five causes of mortality and morbidity in Kenya, particularly among infants and children below five years. Though diarrhoea case management is well illustrated in the Integrated management of childhood illnesses (IMCI) guidelines, the coverage of health workers in the country who are trained on IMCI has remained low.[8]

According to a National IMCI health facility survey (HFS), conducted in November 2006 by the Division of Child and Adolescent Health, Ministry of Public Health and Sanitation and Partners, diarrhoea is the third most common cause of mortality and morbidity in the country with a case fatality of up to 21 percent.[8] The prevalence of diarrhoea was found to be lowest in Nairobi at 12% and highest in the coast being at 27%. NEP was at 16%.[7] This shows that the prevalence of diarrhoea in NEP is high and had the fourth highest prevalence of diarrhoea out of the eight provinces in the country.

1.3 QUALITY OF HEALTHCARE

The quality of hospital care can be significantly improved if knowledge gained from health research is better translated into practice.[9] Previous studies have shown that adherence to such evidence-based guidelines is associated with improved health outcomes amongst them reducing the risk of death.[10] [11] [12] Despite the considerable efforts in developing and implementing evidence based guidelines, only a modest impact has been found on clinical practice. [17] Fifty five percent of the children with diarrhoea in Kenya, are correctly assessed and classified appropriately. Further, only about 10 percent of the caregivers are advised to give the child extra fluids, translating to poor case management and reduced focus on diarrhoeal disease. Further, a review of various Kenya Demographic Health Surveys (KDHS) showed a continued decline in oral rehydration solution (ORS) use in the last 10 years.[8] In Kenya only 49% of children with diarrhoea are taken to a health facility.[7]

Further, the research knowledge has been slow to influence practice or to bridge the know-do gap and a wide range of factors affect the actual ability to improve care.[13 14 15] The adherence to treatment guidelines for the management of common childhood illnesses such as diarrhoea and respiratory tract infections is low worldwide. [5 16] One of the ways to identify those at risk of dying will be guided by the appropriate use of the case management guidelines. However, few hospitals or health workers in Kenya have access to either the World Health Organization (WHO) recommendations or modern local practice guidelines.[1]

Clinical Practice Guideline implementation strategies have focused on changing the performance of doctors, and a minority have targeted nurses or other health professionals.[17] The findings of extensive research concur that passive dissemination of guidelines alone is usually insufficient to change clinical behaviour and practice, [18] while other interventions have small to moderate effects at best.[19] Some of the factors that may influence the implementation of a guideline in practice are, disagreement among experts, lack of appreciation by a target group, lack of outcome expectancy, lack of motivation or inertia of previous practice, failure of patients to accept changes, lack of training on the guidelines, ambiguous and complex guidelines, time constraints, lack of resources or infrastructure, staff shortage and lack of appropriate feedback.[20 21]

There is no clear cut method for improving the quality of healthcare, but there are a wide range of interventions available that improve professional practice and patient outcomes[22] and little evidence exists to indicate which interventions to use for specific problems and settings.[30] Theories of behaviour change identify factors that may prevent or motivate change in behaviour and might be helpful in tailoring guideline implementation strategies. Therefore, there is need to understand the current situation in order to apply appropriate strategies to influence quality of care. [23]

Irimu et al[24] aimed to develop simple clinical practice guidelines (CPGs) for conditions commonly associated with mortality in Kenyan Hospitals and an in-service training package to facilitate their implementation. CPGs are systematically developed statements to assist

practitioner and patient decisions about appropriate health care for specific clinical circumstances.[25] [26] The guidelines aim to improve the quality of patient care by providing specific recommendations for daily practice.[27] The Ministry of Health Republic of Kenya Basic Paediatric Protocols, have been adopted from the World Health Organisation/Integrated Management of Childhood Illnesses (WHO/IMCI) Book, "A Pocket book of Hospital Care for children". These guidelines include the management of Convulsions, Diarrhoea /dehydration, Human Immune Deficiency Virus (HIV), Malaria, Malnutrition, Meningitis, Pneumonia, Asthma and Newborn Care. Case management guidance for these diseases relies in part on rapid and appropriate recognition of sick children and subsequent prompt treatment and they focus on the inpatient care of children seriously ill enough to be referred.[28] A relatively small set of clinical features are used for the identification and assessment of severity of illness in such approaches. The correct use of these guidelines ensures that timely and appropriate quality of care is provided. These guidelines are mainly aimed at health workers who are responsible for taking care of young children at District hospitals.[29] The WHO guidelines on diarrhoea case management are based on studies that have shown reduction in morbidity and mortality due to diarrhoea.[30] [31] [32] [33] [34] Case management guidelines, however, have an impact on patient outcome only if treatment is given as prescribed.[7]

1.31 Assessment of Quality of Care

Aspects of patient care or Pillars of Quality of care include, structure (Facility level), process (Health worker level) and outcomes (Mortality, morbidity, recovery, restoration cost, influenced by many factors outside health care). According to Donabedian, assessment of care will involve assessment of outcome in terms of recovery, restoration and of survival, which has been frequently used as an indicator of the care given. Although outcomes may indicate good or bad care in the aggregate, they do not give an insight into the nature and location of the deficiencies or strengths to which an outcome may be attributed. Many factors other than medical care may influence outcome, and precautions must be taken to hold all significant factors other than medical care constant if valid conclusions are to be drawn.[35] Further, basing an assessment on a reduction of paediatric mortality in hospitals in resource limited settings and particularly in Kenya is found to be problematic. There are confounding factors such as: poor recording of

deaths that have occurred which give a false picture of the mortality in the health facility. However, if the data management or information systems improve during a study, there may be an increase in recorded mortality. Variation in the severity of disease at presentation may influence mortality. An intervention in a health facility may change outcomes such as mortality. For example, the hospital may stop admitting mildly ill children or utilisation of the facility may change in response to perceived change in quality of care. Disease pattern such as prevalence of malaria may influence outcomes and therefore mortality between hospitals may vary depending on the types of cases seen.[36]

Another approach to assessment is to examine the process of care itself, rather than its outcomes. This is justified by the assumption that one is interested not in the power of medical technology to achieve results, but in whether what is known to be "good" medical care has been applied. This will be more relevant to the question at hand; whether medicine is properly practiced, in this case whether diarrhoea management is per the diarrhoea case management guidelines available. This is illustrated in the Ministry of Health Republic of Kenya Basic Paediatric Protocols. A third approach to the assessment is to study not the process of care itself but the settings in which it takes place and the instrumentalities of which can be accepted at face value.[35]

1.4 DIARRHOEA CASE MANAGEMENT

Diarrhoea is the passage of unusually loose or watery stools, usually at least three times in a 24 hour period. There is usually an increased loss of water and electrolytes (sodium, chloride, potassium and bicarbonate) in the stool. Dehydration occurs when these losses are not replaced adequately and a deficit of water and electrolytes develops.[37] The basis for all diarrhoea is disturbed intestinal solute transport: water movement across intestinal membranes is passive and is determined by both active and passive fluxes of solutes, particularly sodium, chloride and glucose.[38] The commonest infectious cause of acute watery diarrhoea is human rota virus but many other organisms, including enteric Adenovirus, Norwalk virus and Calicivirus, can cause a similar picture.[39] Therefore, antibiotics are not used in the management of acute watery diarrhoea. Further, there has been an irrational use of antibiotics and inappropriate use of fluids in the management of diarrhoea in Kenyan hospitals.[1 40]

Morbidity and mortality are primarily due to loss of fluid and electrolytes in the stool. Stool losses are initially derived from the circulation and as the circulating volume contracts, the results of adaptive fluid shifts produce the clinical signs of dehydration. Consequently, the clinical presentation lags behind the true state of the child's dehydration. Clinical scoring systems are not an accurate means to assess total fluid management. The only reliable measure of fluid loss is to compare the child's current weight with an accurately measured recent clinic weight. However, this information is not always available.[39] Hence, to clinically estimate fluid loss according to current Ministry of Health CPGs, the various features are used: Shock which includes cold hands plus a weak or absent pulse and either; capillary refill of more than 3 seconds and the level of consciousness less than Alert (AVPU < A). Severe dehydration which includes inability to drink or level of consciousness less than Alert plus sunken eyes and return of skin pinch more or equal to 2 seconds. Some dehydration includes child able to drink adequately with two or more of the following i.e. presence of sunken eyes, return of skin pinch 1-2 seconds and restlessness or irritability. No dehydration includes fewer than two of the following symptoms i.e. sunken eyes, return of skin pinch 1-2 seconds, restlessness or irritability and is able to drink.[29] (see Appendix II)

The United Nations Children's Fund (UNICEF) and the World Health Organization (WHO) set out a 7 point plan for comprehensive diarrhoea control that includes a treatment and prevention package.[41]

The treatment package includes, zinc treatment and fluid replacement to prevent dehydration. Oral rehydration therapy is the cornerstone of fluid replacement and has been one of the most important medical inventions of the 20th century.[42]

A new aspect of this approach includes the use of low- osmolarity oral rehydration salt (ORS) which is more effective than the original ORS formulations and zinc treatment. The use of low osmolarity oral rehydration salts (glucose 75mmol/l, sodium 75mmol/l and osmolarity of 245mOsmol/l) has been shown to effectively correct the electrolyte and fluid imbalance. In children admitted to hospital with dehydration associated with diarrhoea, reduced osmolarity

rehydration solution is associated with reduced need for unscheduled intravenous infusions, lower stool volume, and less vomiting compared with standard WHO rehydration solution.[43] It is alarming that although the use of zinc for treatment of diarrhoea was introduced in Kenya in 2006, only less than 1 % of children with diarrhoea are given zinc supplements.[7] Zinc is an important micronutrient for a child's overall health and development. It is lost in greater quantity during diarrhoea. Replacing the lost zinc is important to help the child recover and to keep the child healthy in the coming months. It has been shown that zinc supplements given during an episode of diarrhoea reduce the duration and severity of the episode and lower the incidence of diarrhoea in the following 2-3 months.[44]

In the care of the child with dehydration due to diarrhoea, the Ministry of Health CPGs recommend the classification according to the degree of dehydration such as shock, severe dehydration, some dehydration or no dehydration. The recommended management for the various classifications is different in terms of the type, amount and duration of the fluid used for management. Antibiotics are not indicated unless there is dysentery or persistent diarrhoea and proven amoebiasis or giardiasis. All children with diarrhoea are to be given zinc.[29] (See Appendix II)

Continued feeding including breastfeeding, during diarrhoea episodes and the use of appropriate fluids available in the home if ORS are not available, along with increased fluids in general is recommended. The prevention package includes promotion of early and exclusive breast feeding, Vitamin A supplementation, promotion of hand washing with soap and water, improved water supply quantity and quality, including treatment and storage of household water and promotion of community-wide sanitation and rotavirus and measles vaccinations.[6]

2. STUDY JUSTIFICATION AND UTILITY

This study will provide baseline information, that will help in developing strategies for improving the quality of services offered at Garissa Provincial Hospital and improve efficiency in service delivery.

This study will also highlight challenges in case management and help health planners and policy makers to focus on priority areas such as case management training during the dissemination of the guidelines.

3. OBJECTIVES

3.1 Primary Objective

1. To assess the management of children aged (2-59 months) admitted with acute watery diarrhoea at Garissa Provincial Hospital.

3.2 Secondary Objective

1. To determine the adequacy of inventory for the management of children admitted with acute watery diarrhoea at Garissa Provincial Hospital.

4. RESEARCH METHODOLOGY

4.1 STUDY DESIGN

This was a hospital based retrospective cross-sectional study.

4.2 STUDY AREA

The study was carried out in the Garissa Provincial Hospital Paediatric ward.

The Garissa Provincial Hospital serves as the main referral hospital in the North Eastern Province and neighbouring districts of Wajir to the North, Ijara to the South, Isiolo to the North West and Mwingi in Eastern province and Tana River District to the West in Coast Province. It serves a population of about 1,450,784 million people in North Eastern Province. It is also a main referral facility for parts of Somalia to the East. It has an in-patient capacity of 248 beds of which 54 are in the paediatric wards. The average bed occupancy is 90% per year. The doctors undergoing training over the year as interns undergo a 3 months rotational training in each department. This also applies to the clinical officer interns. The registered clinical officers rotate in the department every 6 months, the higher diploma clinical officers work on an average of 3 years in the department and the enrolled and registered nurses rotate in the department for an average of one year and are posted to work in other departments thereafter.

In the North Eastern Province (NEP) 68% of the children with diarrhoea are more likely to be taken for treatment than in other provinces such as western with 31%.[7] However, there are many risk factors for diarrhoeal diseases in NEP. The stools of less than half of the children below five years are disposed off safely compared to that of children in Nairobi that is, 45% and 97 % respectively. This is made worse by the fact that 77% of the women 15-49 years of age have no sound education and it has been shown that the education levels of women or mothers is associated with increased safety in disposal of children's stools.[7] In Kenya, 77% of children aged 12-23 months are fully vaccinated. North Eastern Province (NEP) has the lowest proportion of children fully vaccinated at 48 %. Like the rest of the country rotavirus vaccine is not given routinely in public health facilities.[7]

4.3 STUDY POPULATION

For the primary objective

The study population comprised medical records of children aged (2-59months) who had been managed for acute watery diarrhoea at Garissa Provincial Hospital from January 2010 to June 2012.

For the secondary objective

The study population comprised health workers who worked in the paediatric department and were involved in the day to day management of paediatric illnesses at Garissa Provincial Hospital from January 2010 to September 2012.

4.4 STUDY PERIOD

The study was carried out between July 2012 and September 2012.

4.5 INCLUSION CRITERIA

1. Inpatient medical records of children (2-59 months) admitted between January 2010 and June 2012, with a primary diagnosis of acute watery diarrhoea.

2. Health workers who gave informed consent and were involved in paediatric care such as doctors, nurses and clinical officers during the study period, July 2012 – September 2012.

4.6 EXCLUSION CRITERIA

1. Medical records of those children with acute watery diarrhoea and co morbidities such as acute kidney injury, cardiac disease and severe malnutrition.

2. Health workers who had worked in the paediatric department for less than 3months during the study period, July 2012 –September 2012.

4.7 STUDY PROCEDURES

4.71 SAMPLE SIZE DETERMINATION OF THE NUMBER OF CHILDREN MEDICAL RECORDS TO BE EVALUATED.

a.) For the primary Objective

Medical records of the children admitted between January 2010 and June 2012 that met the inclusion criteria were manually selected. They were sorted by month of admission grouping them into quarter categories and each record was given a unique code or serial number that was used to make the sampling frame. The medical records of the study were then selected by using a blind draw/ballot procedure from each quarter until the sample size was achieved. Random selection of the files was stratified per quarter. An average of 50 files was selected per quarter. The sample size calculation for the in-patient number of medical records to be evaluated was as follows:

$n = [(z^2 * p * q) + ME^2] / [ME^2]$

n = **363** children's files.

Where;

z is the critical z score at 95% confidence level = 1.96

p is the estimated proportion of children with diarrhea managed with intravenous fluids with appropriate volume and duration of the fluids.[1] = 38%

q = 1-p = is the estimated proportion of children with diarrhea not being managed appropriately.

ME is the margin of error set at 0.05

4.72 SAMPLING OF THE HEALTH WORKERS

(b.) For the secondary objective

There were 35 health workers running the paediatric departments during the study period. All health workers interviewed had managed a child with diarrhoea and dehydration in the past 3months to a year prior to the study period.

Of these they were 9 doctors, 16 clinical officers, 3 enrolled nurses and 7 registered nurses. A total population sampling was carried out during the study period. It was purposive and by convenience. Potential study participants were those working in the above mentioned paediatric departments as from January 2010 to September 2012 as this included both the senior and junior health workers.

4.8 DATA COLLECTION

The data collection during the study period was carried out by the principal investigator and one research assistant who were working amongst the health workers at Garissa Provincial Hospital. The principal investigator was working in the hospital as a paediatric registrar and the research assistant was of a healthcare background, a clinical officer. The research assistant was trained by the principal investigator for two days on how to use the study tools and standard operating procedures form until they demonstrated competency in completeness and accuracy of test data entered.

For the primary objective

After permission to conduct the study was sought from the Kenyatta National Hospital (KNH) Ethics Committee and the Garissa Provincial hospital administration, the medical records of children who satisfied the inclusion criteria were evaluated by the principal investigator and the research assistant using a data retrieval form/questionnaire with the use of a standard operating procedure guidance form.

All the medical records that were eligible were allocated a unique study number to ensure that patient names and their respective file numbers were not utilised. The eligible patient records were kept in a lockable cabinet in the Records officers' office and only the principle investigator, research assistant and records officer had access to the patient files. Once the information was retrieved, the medical records were returned to the Hospitals' Records Department for safe keeping.

Data was collected using standardized questionnaires which were kept in a lockable cabinet in the Principal Investigator's office or the statistician's office. This data was then entered into a password protected Microsoft Access Database to prevent unauthorized access to patient records. Quality assurance was done by random selection of 5% of the medical records abstracted each week and data was reabstracted using the same study tool by a different person. The agreement between the two data sets was compared. More than 90% variation would require the data collector retrained on specific areas and on the use of standard operating procedures and study tools and issues clarified.

The investigator reviewed the initial patient assessment and management documented at admission and within the first 48 hours. This information was retrieved from the clinicians admission notes, medical records such as patients treatment sheets and nurses cardexes. Fluid charts were not available for assessment.

The data retrieval form included patients' demographic data (age, gender, sex, and study ID number), date of admission, and date of discharge/death.

The audit criteria was adopted from the criteria developed by staff in Kenyatta National Hospital as an appropriate tool for assessing the quality of care in the treatment of diarrhoea.[45] It aimed to capture clinical assessment, quality of diagnosis, prescription, adherence to prescribed treatment and monitoring of patient progress over the first 48 hours of admission. (See Appendix III)

For the secondary objective

This was conducted by the principal investigator and one research assistant after data abstraction from medical records was completed. The interviewer introduced herself and explained to the potential study participants the purpose and methods of the study. Informed written consent using a predesigned consent form was sought from the health worker. (See appendix VI) All health workers who met the inclusion criteria and were eligible were recruited after accepting to participate in the study. After recruiting the health workers, data was collected using a structured pre-tested self administered questionnaire. The inventory of commodities was in the form of a hospital assessment checklist where all the items/commodities were scored only as present or absent. The principal investigator filled out an inventory of commodities necessary for the management of severe dehydration by direct observation in the paediatric wards. (See Appendix IV B) The consumable commodities such as intravenous fluids, paediatric intravenous cannulars, intravenous giving sets and naso-gastric tubes, were deemed available for immediate use if they were found on the ward. If they were present in the hospital pharmacy where access outside routine hours is problematic they were classified as unavailable. Equipment such as intravenous fluid stands was deemed present if functional. (See appendix III c) The availability and reliability of supplies was also explored by using a self administered questionnaire completed by the ward based doctors, clinical officers and nurses. This was done by rating the availability of items on a four point scale as: never available, rarely available, usually available or always available. (See Appendix IV A)

The self administered questionnaire included the following:

1. Health workers socio-demographic data (age, gender, education level and qualifications, department that they work in, any trainings on the guidelines such as Emergency Triage Assessment and Treatment (ETAT) or (ETAT +) on diarrhoea case management.
2. An inventory of commodities necessary for the management of severe dehydration and shock due to diarrhoea.

4.9 CONTROL OF ERRORS AND BIASES

1. The questionnaire and other data collection tools were pretested on a sample population not included in the study to ensure validity before commencement of the study.
2. The research assistants were provided with standard operating procedures (see Appendix III) and explanation of terminologies used in the questionnaire to ensure uniform interpretation (see Appendix II).
3. Data collected was assessed on a daily basis and entered into a pre-programmed computer. The data entered was crosschecked to ensure the validity of data entered.
4. The Principal Investigator administered the questionnaire and assessed the responses given to the questionnaires on a daily basis and oversaw data entry to ensure validity of collected data especially as regards interpretation of the child's documented diagnosis and management.

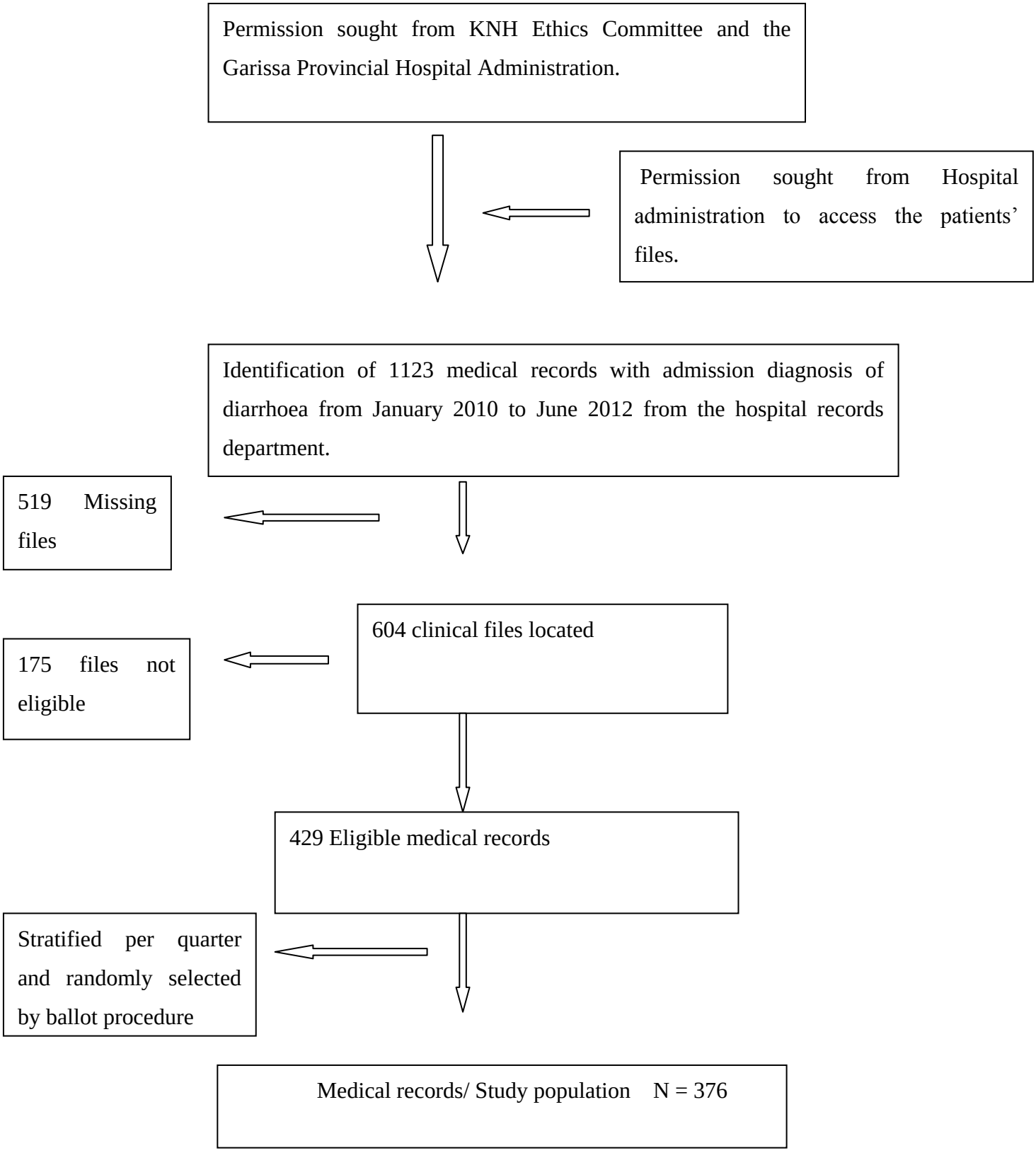
4.10 STUDY ASSUMPTIONS

1. The health worker would provide correct information for the questions asked in the questionnaire during the study period.

2. Bias due to seasonality of diarrhoea, peculiarities in staffing or inconsistencies in supply that can take place over a short period of time of study would be reduced by collecting data for a 24 months period.

3. What is documented is what was done by the health worker that is, the health worker documented every assessment he/she made.

4.11 STUDY FLOW CHART



4.12 DATA ANALYSIS AND MANAGEMENT

Data was coded, cleaned, verified and analyzed using IBM Statistical Package for Social Scientists (SPSS) Version 18. Categorical data collected included gender, level of qualification, type of management according to severity of diarrhoea and drug treatment. This kind of data was summarized using frequencies and percentages. Continuous data included age, duration of diarrhoea and duration of hospital stay; Mean and standard deviation or median and IQR was used to summarise this data. Statistical testing was done using Chi square test for categorical variables and for continuous data comparisons of means was done using Student's t test. Tests of associations was performed using Chi-square test for categorical variables.

4.13 ETHICAL CONSIDERATIONS

1. Approval to carry out the study was sought from KNH Ethics and Research Committee.
2. The approval letter was presented to the Garissa Provincial Hospital Management Team (HMT) to seek permission to carry out the study.
3. Informed written consent to participate in the study was obtained from the health workers in the relevant departments after explanation of the study and voluntary nature of participation. They were informed that refusal to participate in the study would not affect their status and their daily management of children in their departments.
4. Confidentiality was maintained. Medical records that were eligible for the study were given a unique study identification to ensure the patients names or file numbers were not utilised during analysis. Personal details such as name of the health worker were not recorded.

4.14 DISSEMINATION OF RESULTS

The findings of the study will be disseminated to the Garissa Provincial Hospital Medical superintendent and other relevant departmental heads, together with the study participants and copies of this dissertation made available in the University of Nairobi library and department of Paediatrics and Child Health. The results will be made available to policy makers and health workers within the hospital and the University of Nairobi to facilitate improvement of diarrhoea case management.

5.0 RESULTS

Three hundred and seventy six (376) medical records of children admitted to GPH with diarrhoea and dehydration during the period January 2010 to June 2012 were included in this study. The descriptive analysis of the study population is presented in the section below.

5.1 Basic patients' demographic characteristics

There were 226 (60.3%) males and 149(39.7%) female in the study with a male-to-female ratio of 1.5:1. The median age for children presenting with acute watery diarrhoea was 10 months (IQR 6 to 14). Males presenting with diarrhoea had a median age of 11 months (IQR 6-17) compared to 9 months (IQR 6-12) for females (p = 0.024). Overall, the modal age group was 2 to 11 months and this age group accounted for 56.4% of the patients (Table 1).

Table 1: Demographic characteristics of children with acute watery diarrhoea.

Characteristic		Frequency, n (%) N = 376
Age category	2 to 11 mo	212(56.4%)
	12 to 24 mo	118(31.4%)
	24 to 35 mo	23(6.1%)
	36 to 47 mo	16(4.3%)
	48 to 60 mo	7(1.9%)
Sex*	Male	226(60.3%)
	Female	149(39.7%)

* There was one medical record that was missing the sex of the patient.

The median duration of diarrhoea at presentation to Garissa PGH was 4 days (IQR 3-7). Vomiting was present in 357 (95%) out of the 376 patients and of these patients with vomiting 161 (45.1%) were reported to have vomited everything. The median duration of this symptom was 4 days (IQR 2-7).

5.2 Clinical signs assessed

Documentation of guideline recommended clinical features of acute watery diarrhoea is presented in table 2. The level of consciousness was the most commonly documented of the six recommended features. Of the patients assessed for the ability to drink, only 78/376 (20.8%) patients had been documented as being able to drink.

Table 2: Profile of documentation of the study subjects.

General examinations	Category	Frequency, n (%)
Ability to drink	Yes[c]	78(20.8%)
	No[c]	26(6.9%)
	No information[d]	272(72.3%)
Peripheral pulse [a]	Normal[c]	132(35.1%)
	Weak[c]	10(2.7%)
	No information[d]	234(62.2%)
Capillary refill	< 3 sec[c]	63(16.8%)
	> 3sec[c]	3(0.8%)
	No information[d]	310(82.4%)
Sunken eyes present	Yes[c]	96(25.5%)
	No[c]	15(4.0%)
	No information[d]	265(70.5%)
Was skin pinch documented	Yes	117(31.1%)
	No	259(68.9%)
Level of consciousness [b]	Alert[c]	161(42.8%)
	Altered level of consciousness[c]	20(5.3%)
	No information[d]	195(51.9%)

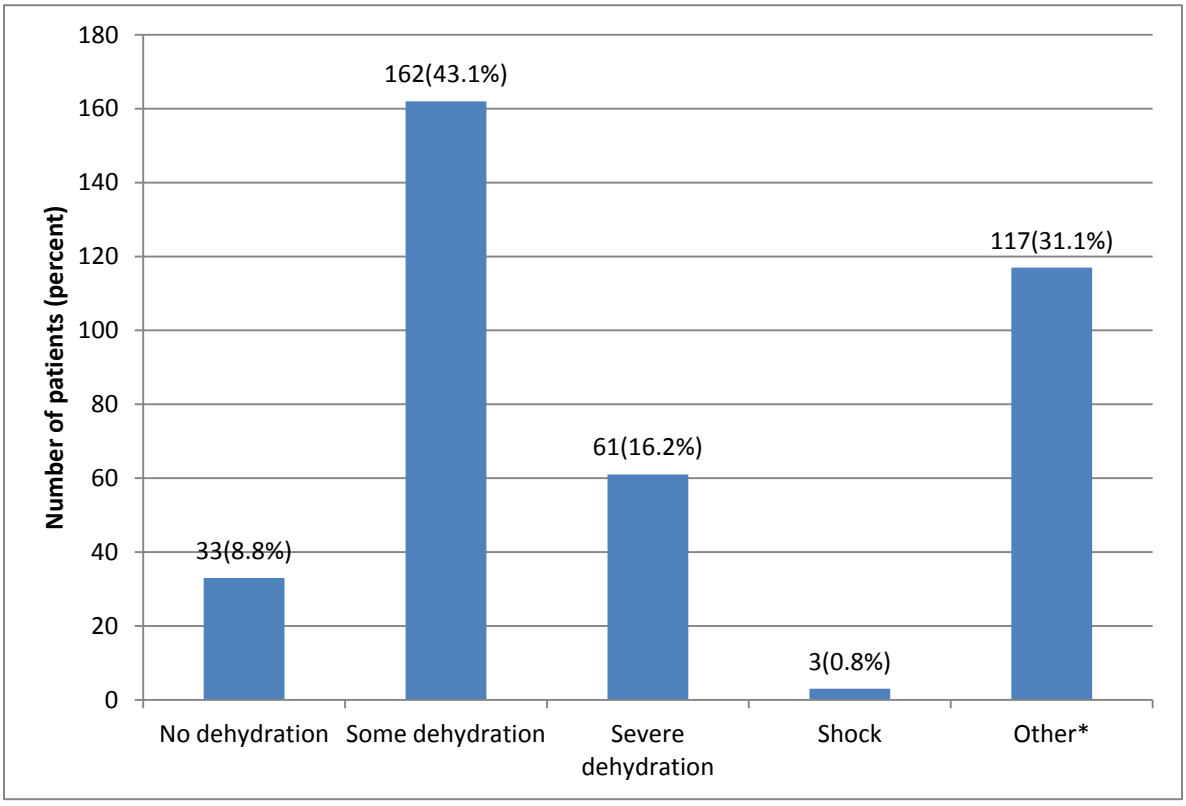
[a] Peripheral pulse was assumed to be normal if the patient was alert, [b] AVPU score was used to determine the level of consciousness: A= alert and AVPU<A was considered altered level of consciousness, [c] Number of patients with a documented clinical parameter, [d] Number of patients with a clinical parameter not documented.

Twenty six (6.9%) of the patients were documented as not being able to drink. However, there was no documentation on the ability to drink in 272 (72.3%) patients. One hundred and thirty two (35.1%) had a normal peripheral pulse whereas 10 (2.7%) had a weak pulse. Two hundred and thirty four (62.2%) had no documentation on the presence and character of the pulse. Sixty three (16.3%) of the patients had a capillary refill less than 3 seconds whereas only three (0.8%) had a capillary refill of more than 3 seconds. Three hundred and ten (82.4%) patients had no information on whether the capillary refill was assessed. Ninety six (25.5 %) patients had sunken eyes whereas 15 (4%) had no sunken eyes. Two hundred and sixty five (70.5%) patients had no information on whether sunken eyes as part of the general examination had been assessed. Skin Pinch was documented in 117 (31.1%) of the patients, whereas it was not documented in 259(68.9%) of the patients. Of those documented 89/117 (76.1%) of the patients had an immediate skin pinch(less than two seconds) and 28/117 (23.9%) had a prolonged skin pinch (more than 2 seconds). One hundred and sixty one (42.8%) patients were noted to be alert and 20 (5.3%) were noted to have altered level of consciousness. One hundred and ninety five patients (51.9%) had no information on whether or not the level of consciousness was documented. (Table 2).

5.3 Classification of hydration status of children admitted with acute watery diarrhoea at Garissa Provincial Hospital.

Thirty three 33/376 (8.8%) patients admitted with acute watery diarrhoea had a diagnosis of no dehydration. One hundred and sixty two (43.1%) patients were diagnosed as having some dehydration. Sixty one (16.2%) patients had severe dehydration with 0.08% of the 61 having been diagnosed as having shock. Approximately one third 117/376 (31.1%) of the patients were not classified using terms consistent with the Kenya Ministry of Health Paediatric Protocols.

Figure 1: Classification of severity of dehydration by the admitting clinician



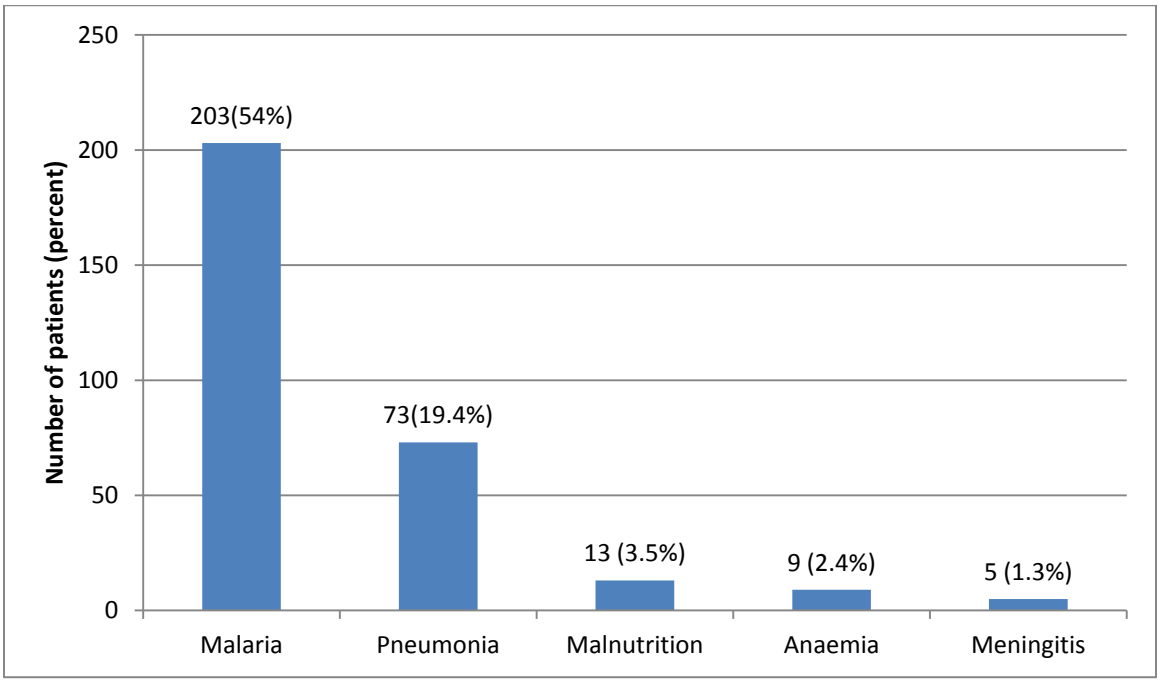
* Other classification not consistent with the Kenya's Ministry of health Paediatric Protocols (Sept 2010 edition) were: Acute gastroenteritis, Gastroenteritis, Gastroenteritis with dehydration, Diarrhoea, Diarrhoea and dehydration.

5.4 The co-morbidities present

Three hundred and three 303/376 (80.6%) patients with acute watery diarrhoea had co-morbidities.

The most common co-morbid illnesses were malaria 203(54%) and pneumonia 73(19.4%). Other co-morbidities were malnutrition in 13(3.5%) patients, anaemia in 9(2.4%) patients and meningitis in 5 (1.3%) patients. Of the three hundred and seventy six patients, ninety one (24.2%) patients with the co-morbidities had an indication for antibiotic use despite also having a diagnosis of acute watery diarrhoea. These included, those diagnosed with pneumonia, meningitis and malnutrition (Figure 2).

Figure 2: Co morbidities among the study subjects



5.5 Management

The commonly used fluid for rehydration was ORS 224/376 (59.6%) followed by Ringers Lactate 146/376 (38.2%). The choice of rehydration was consistent with the Kenya Ministry of Health Paediatric Protocols in 138/224 (61.6%) patients treated with ORS and in 43/146 (29.5%) patients treated with Ringers lactate solution.

A total of two hundred and fifteen patients were treated with antibiotics of which one hundred and twenty four (57.7%) patients with non bloody diarrhoea and no co morbidity being treated with antibiotics as shown in (Table 3).

Table 3: Antibiotic prescription in children admitted with acute watery diarrhoea.

Antibiotic Prescription	n= Frequency	(%)
Non bloody diarrhoea	124	57.7%
Non bloody diarrhoea with Co-morbidity requiring antibiotics	91	42.3%
Total	215	100

Three hundred and forty five 345/376 (92%) children with acute watery diarrhoea had a prescription of zinc sulphate made. Three hundred and sixteen 316/376 (84%) had a dose of the zinc sulphate consistent with the Kenya's Ministry of Health Paediatric Protocols and 260/376 (69.4%) had a correct duration of the same consistent with the Kenya Ministry of Health Paediatric Protocols as shown in (Table 4).

Table 4: Pattern of zinc utilization among children admitted with acute watery diarrhoea.

Variable	Category	Frequency n/376 (%)
Children prescribed zinc sulphate*	yes	346(92%)
	No	30(8.0%)
Correct zinc sulphate dose	Yes	316(84.0%)
	No	30(8.0%)
	N/A [a]	30(8.0%)
Correct zinc sulphate duration	Yes	260(69.2%)
	No	55(14.6%)
	No information[b]	31(8.2%)
	N/A[c]	30(8.0%)

[a, c] Number of patients who did not receive zinc sulphate.

[b] Number of patients who did not have the duration of the zinc sulphate prescription documented.

5.6 Monitoring in the First 48 hours

Rehydration fluid was given as prescribed by the clinician in 57/376 (15.2%) patients whereas it was not given as prescribed in 11/376 (2.9%) patients. Overall 308/376 (81.9%) patients had no documentation of fluid given as prescribed on the treatment sheet. Medical review within 6 hours on completion of correct PLAN C (see appendix) was only done in 7(1.9%) patients admitted with acute watery diarrhoea.

Of the fifty seven patients who received fluids as prescribed by the clinician, only 25/57 (43.86%) of the patients with some dehydration and 12/57 (21.05%) of the patients with severe dehydration and shock received the appropriate rehydration fluid (Table 5).

Table 5: Fluid given as prescribed by the clinician versus the classification of dehydration.

	Fluid given as prescribed by clinician		
Illness classification	Frequency (%) Yes n (%)	Frequency (%) No n (%)	Frequency (%) No information n (%)
Some dehydration	25 (43.86)	5(50)	132(48.00)
Severe dehydration/ shock	12(21.05)	3(30)	49(17.82)
Other [a]	20(35.09)	2(20)	95(34.54)
Total	57(100)	10(100)	275(100)

[a] Dehydration classification not consistent with the Ministry of Health Republic of Kenya Basic Paediatric Protocols (Sept 2010 edition)

Intravenous fluid therapy was given to 3(9.1%) patients with a diagnosis of no dehydration and to 48(29.6%) patients with a diagnosis of some dehydration. Twelve (19.7%) of patients with a diagnosis of severe dehydration did not receive intravenous fluids. All 3(100%) patients with a diagnosis of shock appropriately received intravenous fluids (Normal saline and Ringers Lactate) as the correct type of fluid given. Twenty seven (81.8%) of the patients with a diagnosis of no dehydration and 112(69.1%) of the patients with a diagnosis of some dehydration (69.1%) received ORS (Table 6).

Table 6: Intravenous fluid and Oral rehydration salt solution therapy versus the classification of dehydration.

Illness classification	Intravenous Fluids(IVF)		Total	Oral Rehydration salt solution(ORS)		Total
	No n (%)	Yes n (%)		No n (%)	Yes n (%)	
No dehydration	30(90.9)	3(9.1)	33	6(18.2)	27(81.8)	33
Some dehydration	114(70.4)	48(29.6)	162	50(30.9)	112(69.1)	162
Severe dehydration	12(19.7)	49(80.3)	61	48(78.7)	13(21.3)	61
Shock	0(0)	3(100)	3	3(100)	0(0)	3
Not classified	74(63.3)	43(36.8)	117	45(38.5)	72(61.5)	117
Total	230	146	376	152	224	376

5.7 Outcome of patients admitted with acute watery diarrhoea

The majority of the patients (96.5%) managed with acute watery diarrhoea were discharged alive with 13(3.5%) deaths occurring during hospitalisation (Fig 3).Five of the thirteen (38.5%) deaths that occurred during hospitalisation occurred in children with acute watery diarrhoea only while the remaining deaths were related to a co-morbidity. The median length of stay in the wards was 3 days (IQR 2-4.5).

Figure 3: Outcome of patients admitted with acute watery diarrhoea.

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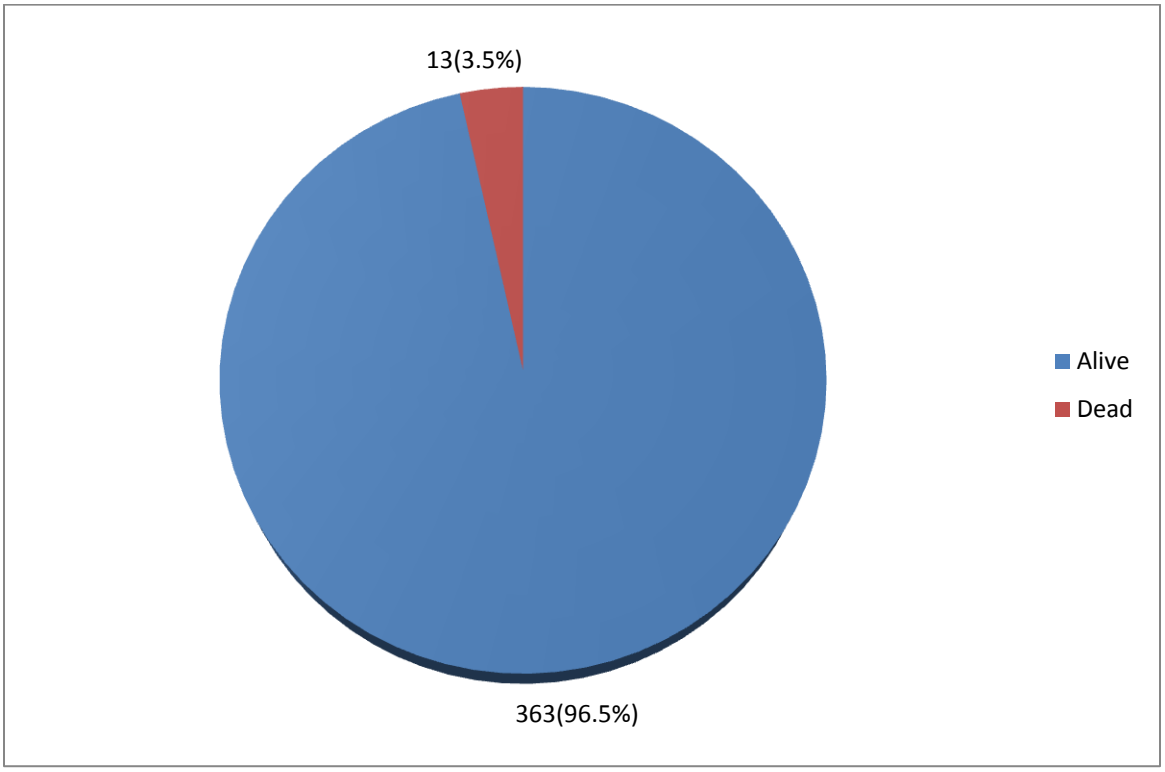


5.8 Staff interviews

The staff interviews were intended to ascertain the management of patients with diarrhoea and dehydration and to determine the adequacy of facilities and equipment in managing these children. During the study period a total of 35 health workers were interviewed. The median age of the health workers was 29.2 years (22-48) (SD 7.1) with 18(51.43%) of them being male and 17 (48.57%) being female. They comprised 16(45.71%) clinical officers, 9(25.71%) doctors, 3(8.57%) enrolled nurses (KEN/KECHN) and 7(20%) Registered nurses (KRN/KRCHN). All health workers interviewed, had managed a child with diarrhoea and dehydration in the 3months to a year prior to the study period.

The number of health workers who had been trained in Emergency Triage Assessment and Treatment (ETAT +) were 14(41.18%).

More than half of the health workers interviewed, reported the following items to be always or most of the times available; oral rehydration salt solution, Ringers lactate, Normal saline (0.9%) solution, Zinc sulphate tablets, Intravenous fluid giving sets, Blood giving sets, Intravenous branular (yellow), Syringes 10cc and 20cc, Naso-gastric tube French gauge 6,8,10 and 12, and Kenya's Ministry of Health Paediatric Protocols. Only 3 of the 17 items assessed were reported by more than half of the health workers as rarely or never being available. These included Syringes 50cc, a functional Glucometer and Glucose strips. Of note was the inconsistency in reporting availability of some items among the health workers. For example, 18(54.54%) of the health workers noted that the Intravenous fluid charts were mostly and/ or always available. This was not in keeping with the principal investigators' ward inventory which showed unavailability of the charts during the study period. When fluid monitoring documentation was done, it was mostly done in the nurses' cardexes. The charts were also noted to be missing in all the medical records of the study participants. Only 7(21.21%) of the health workers noted the charts as never being available which was in keeping with the principal investigators' ward inventory (Table 7).

Table 7: Availability of essential supplies for the management of acute watery diarrhoea in GPH reported by ward based health workers (n=35).

Commodity	Availability				Total	
	Never available	Rarely available	Mostly available	Always available	Frequency	percentage
1.)Oral rehydration salt solution	-	1(2.86%)	5(14.29%)	29(82.86%)	35	100
2.)Ringers lactate solution	-	2(5.88%)	16(47.06%)	16(47.06%)	34	100
3.) Normal saline 0.9% solution	-	-	11(31.43%)	24(68.57%)	35	100
4.) Zinc sulphate	1(2.86%)	1(2.86%)	15(42.86%)	18(51.43%)	35	100
5.) IV fluid giving sets	-	-	8(22.86%)	27(77.14%)	35	100
6.)Blood giving sets	-	-	12(34.29%)	23(65.71%)	35	100
7.) IV branulars(yellow/blue)	-	-	16(45.71%)	19(54.29%)	35	100
8.) Syringes 10 &20 cc	-	1(2.86%)	15(42.86%)	19(54.29%)	35	100
9.) Syringes 50cc	12(34.29%)	12(34.29%)	5(14.29%)	6(17.14%)	35	100
10.) IV Fluid charts	7(21.21%)	8(24.24%)	9(27.27%)	9(27.27%)	33	100
11.) Nasogastric tubes FG 6	2(6.43%)	3(9.68%)	14(45.16%)	12(38.71%)	31	100
12.) Nasogastric tubes FG 8	2(5.71%)	3(8.57%)	19(54.29%)	11(31.43%)	35	100
13.) Nasogastric tubes FG 10	3(9.09%)	5(15.15%)	13(39.39%)	12(36.36%)	33	100
14.) Nasogastric tubes FG 12	4(12.9%)	4(12.9%)	11(33.48%)	12(38.71%)	31	100
15.) Guidelines (wall charts ,booklets)	2(5.88%)	4(11.76%)	9(26.47%)	19(55.85%)	34	100
16.) Functional glucometer	3(8.57%)	23(65.71%)	4(11.43%)	5(14.29%)	35	100
17.) Glucose strips	5(14.29%)	22(62.86%)	5(14.29%)	3(8.57%)	35	100

6.0 DISCUSSION

Diarrhoea remains the second most common cause of death among children under five globally, second to pneumonia.[6] and has remained among the top five causes of mortality and morbidity in Kenya, particularly among infants and children below five years.[8] The quality of healthcare can be significantly improved if evidence based guidelines are adhered to, translating to improved health outcomes amongst them reduced risk of death.[10 11 12]

The characteristics of children admitted to the Garissa Provincial Hospital (GPH) with acute watery diarrhoea were similar to those children admitted at a Kenyan tertiary hospital. In both studies males were the majority representing 60% and 56% of the participants respectively. The patients were also comparable in terms of age with the median age of 10 months in the current study compared to 8 months in the previous study. The characteristics are similar despite the hospitals being of different referral levels and speculate that caretakers will seek care at the referral hospitals in their area when their children are very ill.

The clinical assessment

The clinical signs found during the assessment of children admitted with acute watery diarrhoea at Garissa Provincial hospital were poorly assessed with the "capillary refill" being the least clinical sign assessed. This was not the case in the Kenyan tertiary hospital study where the least assessed sign was the ability to drink.[45] In the current study, the ability to drink was assessed readily as the clinicians did ask the caretakers if their children were able to take orally and retain the feeds taken and documented this. This difference may be due to the inadequate knowledge and training of the diarrhoea case management in the Kenya Ministry of Health Paediatric Protocols by the health workers. This showed a gap in the knowledge and practice of these clinicians and this may not have been emphasized during their prequalification years. In the current study the level of consciousness was the most assessed clinical sign in 48.1% of patients and was similar to the findings in the Kenyan tertiary hospital study by Irimu et al where level of consciousness was the most common clinical sign that was assessed in 56.9% of the patients.[45] This could be due to the fact that clinicians are more aware of some of the danger signs such as deteriorating level of consciousness and are more likely to identify it.

Classification of the illness

In the current study, approximately a third (31.1%) of the patients was not classified using terms consistent with the Kenya ministry of Health Paediatric Protocols. This is comparable to a study done in a tertiary hospital in Kenya where 19.74% of the patients admitted with acute diarrhoea had no classification consistent with the clinical Practice guidelines (CPGs).[45] This may be due to lack of knowledge of the diarrhoea case management in the Kenya Ministry of Health Paediatric protocols by the clinicians.

Intravenous fluid therapy was administered to 9% of the patients with a diagnosis of no dehydration and close to a third (29.6%) of the patients with a diagnosis of some dehydration. Similarly in Thailand 26.7% of the patients with no dehydration and moderate dehydration were administered with IVF unnecessarily.[21] In the current study the reason might be that the clinicians made classifications arbitrarily without having knowledge of what the management should be instituted for each classification of dehydration. However, another study looking into why the management habits of these clinicians on acute diarrhoeal disease are different from the Kenya Ministry of Health Paediatric protocols is needed to fully answer this. In the Thailand study the reasons given for physicians altering the standard guidelines when managing childhood diarrhoea were; caretakers preference for a particular kind of treatment which is not in keeping with the guidelines over another, clinicians feeling that some of these children had trekked from very far and needed more medications than necessary just in case the illness worsened. The clinicians also believed that they had not left anything to chance. The belief of the care takers that use of poly medicine led to quicker recovery other than one type of management such as use of Oral rehydration salts (ORS) alone also influenced the physicians prescribing habits. In the current study the choice of rehydration was consistent with the Kenya's Ministry of Health Paediatric Protocols in 61.6% of the patients treated with ORS and in about a third (29.5%) of the patients treated with Ringers lactate solution. The Thailand study had 15% of prescriptions adhering completely to Thai guidelines of ORS prescribing. [21] This may be due to the availability of the ORS at the Garissa Provincial Hospital and the advocacy by the Ministry of Health of Kenya on the utilization of ORS through its policy guidelines on control and management of diarrhoeal diseases in children below five years.

Six of thirty three (18.2%) patients with a diagnosis of no dehydration were not prescribed ORS even when the Protocols stipulate that they be administered with ORS. Similarly a third 30.9% of the patients with a diagnosis of some dehydration was not administered with ORS. Twelve (19.7%) of the patients with a diagnosis of severe dehydration did not receive intravenous fluids. This shows prescription habits not consistent with the Kenya Ministry of Health Paediatric Protocols.

One hundred and twenty four (59.6%) patients with non bloody diarrhoea were treated with antibiotics. This is similar to the Nolan T et al study where inappropriate treatment with antibiotics and fluids occurred in 61% of the patients.[2] In the current study this could be due to the health workers having inadequate knowledge on the management of acute diarrhoeal disease. In the previous study the proportion of doctors and nurses in the district hospitals had inadequate knowledge in the management of specific childhood conditions diarrhoea. This is also similar to a study done in first referral level hospitals in 13 districts in Kenya where 66(56%) of the patients with non bloody diarrhoea were administered antibiotics.[1] A study in Thailand had 75.5% patients treated by clinicians receive inappropriate antibiotics. [21] In the Thailand study, some of the doctors felt that some of the patients lived in unsanitary household conditions and that the caretakers low level of education might later result in the children acquiring infectious diarrhoea leading to severe dehydration and hence the need of administering antibiotics.

Ninety two percent (345/376) of the children with acute watery diarrhoea in the current study were administered zinc sulphate where the correct dose and duration was prescribed to more than half of the patients (84.0%) and 69.2% respectively. More than half 67.1% (49 out of 73) of Nigerian paediatric doctors prescribed zinc sulphate all the time that they managed a child with acute diarrhoea.[46] For both studies this may be attributed to the widespread awareness of the importance of zinc sulphate in the management of acute diarrhoeal disease by the clinicians.

Monitoring of the patients in the first 48 hours of admission

In the current study, 57/376(15.2%) patients received fluid therapy as prescribed by the clinician in the first 48 hours. Of these 25/57(43.86%) patients had some dehydration, 12/57(21.05%) had severe dehydration and shock. Three hundred and eight (81.9%) patients had no documentation of fluid given as prescribed by the clinician. In a study conducted in 13 districts in Kenya, 22(19%) of the patients with acute watery diarrhoea were not administered fluids at all and where intravenous fluids were prescribed only 38.2% the patients received the appropriate volume and duration of the intravenous fluids.[1] In the current study there were no fluid monitoring charts available and fluid monitoring was not appropriately done. The nursing officers only wrote on the cardex, on the amount prescribed on the treatment sheet by the clinician. Staff shortage also contributed to poor fluid monitoring. In the previous study the reasons were similar.

In the current study medical review within 6 hours of completion of Plan C was only done in 7(1.9%) patients admitted with diarrhoea and dehydration. This is similar to a study in a Kenyan tertiary hospital where documented review of the patients by both nurses and clinicians in the first 48 hours of admission was found to be poor where only 2 (0.7%) of the patients had intravenous fluid therapy for severe dehydration monitored after administration.[45] In the current study the reason for this may have been due to inadequate knowledge of the diarrhoea case management guidelines by the health workers ,staff shortage and lack of standardised reporting documents such as fluid charts. In the Kenyan tertiary hospital study poor documentation of the care provided by the health professionals may explain in part the observed errors in the management.[45] Similarly inadequate monitoring or failure to re-assess patients adequately by the clinicians during treatment occurred in 39(30%) of patients in a study done by Nolan T et al.[2] In this previous study staff were not specifically trained on triaging and emergency treatment and assigned to these activities, facilities were not well organised, guidelines for standard assessment and treatment were not provided, basic drugs and supplies were not available in the emergency area.[2]

Three hundred and three (80.5%) patients in the study had co-morbidities with the co-morbidity mostly noted to be malaria in 203(54%) patients. A similar finding was noted in a study

conducted in less developed countries where 90% of children assessed had severe common childhood illnesses often with underlying malaria.[2] This is may be attributed to where these two studies were undertaken as these were malaria endemic areas.

Outcome of patients admitted with acute watery diarrhoea

The majority of the patients (96.5%) managed for diarrhoea and dehydration were discharged alive with 13(3.5%) deaths occurring during hospitalisation. These could have died due to other associated co-morbidities. The median length of stay in the wards was 3 days (IQR 2-4.5).

Staff Interviews

During the study period a total of 35 health workers were interviewed. The median age of the health workers was 29.2 years (22-48) (SD 7.1) with 18(51.43%) of them being male and 17 (48.57%) being female. They comprised of 16(45.71%) clinical officers, 9(25.71%) doctors, 3(8.57%) enrolled nurses (KEN/KECHN) and 7(20%) Registered nurses (KRN/KRCHN).

All health workers interviewed, had managed a child with acute watery diarrhoea in the past 3months to a year prior to the study period and only 14(41.18%) had been trained in Emergency Triage Assessment and Treatment Training (ETAT+).

Adequacy of inventory for the management of children admitted with acute watery diarrhoea

Most of the commodities needed for the management of acute watery diarrhoea were present and this was collaborated by the principal investigator who performed an independent ward inventory check as well during the study period. The only commodities lacking were the fifty millilitre syringes, a functional glucometer, glucose strips, zinc sulphate and fluid charts.

7.0 CONCLUSION

1. There was inadequate assessment and documentation of the general signs and symptoms of children admitted with acute watery diarrhoea by the clinicians in accordance with the Kenya Ministry of Health Paediatric Protocols.

2. There was inappropriate use of rehydration fluid therapy and antibiotics inconsistent with the Kenya's Ministry of Health Paediatric Protocols.

3. Rehydration fluid was given as prescribed by the clinician in 57(15.2%) of the patients admitted with acute watery diarrhoea.

4. Medical review within 6 hours of completion of PLAN C was done in only 7(1.9%) patients admitted with acute watery diarrhoea.

8.0 RECOMMENDATION

1. Audit of care and regular feedback to be given to the health workers by the audit team of the hospital which should include all the health workers and those in the administration so as to improve the quality of care particularly in the management of such a common and killer disease, diarrhoea, and its resultant dehydration.
2. Guidelines and protocols for the management of acute watery diarrhoea should be used correctly by the health workers if quality of care is to improve.

3. The needed commodities for the care of these patients with acute watery diarrhoea to be made available such as a functional glucometer, glucose measuring strips, 50cc syringes and fluid charts .

9.0 LIMITATION

1. The study relied on documentation and health workers are known to have poor documentation practice. This study being an audit (medical records review) can only then reflect what is documented. This would therefore be a measure of good clinical practice in documenting.
2. There being a significant proportion of missing information, it was difficult to confidently report on the proportion of correctly diagnosed patients admitted with acute watery diarrhoea retrospectively.
3. The study depended on the willingness of the participants to provide accurate and truthful information.
4. The validity of retrospective data was often difficult to verify.

APPENDIX I: STUDY DEFINITIONS.

Audit Criteria: are defined as measureable statements about health care that describe its quality and can be used to asses it.

Acute watery diarrhoea: is defined as the passage of three or more loose or liquid stools per day.

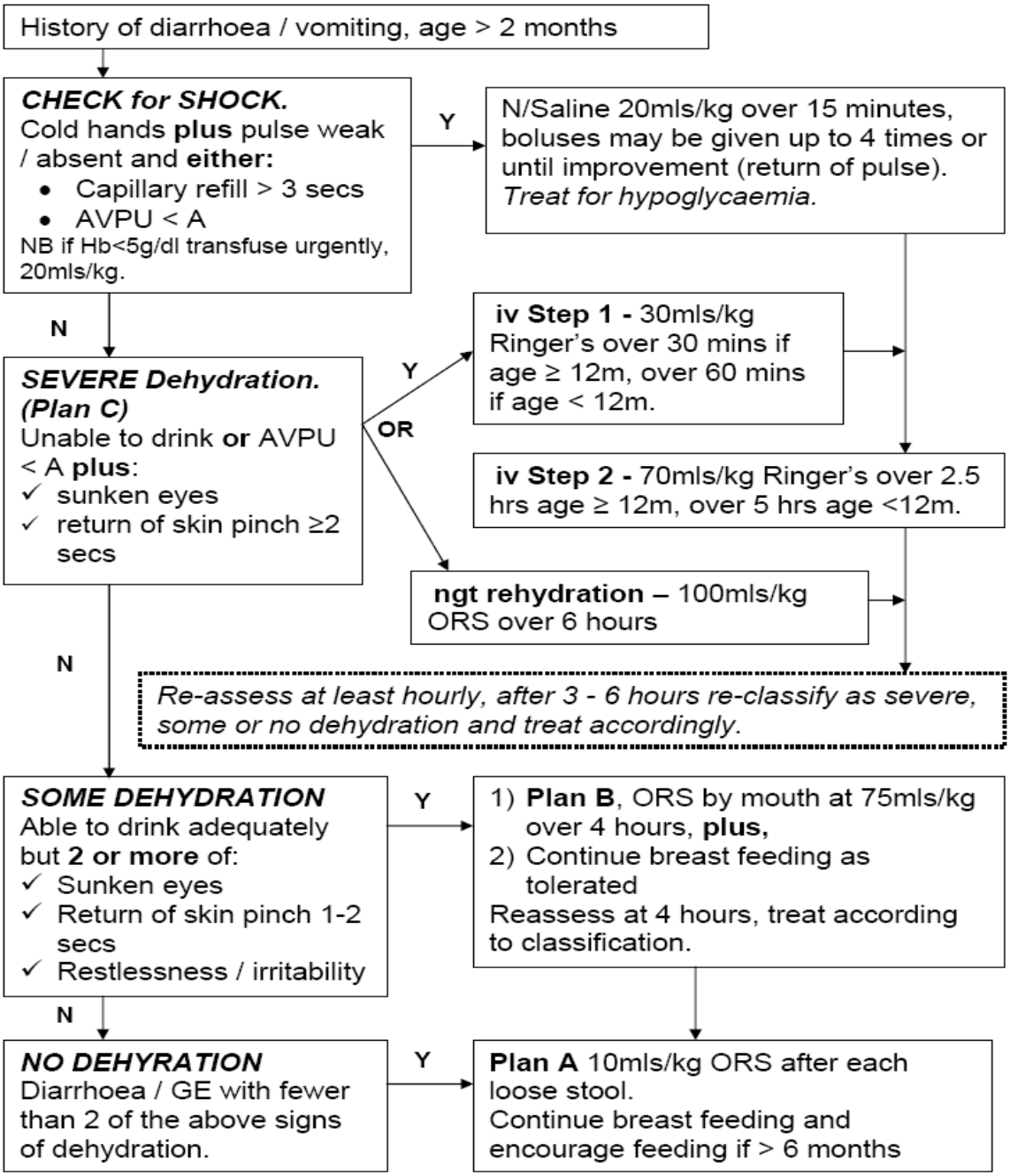
Dysentery: Blood in stool (seen or reported).

Persistent Diarrhoea: Diarrhoea lasting 14 days or longer.

APPENDIX II: WHO/IMCI CLASSIFICATION AND MANAGEMENT OF DIARHOEA/DEHYDRATION.

Diarrhoea / GE protocol (excluding severe malnutrition).

*Antibiotics are NOT indicated unless there is **dysentery** or **persistent diarrhoea** and proven amoebiasis or giardiasis. Diarrhoea > 14 days may be complicated by intolerance of ORS – worsening diarrhoea – if seen change to iv regimens.* ***All cases to receive Zinc.***



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Urgent Fluid management – Child WITHOUT severe malnutrition.*

Weight kg	Shock, 20mls/kg Ringer's or Saline Immediately	Plan C – Step 1 **30mls/kg** Ringer's **Age <12m**, 1 hour **Age ≥1yr**, ½ hour	Plan C – Step 2 **70mls/kg** Ringer's or ng ORS **Age <12m**, over 5 hrs = drops/min**	Volume	**Age ≥ 1yr**, over 2½ hrs = drops/min**	Plan B - 75mls/kg Oral / ng ORS Over 4 hours
2.00	40	50	*10*	150	** ***Assumes 'adult' iv giving sets where 20drops=1ml***	150
2.50	50	75	*13*	200		150
3.00	60	100	*13*	200		200
4.00	80	100	*20*	300		300
5.00	100	150	*27*	400	*55*	350
6.00	120	150	*27*	400	*55*	450
7.00	140	200	*33*	500	*66*	500
8.00	160	250	*33*	500	*66*	600
9.00	180	250	*40*	600	*80*	650
10.00	200	300	*50*	700	*100*	750
11.00	220	300	*55*	800	*110*	800
12.00	240	350	*55*	800	*110*	900
13.00	260	400	*60*	900	*120*	950
14.00	280	400	*66*	1000	*135*	1000
15.00	300	450	*66*	1000	*135*	1100
16.00	320	500	*75*	1100	*150*	1200
17.00	340	500	*80*	1200	*160*	1300
18.00	360	550	*80*	1200	*160*	1300
19.00	380	550	*90*	1300	*180*	1400
20.00	400	600	*95*	1400	*190*	1500

**Consider Immediate blood transfusion if severe pallor or Hb <5g/dl on admission*

[29] Ministry of Health Basic Paediatric Protocols

APPENDIX III: a) Standard operating procedures (SOPs) of patient with admission diagnosis of severe dehydration/diarrhoea as per the Ministry of Health Basic paediatric protocols.

Areas of study	**Clinical indicators**	**Source of information**
Patient initial assessment	Duration of diarrhoea documented	Clinician's admission notes
	Documentation of whether diarrhoea is bloody or non bloody	Clinician's admission notes
Initial clinical examination	Documentation of whether eyes are sunken or not &the time taken for pinched skin to fold to return to normal.	Clinician's admission notes
	Peripheral pulse character: normal/weak/unpalpable documented for all patients with unaltered consciousness. If alert fill N/A	Clinician's admission notes
	Level of consciousness documented using AVPU scale, Glasgow or Blantyre coma scale	Clinician's admission notes
Classification on admission	1= severe dehydration,2= shock,	Clinician's admission notes

	3= some 0= others	
	Correct syndromic approach as MOH- Republic of Kenya Basic Paediatric Protocols	Clinician's admission notes
Treatment	Correct rehydration therapy (choice of fluid and volume) as recommended by the MOH- Republic of Kenya Basic Paediatric Protocols. (Fluid volume rounded to nearest -/+ 20% will be considered appropriate).	Treatment Chart
Monitoring in first 48 hours	Fluid given as prescribed by the clinician.	Fluid chart/Nurses cardex
	Reassessed within 6 hours of completion of plan C ONLY for patient with correct plan C if not correct plan C Fill N/A	Clinicians notes / treatment charts

b) Correct rehydration therapy (fluid and volume) as recommended by the Ministry of Health-basic paediatric protocols

a. Shock Management (20mls/kg of N/saline over 15 minutes, boluses up to 4 times or until improvement (return of pulse).....

b. Plan C (For <12 months old with severe dehydration First give RL30ml/kg in 1 hour(step 1) then 70ml/kg in 5hrs (Step 2) or Naso-gastric rehydration 100mls/kg ORS over 6 hours. (Nb. // for children in shock omit step 1).....

c. Plan C (For >12 months old with severe dehydration First give RL 30ml/kg in 30minutes then 70ml/kg in 2 1/2 hrs) or Naso-gastric rehydration 100mls/kg ORS over 6 hours (Nb. // for children in shock omit step 1).....

d. Plan B (For Some dehydration ORS by mouth at 75mls/kg over 4 hours).....

e. Plan A (For no dehydration, 10mls/kg ORS after each loose stool).....

f.) Zinc given dose in 20 mg/day > 6months..... **Duration in (days**) 10 - 14 days

g) Zinc given dose in 10 mg/day < 6months..... **Duration in (days**) 10 -14 days

c) Inventory of commodities checklist.

1.) Consumable commodities such as intravenous fluids, paediatric intravenous cannular, intravenous fluid giving set, nasogastric-tubes deemed

a) Available for immediate use if they are found on the ward.

b) Unavailable if in the hospital pharmacy outside routine hours or not available in the ward and in the pharmacy during routine hours.

2.) Nasogastric tubes defined as available if all sizes are present in the ward i.e fg 8 &10

3.) Equipment deemed present if functional e.g fluid stands, glucometer.

4.) Syringes size 10cc or 20cc and 50cc deemed present if found on the ward.

APPENDIX IV: QUESTIONNAIRE

A: Health worker Questionnaire

Questionnaire Number……Date of Interview……

SECTION 1: Participants Demographics.

1.) Age of the health worker (years)…… or Date of Birth dd...../mm...../yr.....

2.) Sex of the health worker

a. Male
b. Female

3.) What is your current designation?

a. Consultant
b. Clinical Officer (CO)
c. Medical Officer (MBChB)
d. Enrolled nurse (KEN/KECHN)
e. Registered nurse (KRN/KRCHN)
f. Graduate nurse (BSci Nursing)
g. Other.....

SECTION 2.

1.) Have you managed a child with diarrhoea aged 2-59months (2months to 5years) for the past 3 months to 1year?

a. Yes.....
b. No.....

2.) Have you had the ETAT+ training?

a. Yes.....

b.No.....

If yes when (year).....

3.) Are the guidelines (Ministry of Health Republic of Kenya Basic Paediatric protocols) available?

Yes.....
No.....
If yes where are they available?

a. In the wards
b. In the clinics
c. In OPD
d. In the matrons Office
e. With you/In your Pocket
f. Other place.....(specify)

SECTION 3.

Tick appropriately.Key:

1. Always available 2. Mostly available 3. Rarely available 4.Never available

A. Indicate the availability of the following commodities	(1)	(2)	(3)	(4)
1.) Oral rehydration salts (low osmolarity)				
2.) Ringers lactate/ Hartmans solution				

3.) Normal Saline 0.9%				
4.) Zinc Sulphate				
5.) Intravenous fluid giving sets				
6.) Blood giving sets				
7.) Nasogastric tubes French Gauge(FG) 6				
'' FG 8				
'' FG 10				
'' FG 12				
8.) Guidelines on management of diarrhoea/dehydration.(Wall charts, booklets)				
9.)Intravenous branulars Yellow				
10.) Syringes 10cc or 20cc				
'' 50cc				
11.)Intravenous fluid charts				
12.)Functional Glucometer				
13.)Glucose strips				

B: Inventory of commodities Ward Checklist

Items	Present=1	Absent=0
1.) Ringers Lactate/Hartmans sol.		
2.)Normal Saline 0.9%		
3.) Low osmolarity oral rehydration salt		
4.)Zinc sulphate		
5.)Blood giving sets		
6.)Intravenous fluid giving sets		
7.)Nasogatric tubes FG 8,10		
8.) Intravenous branular Yellow and Blue (FG 24 & 22 respectively)		
9.)Syringes 10cc and or 20cc		
10.)Syringes 50cc		
11.) Intravenous fluid charts		
12.) Guidelines on management of diarrhoea/dehydration		
13.)Functional Intravenous stands		
14.) Functional Glucometer		
15.) Glucose strips		
16.) Drinking cups		
17.) Clean water for mixing of Oral rehydration salts		
18.) Water boiler		
19.) Electric kettle		

20.) Are there adequate Intravenous fluid stands available for use by the children in the ward? .....

21.) Are their cups in the ward for ORS .....or Do Patients bring their own?.....

22.) What items should we have in the ORS corner ?

i).....ii).....

iii).....iv).....

C: Clinical Record Data Retrieval Form

Questionnaire number..... Admitting Ward..... Date..../...../.2012

IP/No..... Weight.....

Study Identification No..... Date of data retrieval...../...../2012

Fill in the appropriate response in the spaces provided.

1) Demographic characteristics of the patient.

1.) Date of birth.....

2.) Age Months.....

3.) Sex.....Male ☐ emale ☐

2) History (Is it documented by admitting clinician?)

4.) Was diarrhoea present? Y..... N..... No information.....

If yes proceed, if no discontinue filling the questionnaire.

5.) How many days? (Duration of diarrhoea)..... No information.....

6.) Diarrhoea : Non Bloody..... Bloody..... No information.....

7.) Was vomiting present? Y..... N..... No information.....

8.) Vomiting duration (days) ..... No information.....

9.) Vomiting everything Y..... N..... No information.....

3) General examination (as documented)

10.) Peripheral pulse (In AVPU <A) Normal.....,weak.....,.No information.....

11.) Cap refill < 3 sec..... >3sec..... No information.....

12.) Sunken eyes present? Y.....N.....No information.....

13.) Was Skin Pinch documented? Y..... N..... if yes what was the duration Immediate/(1-2 sec)....., slow/prolonged/ >2sec.....

14.).Level of consciousness Alert.....Altered consciousness.....No information.....

15.) Ability to drink/breastfeed: Y..... N..... No information.....

4) Classification on admission

(Admission Diagnosis by admitting ward clinician Fill/tick in appropriately)

16.) Severe dehydration=1..... Shock =2 .....Some=3..... Others = 0..... If others write down the diagnosis given by the clinician.....

17.) Was the diagnosis correct using of syndromic approach as MOH_GOK guidelines Y..... N...

18.) Other co-morbid conditions specified by admitting clinician.Indicate N/A if there are no co-morbid conditions.

i. .....

ii. .....

iii. .....

5) Management

19.) What fluid was given ORS.....,IVF(Indicate which fluid)..... Others..... No information.....

20.) Was choice of rehydration therapy correct as recommended in MOH-GOK guidelines? Y..... N..... (As per the T sheet)

21.) Was the amount of IVF given in the first hour correct? (Check SOPs) Y..... N..... No information..... N/A (IVF not given).....

22.) Was zinc sulphate given to these children? Y..... N.....

If yes

23.) Was the dose correct? (check SOPs)Y..... N.....No information.....

If yes

24.) Was the duration prescribed correct? Y..... N.....No information.....

25.) Was the child prescribed for antibiotics Y.....N..... Which antibiotics..... What duration.....

6) Monitoring in the first 48 hrs.

26.) Was Fluid given as prescribed by the clinician (As per the fluid chart Volume at the start time .....And Vol..... at end time) Y..... N.....No information.....

27.) Was there medical review within 6hours of completion of IVF PLAN C ONLY for patient with correct plan C) .Y..... N..... No information.....

7) Outcome

28.) Discharge Date...../...../..... Alive ☐ Dead ☐

29.) Duration of hospital stay to discharge.....

APPENDIX V: TIME FRAME

- Nov/Dec 2011: Proposal development/final copies
- Jan 2012:Proposal Presentation and Departmental approvals
- Feb 2012: Ethical approvals
- Mar-Jun 2012: Data collection
- Jul/Aug 2012: Departmental presentation of results
- Aug/Sept 2012: Preparation of manuscripts for publication in a reputable peer reviewed Journals
- Oct-Nov 2012 Dissertation writing
- December 2012 Dissertation Submission

APPENDIX VI: CONSENT FORM FOR PARTICIPATION IN THE STUDY.

Study Identification Number:_____

Date:_____

Study title

Assessment of care for diarrhoea among children aged 2-59 months admitted in Garissa Provincal Hospital.

Investigator's statement

I am a Dr. Miriam Weru a postgraduate student at the University of Nairobi – Department of Paediatrics. I am asking you to participate in a research study. The purpose of this consent form is to give you information you will need to help you decide whether to participate in the study. Please read this form carefully. You are free to ask any questions about the study. The investigator will be available to answer any questions that arise during the study and afterwards.

Brief description of Study

The Ministry of Health has adopted and implemented clinical guidelines to assist health workers in managing major paediatric illnesses at their place of work. The study aims to audit care of children with diarrhoea and dehydration admitted at Garissa Provincial Hospital in order to determine areas of care that need improvement and thus better the outcome for such children.

The results of this study will help health workers in this facility and beyond to improve care given to all children with diarrhoea. It will also provide you with information on the current management of diarrhoea and the steps you can take to improve in managing diarrhoea.

All the information obtained will be held in strict confidentiality. Any information that may identify you will not be published or discussed with any unauthorised persons. We will however discuss overall findings regarding all health workers who participated in the study without revealing your identity. Your participation in this study is purely voluntary and there is no monetary gain. It will not cost you financially to participate in this study. You are free to withdraw from the study if you so wish without any penalty.

If you have any questions about the study or your participation in the study you can contact the principal investigator, Dr. Weru Miriam, **0721 377 605**.

If you have any questions on your rights as a research participant you can contact the Kenyatta National Hospital Ethics and Research Committee (KNH- ESRC) by calling **2726300** Ext. **44355**

I confirm I have explained to the health worker all relevant information about the study as indicated above.

Interviewer's Signature..... Date.....

I confirm the above study has been explained to me. I agree to participate in the study. I have had a chance to ask questions about the research, to which satisfactory answers have been given. I understand l can withdraw from the study at any time without any penalty.

Health worker's Signature….. ……. Date ……

APPENDIX VII: STUDY REQUIREMENTS AND BUDGETARY ESTIMATES

	Remarks	Units	Unit Cost (KShs)	Total (KShs)
Proposal Development	Printing drafts	1000 pages	5	5,000
	Proposal Copies	10 copies	500	5,000
Data Collection	Pens	10	10	100
	Stationary (paper, files, stapler ,staples, paper punch, clips)		-1 rim of paper 400*4 -staples, paper punch, clips, rubbers, files calculator	1600 2000
	Training of research assistants	2 days	1000*2	2000
	Research assistants (2)		7500*2	15000
Data Analysis	Statistician	1		20,000
Thesis Write Up	Computer Services			7,000
	Printing drafts	1000 pages	5	5,000
	Printing Thesis	10 copies	500	5,000
Contingency funds				40,000
Rent			6,000/- per month	24,000
Total				131,700/-

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Ref: KNH-ERC/A/164

15th June 2012

KENYATTA NATIONAL HOSPITAL APPROVED 15 JUN 2012 ETHICS & RESEARCH COMMITTEE

Dr. Miriam Weru
Dept. of Paediatrics &Child Health
School of Medicine
University of Nairobi

Dear Dr. Weru

Research proposal: "Adherences to Ministry of Health-Government of Kenya guidelines by health workers in the management of Diarrhoea among children aged 2-59 months at Garrissa Provincial Hospital, Kenya" (P62/02/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (ERC) has reviewed and **approved** your above revised research proposal. The approval periods are 15th June 2012 to 14th June 2013.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN**

"Protect to Discover"

Yours sincerely

PROF. A.N. GUANTAI
SECRETARY, KNH/UON-ERC

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