

**EFFECT OF AN EMERGENCY CARE TRAINING ON THE  
MANAGEMENT OF ACUTE CHILDHOOD DIARRHOEA IN  
NAKURU DISTRICT, KENYA**

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## DECLARATION

### Declaration by the candidate

“This thesis is my original work and has not been presented for a degree in any other university.”

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## **DEDICATION**

This work is dedicated to my parents, my dear wife Mary Washuka, sons Mike and Emmanuel and finally, to my only daughter Kimberly.

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I give all the Glory to God for granting me the resources, the knowledge and wisdom that enabled me to successfully complete this study. I am deeply indebted to my employer, the Ministry of Public Health and Sanitation and my boss Dr. Annah W. Wamae, Head Division of Child and Adolescent Health for allowing me to pursue the course. May my supervisors Dr. Joyce Mwaniki of Kenyatta University and Dr. Grace Irimu of University of Nairobi be abundantly blessed, whose able guidance, encouragement and support has brought me this far. I offer deep gratitude to the teaching and non-teaching staff in the Department of Public Health, School of Health Sciences and to my research assistants Mr. Jackson Cheruiyot, Mrs. Grace Omollo and Christine Toromo all attached to the Rift Valley Provincial Hospital (RVPH) for the support they accorded me in their collective and individual capacities. I wish to thank the research and ethical committee at the Rift Valley Provincial Hospital through the Medical Superintendent for authorizing me to conduct the research in the health facility. Finally I appreciate all staff and the research participants without whose consent and cooperation, this study could not have been a success.

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## **DEFINITION OF TERMS**

Acute diarrhoea: An episode of diarrhoea lasting less than fourteen (14) days.

Assessment: Refers to physical examination for signs of dehydration and /or of shock.

In this regard, the signs of dehydration are altered levels of consciousness by the AVPU scale, sunken eyes, ability to drink, skin pinch reaction and restlessness or irritability. The signs of shock are cold extremities, weak rapid pulse, and a slow capillary refill.

Assessment score: is the aggregate of scores obtained for each record where each sign picked by the health service provider is given a score of (1) one and each sign not picked scores zero. The maximum score for the assessment for signs of dehydration is 5.

Appropriate assessment: This is when the aggregate assessment score based on the number of signs picked for a record is equivalent to 3 and above. This is when the service provider has checked for at least 3 signs of dehydration.

Secondary prevention: The diagnosis and treatment of acute diarrhoea.

Diagnosis: the steps involved in the assessment of an episode of acute diarrhoea leading to appropriate treatment.

Treatment: Adherence to recommended treatment protocols. Seven (7) important steps were identified. The first of these is selection of a treatment plan. There are three treatment plans (A, B and C) to select from depending on the state of dehydration.

Treatment plan A: Recommended management of diarrhoea in which there is no dehydration. It involves advice on giving more food, more fluids and advising the caregiver on when to return.

Treatment plan B: This is treatment of diarrhoea with some dehydration. It involves direct observation of the caregiver giving the child ORS over four hours in the health facility followed by reassessment of dehydration.

Treatment plan C: This is inpatient treatment of severe dehydration by giving intravenous fluids.

Treatment score: Aggregate of scores obtained equivalent to the total number of treatment steps done and documented for each episode of acute diarrhoea by the service provider. The treatment parameters in this study were a treatment plan was selected, selection of a correct treatment plan, if fluids were prescribed, correct fluid type, amount and schedule for the dehydration status, prescription of vitamin A and prescription of zinc sulphate. The maximum treatment score is 6.

Appropriate treatment: Is when the treatment score aggregate is equivalent to 4 and above, This means at least, a treatment plan was selected, the treatment plan was correct, at least fluids were prescribed for the episode of diarrhoea, and the fluid therapy was correct in regard to type, amount and schedule. Scores of less than four are considered inappropriate treatment.

Capillary refill: A measure of peripheral perfusion of blood by exerting pressure on big toe or thumb and releasing followed by observing how long the blanched part takes to re-perfuse. It should normally be immediate.

Slow capillary refill: Blanched part takes longer than three (3) seconds to re-perfuse.

Skin pinch reaction: Test of elasticity of the skin using a skin fold technique.

- Slow skin reaction- Skin fold takes less than two (2) seconds to unfold.
- Very slow skin pinch- Skin fold takes longer than two (2) seconds to unfold.

Shock: Presence of cold hands plus weak/absent pulse and either- capillary refill  $> 3$  seconds or AVPU  $< A$ .

Classification: Categorization of dehydration into severe, some or no dehydration depending on the signs of dehydration present.

- Severe dehydration- Unable to drink or AVPU  $< A$  plus: sunken eyes and very slow return of skin pinch  $> 2$  seconds.
- Some dehydration- Able to drink adequately but 2 or more of: sunken eyes, slow return of skin pinch 1-2 seconds, restlessness/irritability.
- No dehydration- Absence of signs of severe or some dehydration in a child who has diarrhoea.

Correct classification: Correctly categorized dehydration status based on the signs of dehydration found using the 'basic paediatric protocols' as the gold standard.

Incorrect classification: Wrongly categorized dehydration status based on the signs of dehydration found.

## ABBREVIATIONS AND ACRONYMS

AAP.....	American Association of Paediatrics
ARI.....	Acute Respiratory Infections
BPP.....	Basic Paediatric Protocols
CDC.....	Centres for Disease Control
CDD.....	Control of Diarrhoeal Disease (CDD)
CME.....	Continuous Medical Education
CPG.....	Clinical Practice Guidelines
CSF.....	Cerebro-Spinal-Fluid
DHMT.....	District Health management Team
DHS.....	Demographic and Health Survey
DMOH.....	District Medical Officer of Health
ETAT.....	Emergency Triage Assessment and Treatment
GIC.....	Generic Instructor’s Course
HIV.....	Human Immuno-deficiency Virus
IID.....	Infectious Intestinal Diarrhoea
IMCI.....	Integrated Management of Childhood Illness
IMR.....	Infant Mortality Rate
KEMRI.....	Kenya Medical Research Institute
KNBS.....	Kenya National Bureau of Statistics
KSPA.....	Kenya Service Provision Assessment
MCH.....	Maternal and Child Health

MDG.....	Millennium Development Goal
MNC.....	Maternal Newborn and Child
ORS.....	Oral Rehydration Salts
ORT.....	Oral Rehydration Therapy
PALS.....	Paediatric Advanced Life Support course
PHMTs.....	Provincial Health Management Teams
PMO.....	Provincial Medical Officer of Health
RVPGH.....	Rift Valley Provincial General Hospital
SBM-R.....	Standards Based Management and Recognition
SPSS.....	Statistical Package for Social Sciences
UNDP.....	United Nations Development Programme
UNICEF.....	United Nations Children’s Fund
WHO.....	World Health Organization

**Acronyms**

ABCD:.....The emergency triage mnemonic. A=Airway; B=Breathing; C=Circulation, convulsions, coma; D= dehydration when referring to triage, D=Disability.

AVPU.....Coma scale: A=Alert; V=Responding to voice; P= Appropriate response to pain; U=Unresponsive to stimuli.

## ABSTRACT

Every year there are approximately 1.5 billion acute diarrhoea episodes and 4 million deaths in children less than five years of age (most from 6 months to 12 months). Acute diarrhoea accounts for approximately 7% of all paediatric admissions in the under 5 age group. Appropriate secondary prevention would reduce these deaths considerably however, studies done in resource rich and poor settings confirm that the management of this common illness by health professionals remains sub-optimal. The aim of this study was to determine the effect of a five day emergency care training namely-Emergency Triage Assessment and Treatment plus admission care (ETAT+) on the case management of acute childhood diarrhoea in a busy public hospital in Kenya. This training has been conducted in most Provincial General Hospitals. Nakuru PGH is one of the health facilities where training has been undertaken and there are plans to roll out to district hospitals. The study design was cross-sectional with historical controls of acute diarrhoea episodes managed without ETAT+ training compared to episodes managed with ETAT+ training in a paediatric out patient setting. The assessment, classification and treatment of acute childhood diarrhoea episodes in children aged 2months up to 59 months was observed and documented using the basic paediatric protocols as the “Gold standard”. A total of 334 acute childhood diarrhoea episodes were assessed. The primary outcomes were the proportions of acute childhood diarrhoea episodes appropriately assessed, classified and treated for shock and dehydration. The study found out that ETAT+ training improved the assessment of signs of dehydration --checking AVPU from 37.1% to 69.6%  $p=0.001$ , RR 0.511 - 0.811 at 95% CI); checking for sunken eyes from 55.0% to 80.9%  $p=0.010$ , RR 0.700 - 0.961 at 95% CI); checking skin pinch reaction increased from 40.7% to 70.6%  $p=0.0001$ , RR 0.561 - 0.863 at 95% CI) and checking ability to drink which was least practiced, also significantly rose from 11.4% to 34.5%  $p=0.001$ , RR 0.243 - 0.651 at 95% CI). In regard to treatment practices, selection for the correct treatment plan for dehydration improved from 26.45 to 67.55  $p=0.001$ , RR 0.353 - 0.631 at 95% CI); correct fluid therapy rose from 44.3% to 69.1%  $p=0.011$ , RR 0.631 - 0.948 at 95% CI); prescription of vitamin A was poor and had no improvement 37.1% to 43.3%  $p=0.819$ , RR 0.794 - 1.350 at 95% CI); while prescription of zinc supplements was poor but improved from 0.7% to 26.6%  $p=0.001$ , RR 0.006 - 0.286 at 95% CI) following ETAT+ training. The results suggest that ETAT+ training resulted in improved overall case management practices. It resulted in significantly higher proportions of acute diarrhoea episodes appropriately assessed for dehydration (27.9% without ETAT+ training compared to 67.0% after ETAT+ training  $p<0.001$ , RR 0.448 - 0.658 at 95% CI), correct classifications of dehydration status documented using the terms to describe the severity as recommended in ETAT+ (45.7% without ETAT+ training compared to 78.4% with ETAT+ training  $p=0.03$ , RR 0.582 - 0.851 at 95% CI) and appropriate treatment (42.1% without ETAT+ training compared to 54.1% with ETAT+ training,  $p=0.001$ , RR (0.710 – 0.992 at 95% CI). In conclusion, ETAT+ training significantly improved the management of childhood diarrhoea however; the treatment of diarrhoea is still sub-optimal. Training alone cannot therefore be relied on to change case management practices. It has to be augmented with intensified support supervision and structured internal and external quality of care audits by embracing such strategies as Standards Based Management and Recognition (SBM-R).

## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Over 10.9 million deaths occur annually in children aged <5 years in developing countries (Murray *et al.*, 2001); in the year 2006, the under-five mortality rate for sub-Saharan Africa was 160 per 1000 live births, meaning that roughly 1 in every 6 children failed to reach their fifth birthday (UNICEF, 2006). Most deaths are caused by preventable and easily treated childhood diseases namely pneumonia, diarrhoea, malaria with malnutrition as an underlying cause in about 54% of these deaths (WHO, 1995). Appropriate management of these conditions is one of the most cost effective interventions to reduce the global burden of disease (World Bank, 1993).

Globally, Governments are working towards the achievement of the Millennium Development Goals. Sub-Saharan countries are lagging behind other regions in the progress towards MDG 1, 4 and 5 targets. Kenya is 14<sup>th</sup> in the list of the worst 20 countries that contribute the highest numbers of maternal deaths. Kenya is among the countries that have high levels of Newborn and child deaths in the region. (WHO, 2008) The preliminary results of the Kenya Demographic and Health Survey showed the all maternal health indicators remain poor with the maternal mortality ratio at 410/100,000; Child Survival has improved under five mortality from 112/1000 in 2003 to 77/1000 in 2008; infant mortality rate from 78/1000 in 2003 to 52/1000 in 2008 but is being pulled back by the high newborn deaths. In 2008 DHS, neonatal mortality has increase to 60% of the IMR, up from 45% in 2003. Nutritional indicators have also largely remained unchanged over the last decade. Available strategies in the various areas include:

- Maternal and newborn health as outlined in the National Roadmap which is adapted from the African Union Road Map.
- Child Survival and Development Strategy
- Nutrition and Infant and Young Child Feeding strategy
- The Community Strategy

There is need to involve other ministries and stakeholders e.g. Ministry of Education, Gender, Agriculture, Social services, Youth, Roads, transport and communication, Office of the president etc cannot be underscored. This is due to the fact that reduction of MNC morbidity and mortality also depends heavily on their participation. It was also important that the operations research component and health financing issues need to be highlighted strongly in all the strategies as well as scaling up the use of local best practices that are cost effective in reducing maternal, newborn, and child morbidity and mortality.

Diarrhoea is the 2<sup>nd</sup> leading cause of death among children under five years globally. Nearly one in five child deaths- about 1.5 million each year—is due to diarrhoea (WHO, 2009). It kills more young children than AIDS, malaria and measles combined and yet is a preventable and easily treatable disease (WHO, 2009). The prevalence of acute childhood diarrhoea in Kenya is 17% and accounts for one in five of hospital admissions according to the Kenya Service Provision Assessment (KNBS, 2004). Diarrhoea is the third commonest cause of death of children at the Rift Valley Provincial General Hospital, Nakuru. It accounts for 32% of sick child consultations at the Rift valley Provincial General Hospital (RVPG, annual report, 2008).

A study of 13 district hospitals and 8 teaching hospitals, found adverse factors in case management including inadequate assessment, inappropriate treatment and

inadequate monitoring in 76% of inpatient children and that there was a considerable scope for improvement (Nolan *et al.*, 2001). Decay of knowledge and loss of skills pose a real threat to the ongoing success for best practice care interventions (Jabbuor M. *et al.*, 1996; Davis *et al.*, 1997).

Clinical practice guidelines for diarrhoea have been available for many years (WHO 1990; Murphy *et al.*, 1998; Armon *et al.*, 2001). However, few hospitals or health workers in Kenya have access to either the World Health Organization (WHO) recommendations or modern local practice guidelines (English *et al.*, 2004). In order to standardize and improve the quality of care for the sick child, the Ministry of Health, Kenya developed clinical practice guidelines (CPGs), referred to as “Basic Paediatric protocols” (MOH, 2005) [www.health.go.ke/pandpromotive/paediaticprotocols](http://www.health.go.ke/pandpromotive/paediaticprotocols). The CPGs include guidelines for the common childhood illness namely diarrhoea/dehydration, pneumonia, severe malnutrition, severe malaria, altered consciousness/meningitis and neonatal related conditions. These guidelines were adapted from WHO Pocketbook for Hospital Care for Children and the local clinical guidelines (WHO, 2005). To facilitate dissemination of the CPGs a 5 day training package called Emergency Triage Assessment and Treatment plus admission care (ETAT+) was developed (Irimu *et al.*, 2008). The ETAT+ training is based on conceptual models (Prochasta *et al.*, 1992; Rodgers *et al.*, 1995) and teaching methods that address adult learning and translation of knowledge into practice (Davis *et al.*, 1997).

ETAT+ training has been conducted in all the Provincial and referral hospitals and six district hospitals. Since training on ETAT+ course took place at the Rift valley

Provincial General Hospital in April 2007, no assessment was conducted to determine its effect on the management of acute childhood diarrhoea.

The aim of this study was therefore to determine the effect of the dissemination of Clinical Practice Guidelines through ETAT+ training on the management of acute childhood diarrhoea in a busy public hospital in Kenya.

## **1.2 Statement of the problem and justification**

Most health professionals are familiar with childhood diarrhoea and believe themselves to be competent in managing it. However, studies done in resource rich and poor settings confirm that the management of this common illness by health professionals remains sub-optimal (WHO, 1998; English *et al.*, 2004).

A study in Benin showed that symptom specific assessments were conducted in only 26.2% sick children, skin pinch reaction was assessed in only 13.5% of acute diarrhoea episodes, ability to drink in 5.3% while correct classifications for dehydration were less than 21% (Rowe *et al.*, 2005). Inaccurate assessment of dehydration can have serious consequences. Unrecognized and untreated fluid deficits can create electrolyte disturbances, acidosis, and end organ damage including cardiovascular instability, renal insufficiency, and central nervous system manifestations. Over hydration can lead to circulatory overload and often instant death from congestive cardiac failure. These complications can produce devastating results including permanent injury or death (Steiner *et al.*, 2004). Conversely, unnecessary interventions may be done after erroneous assessment that a child has some or severe dehydration when there are no features of dehydration (McConnochie *et al.*, 1999).

The purpose of training first level health workers on ETAT+ is to improve their practices in managing critically sick children up to 48 hours of admission. The CPGs will be useless if they are not understood and if recommended practices are not delivered appropriately. This study is intended to find out if there is improvement in the care practice attributable to ETAT+ training and therefore determine if there is a justification for scaling up.

### **1.3 Research Questions**

The study aimed at answering the following question:

Was there a difference in the acute childhood diarrhoea management practices by health workers before and after ETAT+ training?

### **1.4 Null hypothesis**

For the purposes of this study, it is hypothesized that ETAT+ training had no effect on the case management of acute childhood diarrhoea.

### **1.5 Objectives**

#### **1.5.1 Broad Objective**

The purpose of the study was to determine the effect of training health service providers on ETAT+ on the management of acute childhood diarrhoea.

#### **1.5.2 Specific objectives**

- i. To assess the impact of ETAT+ training on the assessment of acute childhood diarrhoea episodes by health workers

- ii. To assess the impact of ETAT+ training on correct classification of acute childhood diarrhoea by health workers
- iii. To assess the impact of ETAT+ training on the treatment of cases of acute childhood diarrhoea episodes

## **1.6 Significance and expected outputs**

Knowledge of the impact of ETAT+ training on performance of health workers will inform policy makers on how to improve care of children with diarrhoea, the need to scale up and need to modify the ETAT+ training itself. The results would show the effect of training on the ability to perform physical examination, classification and treatment of acute childhood diarrhoea.

## **1.7 Delimitations and Limitations**

### **1.7.1 Delimitations**

- i. The actual practice could be influenced by prior knowledge of the research team on ETAT+.
- ii. The supervisors were very friendly, supportive and gave valuable guidance throughout the study period.

### **1.7.2 Limitations**

- i. The study was confined to case management of acute diarrhea among children aged 2-59 months. Acute diarrhoea among those aged less than 2 months may be caused by many non-infective causes (parenteral) and was therefore not be considered.

- ii. The study had no control over other factors influencing case management practice and especially so, health system and staffing factors.

## **1. 8 Assumptions**

1. The study assumed that all other factors influencing case management were adequately provided for including adequacy of staffing, supplies and equipment and no mass transfers or re-deployments took place during the study period.
2. That there was adequate basic competency for all health workers involved and observers also had adequate knowledge on appropriate diarrhoea case management processes.
3. It assumed no 'mass' transfer of the trained staff from the points of service delivery to the sick child during the study period and that the hospital's administration fully supported the researchers.
4. There was minimum knowledge decay among the staff involved during the study period.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Need for clinical practice guidelines (CPGs)

One of the strategies needed for achieving the fourth Millennium Development Goal (MDG 4), which calls for a two thirds reduction of the 1990 mortality levels in under 5 year-old children by 2015 (UNDP Report, 2003) is improving the management of common severe childhood illnesses. Hospital mortality rates as high as 15% are reported (English *et al.*, 2004; Mwakyusa *et al.*, 2006). The majority of deaths are attributable to a handful of illnesses and hospital assessments demonstrate that the quality of care provided to children in low-income countries is often poor and has considerable scope for improvement (Nolan *et al.*, 2001; English *et al.*, 2004).

To assist health providers in evidence based decision making and promotion of the provision of optimal care, clinical practice guidelines (CPGs) are needed. Previous studies have shown that adherence to such evidence-based guidelines is associated with improved health outcomes (Walker *et al.*, 1988; Grimshaw *et al.*, 1993; Peristein *et al.*, 2000). Clinical practice guidelines for diarrhoea (Murphy *et al.*, 1998; Armon *et al.*, 2001) and pneumonia (WHO, 1990) have been available for many years. In 2000 evidence and expert opinion were used to provide comprehensive advice on the care of sick children in hospital with common conditions (WHO, 2000). However, few hospitals or health workers in Kenya have access to either the WHO recommendations or modern local practice guidelines (WHO,1990) and it is known that a wide range of factors affect the actual ability to improve care and outcomes (Davis *et al.*, 1997; Cabana *et al.*, 1999; Jamtevedt *et al.*, 2003; Grimshaw *et al.*, 2004;). Earlier studies have established the need for improved paediatric care in 13 Kenyan district hospitals (English *et al.*, 2004).

## 2.2 MoH Basic Paediatric Protocols

The basic paediatric protocols (BPP) are clinical practice guidelines developed to improve the quality of paediatric care at referral health facilities in Kenya. Target illnesses responsible for more than 80% of hospital deaths were identified and included malaria/anaemia, pneumonia/asthma, diarrhea/dehydration, severe malnutrition, meningitis, neonatal sepsis, birth asphyxia and low birth weight/prematurity (English *et al.*, 2003; Mwakyusa *et al.*, 2006). In addition, to these illnesses, lack of basic life support skills; convulsions, hypoglycaemia and HIV were considered additional problems. For HIV the main focus was on recognition and diagnostic counseling and testing in line with available local guidelines (MOH, 2004).

The target users of the CPGs are Clinical Officers (who undertake a three year diploma in clinical medicine course) and provide most of the initial clinical care and nurses who happen to provide most of the neonatal care (Mwakyusa *et al.*, 2006). Junior physicians also provide some care but senior physicians or qualified paediatricians are rarely available early in an admission.

In regard to the scope of the BPP, most deaths of children in hospital in Kenya occur within 24-48 hours of admission (Marsh *et al.*; 1995; Berkley *et al.*, 2003; Berkley *et al.*, 2005). The BPP were therefore aimed specifically at trying to ensure that appropriate initial care could be provided by health providers with limited paediatric training by providing highly directive and explicit guidance on illness severity assessment, classification where applicable and use of recommended evidence based treatment protocols. In order to ensure that the CPGs did not conflict with existing case

management protocols, stepwise adaptation was conducted under the leadership of the Division of Child and adolescent Health in the Ministry of Health.

The CPGs produced consist of clear and direct recommendations for best practice in delivering emergency and early inpatient care for common problems and largely reflect the international recommendations for provision of life support and care presented in the WHO *Pocket Book of Hospital Care for Children*. As such, the CPGs attempt to implement referral level or inpatient Integrated Management of Childhood Illnesses (IMCI). However, the CPGs will be useless if they are not understood and if the recommended practices are not delivered appropriately. Decay of knowledge and loss of skills pose a real threat to the ongoing success for best practice care interventions (Davis *et al.*, 1992; Jabbur *et al.*, 1996). To facilitate dissemination of the CPGs, a training package called Emergency Triage Assessment and Treatment plus admission care (ETAT+) was developed (Irimu *et al.*, 2008).

### **2.3 The ETAT+ training**

The ETAT+ training is based on conceptual models (Prochasta *et al.*, 1992; Rodgers *et al.*, 1995) and teaching methods that aim at improving knowledge translation and execution of recommendations through well sequenced activities. Interactive sessions are used to promote the use of acquired knowledge by participants and provide the opportunity to practice and hone skills (Conroy *et al.*, 1995; Davis *et al.*, 1999). Deductive interventions attempt to change knowledge, skills or attitudes or may act as predisposing elements to change, particularly if well delivered. As successful adult education is learner-centred, active rather than passive and positive reinforcement relevant to the learner's needs are encouraged (Allery *et al.*, 1997; Duke *et al.*, 2003;

English *et al.*, 2004). Studies have shown that nurses can often perform as well as clinicians in basic initial steps of management (Tamburlini *et al.*, 1999; Robertson *et al.*, 2001; Amaral *et al.*, 2004). The course therefore targets the mid-level health providers as well as doctors.

All instructors and facilitators are equipped with skills and techniques through training on the Paediatric Advanced Life support Course (PALS) and the UK resuscitation Council's Generic Instructors Course (GIC) in Kenya.

Reluctance to change practice and unsupportive environments may be significant barriers to knowledge use (Rowe *et al.*, 2005). To facilitate implementation of practices in line with the CPGs, pre-course preparation includes sending participants authoritative WHO reading material (WHO, 2005) before hand and informing them that they would sit multiple choice and practical exams at the end of training. Mixed cadres of participants were trained together to enhance teamwork.

The primary targets for the CPGs are District hospitals as, although staffed by health providers with little or no specialist paediatric training, they are the major referral sites for sick newborns and children from peripheral health units and therefore represent the clinical service area with the greatest potential for reducing mortality (Snow *et al.*, 2000).

A course on ETAT+ was conducted for staff at the Rift valley Provincial General Hospital in April 2007. This study is an assessment of the effect of this course on the case management of acute childhood diarrhoea.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 Study setting**

The study was conducted at the Rift Valley Provincial General Hospital (RVPGH), Nakuru, Kenya. This is a provincial referral hospital for the vast Rift valley Province. Initial clinical care for the sick was given by Clinical Officers (diploma level clinicians), nurses and also by Medical Officers supported by consultant paediatricians. The hospital has 87 clinical health workers assigned to the paediatric units (5 Medical officers, 15 Clinical Officers and 67 Nurses) primarily responsible for rendering inpatient and outpatient care to children aged less than five years. Critically ill children were triaged and attended at the Outpatient Paediatric Department (OPD) before being referred for admission to the paediatric wards. In the year 2006, about 15,000 sick children attended the paediatric outpatient clinic, 32% of these had acute childhood diarrhoea. Twelve percent of paediatric admissions had acute diarrhoea. A Five day ETAT+ training was conducted in RVPGH in April 2007, when thirty health providers comprising of 5 medical officers, 15 Clinical officers and 10 nurses were trained. The study covered the period from April 2008 to June 2008.

### **3.2 Target population**

All children aged less than five years.

### **3.3 Study population**

The study subjects comprised 334 children aged 2-59 months attended to at the Outpatient Paediatric Department having acute childhood diarrhoea episodes at the Provincial Hospital during the study period. All children outside that age bracket or with

diagnosis of severe malnutrition or dysentery documented by the managing clinician were excluded.

### **3.4 Study design**

This was a cross-sectional survey with historical controls. It involved prospective observations of the case management of acute childhood diarrhoea episodes at the paediatric outpatient clinic comparing episodes managed by health workers trained on the Emergency Triage Assessment and Treatment plus admission care (ETAT+ trained) with managed by those not trained on ETAT+.

### **3.5 Variables**

#### **3.5.1 Independent variable**

Training on emergency triage assessment and treatment plus admission care (ETAT+ training).

#### **3.5.2 Dependent variables**

1. Assessment of acute childhood diarrhoea
2. The classification of dehydration status
3. The treatment of acute childhood diarrhoea

### **3.6 Sampling procedure**

All clinicians directly involved in the clinical care of sick children found on day duty at the out patient clinic of the Rift valley Provincial General Hospital during the study period were included in the study upon giving verbal informed consent. Inclusion of health workers was therefore based on those on duty. This resulted in a nested cohort of

12 not ETAT+ trained and 13 ETAT+ trained health workers who managed sick children having episodes of acute diarrhoea during the study period.

In regard to sick children, the following criteria were used:

**Inclusion criteria**

- i. Children aged 2 months up to 59 months having acute diarrhoea seen at the paediatric out-patient clinic during the study period.
- ii. Informed consent obtained from the caretakers.

**Exclusion criteria:**

- i. Cases of children aged 2 months up to 59 months who did not have diarrhoea
- ii. Cases of acute childhood diarrhoea with dysentery or having severe malnutrition
- iii. Cases of acute childhood diarrhoea for whom no consent to participate was given

Sick children presenting with acute diarrhoea were recruited until the desired sample size was reached.

### **3.7 Ethical Considerations**

Clearance to conduct this study was sought from the School of Health Sciences through the Department of Public Health, Kenyatta University, The graduate school, the Ministry of Education, Provincial Administration and the health authorities in the study area and the ethical committee of the Rift Valley Provincial Hospital. Each subject made a signed consent to participate in the study after explanations about the study and its process. Confidentiality was assured. The subjects were informed of their freedom to withdraw

from the study if they so wished with no repercussions. Any personal concerns by the subjects were addressed by the researcher.

### 3.8 Sample size

The sample size was determined using Fisher's (1983) formula for sample size determination.

$n = z^2 pq/d^2$  where  $n$  = the desired sample size when population > 10,000

$z$  = standard normal deviate - Set at 1.96 at 95% confidence level.

$p$  = proportion of the subjects having the characteristic being tested.

For this study  $p$  was estimated at 0.32 (sick children aged less than five years seen with diarrhoea at the RVPGH—source RVPGH annual report 2008)

$q = 1 - p$

Therefore the desired sample size  $n = \frac{1.96^2 \times 0.32 \times 0.68}{0.05^2} = 334$

### 3.9 Data collection instruments

The instrument consisted of an observation checklist developed based on the protocols for diarrhoea case management used in the ETAT+ training. It was basically made up of five sections namely; demographic characteristics of subjects, case assessment section which collected information on history taking, and physical examination for signs of dehydration and shock, classification of dehydration status section, then treatment and monitoring sections.

### **3.10 Validity and Reliability**

The study instrument was pre-tested at the Garissa Provincial Hospital conveniently selected by the investigator. Necessary revisions were made to improve on reliability and validity. Final year clinical medicine students were recruited as observers and trained on use of the practice observation checklist for two days by the principal investigator. The observers had been trained on the Integrated Management of Childhood Illnesses and this made it possible for the two days training on the research tool to be sufficient for them to collect data. The observers were instructed on the possible biases this could introduce and their role in producing a valid research result. The principal investigator re-assessed all sampled children, made appropriate classifications and treatments as indices for validation. The PI also cleaned the data and checked for outliers to ensure that the data obtained was accurate.

### **3.11 Data collection methods**

Informed consent for the observation of the case management process was obtained from the health service providers. The consent statements clarified that the activity was purely academic and not a supervisory one. It was further emphasized that the observer would in no way interfere with the case management process and that all observations made would remain confidential. Similarly, consent was obtained from caregivers of the sampled children requesting them to allow the observer to be present in the examination room. The observer then observed health workers managing episodes of acute childhood diarrhoea at the paediatric outpatient clinic beginning from the time the patient comes in and recorded observations on all the management steps from assessment, classification

and treatment using a checklist modified from the diarrhoea case management flow chart in the 'Basic Paediatric Protocols'

([www.health.go.ke/pandpromotive/paediatricprotocols](http://www.health.go.ke/pandpromotive/paediatricprotocols)). All sampled children were then separately re-assessed by the principal investigator. Observations were made until the desired number of acute childhood diarrhoea episodes was obtained.

### **Outcome measures**

The primary outcomes were:

(1) The proportions of acute childhood diarrhoea episodes appropriately assessed for dehydration. Each of the five essential items in assessment for dehydration (assessment of consciousness level, irritability, sunken eyes, skin pinch reaction and ability to drink) were scored as one if it was either checked or documented and zero if it was not. The sum of assessment scores was determined. Cumulative scores of three or more was considered appropriate assessment while scores of less than 3 was inappropriate.

(2) The proportions of acute childhood diarrhoea episodes correctly classified for status of dehydration based on the Basic Paediatric Protocol and

(3) The proportions of acute childhood diarrhoea episodes appropriately treated for dehydration. Each of five essential dehydration treatment parameters (selection of treatment plans, correct treatment plans, correct fluids therapy (prescribed, correct type, amount and schedule of fluids), administration of vitamin A, administration of zinc sulphate) was scored as one if done and zero if not. The sum of treatment scores of three and above were rated as appropriate treatment while scores less than three were considered inappropriate treatment.

### **3.12 Data analysis**

All the observations checklist data was double entered using Statistical Package for Social Sciences (SPSS) v. 11 and Epi-Info v 3.3.2 and verified prior to analysis. Descriptive statistics were applied to determine the frequencies and cross-tabulations of the signs of dehydration and shock assessed, the classification of dehydration status and the treatment protocols adhered to. Chi square was used to compare categorical data. The hypothesis was tested using the independent sample t-test.

## CHAPTER FOUR: RESULTS

### 4.1: Demographic characteristics of study participants

#### 4.1.1 Age and sex distribution of the study population

This study involved 334 sick children having episodes of acute diarrhoea. Children aged 6 to 11 months were the majority, those of ages 12 to 23 months and 24 to 59 months had almost equal prevalence of acute childhood diarrhoea. Infants aged less than 6 months had the lowest prevalence of acute childhood diarrhoea. Male children appeared to suffer more episodes of acute childhood diarrhoea than female although this finding was most evident in the less than six months age group (Table 4.1).

Table 4.1: Age and sex distribution of acute childhood diarrhoea patients

	Sex of child		Total	Proportion
	Female	Male		
Under six months	13	30	43	13.0%
6 to 11 months	47	58	105	31.4%
12 to 23 months	43	52	95	28.4%
24 to 59 months	43	48	91	27.2%
Total	146	188	334	100

### 4.1.2: Characteristics of health service providers

All clinical health workers found on duty managing sick children at the paediatric out patient clinic during the study period were included in the study upon giving informed verbal consent. A total of 25 health service providers composed of medical officers, clinical officers and nursing officers were involved in the study providing a nested cohort of 12 not trained on ETAT+ and 13 trained on ETAT+. The overall mean age was 29.3 years with an uneven male female ratio (Table 4.2).

Table 4.2: Characteristics of health service providers involved

	<b>Total HW</b>	<b>Mean age (yrs)</b>	<b>M:F</b>	<b>ETAT+ trained</b>	<b>Not ETAT+ trained</b>
Medical officers	4	30.2	3 : 1	2	2
Clinical Officers	14	28.6	3 : 4	8	6
Nursing officers	7	29.1	4 : 5	3	4
<b>Total</b>	<b>25</b>			<b>13</b>	<b>12</b>

## 4.2 Assessment for signs dehydration by health service providers

### 4.2.1: Frequencies of the assessment of signs of dehydration

All the 334 children included in this study were eligible for assessment of all the signs of dehydration. The most frequently assessed sign of dehydration was sunken eyes. Assessment for levels of consciousness using the glassgow coma scale and of skin pinch reaction although done, were only slightly above average. The assessment of ability to drink and restlessness were both sub-optimal with very low proportions. Assessment for ability to drink was least practiced by all cadres of health service providers (Table 4.3).

Table 4.3: Frequencies of the assessment of signs of dehydration

	<b>Checked</b>	<b>Checked</b>	<b>Checked</b>	<b>Tested</b>	<b>Checked</b>
	<b>AVPU</b>	<b>skin pinch</b>	<b>sunken eyes</b>	<b>ability to</b>	<b>restlessness</b>
	<b>N=187</b>	<b>N=192</b>	<b>N=234</b>	<b>drink</b>	<b>N=122</b>
				<b>N=83</b>	
Medical Officer	43 (23.1%)	17 (8.8%)	23 (9.8%)	10 (12.0%)	12 (9.8%)
Nurse	33 (17.6%)	49 (25.6%)	54 (23.1%)	16 (19.3%)	24 (19.7%)
Clinical Officer	111 (59.3%)	126 (65.6%)	157 (67.1%)	57 (68.7%)	86 (70.5%)
<b>Total</b>	<b>187/334</b>	<b>192/334</b>	<b>234/334</b>	<b>83/334</b>	<b>122/334</b>
	<b>(55.9%)</b>	<b>(57.4%)</b>	<b>(70.0%)</b>	<b>(24.8%)</b>	<b>(36.5%)</b>

#### **4.2.2: Overall assessment of dehydration**

Appropriate assessment is when the health provider has checked at least three (3) of the five signs of dehydration. Correct classification is the appropriate classification of the dehydration status based on the algorithm for the Integrated Management of Childhood Illnesses (IMCI) and appropriate treatment means that at least, the treatment plan was correct and the type, amount and schedule of rehydration fluid was either prescribed or administered for the status of dehydration.

It was observed that female service providers performed slightly better than their male counterparts. However, for both sexes, there was no difference in the proportions of inappropriate and appropriate assessments for dehydration.

The proportions of appropriate assessment for dehydration was significantly related to age of the service provider. The younger the service provider, the better the assessment. Older service providers also appeared to make higher proportions of inappropriate assessments for dehydration.

Clinical officers made the most appropriate and inappropriate assessments for dehydration. Fewer episodes of acute childhood diarrhoea were appropriately assessed than those inappropriately assessed by medical officers and nursing officers. Conversely, clinical officer made more appropriate assessments than inappropriate. Overall, there were higher proportions of appropriate assessments (Table 4.4).

Table 4.4: Overall assessment of dehydration by sex, age and cadre of service provider

	<b>Inappropriate assessment N=159 (47.6%)</b>	<b>Appropriate assessment N=175 (52.4%)</b>	<b>Total</b>
<b>Sex of service provider</b>			
Male	76 (47.8%)	84 (48.0%)	160
Female	83 (52.2%)	91 (52.0%)	174
<b>Age of service provider</b>			
Under 30 years	72 (45.3%)	114 (65.1%)	186
31 to 40 years	72 (45.3%)	47 (26.9%)	119
Above 40 years	15 (9.4%)	14 (8.0%)	29
<b>Cadre of service provider</b>			
Medical officer	38 (23.9%)	14 (8.0%)	52
Clinical officer	67 (42.1%)	125 (71.4%)	192
Nurse	54 (34.0%)	36 (20.6%)	90

### **4.3: Classification of dehydration status**

#### **4.3.1: Frequencies of the classification of dehydration status**

Health service providers are expected to make classifications for the status of dehydration for every episode of diarrhoea based on the signs found during the assessment. There are three classifications for dehydration status namely, no dehydration, some dehydration and severe dehydration. Classifying the status of dehydration guides on the selection of an appropriate treatment plan.

The results showed that female health providers made more classifications for no dehydration and some dehydration than the male counterparts. At the same time, male health providers failed to make classifications for dehydration status in more episodes than the female ones.

It was observed that failure to make classifications for dehydration status diminished with increasing age of the service provider. The older the service provider, the more likely they are to make classifications for dehydration. Medical officers had the lowest proportion of episodes not classified for the status of dehydration. Most of the acute diarrhoea episodes were classified as some dehydration. Only a few were classified as severe dehydration. Failure to make classification was rampant at 32.3% (Table 4.5) .

Table 4.5: Classification of dehydration status made by sex, age and cadre of service provider

	Severe dehydration N=42 (12.6%)	Some dehydration N=94 (28.1%)	No dehydration N=90 (26.9%)	Not classified N=108 (32.3%)	Total
<b>Sex of service provider</b>					
Male	21 (50%)	45 (47.9%)	36 (40.0%)	58 (53.7%)	160
Female	21 (50%)	49 (52.1%)	54 (60.0%)	50 (46.3%)	174
<b>Age of service provider</b>					
Under 30 years	20 (47.6%)	56 (59.6%)	56 (62.3%)	54 (50.0%)	186
31 to 40 years	14 (33.3%)	28 (29.8%)	31 (34.4%)	46 (42.6%)	119
Above 40 years	8 (19.1%)	10 (10.6%)	3 (3.3%)	8 (7.4%)	29
					334
<b>Cadre of service provider</b>					
Medical officer	18 (42.9%)	11 (11.7%)	0 (0%)	23 (21.3%)	52
Clinical officer	20 (47.6%)	62 (66.0%)	58 (64.4%)	52 (48.1%)	192
Nurse	4 (9.5%)	21 (22.3%)	32 (35.6%)	33 (30.6%)	90

Female service providers had higher proportions of appropriate classifications for dehydration status than males. Correct classification was found to be inversely proportional to the age of the service provider with younger one performing better. Incorrect classifications were rampant across the cadres (Table 4.6).

Table 4.6: Appropriate classification of dehydration by sex, age and cadre of service provider

	<b>Incorrect classification N=118 (35.3%)</b>	<b>Correct classification N=216 (64.7%)</b>	<b>Total</b>
<b>Sex of service provider</b>			
Male	63 (53.4%)	97 (44.9%)	160
Female	55 (46.6%)	119 (55.1%)	174
<b>Age of service provider</b>			
Under 30 years	52 (44.1%)	134 (62.0%)	186
31 to 40 years	53 (44.9%)	66 (30.6%)	119
Above 40 years	13 (11.0%)	16 (7.4%)	29
<b>Cadre of service provider</b>			
Medical officer	28 (23.7%)	24 (11.2%)	52
Clinical officer	50 (42.4%)	142 (65.7%)	192
Nurse	40 (33.9%)	50 (23.1%)	90

## **4.4: Treatment of dehydration**

### **4.4.1: Frequencies of the use of treatment protocols**

In a slightly above average proportion of acute diarrhoea episodes (57.2%), treatment plans for the treatment of dehydration were selected. Half the cases of acute childhood diarrhoea had the correct treatment plans selected. Clinical officers had the highest proportions on both selection and correctness of the plan treatment. Most acute diarrhoea episodes were put on plan A followed by plan B and least were on plan C. It was observed that medical officers put most of their patients on plan C.

Correct fluid type, dose and schedule of fluids were prescribed in 58.7% of acute diarrhoea episodes. Incorrect fluid therapy was found in only 9.0% of episodes.

Failure to give fluids for episodes of diarrhoea was observed with clinical officers being the most likely not to prescribe fluids. Medical officers had the lowest proportion of episodes not given fluids. In an above average number of episodes, the correct type, amount and schedule of fluids were prescribed. The prescription of vitamin A and zinc supplements were still poor. Zinc was seldom prescribed for cases of acute childhood diarrhoea (Table 4.7).

Table 4.7: Frequencies of the use of treatment protocols by cadre

	Selected					Incorrect	Correct			
	treatment	correct				No fluids	fluid	fluid	vitamin A	Zinc
	Plan	plan	Plan A	Plan B	Plan C	prescribed	therapy	therapy	prescribed	prescribed
	N=191	N=168	N=89	N=79	N=61	N=108	N=30	N=196	N=136	N=43
	(57.2%)	(50.3%)	(26.6%)	(23.7%)	(18.3%)	(32.3%)	(9.0%)	(58.7%)	(40.7%)	(12.9%)
Medical officer	34 (17.8%)	16 (9.5%)	5 (5.6%)	1 (1.3%)	35 (57.4%)	15 (13.9%)	18 (60.0%)	19 (9.7%)	1 (0.7%)	1 (2.3%)
Clinical officer	119 (62.3%)	119 (70.8%)	52 (58.4%)	62 (78.5%)	22 (36.1%)	55 (50.9%)	6 (20.0%)	131 (66.8%)	75 (55.1%)	33 (76.7%)
Nurse	38 (19.9%)	33 (19.6%)	32 (36.0%)	16 (20.3%)	4 (6.6%)	38 (35.2%)	6 (20.0%)	46 (23.5%)	60 (44.1%)	9 (20.9%)

#### 4.4.2: Appropriate treatment by sex, age and cadre

It was observed that there was no relationship between sex and appropriateness of treatment. Appropriate treatment practices steadily decreased with rising age. Medical officers had higher proportions of inappropriate treatments than appropriate, nursing officers had almost equal proportions in regard to treatment practices while clinical officers exhibited higher appropriate treatment proportions (Table 4.8).

Table 4.8: Frequencies of inappropriate and appropriate treatments of diarrhoea by sex, age and cadre

	<b>Inappropriate Treatment</b> N=168 (50.3%)	<b>Appropriate Treatment</b> N=166 (49.7%)	<b>Total</b>
<b>Sex of service provider</b>			
Male	81 (48.2%)	79 (47.6%)	160
Female	87 (51.8%)	87 (52.4%)	174
<b>Age of service provider</b>			
Under 30 years	97 (57.7%)	89 (53.7%)	186
31 to 40 years	58 (34.6%)	61 (36.7%)	119
Above 40 years	13 (7.7%)	16 (9.6%)	29
<b>Cadre of service provider</b>			
Medical officer	35 (20.8%)	17 (10.2%)	52
Clinical officer	88 (52.4%)	104 (62.7%)	192
Nurse	45 (26.8%)	45 (27.1%)	90

## 4.5: EFFECT OF ETAT+ TRAINING

### 4.5.1: Assessment of shock

Although the training made some improvements in the assessment for signs of shock, most service providers were still insensitive to the need to assess for shock. Only checking for peripheral pulse appeared to be done at an average frequency (Table 4.9).

Table 4.9: Frequencies of signs of shock assessed

	ETAT+ Trained N=194 (58.1%)	Not ETAT+ Trained N=140 (41.9%)	P-value
Checked peripheral pulse	105 (54.1%)	64/140 (45.7%)	<b>0.001</b>
Checked cold extremities	59/194 (30.4%)	48/140 (34.3%)	<b>0.042</b>
Checked capillary refill	40/194 (20.5%)	28/140 (20.0%)	<b>0.624</b>

#### **4.5.2: Comparison of the assessment, classification and treatment of dehydration by ETAT+ training status**

ETAT+ training resulted in marked improvements in checking for all the cardinal signs of dehydration. It should however, be noted that the practice of checking the child's ability to drink, is still not well inculcated among health service providers. Fewer episodes of acute childhood diarrhoea were not classified for dehydration status following the course while the proportion of correctly classified dehydration status significantly rose. In regard to treatment, ETAT+ training had mixed effects. First, frequencies of acute diarrhoea episodes for which correct treatment plans and correct fluid type, amount and schedule were prescribed rose. There was a slight increase in the prescription of zinc sulphate supplements following ETAT+ training. Ironically the results showed more cases of diarrhoea for which no fluids were prescribed and no difference in the prescription of vitamin A (Table 4.10).

Table 4.10: Summary of findings of the effect of ETAT+ training on the management of childhood diarrhoea

	<b>ETAT+ Trained</b>	<b>Not ETAT+ Trained</b>	<b>p- value</b>	<b>Risk Ratio (95% CI)</b>
<b>Assessment</b>				
Checked AVPU	135/194 (69.6%)	52/140 (37.1%)	0.001	0.511 - 0.811
Checked sunken eyes	157/194 (80.9%)	77/140 (55.0%)	0.010	0.700 - 0.961
Checked Skin pinch reaction	137/194 (70.6%)	57/140 (40.7%)	0.001	0.561 - 0.863
Checked ability to drink	67/194 (34.5%)	16/140 (11.4%)	0.001	0.243 - 0.651
<b>Correct classification</b>	152/194 (78.4%)	64/140 (45.7%)	0.001	0.582 - 0.851
<b>Treatment</b>				
Correct treatment plan	131/194 (67.5%)	37/140 (26.4%)	0.001	0.353 - 0.631
Correct fluid therapy	134/194 (69.1%)	62/140 (44.3%)	0.011	0.631 - 0.948
Prescribed vitamin A	84/194 (43.3%)	52/149 (37.1%)	0.819	0.794 - 1.350
Prescribed Zinc supplements	42/194 (21.6%)	1/140 (0.7%)	0.001	0.006 - 0.286

### 4.5.3: Comparison of appropriate assessment, classification and treatment by ETAT+ training status

The training resulted in improved overall management of acute childhood diarrhoea. As shown above, the treatment aspect is still sub-optimal (Table 4.11).

Table 4.11: Inference on the effect of ETAT+ training on the management of acute childhood diarrhoea

	<b>Not ETAT+ Trained</b>	<b>ETAT+ Trained</b>	<b>p-value</b>	<b>Risk ratio (95% CI)</b>
Appropriate Assessment	39/140 (27.9%)	130/194 (67.0%)	0.001	(0.448 - 0.658)
Correct Classification	64/140 (45.7%)	152/194 (78.4%)	0.001	(0.582 - 0.851)
Appropriate Treatment	59/140 (42.1%)	105/194 (54.1%)	0.040	(0.710 – 0.992)

Where appropriate assessment is the health provider having checked at least three (3) of the five signs of dehydration. Correct classification is the appropriate classification of the dehydration status based on the algorithm for the Integrated Management of Childhood Illnesses (IMCI) and appropriate treatment means that at least, the treatment plan was correct and the type, amount and schedule of rehydration fluid was either prescribed or administered for the status of dehydration. Based on these results, it can be concluded

that ETAT+ training resulted in significant improvements in the assessment, classification and treatment of acute childhood diarrhoea.

#### 4.6: Hypothesis testing: 2 Independent samples t-test

Table 4.12: Comparison of mean score of assessment and treatment by ETAT+ training

	ETAT+ training	N	Mean	Std. Deviation	Std. Error Mean
Scores on assessment	ETAT+ Trained	194	<b>3.08</b>	1.27	8.79E-02
	Not ETAT+ Trained	140	<b>1.79</b>	1.38	.12
Treatment scores	ETAT+ Trained	194	<b>2.91</b>	1.50	.10
	Not ETAT+ Trained	140	<b>2.19</b>	1.65	.15

The means of assessment scores and treatment scores were found to be higher following ETAT+ training. For comparison, mean 1: mean scores without ETAT+ training and mean 2: mean scores with ETAT + training.

Ho: (Null hypothesis) was stated as: ETAT+ training had no effect on the assessment, classification and treatment of acute childhood diarrhoea.

This implies that Mean 1 = Mean 2

H<sub>1</sub>: (Alternative hypothesis) ETAT+ training had an effect on management of diarrhoea

Mean1 ≠ mean 2

Accept Ho if  $p > 0.05$

Reject Ho if  $p < 0.05$

The p-value obtained for both the assessment and treatment means comparison was **p=0.000** for each.

#### Conclusion

Since the p value of 0.000 is  $<0.05$ , the null hypothesis is therefore REJECTED. The conclusion is that the mean score with and without ETAT+ training are significantly different and therefore the training did have an effect on the management of acute childhood diarrhoea.

## **CHAPTER FIVE: DISCUSSIONS**

### **5.1 Introduction**

This study was meant to determine the effect of Emergency Triage Assessment and Treatment plus (ETAT+) training on the management of acute childhood diarrhoea by health workers. It took a cross-sectional design with historical controls to facilitate comparison of the management of acute childhood diarrhoea episodes with and without ETAT+ training. All clinical health workers directly involved in the clinical care of sick children found on duty during the study period were included in the study upon giving informed consent. This resulted in a nested cohort of 12 non ETAT+ trained and 13 ETAT+ trained health workers who participated in the study. A total of 334 episodes were observed between July and December 2007. The training intervention significantly improved assessment for signs of dehydration and of shock, classification of dehydration and use of the treatment protocols.

### **5.2 Age and sex distribution of acute diarrhoea episodes**

It was observed that children aged 6 months to 11 months had the highest prevalence of acute diarrhoea. Those aged less than 6 months had the lowest prevalence of 13%. This prevalence is however relatively unacceptable for this young infants and could be attributed to inappropriate feeding practices such as pre-lacteal feeding and early weaning. Ironically, the prevalence of acute childhood diarrhoea was found to be almost equal among children aged 12 months to 23 months (28.4%) and those aged 24 months to 59 months (27.2%). This finding contrasts the study by Jabbuor *et al.*, 1996 which

suggested that the prevalence steadily decreases with increasing age. It may be pointing to inappropriate or deteriorating primary prevention of childhood diarrhoea.

### **5.3 Assessment of acute diarrhoea episodes**

#### **5.3.1 Assessment for shock and dehydration**

There was no correlation between sex of the health provider and performance however, it was observed that younger health providers assessed for signs of dehydration better. This agrees with a previous study in Benin which found that there was no association of sex with performance (Rowe *et al.*, 2001) Medical Officers also made lower proportions of inappropriate assessments. This finding agrees with one in Ethiopia. The results showed that health service providers seldom checked for signs of shock such as capillary refill time, and cold extremities. There was however, significant improvements in checking for the signs of dehydration related to ETAT+ training. The assessment for levels of consciousness using the AVPU scale, sunken eyes, and skin pinch reaction greatly improved. Medical Officers were most keen in checking for levels of consciousness using the Glasgow coma scale while clinical officers were most keen in checking for sunken eyes. Health service providers seldom checked for ability to drink thus contributing enormously to inappropriate assessment for dehydration. They are required as a procedure of assessment either to ask the caregiver to put the baby to the breast if breastfeeding or offer a child something to drink in order to confirm ability to drink. Inability to drink makes it impossible to give fluids and foods to prevent or treat dehydration. The child is therefore at risk of developing not only severe dehydration but also hypoglycaemia.

The overall assessment for dehydration significantly improved following ETAT+ training. These findings agree with previous studies (Walker J. 1998; Peristan et al., 2000; Grimshaw et al., 2004) which suggested that adherence to clinical practice guidelines did improve case management practices.

#### **5.4 Classification of dehydration**

Although ETAT+ training resulted in more acute diarrhoea episodes being correctly classified for the dehydration status, it should however be noted that misclassifications or failure to classify for dehydration status was observed at 47.2% without ETAT+ training and 23.4% with ETAT+ training. This finding agrees with a previous study in Kenya (Penelope, Odhacha 2001) which found out that misclassifications were still widespread.

#### **5.5 Treatment of acute diarrhoea**

There was no correlation between appropriate treatment and sex of the service provider. However, a strong correlation was noted with age. Proportions of acute diarrhoea episodes steadily decreased with increasing age of the service provider. ETAT+ training had mixed effects. The main impact was the improvement in administration of the correct type, amount and schedule of rehydration fluids and the selection of correct treatment plans. This could be attributed to operation of an Oral Rehydration Treatment (ORT) Corner at the paediatric outpatient clinic. There was also a slight increase in the prescription of zinc sulphate supplements following ETAT+ training. Ironically the

results showed more cases of diarrhoea for which no fluids were prescribed and no difference in the prescription of vitamin A. Overall, the change in treatment practices was still unsatisfactory and the treatment of dehydration can be considered sub-optimal even after ETAT+ training. This can only be explained by the findings of a previous study (Rowe *et al.*, 2005) which singled out resistance to change by health service providers as a barrier to adherence to clinical practice guidelines.

Reasons for not giving appropriate treatment included not selecting a correct treatment plan and incorrect or no classification for dehydration. This can be explained by the tendency of health service providers to put almost all severely sick children on intravenous fluids which translates to treatment plan C on admission irrespective of the status of dehydration. A treatment plan guides the health service provider not only on the correct type of fluids to administer but also on the correct dose and schedule of fluid therapy. There are three diarrhoea treatment plans on which services providers are trained to apply depending on the degree of dehydration. A child who has acute diarrhoea but does not have any signs of dehydration is put on plan A. This involves giving home treatment for diarrhoea including giving more food and fluids and ORS. The ORS in plan A is given after every episode of passing loose stools at a dose which depends on the child's age. Plan B is giving ORS to a child who has some dehydration as a directly observed treatment in a health facility over four (4) hours. Plan C is inpatient fluid therapy for cases of acute diarrhoea coupled with severe dehydration. Apart from failure to select a correct treatment plan, some providers also prescribed wrong doses and schedules of fluids.

The study was not without limitations. Health system determinants of quality of care were not considered in the study. The study was unable to provide any information on duration effect of training.

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **6.1: Conclusions**

1. The training intervention significantly improved the overall performance of assessment for shock and dehydration, classification of dehydration and treatment of acute childhood diarrhoea therefore rejecting the null hypothesis.
2. There were significant reductions in the frequency of inappropriate and potentially harmful practices.
3. Whereas it was expected that ETAT+ trained health providers would practice appropriate assessments, correct classifications for dehydration and appropriate treatments, a remarkable proportion of them still showed inappropriate case management practices. It follows that training alone cannot be sufficient to effect behavior change.

## **6.2: Recommendations**

1. The Ministries of Medical Services and Public Health and Sanitation should train more health providers on ETAT + and the Integrated management of Childhood Illnesses (IMCI) to ensure a high proportion of episodes of acute childhood diarrhoea are appropriately managed.
2. The Ministries of Medical Services and Public Health and Sanitation should strengthen cascaded support supervision.
3. Encourage knowledge sharing through continuous medical education activities (CMEs).
4. The Ministries of Medical Services should embrace quality of care improvement strategies such as standards based management and recognition (SBM-R).

### **6.3 Suggestions for Further research**

1. Studies on adherence to clinical practice guidelines.
2. Why health providers do not change their clinical practice
3. An investigation into the effect of ETAT+ on the prevalence of relapses of acute childhood diarrhoea.
4. Review of overview of health worker training.

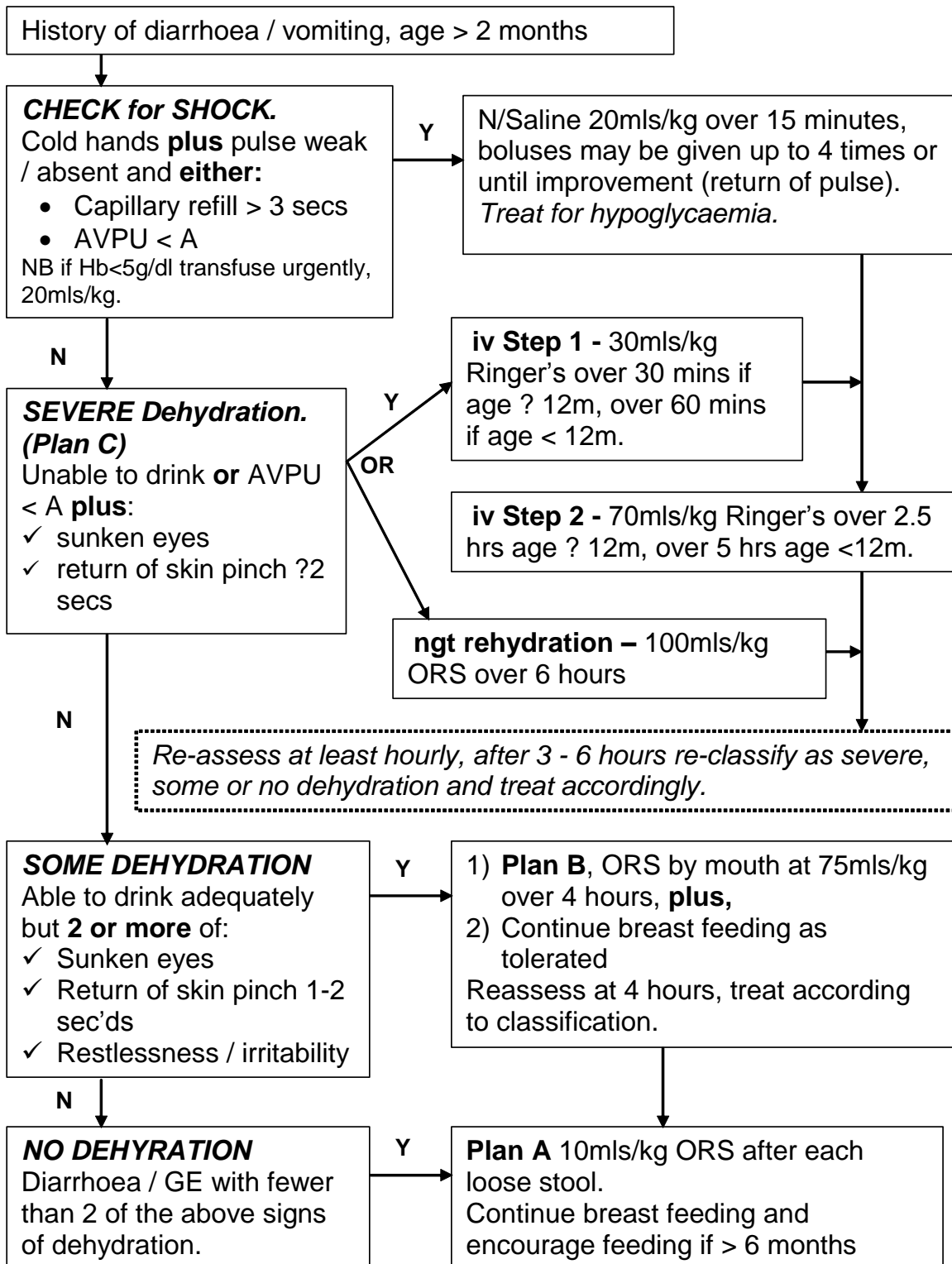
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## APPENDIX 1-ETAT+ Diarrhoea management algorithm



## APPENDIX 2: Checklist for management of acute childhood diarrhoea

### D. DEMOGRAPHIC FEATURES OF SUBJECTS:

District: ..... Date: ... / ... / ...

Facility name: ..... Facility code ..... Facility type .....

Surveyor ID: .....

Health worker: Name ..... ID ..... Sex: (1) M (2) F

Type: (1) Doctor (2) Nurse (3) Clinical officer (4) Other ..... Years of service:.....

Child: Name ..... ID ..... Sex: (1) M (2) F Age:.....

**Instructions:** *Circle appropriate option and fill in the blank spaces in the checklist*

#### A. ASSESSMENT

*Check the history as asked or recorded by the health worker:*

A1. Did the health worker ask for the duration of diarrhoea? (1) Yes (2) No

A2. Did the health worker ask about presence of blood in stool? (1) Yes (2) No

A3. Did the health worker ask whether the child vomits everything? (1) Yes (2) No

*Observe the physical examination as conducted by the health worker for the following:  
counter check with **Basic Paediatric Protocols**:*

A4. Did the health worker check for levels of consciousness (AVPU scale)?

(1) Yes (2) No *Skip to question #A6*

A5. What was the level of consciousness? 1= A 2= V/lethargy 3= P 4= U

A6. Did the health worker check for sunken eyes? (1) Yes (2) No *Skip to question #A8*

A7. Were the eyes sunken? (1) Yes (2) No

A8. Did the health worker check for skin pinch reaction? (1) Yes (2) No *Skip to question #A10*

A9. What was the skin pinch reaction?

- (1) Immediate < 1 second
- (2) Slow 1-2 seconds
- (3) Very slow-Longer than 2 seconds

A10. Did the health worker check the character of peripheral pulse? (1) Yes (2) No *Skip to question #A12*

A11. Was the peripheral pulse rapid and thready/absent?

- (1) Yes
- (2) No

A12. Did the health worker check for capillary refill time? (1) Yes (2) No *Skip to question #A14*

A13. Was the capillary refill time, 1=indeterminate 2= <2secs 3= 2-3secs 4= >3secs

A14. Did the health worker check for signs of severe malnutrition? (1) Yes (2) No *Skip to question #A16*

A15. Was the child severely malnourished? (1) Yes (2) No

A16. Did the Health worker check for ability to drink/breastfeed? (1) Yes (2) No *Skip to question #C1*

A17. Was the child able to drink? (1) Yes (2) No

**(1) CLASSIFICATION**

*Check from clinical notes for health worker diagnosis/classifications:*

C1. Was severity of dehydration classified? (1) Yes (2) No *Skip question #T1*

C2. Record health worker's classification(s)

- a. Shock
- b. Severe dehydration
- c. Some dehydration
- d. No dehydration

*Using the signs recorded by the health worker, deduce correct classification from the algorithm in the basic paediatric protocols/WHO guidelines:*

C3. What is/are the correct classification considering documented clinician's assessment?

- a) Shock
- b) Severe dehydration
- c) Some dehydration
- d) No dehydration

C4. Did the health worker make correct classification(s)? (1) Yes (2) No (3) No information (i.e.

No information to classify retrospectively)

**T. TREATMENT**

*Check the clinical notes and treatment sheet-determine correct treatment from the algorithm in the MOH/WHO guidelines:*

T1. Did the health worker manage shock? (1) Yes (2) No *Skip to question #T3*

T2. If so, Amount of Normal saline prescribed-----mls/Kg Duration-----

T3. Did the health worker prescribe IV fluids for severe dehydration (Plan C)? (1) Yes  
(2) No *Skip to question # T6*

T4. Which IV fluids were prescribed? 1= Hartmann's solution 2= HSD 3= 5% dextrose  
4= N/saline 5= Hartmann's in 5% dextrose 6= Others specify-----

T5. Did the health worker prescribe correct volume for weight and duration of fluid  
therapy?

(2) Yes (2) No

Volume/Kg/6hrs (infant)-----

Volme/kg/3hrs (Child)-----

T6. Did the health worker prescribe ORS for some dehydration? (1) Yes (2) No *Skip to  
question # T8*

T7. Did the health worker prescribe dose and schedule of ORS? (1) Yes (2) No

ORS volume-----ml/kg

Duration-----hrs

T8. Did the health worker prescribe antibiotics for children with diarrhea as a single  
diagnosis i.e. no other illness requiring antibiotics? (1) Yes (2) No *Skip to question  
#T10*

T9. If yes, which antibiotics were prescribed? 1= Cotrimoxazole 2= Cloramphenicol 3=  
Metronidazole 4= Gentamycin 5= Others specify-----

T10. Did the health worker prescribe Vitamin A? (1) Yes (2) No *Skip to question #T12*

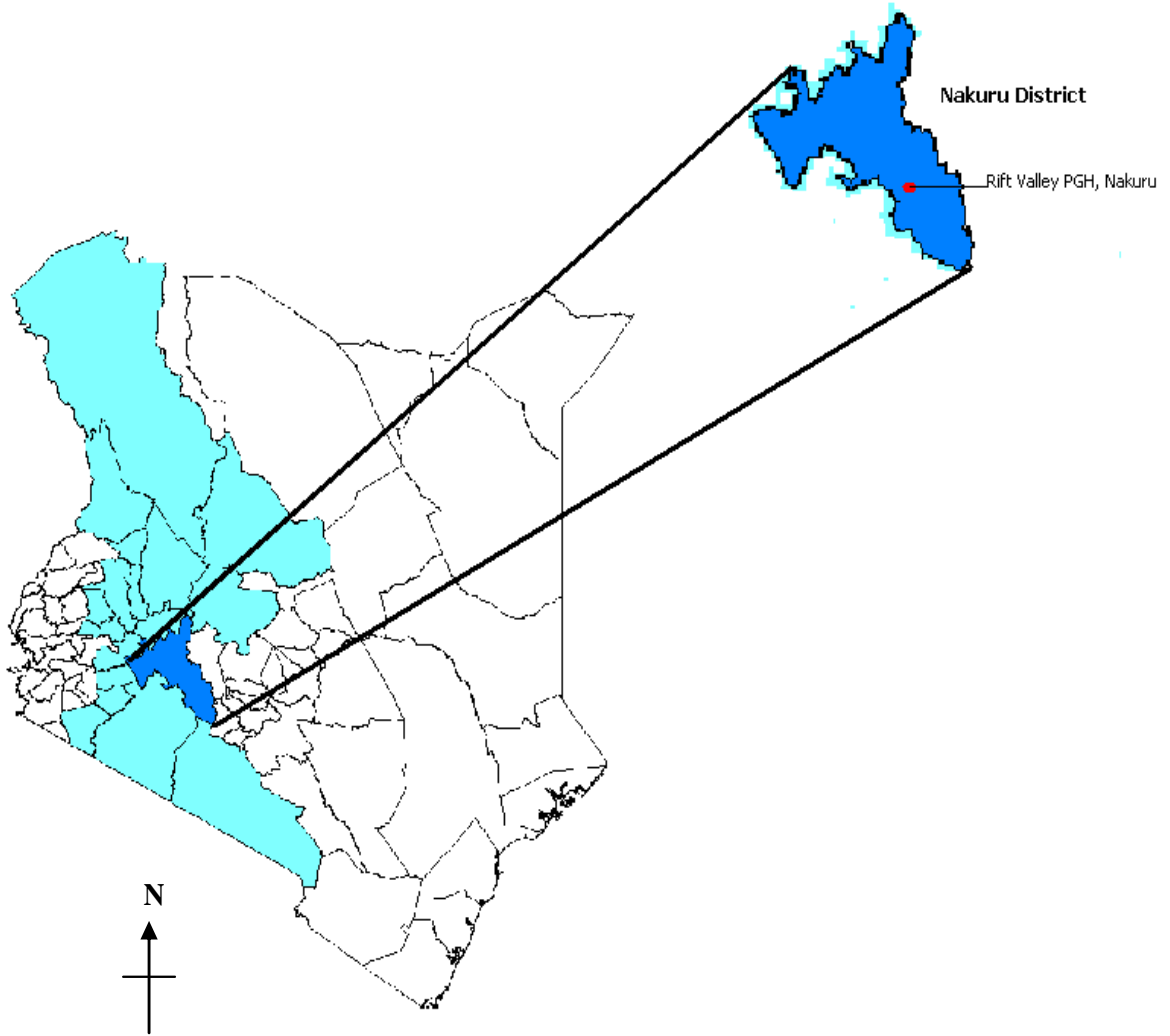
T11. Was the correct dose and schedule prescribed? (1) Yes (2) No

T12. Did the health worker prescribe Zinc supplements? (1) Yes (2) No *Skip to question  
#T14*

T14 Was correct dose of Zinc prescribed? (1) Yes (2) No

### APPENDIX 3: Study area map

MAP OF KENYA SHOWING THE STUDY AREA- LOCATION OF RIFT VALLEY PROVINCIAL HOSPITAL IN RIFT VALLEY PROVINCE, KENYA



Shaded light blue is the Rift Valley province

## **CONSENT FORMS**

### **HEALTH WORKER CONSENT FORM**

I am.....a student at Kenyatta University conducting a research on the treatment of childhood diarrhoea. This research is a requirement for me to complete my course and be awarded a degree. It is purely for learning purposes only and not a supervisory activity. The results of the research will help to improve the management of childhood diarrhoea in Kenya. For the purposes of the study, I beg to be present as you manage sick children without interfering in any way. What ever I will see or hear will be strictly confidential. You can decide to stop participating at any time. Do I have your permission to proceed?

### **CAREGIVER CONSENT FORM**

I am.....a student at Kenyatta University conducting a research on the treatment of childhood diarrhoea. This research is a requirement for me to complete my course and be awarded a degree. The results of the research will help to improve the management of childhood diarrhoea in Kenya. For the purposes of the study, I beg to be present as your child is seen. Whatever I will see or hear will be strictly confidential. You can decide to stop participating at any time. Do I have your permission to be present?