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Assessment of Medical Management Practices of Acute Diarrhea among Children Admitted to Pediatric Hospitals in Gaza City

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Dedication

To my beloved parents and family,

To my wife,

To my daughter Noor,

To all of them,

I dedicate this work

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed: ……..

Ibrahim O. Lubbad

Date……

Acknowledgment

All praise to **ALLAH** (Al-mighty), The Beneficent, the Merciful, without his mercy and guidance this work and other works never has been started nor completed. I praise to Him (Al-mighty) as much as the heavens and earth and what is between or behind.

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Abstract

Diarrhea is one of the most common diseases in children. It constitutes a large problem in Gaza Strip, where it's percentage is more than 11% of all diseases in children under age of five, and thus, represents a large load. The one answer of the problem is to utilize evidence based guidelines in managing of diarrhea, such as the World Health Organization guidelines.

In an attempt to assess the medical management of acute diarrhea regarding the World Health Organization guidelines, a across sectional study was conducted in Gaza city, during the peak of diarrheal diseases (May to August, 2016), in order to improve medical adherence to the universal guidelines which enforce effective, standardized, ideal, and management of acute diarrhea.

The interviewed questionnaires targeted all physicians working at AL-Nasser and Al-Durra Pediatric hospitals (102 physicians) to identify their knowledge regarding the guidelines. The response rate was 93%. Also, a retrieval sheet was used to identify their actual practices, where 301 acute diarrhea cases' records were retrieved from the two hospitals.

Reporting of the most danger signs of acute diarrhea (3 and 4 compatible signs) specified by the guidelines had very low percentage in the knowledge (10.6%)and practice (18.9%). On other hand, Reporting of the most of dehydration signs (2 and 3 correct signs) had a high percentage in the knowledge (71.1%) and less in the practice (47.5%). For the correct classification of dehydration, only 4.2% of the physicians classified dehydration correctly, while 27% of the classification practices were correct. Though the percentage of requesting serum electrolytes was 88.4% in the knowledge, 54.2% of the records contained them. The sharp differences between knowledge and practices were found in correct indication of intravenous fluids, and use of zinc during management of acute diarrhea, where the percentages 85.3%, and 86.3% respectively were in knowledge, compared with 16.3%, and 24.3% in the practice. The opposite were found in the use of antiemetics (24.2% VS 65.1%), antimicrobials (18.9% VS 59.1%), and the correct indications of Oral Rehydration Salts (23.2% VS 65.4%). Regarding the use of antidiarrheal, the difference between knowledge (4.2%) and practice (5.6%) was very small.

The intravenous fluids' sets were the most available commodities (98.9%), while the guidelines on management of diarrhea /dehydration were the least available (14.7%). Furthermore, the largest problem impeding application of the guidelines was lot of work (48.5%).

The researcher called for the importance of adoption, on the job training, and application of the guidelines, the need for audit and regular feedback, elimination of the impeding obstacles, and the necessity of provision of the commodities necessary for application of the guidelines.

Table of contents

List of tables

List of figures

List of annexes

List of abbreviations

AAP	The American Academy of Pediatrics
AD	Acute Diarrhea
AGE	Acute Gastro Enteritis
CPGs	Clinical Practice Guidelines
DD	Diarrheal Disease
EDL	Essential Drug List
FFI	Fever for Investigation
GC	Gaza City
GS	Gaza Strip
HIV	Human Immunodeficiency Virus
IMR	Infant Mortality Rate
IV	Intravenous
IVF	Intravenous Fluids
Km	Kilometer
MOH	Ministry Of Health
MOI	Ministry of Interior
NGO	Non-Governmental Organization
NGT	Naso Gastric Tube
NS	Normal saline
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PCBS	Palestinian Central Bureau of Statistics
PDS	Pediatric Dextrose Saline
PHC	Primary Health Care

RL	Ringer Lactate
Sq.	Square
UNRWA	The United Nations Relief and Works Agency
URL	Universal Resource Locator
WB	West Bank
WHO	World Health Organization

1. Introduction

1.1 Background

Diarrhea is one of the most common diseases in children, and the second leading cause of morbidity and mortality worldwide. Globally, there are nearly 1.7 billion cases of Diarrheal Disease (DD) every year (World Health Organization, WHO, 2013). Although usually mild and self-limiting, Acute Diarrhea (AD) in some patients will require early medical intervention or even hospitalization (Pasha and et al. 2009).

In developing countries, diarrhea is among the leading causes of childhood morbidity and mortality. It is estimated that there are 2.5 billion episodes and 1.5 million deaths annually in children under five years of age. This accounts for 21% of all the deaths in these countries, and the number has remained unacceptably high. Many times this number have long term complications like: dehydration, malnutrition, growth retardation, and immune impairment (Mengistie and et al. 2012).

Diarrhea is defined as the passage of three or more loose or liquid stools per day, or more frequent passage than is normal for the individual. Frequent passing of formed stools is not diarrhea, nor is the passing of loose, "pasty" stools by breastfed babies (WHO, 2013).

Diarrhea can last several days, and can leave the body without the water and salts that are necessary for survival. Most people who die from diarrhea actually die from severe dehydration and fluid loss. Children who are malnourished or have impaired immunity as well as people living with Human Immunodeficiency Virus (HIV) are most at risk of life-threatening diarrhea (WHO, 2013).

DD is the most significant public health issue associated with water and sanitation, and can be both water-borne and water-washed. In recent decades, a consensus agreed that the key

factors for the protection against diarrhea are sanitation, personal hygiene, availability of a high quality drinking water, and a sufficient quantity of water for hygiene, where about 88% of diarrhea-associated deaths are attributed to absence of them (Center for Disease Control and Prevention, CDC, 2015).

In Palestine, the control of DD, including promotion of breast-feeding, oral rehydration therapy (ORT), and specific health education is a part of the strategies aiming to improve the quality of life and reduce the burdens caused by DD. Despite this fact, DD constitutes a large problem in Gaza Strip (GS), Where the average percentage of DD, in children under age of 5, is more than 11% of all diseases, which represents a large load (Palestinian Central Bureau of Statistics, PCBS, 2015).

Globally, the management of DD vary with the child's age, the child's health status, the accompanied complications, the pathogens involved, and the health care provision centers. Despite the growing body of the evidence supporting the safety and efficacy of oral rehydration solutions (ORS), they remain underutilized, and the management of DD continues to vary considerably. Common management errors include abstention giving of ORS for children with some and severe dehydration, administering intravenous fluids (IVF) therapy inappropriately, withholding age-appropriate feeding in children with vomiting, etc. For this reason, many evidence based, local and universal guidelines were existed to control the management of health professionals in order to unite the management of DD, and to ensure satisfying the essentials of optimal health care providing for DD cases. On the top of the guidelines' list is the World Health Organization (WHO). That what the researcher relied on, in the next pages, to identify the current medical management of AD in children in Gaza City (GC).

1.2 Research Problem

Children mortalities are the most urgent problems of developing countries. According to the World Health Statistics 2015, the global under-five mortality rate in the year 2013 is 17.7 deaths/1,000 live births, while in Palestine is 22 deaths/1,000 live births (as reported by PCBS in the same year). Globally, DD represents one of the main causes of children mortality. It constitutes 10% of all causes of deaths among children under five years in 2013 (World Health Statistics, 2015).

DD constitutes a large burden in Palestine, as well as GS, where it's percentage exceeds 11% of all diseases among children under age of five (PCBS, 2015), while the average percentage of the admitted cases with DD in GC pediatric hospitals is 18.27% (in the same age group, 2015), and thus, it represents a large load.

For years, WHO has been trying to reduce morbidity and mortality caused by DD, where one answer of the problem is to follow the WHO guidelines. The WHO guidelines for the management of AD need to be adopted at all health care levels. so that it can save time, reduce errors, will be easy to use and moreover will improve the quality of AD cases management to a great extent.

The research problem is to what extent the medical staff (the physicians) in GC comply with the WHO guidelines in the management of AD. Up to date, such matter has not been deeply studied yet, so this study is expected to be important for different stakeholders.

1.3 Justification of the Study

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. Several studies have shown poor knowledge and low adherence of health workers to the guidelines on the management of AD which led to low quality of care. Owing to researcher's clinical experience in pediatrics field, noticing that there is a lack of knowledge regarding adherence to WHO guidelines for management of DD among medical staff, the researcher has chosen this study, as an opportunity to identify the medical management of AD in GC, and to assess the adherence of their clinical practice to WHO guidelines. Therefore this study is expected to be useful for different stakeholders as it will provide baseline information to help in developing strategies to improve the quality of care offered at GC, and then improve efficiency in service delivery. In addition it will regulate the practice of the physicians through the best management of AD that comply with international protocols especially WHO guidelines, and that satisfies the essentials of optimal health care providing. Furthermore, this study will highlight the challenges in diarrhea case management and help health planners and policy makers in the Ministry of Health (MOH), the United Nations Relief and Works Agency (UNRWA), and the Non- Governmental Organizations (NGOs) working in childhood health fields will be informed and will be aware to which extent their medical staff in GC comply with the WHO guideline in the management of AD as a common pediatric disease to accelerate the correction of the defaults and to focus on priority areas such as case management training to improve implementation of these guidelines. Finally, the researcher thinks that the related students and researchers can obtain useful information when they find such local information reference.

1.4 Aim of the Study

The overall aim of the study is to assess the medical management practice of AD among the children less than five years in GC in order to enforce effective, standardized, ideal, safe, and correct application of the WHO guideline.

1.5 Objectives

- To assess the knowledge of physicians working in pediatric hospitals regarding the WHO guidelines for the management of AD among children less than 5 years in GC.
- To assess the practice of physicians working in pediatric hospitals regarding the WHO guidelines for the management of AD among children less than 5 years in GC.
- To compare between physicians' knowledge and actual practices regarding the management of AD according to the WHO guidelines.
- To describe the views of physicians on challenges impeding application of WHO guidelines for treatment of DD in GC pediatric hospitals.
- To describe the views of physicians on availability of commodities necessary for management of acute diarrhea in GC pediatric hospitals.
- To propose useful and applicable related recommendations to improve physicians' adherence to the guidelines.

1.6 Context of the Study

1.6.1. Demographic Context:

Palestine is an Arabic country, and relatively is a small one. The total surface area of the occupied Palestine is about 27.000 Km². Palestine has been occupied in 1948 by Israel and the two remaining parts are separated geographically (West Bank and Gaza Strip) after the war in 1967. Palestine is surrounded by Lebanon, Syria, Jordan, Egypt, and the Mediterranean Sea (annex 1). The total area of the Gaza Strip (GS) and the West Bank (WB) is about 6,020 Sq. Km with total population living in is about 4.74 million individuals (1.85 million in GS and 2,89 WB) with population density 789 capita per Km (PCBS, 2016).

GS is a narrow piece of land lying in the coast of Mediterranean Sea. The total area of GS is about 365 square kilometer. It is an overcrowded area, with total population about 1.85 million, with population density of 5,070 inhabitants per Km², and about 69% of them are refugees as estimated at the end of 2015 (PCBS, 2016). GS is divided into five governorates: Gaza Governorate, North Governorate, Mid-zone Governorate, Khan-Younis Governorate, and Rafah Governorate.

1.6.2. Palestinian Health Care System:

Health care system in Palestine is complex. Health service delivery in Palestine is divided into five major health care providers: two public providers represented by Ministry of Health (MOH) and Ministry of Interior (MOI) (which represented by military health services) , multiple private providers (hospitals, clinics), numerous NGOs providers and the UNRWA. The main health care provider is MOH which operates 26 hospitals and 472 PHC facilities, 418 in West Bank and 54 in Gaza Governorates (MOH, 2014).

The main roles and responsibilities of the MOH according to the Palestinian Public Health Law are: providing, regulating and supervising the provision of health care in Palestine. Also, MOH is responsible for planning the health care services, coordination with different stakeholders, enhancing health promotion to improve the health status, developing human resources in health sector, managing and disseminating health information, etc.

In the GS, the health care services are provided at primary , secondary , and tertiary levels. The PHC services are provided through 54 centers at MOH (15 of them in GC), 21 centers at UNRWA (6 of them in GC) and 81 centers at NGOs. The PHC centers at MOH are classified into level 2, 3, and 4, while UNRWA and NGOs centers are classified into different approach. The secondary health care services are provided by governmental, non-governmental, and private sectors. Moreover, there are 30 hospital in GS; MOH owned 13 of them. The majority of hospital health services are carried out by MOH which have 1968 beds with bed capacity of 63.1% of the total beds (MOH, 2014).

1.6.3. Pediatric hospitals:

Gaza governorates have three pediatric hospitals that are located in GC. These hospitals are directed and owned by MOH as follows: Al-Nasser pediatric hospital, Al-Durra pediatric hospital, and Dr. Abdel Aziz Al-Rantisi specialized pediatric hospital. All the three hospitals contain an administrative employees and clerks, and supportive medical departments as laboratory, x-ray, kitchen, and laundry department, and serve as internal medicine for children aged from one month up to twelve years old, except Al-Nasser pediatric hospital which contains a nursery department that serves the newly born infants since birth.

Most of the employees in the three governmental pediatric hospitals are official employees, who receive their salary from one of the two Palestinians governments, while there are

little number of employees work as temporary contracts employees paid by NGOs, or as volunteers and trainees.

1.6.3.1. Al-Nasser pediatric hospital:

Established in the year 1962 in the western part of GC, Al-Nasser pediatric hospital is providing several medical services for children. The hospital consists of several different sections; emergency room, three general pediatric departments, the intensive care unit, the neonate departments, the pharmacy, the laboratory, etc. The hospital's staff consists of 45 doctors, 101 nurses, and three physiotherapists who provide direct contact care for diseased children. In the year 2016, The percentage of occupancy rate in Al-Nasser pediatric hospital was 66.5% .The average length of stay was 4.27 days. The total number of cases sought the pediatric emergency room was 81169 cases; 7650 cases of them were admitted to the in- patient departments; 1197 of the admitted cases were diagnosed as diarrhea cases. This represented 15.6% of the total admitted cases. In the year 2009 the hospital's department were rehabilitated and renewal.

1.6.3.2. Al-Durra pediatric hospital:

Al-Durra pediatric hospital is relatively a newly- established pediatric hospital. It was constructed by the year of 2000 in the north east of GC. It serve the eastern areas of GC which include the old and crowded parts of the city. The hospital is held on an area of 2000 square meters, and it contains 90 beds in five departments which are: the emergency room, two general pediatric departments, the intensive care unit, and the outpatient department. The hospital's staff consists of 31 doctors, 56 nurses, and three physiotherapists, all of them provide direct contact care for diseased children. In the year 2016, The percentage of occupancy rate in Al-Durra pediatric hospital was 58.4% .The average length of stay was 4.12 days. The total number of cases sought the pediatric emergency room was 73148

cases; 6773 cases of them were admitted to the in- patient departments; 1439 of the admitted cases were diagnosed as diarrhea cases. This represented 21.24% of the total admitted cases.

1.7 Operational Definition

- **Assessment:**

It is a gathering data, determining the points of strength and weakness, and then so, the researcher can measure the knowledge and practice by means of correct responses of pediatricians regarding the World Health Organization (WHO) guidelines in the management of acute diarrhea.

- **Medical Management Practice of Acute Diarrhea:**

The researcher has assessed the physician knowledge and actual management practice of acute diarrhea in Gaza city using **the forth revision of the WHO manual for treatment of diarrhea** (the manual for physicians and other senior health workers, Geneva).

- **Acute Diarrhea**:

Acute diarrhea, or acute watery diarrhea is a type of Diarrheal Diseases that characterized by frequent, watery, loose stools, without visible blood, and lasting less than two weeks.

- **Children:**

In this study, the researcher used the word children to express the age group less than five years old.

2. Literature Review

This section consists of the conceptual framework, the main causative factor of diarrhea, the rout of transmission of diarrhea, the types of diarrhea, the global burden of AD, the impact of AD on children, the prevention and control of diarrhea, the management of a AD according to the WHO, and a group of previous studies about compliance of health staff with the treatment guideline in the management of AD.

2.1 Conceptual Framework

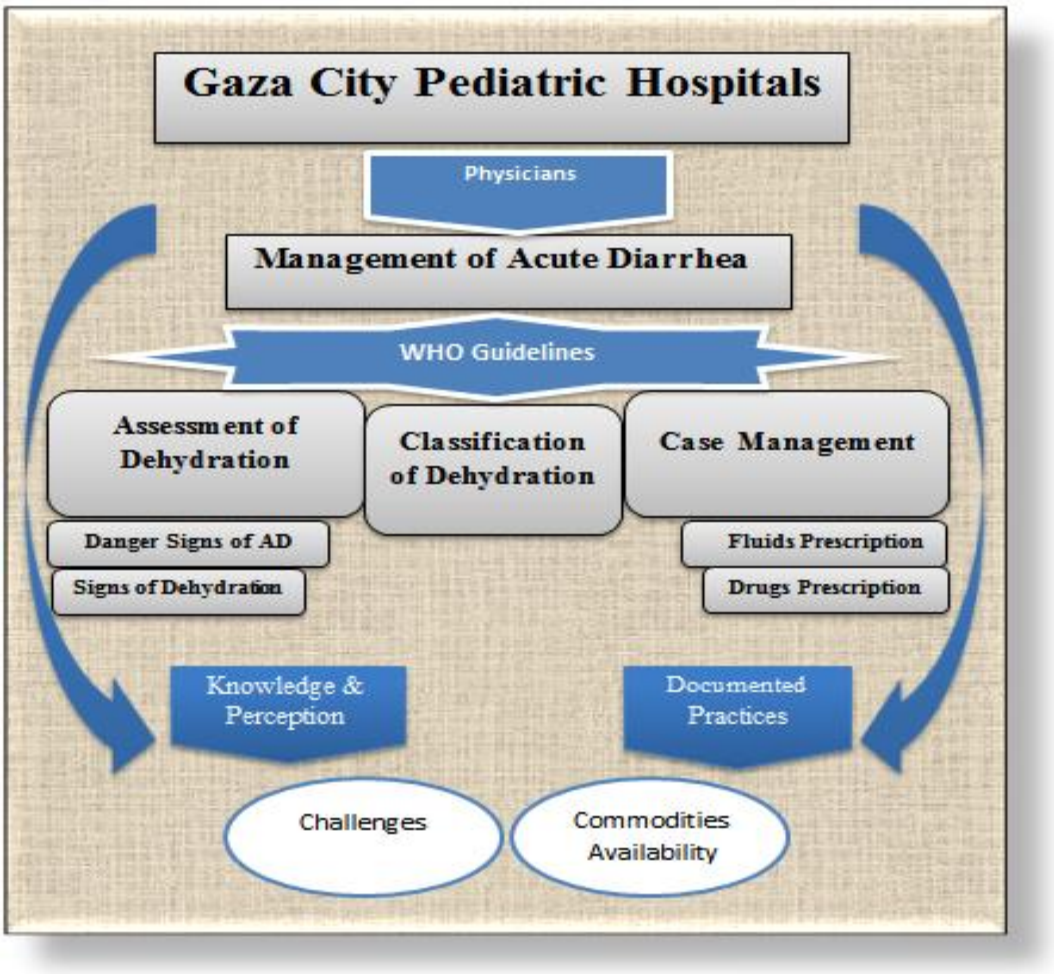

Figure 1.1: Conceptual framework of the study

The figure, illustrated above **(**figure 1.1**)**, is a conceptual framework model includes assessment of the management of AD among children less than five years in GC.

The current research, according to the conceptual framework, studied the compliance of the physicians in GC hospitals with the WHO guidelines in the management of AD. This was done by assessment of physicians' knowledge and perception regarding the guidelines, assessment of their practices regarding the guidelines, and then, comparing physicians' knowledge with the documented actual practices.

According to the conceptual framework, the first part of the assessment process interested in the knowledge aspect. In another word; what the physicians in the GC pediatric hospitals know about the management of AD as recommended by WHO. To achieve that, the researcher asked about the followings: the definition of AD, identifying the danger signs of AD, signs of dehydration, classification of dehydration, and case management which include fluids administration (Oral rehydration solution and intravenous fluids), as well as drug prescriptions (zinc sulphate, antimicrobials, antiemitics, and antidiarrheals). Moreover, the challenges impeding application of AD management guidelines, and the physicians' view regarding availability of the commodities necessary for application of the guidelines also were identified.

The second part of the assessment process interested in the practical aspect (compared also with WHO guidelines), where all of the previous contents were retrieved from the cases' medical records, focusing on the actual practical management which include fluids and drugs prescription. As the two main parts (knowledge and practices) of the study were available, the comparison between them was conducted.

The idea of this framework came from looking through different references, in addition to the researcher’s experience in working at Al-Nasser Pediatric hospital for 9 years.

2.2 Health of the Palestinian Children

Children constitute about half of the Palestinian population (MOH, 2015). They are considered one of the vulnerable groups that need a special interest and support. So, it was important to present their heath situation in Palestinian.

2.2.1. Child health services:

All of the four health care providers in GS (governmental, UNRWA, NGOs, and the private sector) give a special interest for this vulnerable group, where they provide care for children across the phases of the lifecycle, with specific interventions to meet the health needs of newborns, infants under-one year of age, children one to five years of age and even school-aged children. Both preventive and curative services are provided. These services include newborn assessment, periodic physical examinations, immunization, growth monitoring and nutritional surveillance, micronutrient supplementation, school health services and care of the sick children.

The governmental institutions and the UNRWA offer health services to the most them. The UNRWA provide a free of charge health services for all age groups through related centers distributed all over GS (UNRWA, 2015), while MOH free health provisions are for children up to 5 years through the governmental pediatric hospitals represented by Al-Nasser hospital (the main and the largest pediatric hospital in GS); Al-Durra hospital; Dr. Abdel Aziz Al-Rantisi specialized pediatric hospital; and the pediatric departments in the other governmental hospitals, and through the governmental health clinics in GS.

2.2.2. Vaccination:

Aiming to reduce the incidence of infectious diseases, vaccinations program is one of the most successful health programs in the GS. It is available and easily accessible in all

governorates of the GS. UNRWA in cooperation with the MOH provides vaccinations service for all children in GS.

The strength of the Palestinian immunization program plays an important role in improving child health through reduction of morbidity and mortality caused by targeted vaccine preventable diseases. The targeted vaccine preventable diseases are Rotavirus vaccine, Tuberculosis (TB), Poliomyelitis (polio), Diphtheria-Tetanus- Pertussis (DTP), Measles-Mumps-Rubella and congenital rubella syndrome (MMR), Hepatitis B, Hemophilus influenza type b (Hib) and Pneumococcal Conjugate Vaccine (PCV).

Based on the MOH annual report (2015), the average coverage rates exceeded 99% for all vaccines.

2.2.2.1. Rotavirus vaccine:

Rotavirus vaccine is an oral (swallowed) vaccine, not a shot. It will not prevent diarrhea or vomiting caused by other germs, but it is very good at preventing diarrhea and vomiting caused by rotavirus. The first dose of the vaccine is most effective if it is given before a child is 15 weeks of age. Also, children should receive all doses of rotavirus vaccine before they turn 8 months old (CDC, 2016).

Rotavirus vaccine is the best way to protect your child against rotavirus illness. Most children (about 9 out of 10) who get the vaccine will be protected from severe rotavirus illness. While about 7 out of 10 children will be protected from rotavirus illness (CDC, 2016).

Rotavirus is the leading cause of severe and fatal diarrhea in children under five years of age. The WHO estimates that globally, rotavirus is responsible for the deaths of more than 527,000 children each year and for over 40% of all hospitalizations for diarrheal disease in children under 5 years of age. Vaccination is the best way to prevent severe rotavirus

infection. It cannot be cured or prevented with drugs such as antibiotics. The WHO recommends that the rotavirus vaccine be included in all national immunization programs. Rotavirus disease poses a serious threat to the health of young children in the Palestinian Territories due to the high rates of poverty and the destruction of water and sewer infrastructure caused by the recent conflict in Gaza ((Rostropovich-Vishnevskaya Foundation, RVF, 2017).

Rotavirus vaccine is considered essential for every child. This basic right has been extended to all Palestinian babies in Gaza and the West Bank, where on March 1, 2017, a total of 106,873 infants in both the West Bank and Gaza were vaccinated with the first dose of rotavirus vaccine. The coverage rate was 98%. 83,942 of those infants have also received the second dose of the vaccine. The coverage rate was 96% (RVF, 2017).

2.2.3. Infant and child mortality:

In GS (2014), there was a slight increase in the Infant Mortality Rate (IMR) to reach 20 per 1000 live births, and a significant increase in the Neonatal Mortality Rate (NMR) to reach 12 per 1000 live births (PCBS, 2015). This is owed to multifactorial, and may include social, cultural and economic factors, as well as possible deterioration of quality of health services in hospitals due to the longstanding blockade (UNRWA, 2015).

The under-five mortality rate in Palestine (2014) was 22 per 1000 live births. The GS had the highest rates at 24 per 1000 live births compared to the WB at 20 per 1000 live births (PCBS, 2015). The main causes of death for children under five years in Palestine are the prenatal conditions, followed by the congenital deformities (PCBS, 2015).

2.2.4. Diarrhea:

The average incidence of infectious diseases among children, as well as DD, is considered a diagnosis and reflection of the current status of health and an indication of the safety and purity of the environment. It is also a tool to measure social progress and the social status of households and communities. The prevalence of disease is associated with different agents and factors related to the pollution of the environment and the quality of children's food and how it is prepared. Frequent incidences of disease have a negative impact on the child, not only in increasing the risk of death, but also through the impact on the child's health and potential exposure to malnutrition and a weakened immune system (PCBS, 2013).

The percentage of children who had diarrhea was 11.3 % in Palestine, 11.4% in the WB and 11.1% in the GS (PCBS, 2015). Children in the 12-23 month age group were more susceptible to diarrhea than other age groups. This may be attributed to feeding children home cooked and processed foods at this age (PCBS, 2013).

According to the PCBS (2015), the percentage of children under age 5 with diarrhea in the last 2 weeks for whom advice or treatment was sought from a health facility or provider in GS (Care-seeking for diarrhea) was 53.4%, Diarrhea treatment with oral rehydration salts (ORS) (Fluid from packet and Pre-packaged fluid) was 26.5%, while Diarrhea treatment with oral rehydration therapy (ORT) and continued feeding was 34.4%.

2.3 The Main Causative Factors of Diarrhea

According to the literature, some of DD are due to errors of metabolism, chemical irritation or organic disturbance, but the majority are due to infectious pathogens; bacteria, viruses and parasites (Jay, 2013).

In Gaza City, Abu-Elamreen, et al. studied the etiology of AD in Palestinian children under 5 years of age and to improve knowledge of the etiology of diarrheal pathogens using traditional and molecular diagnostic techniques. Various common causative agents of diarrhea (viral, bacterial and parasites) were examined by conventional and molecular techniques among 150 cases of in-patient, admitted to the Al-Nasser Pediatric hospital in GC.

The researchers found that the incidence of the causative agent was as follows: rotavirus 42/150 (28%), Entamoeba histolytica/dispar 23/150 (15%), Shigella spp. 9/150 (6%), Campylobacter coli/jejuni and Escherichia coli O157:H7 7/150 (5%) each, Salmonella spp. 3/150 (2%), Giardia intestinalis 1/150 (1%), and Strongyloides stercoralis 1/150 (1%) of the samples. Shigella and Salmonella isolates were tested for their susceptibility to common antimicrobial agents and most of the isolates were resistant to ampicillin and trimethoprim/sulfamethoxazole.

The study revealed that rotavirus , E. coli O157:H7 and Campylobacter (which are not regularly screened for) were the common causative agents for diarrhea in GS (Abu-Elamreen, et al. 2008).

2.4 The Route of Transmission of Diarrhea

Most pathogens that cause diarrhea share a similar mode of transmission, from the stool of one person to the mouth of another. This is known as fecal-oral transmission. There may be differences, however, in the number of organisms needed to cause clinical illness, or in the route the pathogen takes while travelling between individuals for example, from the stool to food or water, which is then ingested (WHO, 2009).

2.5 Types of Diarrhea

The world health organization (WHO) classified diarrhea - according to the clinical syndromes - into three types, including AD, dysentery (bloody diarrhea), and persistent diarrhea (prolonged diarrhea).

2.5.1. Acute Watery Diarrhea (Acute diarrhea):

This type characterized by abrupt onset of frequent, watery, loose stools, without visible blood, and lasting less than 14 days (WHO, 2014). The episodes of this type subside within 72 hours of onset. Usually, it accompanied by abdominal pain. Nausea, vomiting and fever (Jay, 2013).

As mentioned above, the common causes of AD are viral, bacterial, and parasitic infections.

2.5.2. Dysentery:

It is a diarrhea with blood in the stool, with or without mucus. Usually, it accompanied by abdominal pain, fever and rectal tenesmus. The most common cause of dysentery is Shigella bacteria. Amoebic dysentery is not common in young children. A child may have both watery diarrhea and dysentery (WHO, 2014).

2.5.3. Persistent Diarrhea:

In this type, diarrhea lasts 14 days or more. Up to 20% of episodes of diarrhea become persistent, especially among children less than three years and more so among infants, which often causes nutritional problems and contributes to death in children (WHO, 2014).

2.6 Diagnosis of Diarrhea

As mentioned above, DD are a syndromic diagnosis, and the type of diarrhea is determined by the clinical syndromes, whereas, microscopic stool analysis and microbiological stool culture remain the standard methods and are recommended for isolation of causative agents mainly for bacterial and parasitic causes of diarrhea. To our knowledge viral isolation is not available in GS. according to the clinical syndromes.

2.7 The Global Burden of DD among Children

Clearly, diarrhea among children is responsible for exorbitant economical and human loss. Worldwide, DD is the second leading cause of death among children under age of five. It is called the common illness and the global killer, where it kills more than AIDS, malaria, and measles combined. 2,195 children die daily of diarrhea, that's like losing nearly 32 school buses full of children each day. 1 in 9 child deaths are due to diarrhea. 801 thousand child deaths from diarrhea every year (CDC, 2015). Globally, there are nearly 1.7 billion cases of DD every year (WHO, 2013). In developing countries, diarrhea is among the leading causes of childhood morbidity and mortality, accounting 21% of all diseases causing deaths at below five years of age, and causing 2.5 million deaths per year. Although diarrhea morbidity remains relatively unchanged, the current percentage are estimated to reach one billion episodes or 3.2 episodes per child-year (Mengistie and et al. 2012).

2.8 Prevention and Control of DD in GC

According to the Gaza Epidemiological Bulletin (2012), epidemiological analysis was carrying out in GS to determine the real causes of increasing numbers of patient with DD. The result of analysis detected that the most potential cause of this increase is eating of unsafe food which caused by frequent electricity cut off which lead to rapid growth of

pathogenic microorganisms. For this topic, multiple actions are proposed to be effective in in control of DD in GC, which include: treatment through ORS, exclusive breastfeeding, improvement of water supply, safe water, food safety facilities, improve sanitation and hygiene, zinc and vitamin A supplementation, and administration of antibiotics and antiamebic for dysentery, intensification of health education efforts with emphasis on personal hygiene. Health education is always a helpful preventive measure. Even when complicated techniques are used, in many cases, no organism can be detected. In most cases of AD, it is not significant to identify the cause as the treatment is the same, that is rapid and adequate rehydration as it will be clarified in the next pages. Food safety control measures must be a subject for periodic inspection and sampling. Food that do not conform with acceptable standards must be eradicated. In addition, research projects must be started to determine the optimum strategies for DD control program and to pinpoint various determinants of performance in this field.

2.9 Benefits of Zinc in Treatment of Diarrhea

A high share of all years lost due to ill-health, disability, or early death are caused by diarrhea (Mathers, 2007). Therefore good guidelines on the clinical management of diarrhea among the world's most vulnerable children remain critical. A simple and effective treatment for the clinical management of AD is a routinely use of zinc supplementation, at a dosage of 20 milligrams per day for children older than six months or 10 mg per day in those younger than six months, for 10–14 days (UNICEF and WHO, 2006).

Zinc supplements are generally accepted by both children and caregivers and are effective regardless of the type of common zinc salt used (zinc sulphate, zinc acetate or zinc gluconate) (Awasthi, 2006).

Zinc is also important for normal growth and development of children both with and without diarrhea (Bhatnagar, 2004). Zinc deficiency is associated with an increased risk of gastrointestinal infections, adverse effects on the structure and function of the gastrointestinal tract, and impaired immune function (Lukacik, 2008). Dietary deficiency of zinc is especially common in low-income countries because of a low dietary intake of zinc-rich foods (mainly foods of animal origin) or inadequate absorption caused by its binding to dietary fiber and phytates often found in cereals, nuts and legumes (Haider, 2009).

Although the benefits of zinc supplementation in the management of diarrhea have been established, there remain a number of barriers to the widespread implementation of this treatment strategy. Currently, zinc is not used to treat most cases of diarrhea because the known benefits of zinc supplementation are still not widely appreciated by physicians and health-care workers in developing countries (Santosham, 2010). There is a need to establish the optimal dosage and to investigate whether the same benefits of zinc supplementation are also applicable to children in middle- or high-income nations (Aggarwal, 2007). There is also concern that high zinc intakes may compete for absorption with other micronutrients such as iron and calcium. This, in turn, can have unintended negative consequences for children's health and development (Aggarwal, 2007). Studies are needed to help identify subpopulations that would benefit most in resource-limited settings and to ensure access to zinc supplementation, especially for those families whose children are most at risk of diarrhea but may not be able to afford treatments that include zinc supplements (Fischer, 2009). However, zinc deficiency remains difficult to diagnose because measuring serum zinc levels is not necessarily accurate for this purpose (Winch and et al. 2008).

Currently, only a very small proportion of children in need have access to zinc supplementation (Fischer, 2009).

2.10 WHO Guidelines for the Management of AD

In 2005, the WHO produce the manual for treatment of diarrhea (a manual for physicians and other senior health workers. 4th rev., Geneva), through which the objectives of the treatment were: prevention of dehydration, if there are no signs of dehydration; treatment of dehydration, when it is present; prevent nutritional damage, by feeding during and after diarrhea; and reduce the duration and severity of diarrhea, and the occurrence of future episodes, by giving supplemental zinc.

The researcher attacked the complete part of AD (annex 8) from the forth revision of the WHO manual for treatment of diarrhea (A manual for physicians and other senior health workers, Geneva), by which the study tools were designed, and thus, the physician knowledge and the actual practice of AD in GC were assessed.

2.11 Management of AD

2.11.1. Management of AD According to the WHO:

A nationwide study was conducted to identify to what extent of the primary-care physicians in Bahrain, conform with the WHO recommended guidelines on the use of ORT, antimicrobials, and prescribing of other drugs used in management of AD. In a sample of 300 patients, ORS solution was provided for 89.3% (n=268) patients; 12.3% received ORS alone, while 77% received ORS in combination with symptomatic drugs. Antimicrobials were recommended for 2% of the cases. Parenteral rehydration fluids and other drugs were given to 11.4% of cases. The mean number of drugs was 2.2$\pm$0.87 per

prescription. In about one-third of the cases, three or more drugs were administered (Ismaeel and et al. 2007).

Most of PHC physicians, in Bahrain, always comply with the WHO guidelines, except ORT and antimicrobials. However, in several cases, ORT was recommended along with poly-pharmacy, including irrational use of medications for symptomatic relief (Ismaeel and et al. 2007).

Another study conducted by Kherkheulidze, et al. (2011), where the researcher studied Georgian health care practitioners' knowledge on management of acute diarrhea and its adherence to WHO treatment guidelines. A cross-sectional survey was conducted in hospitals and out-patient clinics of Georgia. 350 namelessly completed questionnaires were analyzed (27% - hospitals, 73% - out-patient clinics). Most of interviewees (65%) defined diarrhea appropriately, 74% named main signs of dehydrations a right, and categorized severity of dehydration, 26% confused signs of moderate and severe dehydration. About 90% used ORS during diarrhea, but only 51% comply with WHO guidelines about fast rehydration. The most of answering staff (78%) don't know the advantages of low osmolarity ORS. 42% pediatricians who work at the hospital used IV rehydration in case of moderate dehydration. 78% of medical staff identified recommended IV fluids either Ringer lactate solution or Normal saline, but 22% as yet select 5-10% Dextrose solution. The majority of doctors (94%) used probiotics, either as monotherapy (22%) or in a mixture (78%). 35% of physicians recommended antiemetics, 27% antidiarrheals, 45% antimicrobial medications. 65% of them, used antibiotics only for cases accompanied with blood in stool. Most of medical staff don't used Zinc. Study showed that most participants advised continuation of breastfeeding. In case of bottle feeding 32% recommended lactose free formula, whereas others continue normal diet. In elder children some limitations in diet is still applied (Kherkheulidze and et al. 2011).

The study concluded that primary level health care practitioners adhered to the WHO recommendations better, than hospital doctors, that was statistically significant. The results revealed a moderate compliance with standard treatment prptocol. The recommendations on using ORS and continuation of breast-feeding are most followed. The most awkward problem are unnecessary use of antibiotics and IV fluids, no use of zinc, needless use of antidiarheals and antiemetics (Kherkheulidze and et al. 2011).

A third study was carried out in Kenya to assess perceptions of zinc as a treatment for diarrhea (according to WHO/UNICEF) in children(6–60 months) and adherence to recommended treatment behaviors (Simpson, 2013).

The researcher asked about other treatments, 64% of the respondents reported using antibiotics, 59% ORS, and 56% a homemade treatment. Among the zinc tablet users, 55% provided zinc as the 3rd or 4th treatment for the reference episode. Also, 75% of the participants reported receiving the zinc treatment free of charge. 88% of the caregivers indicated that zinc was their most preferred treatment.

The mean duration of the reference diarrhea episode was 5.3 days (95% confidence interval (CI) 4.7–5.9). 82 respondents had used zinc tablets, and 18 had given zinc syrup. Among those who used tablets, 62% reported giving zinc for fewer than the recommended 10 days, with a mean of 6.8 days (95% CI 6.1–7.4 days), and 50% said they had been instructed to give zinc for 5 days or less. Also, only 55% gave the correct daily dose.

The researchers concluded that despite the potential benefits of zinc for children with AD in low–resource settings, it still impractical. Furthermore, the availability of zinc is limited primarily to public–sector providers (Simpson, 2013).

Ogbo and Aderemi-Williams (2014) studied in the related subject, where they studied the management of acute diarrhea in children by community pharmacists in Lagos in Nigeria (2014), through which they compare the knowledge and attitude of community pharmacists

(recommended by WHO) in the management of acute diarrhea in children with their observed practice (Ogbo, 2014).

The study detected that the knowledge and attitude of community pharmacists in the treatment of AD in children was different from their observed practice. The difference was statistically significant ($p<0.05$). During the simulations, 23% carried out appropriate assessment before recommending any products, and 15% recommended ORT only. though information to the pharmacists showed non-dysentery, non-cholera, AD, antibiotics and antidiarrheals were irrationally recommended and these were the spine of symptoms' management in practice. Questionnaire data showed that that 24% of pharmacists recognized the right instructions to give on food and fluid intake during diarrhea, whereas 8% followed WHO guideline on food and fluid intake during the visits.

The researchers concluded that assessment of patients to determine AD was insufficient. Observed practice in managing AD in children was inappropriate and clearly disagree with their answers in the questionnaire. The recommendation of ORT was scanty and advice on food and fluid intake was inadequate and sometimes inappropriate. The study revealed that only 15% of community pharmacists comply WHO guidelines in the management of AD among children in Nigeria (Ogbo, 2014).

The practices of the health workers in South Sudan (regarding management of AD in children aged 6-59 months). This was conducted through a cross-sectional study, where the standard WHO/IMCI for assessment of health workers' performance in the management of children under 5years illnesses was adapted and used (Stephen, 2015).

A total of 39 health workers were interviewed and 202 medical records of children admitted at the Juba teaching hospital with AD (March – June) were examined. The majority (75.74%) of the children assessed with diarrhea were 6-24 months old. Most patients were poorly assessed and the most common sign assessed was (75.12%) patients

for sunken eyes and the least assessed sign was ability to drink/breast feed at (34.32%). Seventy five percent of patients were classified correctly according to WHO guidelines and 61% of patients received the correct choice of fluid therapy as per the WHO guideline. The most commonly known danger sign was the child who vomits everything (46.2%) and the least known sign was a child with a change in level of consciousness. Health workers' knowledge in how to assess the hydration state of the children was poor (below 50%) especially in the assessing level of consciousness and ability to drink or breastfeed, while their knowledge in the use of hydration fluid was good (above 50%). Of the commodities for management, ORS was available 87.1% of the time, followed by Ringer's lactate at 56.4%, while the rest were available for less than 50% of the time (Stephen, 2015).

The researcher concluded that there was inadequate assessment and documentation of the signs and symptoms of dehydration in the children admitted with AD at Juba Teaching Hospital. There in inadequate knowledge in assessment of dehydration and use of rehydration fluid therapy. There are adequate supplies needed in the management of acute watery diarrhea at the at Juba Teaching Hospital which are mostly available (Stephen, 2015).

2.11.2. Management of AD According to The American Academy of Pediatrics (AAP):

In accordance to AAP, Alameddine, et al. (2010) carried out a survey to identify how closely current treatment among Lebanese pediatricians compares with the guidelines recommendations and to determine the effects of such management on the healthcare system.

The study indicated that the pediatricians in Lebanon are perceived the importance of ORS and the positive role of breastfeeding in treatment of AGE. However, they do not comply

with optimal recommendations from the AAP regarding nutrition, laboratory examinations and drug prescriptions which poses substantial financial losses and economic burden (Alameddine, et al. 2010).

2.11.3. Management of AD According to the countries' local guidelines:

In a study was conducted to evaluated the association of AGE guideline adherence with outcomes and resource use at pediatric hospitals, it involved children aged 6 months to 6 years with an International Classification of Diseases, Ninth Edition (ICD-9) discharge code indicative of AGE and without illness in the emergency department, observation setting, or hospital. Laboratory studies, antiemetic use, and antibiotic use were evaluated, and the length of stay, mean adjusted total fees, and re-admission proportion were documented. Multiple analysis of variance determined if the variance of adjusted charges, length of stay, and diagnostic studies were hospital-related. A regression analysis identified the association between guideline compliance and outcomes. The result showed that there were a total of 188873 patients; 174594 (92.4%) were not admitted, and 14279 (7.6%) were admitted. There was significant disparity in resource use among hospitals. The mean adjusted total charge for all cases was $863 (SD: 1336). The mean adjusted total fees for non-admitted cases was $591 (SD: 636). Individual hospitals contributed to the variance of mean length of stay, total adjusted charges, and use of diagnostic studies after controlling for covariates ($P < .001$). Standard adherence was associated with a mean decrease in the average adjusted cost ($591) for non-admitted patients of $296 (95% confidence interval: −399 to −193). The researchers concluded that guideline-adherent hospitals demonstrated 50% lower charges for emergency department or observation patients with uncomplicated AGE without adversely affecting outcomes. Use of resources, not routinely suggested by the AGE guidelines, still common in pediatric hospitals (Tieder and et al. 2009).

Shaha (2012) conducted a study in India, to identify, synthesize and summarize current evidence to guide scaling up of management of diarrhea among under-five children in India, and identify existing knowledge gaps. The researchers developed a set of questions concerning the management (prevention, treatment, and control) of childhood diarrhea through a consultative process. Also, a modified systematic review process developed a priori was used (Shaha, 2012).

The study revealed that infants aged 6-24 months are at the highest risk of diarrhea. There is absence of a strong nation-wide data on etiology; rotavirus and diarrhogenic *E.coli* are the most common organisms identified. The current National Guidelines are sufficient for case-management of childhood diarrhea. Exclusive breastfeeding, hand washing and point-of-use water treatment are effective strategies for prevention of all-cause diarrhea; rotavirus vaccines are efficacious to avoid rotavirus causing diarrhea. Though ORS and zinc are the spine of management during an episode of DD, they have low coverage in India. whereas misuse of antibiotics and other drugs is common (Shaha, 2012).

Another study (cross-sectional survey) conducted to evaluate the management of AD among adults, and to assess adherence of clinical practice to national guidelines and 2012 World Gastroenterology Organization guidelines in China (Hou and et al. 2013).

Generally, 31.4% of patients self-cured before visiting the clinic, usually with antibiotics. Stool samples were examined for 70.6% of patients, vibrio cholera stool culture for 57.5%, but non-vibrio bacteria stool culture for only 11.4%. Administration of fluid and electrolyte therapy was for 61.6% of the patients; 28.2% ORS, and 33.4% IV, in spite of the real need was only 13.8%). The first most common drugs were the antibiotics (60.8%), where the most common were fluoroquinolones, followed by aminoglycosides. The irrational use for antibiotic was: unnecessary indications for 47.9% of the cases, and not recommended for

3.4%. antibiotics. The second most frequently prescribed drugs were dioctahedral smectite (59.3%). Less patients received ORS, but more received intravenous fluids, more patients were administered antibiotics, and more received IV antibiotics than Beijing in Shaanxi compared with Beijing respectively. The conclusions were that adherence to both national guidelines and 2012 World Gastroenterology Organization guidelines for the management of AD in adult was restricted among tertiary hospital physicians (Hou and et al. 2013).

Dr. Weru (2013) conducted a retrospective cross-sectional study to audit and determine the adequacy of care of children aged (2-59months) with acute watery diarrhea at Garissa Provincial Hospital in Kenya.

A total number of 376 medical records of children admitted at the Garissa Provincial Hospital were randomly selected and evaluated against the Ministry of Health Basic Pediatric 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. 60.3% of the children were male and 39.7% were female. The median age and duration of diarrhea at presentation was 10 months. 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 (Weru, 2013).

Most of the items 14/17(82.35%) needed to manage AD were reported to be mostly available by more than half of the health workers. It was concluded that 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 (Weru, 2013).

In France, Assathiany et al. (2013), assessed the application of guidelines (based on systematic use of an oral rehydration solution (ORS), early appropriate nutrition, and avoiding routine treatment with medication) by pediatricians in outpatient practice for mild to moderate AGE. The study was conducted through sending e-mail requests to 1187 pediatricians in private practice, requesting them to complete an anonymous questionnaire online at the website of the French Association of Pediatricians in Outpatient Practice.

A total of 641 (54%) responses were completed and analyzed. Nearly all the pediatricians recommended early nutrition after administration of ORS. Depending on the child's age, 16 to 23% reported they would recommend restarting feeding with lactose-free milk, and 80% would advise an antidiarrheal diet for children older than 6 months. The drugs prescribed most often were, in decreasing order, racecadotril (acetorphan), diosmectite, and probiotics. Although 90% of the pediatricians prescribed vaccination against rotavirus, 65% estimated that it was performed in more than half of all children. The study showed variable adherence to guidelines by pediatricians treating outpatients. Although ORS, maintenance of breastfeeding, and early nutrition after ORS are now widely applied, the type of nutrition suggested often failed to meet guidelines. Drug prescription is still too common (Assathiany and et al. 2013).

To assess adherence to the nationally advised zinc treatment regimen in Uttar Pradesh (India) among caregivers of zinc–prescribed children, Lamberti et al. (2015) crried out a study which revealed that caregivers gave zinc for an average of 10.7 days (standard deviation (SD) = 3.9 days; median = 13 days), and 47.8% lasted treatment for the complete 14 days. The correct dose was 30.8% for zinc syrups and 67.3% for tablets. Adherence to age appropriate dose and continuation of zinc for 14 days were greatly associated with having receiving proper instructions.

The results indicated moderate–to–good adherence to national zinc treatment guidelines for diarrhea among caregivers (Lamberti et al. 2015).

In a modern study conducted by Vecchio (2016), a systematic review of Clinical Practice Guidelines (CPGs) on AGE in order to compare recommendations and provide the basis for developing single universal guidelines.

The study revealed that the definition of AGE differs among the 15 CPGs identified. The signs commonly recommended to assess dehydration are skin turgor and sunken eyes, general appearance, capillary refill time and mucous membranes appearance. ORS is universally recognized as first-line treatment. The majority of CPGs recommend hypo-osmolar (Na45-60 mmol/L, 11/15, 66.6 %) or low-osmolality (Na75 mmol/L, 9/15, 60%) solutions. In children who fail ORT, most CPGs suggest IV and NGT rehydration is preferred according by 5/15 CPGs (33.3%). Changes in diet and withdrawal of food are discouraged by all CPGs and early re-feeding is strictly advised in 13/15 (86.7%). Zinc and ORS combined is recommended by 10/15 (66.6%) CPGs, most of them from low-income countries. Probiotics are considered by 9/15 (60%) CPGs, 5 from high-income countries. Antiemetics are not prescribed in 9/15 (60%) CPGs. Regular use of antibiotics is discouraged. The study concluded that the main managements for children AGE are similar in CPGs (Vecchio et al. 2016).

In another modern study conducted in Uttar Pradesh (India), an external evaluation of the program that included assessing the knowledge and practices of private sector providers 6 months after the initial program rollout which include introduction of zinc and ORS for diarrhea treatment in the public and private sectors (Walker and et al. 2016).

The researchers conducted interviews and direct observations among a randomly selected group of formal and informal private sector providers in 12 areas. In addition to calculation

of summary statistics of provider characteristics, diarrhea treatment knowledge and preferred treatments, and the treatments advised during consultation. The study showed that 67% of the 232 interviewed providers reported receiving a diarrhea treatment training/drug detailing visit, which revealed that 14% of providers reported prescribing zinc to all diarrhea cases, while 36% reported prescribing zinc to more than half of them. During direct observation, ORS and zinc were recommended by 77.3% and 29.9% of providers, respectively. Treatments other than zinc and ORS including antibiotics (61.9%) and antidiarrheals (17.5%) were also frequently prescribed (Walker and et al. 2016).

3. Methodology

This chapter focuses mainly on issues related to methodology used to achieve the research objectives. It includes study design, study setting, sample population, eligibility criteria, study period, the construction of the study tools, pilot study, validity and reliability, data collection, response rate, statistical analysis, ethical considerations, and finally the main limitations of the study.

3.1 Study Design

The design of this study is a cross-sectional, descriptive, and comparative one. This type of study was proposed because it is practical, quick, and economic; and study the phenomenon of concern as it naturally occurs in real settings (Turner and Baily- Beckett, 2010). According to the literature, it is the best design to assess the medical management practices of DD. Adopting this design, the study comprised two parts; The first part was interviewed questionnaires asking the physicians regarding their knowledge about the management of childhood AD at GC pediatric hospitals during the study period, whereas the second part was a hospital based retrospective review of records of cases aged less than five years admitted with AD.

3.2 Study Setting

The study was conducted at the two general pediatric hospitals in GC; Al-Nasser pediatric hospital and Al-Durra pediatric hospital which provide health care for the children with DD in the city.

3.3 Study Population

The sample population included all the physicians working at Al-Nasser pediatric hospital and Al-Durra pediatric hospital during the period of the study, and who satisfied the

inclusion criteria (102 physicians; 60 at Al-Nasser pediatric hospital and 42 at Al-Durra pediatric hospital). In addition, 1676 cases was the total number of eligible medical records of AD cases admitted to the two hospitals during the study period (which was the peak period of DD), then as it was calculated by Equation of Stephen Sampson (Annex 3), a sample of 301 medical records were reviewed for identifying the actual documented practice.

3.4 Eligibility Criteria

3.4.1. Inclusion Criteria:

- Physicians who:
  - ✓ agreed to participate in the study.
  - ✓ were practicing pediatric medicine.
  - ✓ were involved in the day-to-day management of pediatric illnesses in GC during the study period.
  - ✓ had at least one year experience in working in pediatric field.
  - ✓ were working at Al-Nasser pediatric hospital or at Al-Durra pediatric hospital during the study period.

- Medical records:
  - ✓ for AD cases aged less than 5 years.
  - ✓ for cases admitted during the study period (1st May to 30th August of 2016).
  - ✓ for cases admitted to one the two GC pediatric hospitals (Al-Nasser pediatric hospital or at Al-Durra pediatric hospital).
  - ✓ for cases with no specialized co-morbidities (eg: cardiology, urology, oncology,….etc).

3.4.2 Exclusion Criteria:

- Physicians who:
  - ✓ had less than one year experience in the working in pediatric field.
  - ✓ were not practicing pediatric medicine.
  - ✓ were not involved in the day-to-day management of pediatric illnesses.
  - ✓ were not working at Al-Nasser pediatric hospital or at Al-Durra pediatric hospital during the study period.

- Medical records:
  - ✓ for cases without AD.
  - ✓ for cases weren't admitted during the study period (1st May to 31st August of 2016).
  - ✓ for cases aged more than 5 years.
  - ✓ for cases with specialized co-morbidities (eg: cardiology, urology, oncology, .etc).

3.5 Study Period

The study was carried out between May and August of the year 2016 (during the peak of DD season as MOH reported in the Annual Epidemiological Report- Gaza Strip, 2014).

3.6 Study Instruments

Two types of instruments were used in this study. The first was interviewed questionnaire (annex 4), while the second type was retrieval sheet (annex 5).

3.6.1. Interviewed Questionnaire:

An interviewed questionnaire was designed and used to be answered by all eligible physicians working in the two GC general pediatric hospitals(Al-Nasser pediatric hospital

and Al-Durra pediatric hospital) to identify their knowledge about the management of AD according to the WHO guidelines. It included the participants' socio-demographic data, any trainings on the DD management guidelines, case management, availability of commodities necessary for the management of children with AD, and challenges impeding application of DD guidelines.

3.6.2. Retrieval Sheet:

The researcher designed a retrieval sheet form to review the medical management of AD. The retrieval form included: patient's demographic data, history taking, assessment of dehydration, classification of dehydration, and case management.

The audit criteria were adopted from the criteria developed from the forth revision of the WHO manual for treatment of diarrhea (the manual for physicians and other senior health workers, Geneva)(annex 8).

3.7 Pilot Study

A pilot study was performed on a sample of 30 physicians in addition to 30 of pediatric case files to test validity, reliability, applicability and clarity of the questionnaire as well as the retrieval sheet. At the end of this process, the modifications on the interviewed questionnaire were: change in question number 16, and transform the questions 13-21 to multiple choices form, while addition of the question number 25 is the modification conducted on the retrieval sheet.

Because these changes were very small and not significant, the researcher had included the pilot study data in the total data.

3.8 Validity and Reliability

3.8.1. Validity:

According to the previous literature, data collection using questionnaire in addition to the retrieval sheet were the most appropriate method to assess the medical management of AD. Also, As mentioned above, the pilot samples (for the two tools) were conducted before the actual data collection to examine the applicability of the study tools. Furthermore, once the study tools' design was completed, validity as well as reliability were examined using SPSS program (see annexes 6 and 7).

3.8.1.1. Face validity:

In order to increase face validity and to insure that each tool appears (at face value) to measure what it claims to, tools' papers were numbered, written using a clear font, and organized in categories with logical sequences.

3.8.1.2. Content validity:

Content validity were evaluated by 10 experts and academicians in pediatrics to assess the relevancy, and then so the comments were taken in consideration using the content validity index (CVI).

3.8.2. Reliability:

So as to assure the reliability of the study tools, the researcher conducted data collection by himself, through which standardization of methods and instruments were kept on. Data entry in the same day of data collection allowed possible interventions to check the data quality or to re-fill the questionnaire when required. And re-entry of 5% of the data after finishing data entry assured correct entry procedure and decreased entry errors. The collected questionnaires and the retrieval sheets were regularly revised and entered in the

pre-designed database of the SPSS program. The researcher used Cronbach's alpha method and Split-Half Coefficient for measuring the stability of the questionnaire as well as the retrieval sheet and the results were accepted (Annex 7)

3.9 Data Collection

Before starting data collection, each questionnaire and retrieval form was prepared, organized, structured, and numbered with serial to be completed without error. From May to August, the researcher himself used the interviewed questionnaires to be completed by the selected sample of physicians. Also the total number of the sample size of the retrieval forms was divided equally with each one of the four study months for each hospital, so that actual documented practices were reviewed after selection the required number of medical records randomly.

3.10 Response rate

A number of 102 physicians in the GC pediatric hospitals met the eligibility criteria, while the number of the interviewed questionnaire's respondents was 95 physicians with response rate more than 93% distributed as 57/60 (95%) and 38/42 (90.47%) at Al-Nasser pediatric hospital and Al-Durra pediatric hospital, respectively.

3.11 Statistical Analysis

To achieve the goal of the study, the researcher used Statistical Package for Social Science (SPSS 20) program for data entry and analysis. Frequency tables were used to show physician's characteristics, to compare between physicians' knowledge and WHO AD treatment guidelines, to compare between physicians' documented practice and WHO AD treatment guidelines, and finally to present physicians' view on availability of commodities necessary for guidelines application. Moreover, the statistical tests; Chi square test, was

used to compare between the perception (knowledge) and the physicians' actual practice of the management of childhood AD in GC pediatric hospitals and to determine any association.

3.13 Ethical Considerations

- ✓ An official letter of approval to conduct the study from Helsinki committee (annex 2).
- ✓ Another administrative approval was obtained from the Human resources development directorate general in the MOH to facilitate study conducting.
- ✓ To guarantee participants rights, a verbal consent to participate in the study was obtained from each participant after explanation of the study and the 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.
- ✓ Confidentiality was maintained. Medical records that were eligible for the study were given a unique study identification to ensure that the patients names or file numbers were not utilized during analysis. Personal details such as name of the study participant were not recorded.

3.13 Study limitation:

The main limitations of the study were:

- Recurrent shortage of electricity.
- Difficult access to update books and journals.
- Lack of resources, especially time and budget.
- A main part of the study (retrieving records) relied on documentation while medical records had bad handwriting, incomplete data, and data fragmentation.

4. Findings and Discussion

This chapter represents the main findings of the study, including result of data derived from questionnaires which are: characteristics of study population, training, knowledge and availability of DD treatment guidelines, physicians' knowledge about AD according to WHO guidelines, physicians' AD case management according to WHO guidelines, challenges impeding application of WHO guidelines, and physicians' view on commodities availability. In addition, the results derived from retrieval sheets which are: demographic characteristics of cases admitted to GC pediatric hospitals, history of cases admitted to GC pediatric hospitals, general examination (as documented) of cases admitted to GC pediatric hospitals, classification of dehydration, physicians' actual documented AD management. Lastly, interviews' answers V/S records' documented practices were identified included comparison between physicians' knowledge and actual practices.

4.1 Results of data derived from the interviewed questionnaires

4.1.1. Characteristics of study population:

The characteristics of study population have been summarized in table (4.1). All of them were involved in the day-to-day management of pediatric illnesses, were working in the GC general pediatric hospitals, and satisfied inclusion criteria as mentioned in the previous chapter.

The researcher clarified their gender, age group, marital status, place of work, their highest grade awarded, and their years of experience.

Table 4.1: Characteristics of study population.

Variable		Frequency	Percentage
Gender	Male	76	80%
	Female	19	20%
Age group	25- 36 years	32	33.7%
	37- 45 years	31	32.6%
	46- 60 years	32	33.7%
Marital status	Single	11	11.5%
	Married	83	87.4%
	Divorced	1	1.1%
Place of work	AL-Nasser Pediatric hosp.	57	60%
	Al-Durra Pediatric hosp.	38	40%
Highest grade awarded	Bachelor degree	49	51.6%
	Master degree	16	16.8%
	Board	28	29.5%
	Doctoral degree (PhD)	2	2.1%
Years of experience	1-5 years	26	27.4%
	6-15 years	32	33.7%
	16-36 years	37	38.9%

4.1.1.1. Distribution of study population by gender:

As shown in table (4.1), most of the study population 76 (80%) were male, where female physicians represent one-fifth (19 physicians)of the study population. That was congruent with situation in Palestine, where male participation rate in labor force was 71.5%, compared to 19.4% in the Palestinian female (PCBS, 2014).

4.1.1.2. Distribution of study population according to age group:

The ages of the sample population ranged from 25 to 60 years. This distribution has divided the study population into three approximately equal in percent groups. The first third of subjects was the physicians with younger age 25- 36 years. This group with young

age are supposed to have fresh updated knowledge, with fresh information that they accept during graduation years, but they are supposed to have less time to be received training about DD management. The second third was the age group between 37- 45 years. they also have the abilities to guide the changes needed to improve performance, while the last third was the age group between 46- 60 years, this group consists of well trained, and experience personnel. Most of them could be in managerial positions and have the abilities of audit and evaluation. The mean age of the study population was 41.78 ± SD 9.78 years.

4.1.1.3. Distribution of study population according to marital status:

It is shown in table (4.1), the majority of the study population were married (87.4%), and the others 11.6% were single, beside only one male physician was divorced in the sample (1.1%). The differences are mostly related to the state of employment.

4.1.1.4. Distribution of study population according to workplace:

As mentioned in chapter 2, the study population was selected from the GC two general pediatric hospitals. The selected sample of physicians working at AL-Nasser Pediatric hospital constituted 60% (57 physicians) of the total sample size, while the remain 40% (38 physicians) was the percentage constituted the sample selected from Al-Durra Pediatric hospital. These percentages were predicted, where the first hospital is the largest and the main pediatric hospital in GC, and involved the largest number of recruited pediatricians.

4.1.1.5. Distribution of study population according to the highest degree awarded:

The study population educational level appears as follows: about half of physicians (51.6%) had bachelor degree in medicine, 16.8% had master degree, 29.5% had the Palestinian board , and 2.1% of them had doctoral degree (PhD)(table 4.1).

4.1.1.6. Distribution of study population according to experience:

Years of experience ranged from 1 to 36 years, considering the use of the nearest integer, with the mean of 13.44 ± SD 9.352 years. They are arranged into three groups similar to previous studies, that consider the employee with experience of 5 years or less is a new employee. The employees with experience between 6 to 15 years are the trained personnel, while other physicians with experience more than 15 years are personnel with very good experience, those can be trainers or role model for others.

As table (4.1) illustrates, 27.4% of the study population had up to 5 years of experience, 33.7% between 6-15 years, and 38.9% had more than 15 years of experience, which represents that more than 61% of study population had less than15 years of experience; in other words, the majority of study participants had good opportunity for improvement, training and development.

4.1.2. Training and availability of DD treatment guidelines:

4.1.2.1. Receiving of DD management training courses:

Only about one-fifth (22.1%)of the physicians informed that they received training courses regarded management of DD; most of them (16.8% `of the total) received only one training course (Figure 4.1).

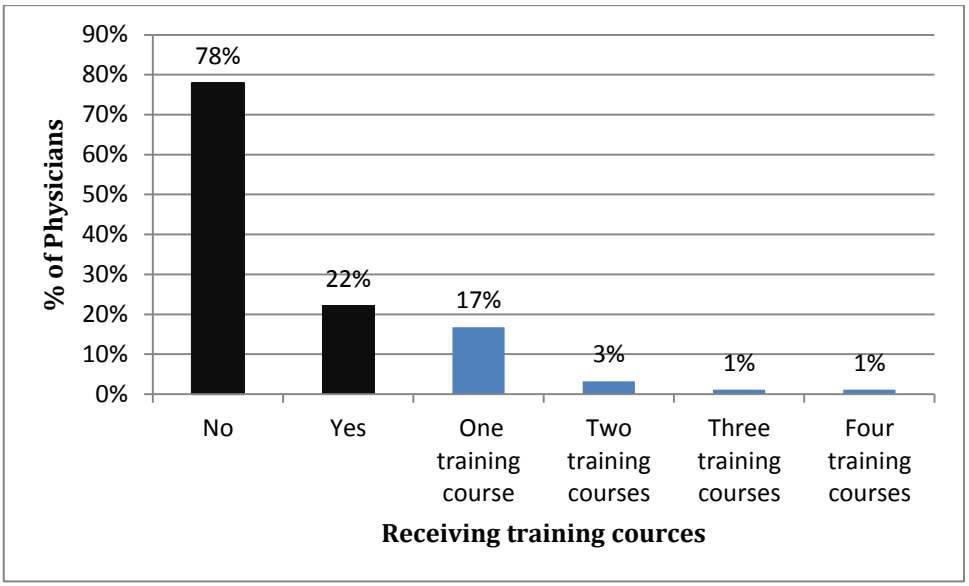

Figure 4.1: Receiving of DD management training courses.

The researcher comments that most of physicians in GC hospitals didn't receive any related training courses, which may owed to multiple causes including high number of new employees who had short employment period to be have training courses, Furthermore the political situation of GS which always distract the MOH to focus on other training fields such crises and emergences.

This result was less than what was revealed in a study conducted in South Sudan, where 33.3% of medical staff (in Juba Teaching Hospital) had training in the DD guidelines (Stephen, 2015), and much less than findings in a study done in Kenya, where the researcher found that the percentage of health workers (Garissa Provincial Hospital) who had been trained in assessment and treatment of DD were 41.18% (Weru ,2013). Accordingly, these differences may illustrate in advanced the variances in percentages of knowledge and practices regarding AD guidelines among the different related studies.

4.1.2.2. Availability and places of availability of DD treatment guidelines:

Figure (4.2) represented that the percentage of availability of DD treatment guidelines was 40% (38/95). In addition the places of availability of these guidelines were varied, where the percentage 40% was distributed as: 8.4% in their offices, 7.4% in the management office, while the majority of the guidelines were available in the wards (24.2%). All of the 38 physicians, who ascertained the presence of DD treatment guideline, considered Nelson textbook (not guidelines) as the only available guideline. This represents that there were no guidelines regarding DD management in GC accessed or recognized by all of the physicians.

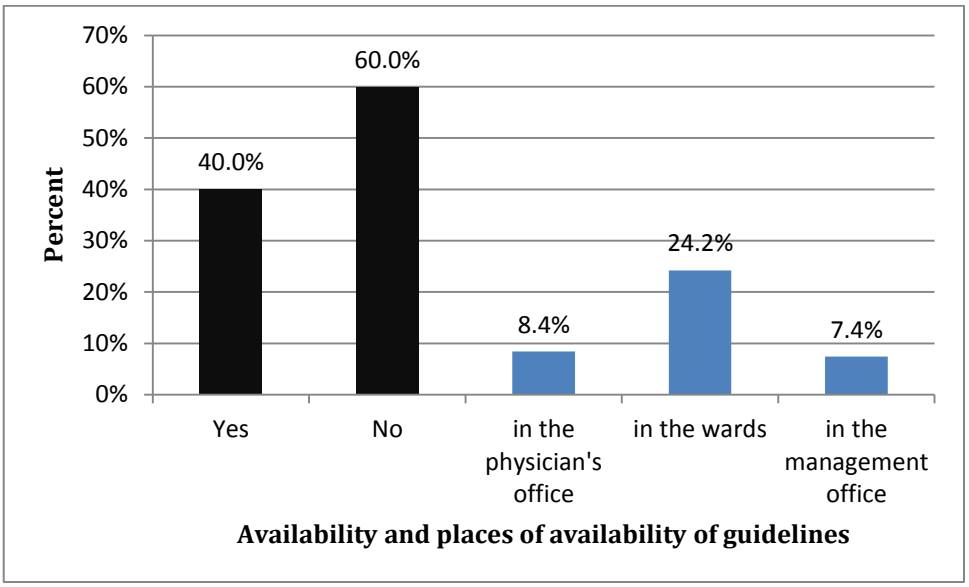

Figure 4.2: Availability and places of availability of DD treatment guidelines.

4.1.3. Physicians' knowledge about AD according to WHO guidelines:

The following table (table 4.2) illustrated Physicians' knowledge about AD according to WHO guidelines. It includes**:** their knowledge about WHO guidelines, definition of AD, knowledge about danger signs of AD, knowledge about the main signs of dehydration, and how they classified dehydration according to WHO guidelines.

The results were as followings: More than 66% of the respondents informed that they didn't know the WHO manual for DD treatment. Only 32.6% of them defined AD correctly as the WHO definition, while 7.4% couldn't defined. Only 3.2% of then could identify the main fourth danger signs of AD which are: changing in conscious level/ irritability, vomiting everything, inability to drink or breastfeed, and convulsions, while the highest share (34.7%) was for mention 2 sings. The percentage 58.9% was the highest for mention two signs of the three main signs of dehydration indicated by the WHO, which are: sunken eyes, irritability, and skin pinch, while inability to mention any one of the signs was the least one (3.2%). It is worth mentioning that most of the physicians (91/95) classified dehydration incompatibly with WHO classification. This represents lack of knowledge regarding WHO DD management guidelines.

Table 4.2: Physicians' knowledge about AD according to WHO guidelines.

Variable		Frequency	Percentage
Knowledge about the WHO manual for DD treatment	Yes	32	33.7%
	No	63	66.3%
	Total	95	100%
Definition of AD according to WHO guidelines	Can't define	7	7.4%
	Compatible definition	31	32.6%
	Incompatible definition	57	60%
Knowledge about danger signs of AD according to WHO guidelines	0/4 correct signs	26	27.4%
	1/4 correct signs	26	27.4%
	2/4 correct signs	33	34.7%
	3/4 correct signs	7	7.4%
	4/4 correct signs	3	3.2%
Knowledge about the main signs of dehydration according to WHO guidelines	0/3 correct signs	3	3.2%
	1/3 correct signs	24	25.3%
	2/3 correct signs	56	58.9%
	3/3 correct signs	12	12.6%
classifying a child with dehydration according to WHO guidelines	Compatible classification	4	4.2%
	Incompatible classification	91	95.8%

It is noted that the percentage of physicians who could define AD compatibly with the guidelines is nearly close to the percentage of those who reported that they know about the WHO manual for DD treatment. This is logical and predicted, and this means that more training on the guidelines, will result in more knowledge and more correct answers.

The percentage of those mentioned most of danger signs of AD (3 and 4 correct signs) is a low one (10.6%), on other hand, those who could mentioned most of dehydration signs (2 and 3 correct signs) is a high percentage (71.1%); this represents that there was mixing in the answering of the two questions and this what was observed by the researcher during data collection, and thus, most the participant (95.8%)classified dehydration incorrectly.

These findings were poorer what was found in Georgia, where the majority of interviewees (65%) defined diarrhea correctly, and 74% of them correctly named the main signs of dehydration (Kherkheulidze et al., 2011).

In the current study, the ability to drink/breast feed was the least known of the danger signs (15.5%), this was similar to the findings in the Juba Teaching hospital study (15.38 %)(Stephen, 2015). These findings were different in the most known danger sign, where it was the level of consciousness (40.5%) in GC study, while it was vomiting everything (46.15%) in South Sudan (Stephen, 2015). Furthermore, the knowledge about dehydration signs in South Sudan was high; sunken eyes (94.87%) and skin pinch (89.74%) (Stephen, 2015). These were better when compared with the findings of our study which found that only half of the physicians identified sunken eyes (50%), skin pinch (36.6%) and irritability (13.3%). This may be due that more of the practitioners working in Juba Teaching Hospital had had DD management training than had those in GC.

For the knowledge regarding classifying of dehydration according the WHO, the findings in South Sudan study at Juba Teaching Hospital (Stephen , 2015) were significantly much better our findings in Gaza pediatrics hospitals' study, where 48.71% of the medical staff classified AD cases using terms consistent with the guideline. This poorer knowledge in Gaza study is distractor and reflects how much we needs to training on DD management guidelines.

4.1.4. Physicians' knowledge about AD management according to WHO guidelines:

4.1.4.1. Physicians' knowledge about fluid indications according to WHO guidelines:

Table 4.3: Physicians' knowledge about fluid indications according to WHO guidelines

Variable		Frequency	Percentage
Degrees of dehydration that are indication for ORS	No dehydration	1	1.1%
	Some dehydration	38	40%
	Severe dehydration	2	2.1%
	No dehydration + Some dehydration	29	30.5%
	Some dehydration + Severe dehydration	3	3.2%
	All degrees of dehydration	22	23.2%
	Total	95	100%
Degrees of dehydration that are indication for IV fluids	Some dehydration	1	1.1%
	Severe dehydration	81	85.3%
	All degrees of dehydration	13	13.7%
	Total	95	100%

The WHO recommended ORS (low osmolarity) for all AD cases, while recommended Intravenous Fluids (IVF) for severely dehydrated cases. The assessment indicated that 85% of the physicians know that IVF are indicated only for severely dehydrated cases. Strikingly, though ORS is the spine of management during an episode of DD, only 23.2% of the physicians know that ORS recommended for all AD cases. These findings reflects how much GC pediatricians need training regarding the guidelines.

This was agreed with result found by Shaha's study in India (2012) where knowledge regarding ORS was very low. In other studies concerning knowledge regarding

rehydration, Alameddine et al. (2010) in Lebanon, found that oral rehydration solutions (ORS) were known to be prescribed by 49% of pediatricians. While the percentages were very high and semi-identical in Georgia and in Bahrain where they were 89.3% (Kherkheulidze and et al. 2011) and 90% (Ismaeel and et al. 2007), respectively .

4.1.4.2. Physicians' knowledge about type of fluid used to treat severe dehydration in the 1st hour:

The researcher asked the participants about the type of fluid used in the management of severe dehydration according WHO guidelines in the 1st hour, the answers included: Ringer lactate (2.1%), Normal Saline (46.3%), and the correct answer which included both fluids was answered by 51.6% of the respondents.

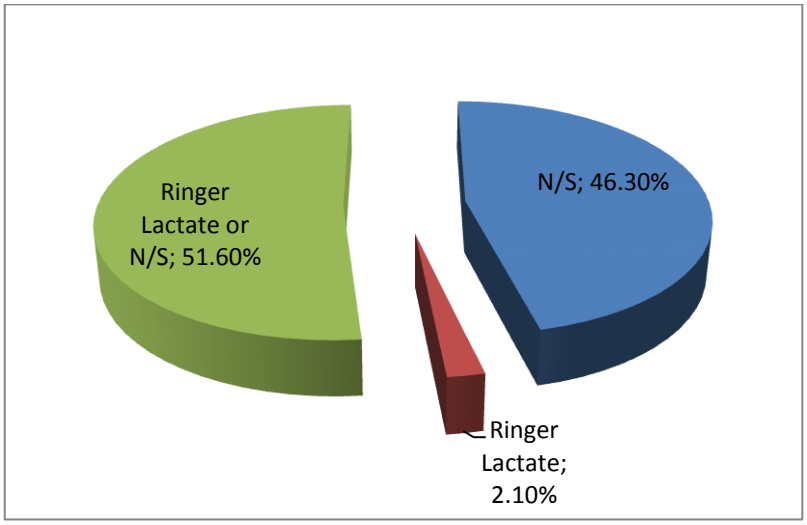

Figure 4.3: Physicians' knowledge about type of fluid used to treat severe dehydration in the 1st hour

It is noted that the percentage distributed on a three answer, and there was no focus on a specified answer; this was due that the three answers were alternatives.

In a study conducted in Georgia , 78% of medical staff recommended either Ringer lactate solution or Normal saline, but 22% of them still choose 5-10% Dextrose solution (Kherkheulidze et al., 2011).

4.1.4.3. Physicians' knowledge about drugs use according to WHO guidelines:

While zinc sulphate is the only drug recommended for all cases of AD (from the drugs listed in the following figure), the percentages of physicians informed that they used to recommend drugs during management of AD cases were: using zinc sulphate 86.3%, using antimicrobials 18.9% (Ampicillin 7.4%, sulphamthoxazole 6.3%, metronidazole 3.2%,and ceftriaxone 2.1%), using antiemetic 24.2% (metchloropramide 21.1%,and Cortigen B6 3.1%), and using antidiarrheal 4.2%; all of these antidiarrheal was furamix syrup. These wrong ideas regarding drugs use should be corrected and modified, and thus, guidelines will be more committed with.

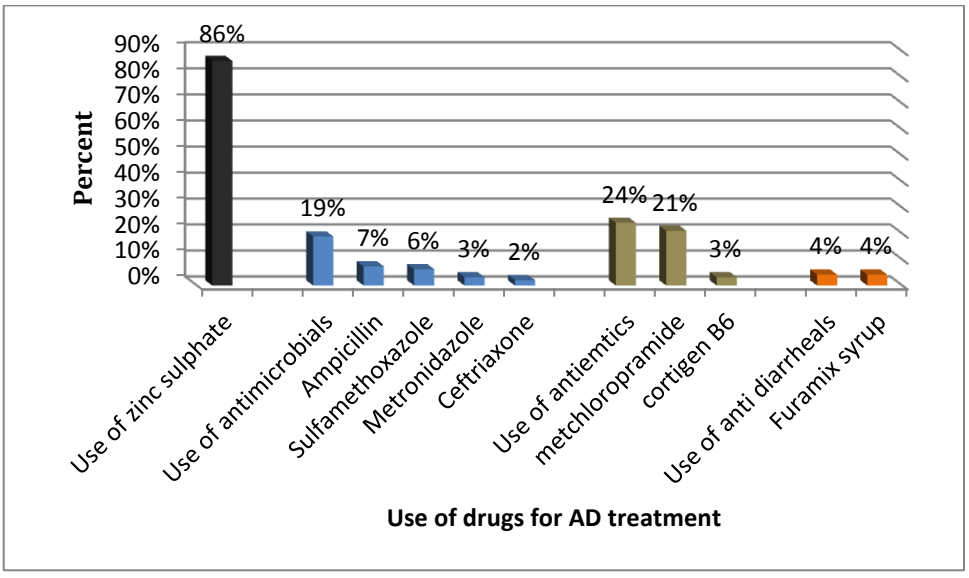

Figure 4.4: Physicians' knowledge about drugs use according to WHO guidelines.

In the context of compliance of physicians with the Palestinian Essential Drug List (EDL), Fattouh (2005) assessed the knowledge, and prescribing practices of GS physicians in PHC. The study showed that only 2.8% of the physicians were involved in the preparation of EDL, 34.4% attended training course on EDL, and 51.2% of them faced many problems in using the EDL. More importantly, the average number of drugs prescribed per each prescription was 1.92; the percentage of the drug prescribed from the EDL was 97.85%, the percentage of drugs prescribed by the generic name was 5.47% (Fattouh, 2005).

Many researchers tried to identify medical staffs' knowledge regarding use of drugs in management of AD. Some of countries complied with guidelines, where the other didn't. For the knowledge regarding use of zinc, in Lebanon, zinc supplements were prescribed by 16.8% of pediatricians.(Alameddine et al., 2010), while the majority of medical staff didn't use zinc in Georgia (Kherkheulidze et al., 2011).

In regard to antibiotic prescription, ElKhoudary (2002) found that the was an overuse and misuse of antibiotics in the GS PHC centers, where 77.8% of children with acute respiratory tract infection were prescribed antibiotics; 77.7% of these antibiotics were unnecessary (ElKhoudary, 2002). In India, Shaha (2012) found that misuse of antibiotics is a common perception. Vecchio in Italy, found that the use of antibiotics was 9.2% (Vecchio et al., 2014), and in Georgia, the use of antimicrobial drugs were 45% (Kherkheulidze et al.,2011). More than 26% of pediatricians in Lebanon preferred to treat acute gastroenteritis with antimicrobial agents, and the rate of antibiotic use was higher in pediatricians working in rural areas or in an ambulatory setting(45.2% versus 40% respectively) (Alameddine et al., 2010). In Bahrain, the knowledge regarding antimicrobial was the best, where antimicrobials were prescribed to 2% of the patients, (Amoxicillin 1%, 0.3% cephalexim, and 0.7% Metronidazole) (Ismaeel et al 2007).

For using of antiemetic, 77% of pediatricians in Lebanon prescribed antiemetic agents (Alameddine et al., 2010). 12% in Bahrain (Ismaeel et al 2007), 35% in Georgia of physicians prescribe antiemetic (Kherkheulidze et a., 2011).

Lastly, For antidiarrheal, antidiarrheal drugs in Italy 0.6% (Vecchio et al., 2014), while in Georgia 27% of physicians prescribed antidiarrheal (Kherkheulidze et a., 2011).

4.1.4.4. Physicians' knowledge about feeding and serum electrolytes for AD cases according to WHO guidelines:

Most of physicians (93/95, 97.9%) in GC complied with the WHO guidelines in supporting continuous feeding (as it is appropriate for child's age) during management of AD cases, while their knowledge interfered with the guidelines in the unhelpful routine of measuring serum electrolytes for the same type of cases, where 88.4% of them used to do it. This wrong idea distracts the focus of the physician to correct them, while using of ORS alone sponsor to correct them.

In a study, Assathiany et al. (2013), found that nearly all the pediatricians in France recommended early nutrition after administration of ORS. While another study revealed that most respondents in Georgia, advised continuation of breastfeeding (Kherkheulidze et al., 2011). In Italy, Vecchio et al (2014), diet changes were recommended by 27.6% of physicians. In Lebanon, 96% of pediatricians resumed early feeding as recommended by the guidelines, and serum electrolytes were requested by 24.6% of pediatricians (Alameddine et al., 2010).

4.1.5. Challenges facing application of DD guidelines:

The most difficult problems that face GC pediatrics physicians in application of WHO guidelines for the management of DD are summarized in figure (4.5). Workload and unavailability of guidelines represented the highest rank; 48.5% and 28.9% respectively. The lowest rank (2.8%) was shared by other obstacles included child refusing of ORS and lack of health education among patient's family.

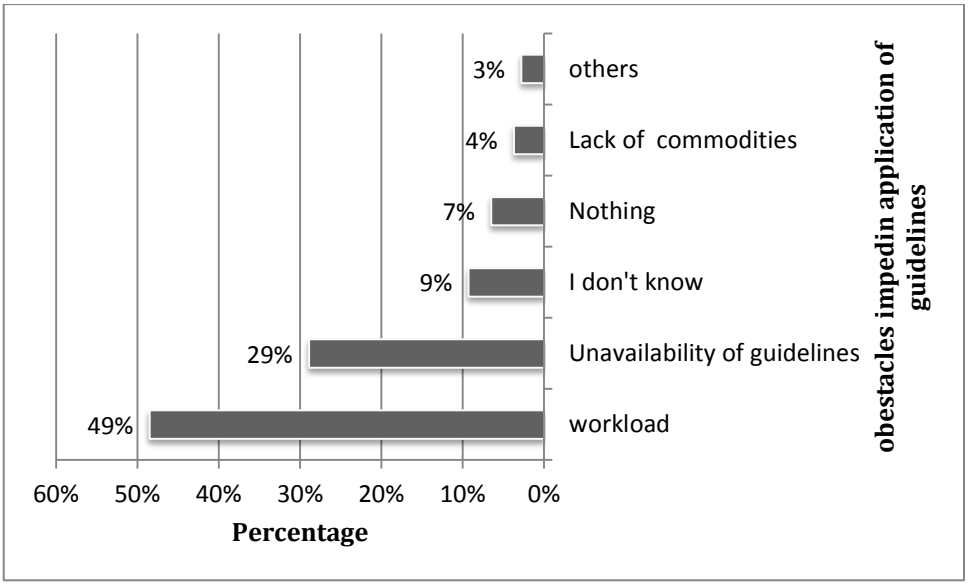

Figure 4.5: Challenges impeding application of guidelines

As 7% of the physicians reported that there was nothing impede application of the guidelines, and 9% didn't know what were the obstacles; this means that audit and administrative enforcement or instruction may play an vital role in improving of the percentage of application of the guidelines. Moreover, 29% of them justified low application of the guidelines as there was no available guidelines, so provide a copy of the guidelines will also be more helpful. According to his experience, the researcher support those who reported workload as the main obstacles. This was obvious especially after the closure of Kamal Odwan hospital in the North of Gaza, where the average daily number of

cases sought in the pediatric emergency room (in each GC hospital in the year 2016) was 224 cases, while the average daily admission was 21 cases, with 4.2 days average length of stay. The solution related this need to be considered from the high administration.

4.1.6. Physicians' view on commodities availability:

Table 4.4: Physicians' view on commodities availability

Commodity	Availability				Rank
	(4)	(3)	(2)	(1)	
	Never available	Rarely available	Mostly available	Always available	
Intravenous fluid giving sets	0	1(1.1%)	0	94(98.9%)	1
Syringes	1(1.1%)	0	1(1.1%)	93(97.8%)	2
Intravenous cannulas	1(1.1%)	2(2.1%)	8(8.4%)	84(88.4%)	3
Normal Saline 0.9%	0	1(1.1%)	14(14.7%)	80(84.2%)	4
Oral Rehydration Salts (low osmolarity)	1(1.1%)	1(1.1%)	12(12.6%)	81(85.3%)	5
Ringers lactate solution	0	2(2.1%)	17(17.9%)	76(80%)	6
Burette	0	6(6.3%)	18(18.9%)	71(74.7%)	7
Nasogastric tubes	0	2(2.1%)	29(30.5%)	64(67.4)	8
Zinc Sulphate	16(16.8%)	32(33.7%)	15(15.8)	32(33.7%)	9
Intravenous fluid charts	29()30.5%	28(29.5%)	22(23.2%)	16(16.8%)	10
Guidelines on management of diarrhea /dehydration(Wall charts, booklets)	34(35.8%)	23(24.2%)	24(25.3%)	14(14.7%)	11

The table (4.4) describes the view of physicians on availability of commodities necessary for DD management which are: intravenous fluid giving sets, syringes, intravenous cannulas, normal saline 0.9%, ORS (low osmolarity), ringers lactate solution, burette, nasogastric tubes, zinc sulphate, intravenous fluid charts, guidelines on management of diarrhea /dehydration. As it is shown, they are organized in descending order according to their availability. The intravenous fluid giving sets were the most available commodities as per the views of the physicians, where their percentage were 98.9%. The least available commodities were guidelines on management of diarrhea /dehydration with 14.7% always

availability percentage. Moreover, the last three commodities (zinc sulphate, intravenous fluid charts, and guidelines on management of diarrhea /dehydration) had the highest sporadic rates in the four rating scale.

Accordingly, nearly all of the commodities need for application of the guidelines were available in GC pediatric hospital, this refutes what was justified that lack of the commodity represents an obstacle for application of the guidelines.

This was different from what was lacking in two researches conducted in Kenya (2013), the first revealed that the availability of zinc is limited primarily to public–sector providers (Simpson, 2013). while in the other, the only commodities lacking were syringes and fluid charts (Weru, 2013). A third study was conducted in South Sudan, where which ORS was the most available commodity (87.1%), while the least available commodities agreed with Weru's study, in lacking of syringes and fluid charts(Stephen, 2015).

4.2 Results of data derived from the retrieval sheets

4.2.1. Demographic characteristics of cases admitted to GC pediatric hospitals:

Table 4.5: Demographic characteristics of cases admitted to GC pediatric hospitals.

Variable		Frequency	Percentage
Hospital	AL-Nasser Pediatric hosp.	153	50.8%
	Al-Durra Pediatric hosp.	148	49.2%
Weight Groups	2.5-5 Kg	40	13.3%
	5.1.-10 Kg	198	65.8%
	10.1- 15 Kg	59	19.6%
	15.1- 19 Kg	4	1.3%
Age Groups	Less than 6 months	112	37.2%
	6 to less than 12 months	106	35.2%
	12 to Less than 18 months	31	10.3%
	18 to Less than 24 months	21	7.0%
	24 to Less than 30 months	10	3.3%
	30 months or more	21	7.0%
Address	North of Gaza	111	36.9%
	Gaza	190	63.1%
Sex	male	180	59.8%
	female	121	40.2%

To identify the GC pediatricians' actual practices, the researcher reviewed 153 AD cases' records from AL-Nasser Pediatric hospital, and 148 from Al-Durra Pediatric hospital to constitute the required calculated sample. The cases' weights were classified into four groups: 2.5-5 Kg(13.3%), 5.1.-10 Kg(65.8%), 10.1- 15 Kg(19.6%), and 15.1- 19 Kg(1.3%). The mean age of the cases was 8.26 ± SD 2.77 years. Also ages were classified to groups (less than 6 months until less than 30 months) with mean of weights 11.66 ± SD

10.57 years. It is obvious that as age increased, the percentage of the disease decreased; The highest share of the study sample cases were males (59.8%) and lived in GC (62.8%).

In our study, The characteristics of AD cases were similar to those in Weru's study (2013), Stephen's study (2015), and Esayas's study (2014) which also noted that the majority of children admitted with AD were male and aged less than 24 months in Garissa Provincial Hospital in Kenya, Juba teaching hospital in Sudan, and Dil Chora Referral Hospital in Ethiopia, respectively.

4.2.2. History of cases admitted to GC pediatric hospitals:

Table 4.6: History of cases admitted to GC pediatric hospitals

Variable		Frequency	Percentage
Presence of diarrhea		301	100%
Diarrhea frequency	1-3 times	200	66.4%
	more than 3 times	47	15.6%
	No information	54	17.9%
Bloody diarrhea	No	108	35.9%
	No information	193	64.1%
Presence of vomiting	Yes	269	89.4%
	No	28	9.3%
	No information	4	1.3%
Vomiting frequency	1-3 times of vomiting	191	63.5%
	more than 3 times of vomiting	33	11%
	No information	77	25.6%
Vomiting everything	Yes	77	25.6%
	No	42	14.0%
	No information	182	60.5%
Convulsion	Yes	7	2.3%
	No	71	23.6%
	No information	223	74.1%

The researcher retrieved the history of the AD cases which contributed in describing to which extent the physicians recognized the danger signs of dehydration. In the previous table (table 4.6) history taken was illustrated as followings:

For diarrhea frequency, 200 out of the 301 AD cases (66.4%) had a history of 1 to 3 times of diarrhea, (15.6% (47 cases) had more than 3 times, while the other were with no information.

For presence of bloody diarrhea, 35.9% (108 cases) had no bloody diarrhea, while the rest were with no information.

For presence of vomiting, most of the cases (89.5%) were with history of vomiting classified to two groups; cases with 1-3 times of vomiting (63.5%),and more than 3 times of vomiting (11%), while more than quarter of cases were with no information. Also, they were classified according to vomiting everything into: cases vomiting everything(25.6%) and cases didn't (14%), and the majority were with no information.

The last sign illustrated was convulsion, where only 2.3% of the cases (7 cases) were with history of convulsion, 23.6% (71 cases) were without, and 74.1% were with no information. The high percentage of cases with no information mentioned was a serious defect which represents to poor documentation and lack appreciation of the importance of identifying the danger signs of dehydration.

4.2.3. General examination of cases admitted to GC pediatric hospitals:

Table 4.7: General examination of cases admitted to GC pediatric hospitals

Variable		Frequency	Percent
Presence of sunken eyes	No information	95	31.6%
	No	40	13.3%
	Yes	166	55.1%
	Total	301	100.0%
Skin Pinch documented	No	249	82.7%
	Yes	52	17.3%
	Total	301	100.0%
Duration of skin pinch	Immediate/(1-2 Sec)	15	5.0%
	Slow/Prolonged/ >2sec	18	6.0%
Level of consciousness	No information	132	43.9%
	Altered consciousness	53	17.6%
	Alert	116	38.5%
	Total	301	100.0%
Ability to drink/ breastfeed	No information	225	74.8%
	No	33	11.0%
	Yes	43	14.3%
	Total	301	100.0%

General examinations of AD cases admitted to GC pediatric hospitals were retrieved. The retrieve focused on presence of sunken eyes, skin pinch, level of consciousness, and ability to drink/ breastfeed. These examinations have an important role in describing physicians' recognition regarding assessment of dehydration. In the previous table (table 4.7) General examinations were illustrated as followings:

For sunken eyes, 166 out of the 301 AD cases (55.1%) had a sunken eyes, while other 95(31.6%) were with no information. Only 17.3% (52 files) were documented for skin pinch; 5% (15 cases) documented as Immediate/(1-2 Sec), 6% (18 cases) were Slow/Prolonged/ >2sec, while the rest were with no information.

For the Level of consciousness, 46.1% of the cases were documented for consciousness level; 17.6% of cases were altered consciousness and 38.5% were alert, while 43.9% of cases were with no information. Lastly, Ability to drink/breastfeed was only documented for the quarter of the cases (25.3%); classified as 14.3% able to drink/breastfeed and 11% didn't able to do. The highest percentage of cases (74.8%) were with no mentioned information regarding level of consciousness.

A high percentage of medical files with no information mentioned regarding most of the previous signs (signs of dehydration) represents poor documentation and lack of awareness regarding the importance of identifying the dehydration signs; the thing that require raise of awareness as well as regular audit and feedback.

The previous table (table 4.7) revealed that the common sign assessed was (56.1%) patients for level of consciousness and the least assessed sign was skin pinch at (17.3%),while Dr. Stephon study in South Sudan (2015) found that the common sign assessed was for sunken eyes (75.12%) and the least assessed sign was ability to drink/breast feed at (34.32%). On the hand, Weru's study in Kenya (2013) was congruent with ours in the most assessed sign which was the level of consciousness (48.1%), nevertheless the least assessed sign was the ability to drink (20.8%).

4.2.4. Classification of dehydration:

Figure (4.6) represents the compatibility of classification of dehydration with WHO guidelines. The result indicated that classification of 27.2%(82/301) of the total retrieved files were compatible with the guidelines, the majority (58.5%, 176/301) were absolutely unclassified, while the rest (14.3%, 43/301) were incompatibly classified; where they were classified as mild dehydration, moderate dehydration, and mild to moderate dehydration.

In South Sudan, Stephen found that 75.68% of the patients were correctly classified according to WHO guideline (Stephen, 2015). This was much higher than the our findings and Weru's study who found that about 31.1% of patients were correctly classified according to WHO. Also the result in Bahrain was better of ours, where only 3% of the cases weren't classified (Ismaeel et al., 2007).

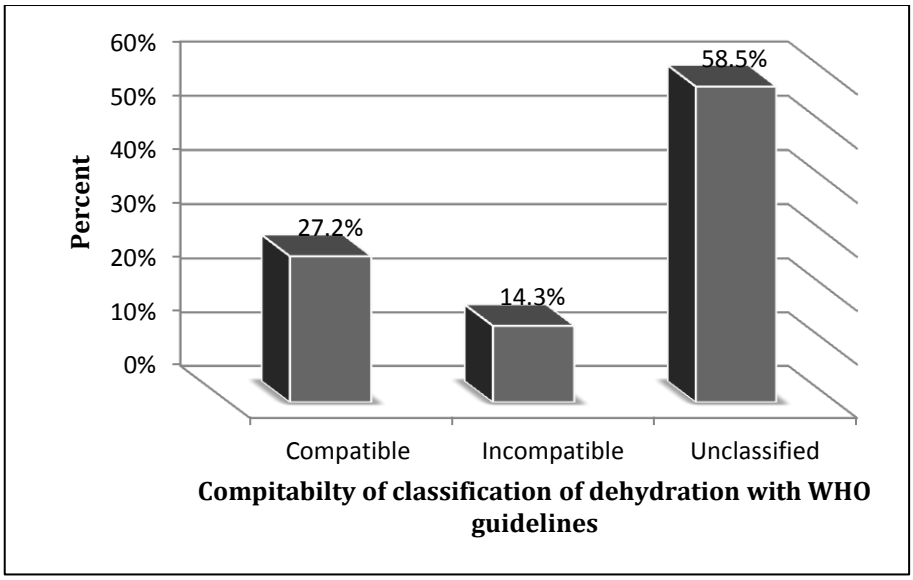

Figure 4.6: Compatibility of classification of dehydration with WHO guidelines

4.2.5. Co-morbid conditions specified by admitting clinician:

Thirty –nine (13%) out of the 301 AD cases files were specified by admitting physicians as a co- morbid conditions. These co-morbid diseases are: Anemia, Upper Respiratory Tract Infection (URTI), Fever for Investigation (FFI), Bronchiolitis, and Pneumonia. The following figure (Figure 4.7) illustrates the distribution of the 39th cases of the co-morbid diseases.

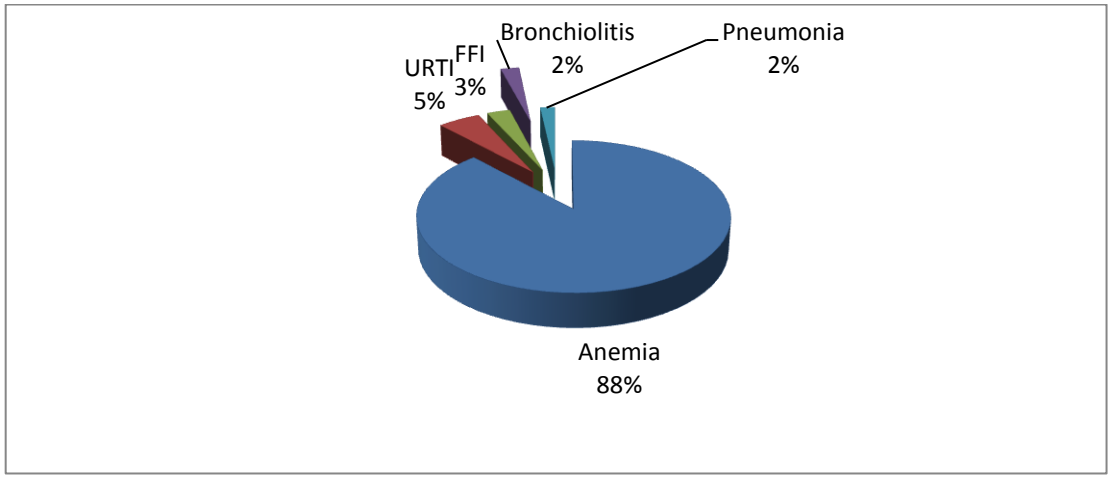

Figure 4.7: Distribution of co-morbid diseases.

The researcher found that 39 patients in Gaza study had an associated co-morbidity with anemia being the most common co-morbid condition at 88%. These findings are lower than the study done in South Sudan and Kenya, where the latter two study revealed that malaria was the most common co-morbid condition at 73.77% in Juba Teaching Hospital, and 54% in Garrisa Provincial Hospital, respectively. The findings in the Gaza study could be due to the siege and low economic condition, while in the other studies could be due to the fact that Sudan and Kenya are in an endemic zone for malaria.

4.2.6. Physicians' actual documented regarded fluid giving:

As seen in figure (4.8), multiple fluids and combinations were used for AD management. They included Pediatric Dextrose saline (PDS), Oral Rehydration Salts (ORS), Normal Saline (NS), and Ringer Lactate (RL). According to the physician's documentations, half of AD cases were managed using ORS and PDS, nearly one third using PDS, while the least (0.7%) was managed only using ORS. Compared with the WHO, the researcher classified the fluids choices. It was found that most of cases (83.7%)were managed using incompatible fluids.

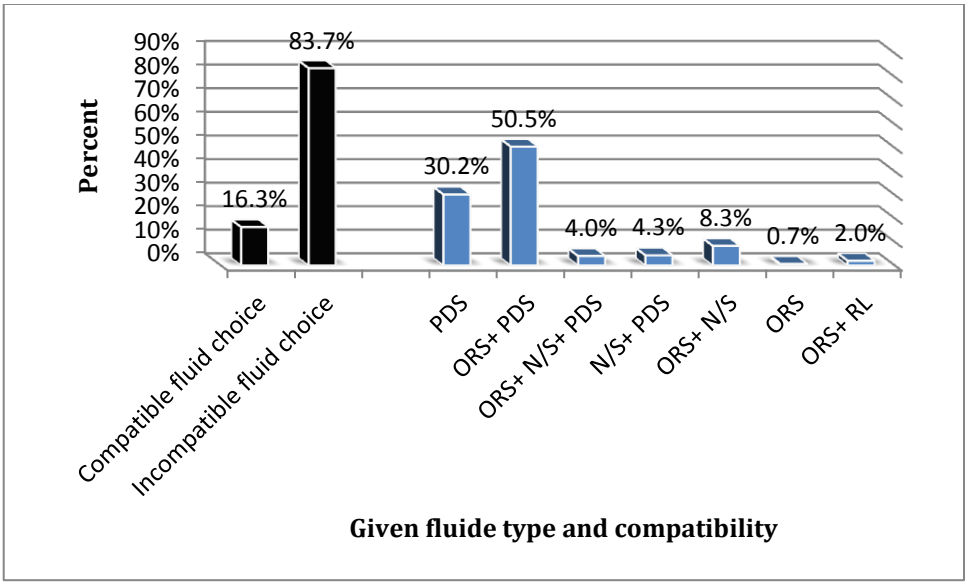

Figure 4.8: Type and compatibility of the given fluid

Though nelson textbook mostly relied on the WHO guidelines of its references, it considered PDS and NS as alternatives; that what by the researcher justified low compatible fluids given with the guidelines in addition to lack of training regarding the guidelines.

In South Sudan study, the most commonly used fluid for hydration was IV fluids at 55% and ORS at 34%. The choice of hydration fluid was correct according to WHO guideline

among 61.73% of patients (Stephen , 2015). In a study conducted in Kenya, the commonly used fluid for rehydration was ORS 59.6% followed by Ringers Lactate 38.2%. The choice of rehydration was consistent with the protocols in 61.6% patients treated with ORS and in 29.5% patients treated with Ringers lactate solution (Weru, 2013). A third study revealed that in spite of availability of ORS, only 3.5% of practitioners In Bihar (India) offered them (Mohanan et al., 2015). While in Botswana was the most in line with the guidelines, where ORS was prescribed in 87% of the diarrhea cases (Boonstra et al., 2005).

In spite of high percentage of incompatible fluid choices, The total percentage of cases managed in GC pediatric hospitals for AD using ORS(65.4%)was higher than their match in South Sudan, Kenya, and Bihar in India.

4.2.7. Physicians' documented actual practices regarded drugs use:

According to figure (4.9) only less than quarter of the pediatricians prescribed zinc sulphate, which was recommended for all cases of AD by the guidelines. Although the theoretical basis for a potential role of zinc has been postulated for some time, convincing evidence of its importance in child health has only come recently from randomized controlled trials of zinc supplementation (WHO, 2005). One of these studies was conducted in GC in Al-Durra pediatric hospital, where it found that zinc supplementation added to standard treatment as ORS was effective and resulted reductions in the duration and severity of diarrhea.(Abu Dalfa and et al. 2016).

Interfering with WHO guidelines, Antimicrobials, antiemetic, and antidiarrheal were prescribed. For using of Antibiotics, the percentages of using Ampicillin was the highest (30.2%), in addition to combining with other antibiotics (10.7%). Most of AD cases in Al-Durra hospital received Ampicillin; that was justified by the hospital's physicians that it is

used as prophylactic antibiotics for all AD cases to prevent nosocomial infection. Despite having a diagnosis of AD, 12% of patients with the co-morbidities may have an indication for antibiotic use. These included those who diagnosed with Upper Respiratory Tract Infection (URTI), Fever for Investigation (FFI), Bronchiolitis, and Pneumonia. In this study, the prescription of antibiotics were less what was found in the governmental GC clinics, where the average percent of antibiotics prescription were 64% (Abu Saman, 2009).

For Antiemetic use in our study, 65.1% of the cases were received the drug; metchloropramide (63.8%),and metchloropramide combined with promethazine (1.3%), while using of antidiarrheal had the least percentage which constituted 5.6%, all of these antidiarrheal was furamix syrup.

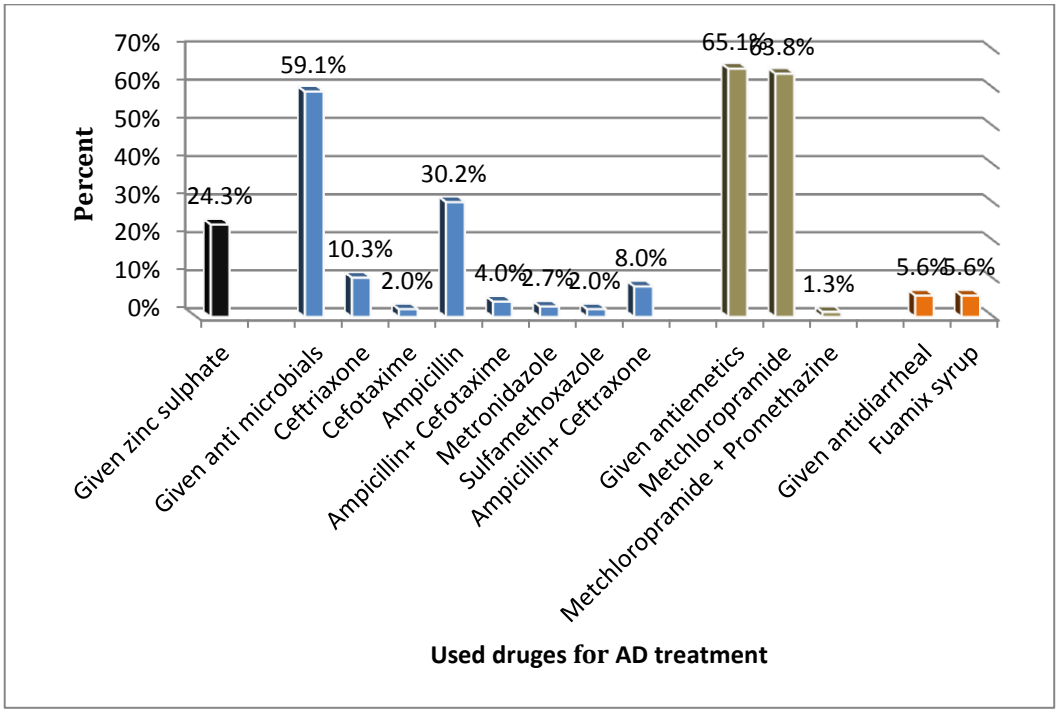

Figure 4.9: Physicians' documented actual practices regarded drugs use

In our study, the researcher believed that low committed to prescription of zinc may owed many reasons including obstacles to incorporating new treatments into routine drug procurement and distribution mechanisms, and failure to appreciate the steps involved in the promotion of new routine treatments (Duke, 2011). In addition to the high cost of the zinc drug in addition to its unpreferable taste, while the high prescription of antiemitics may owed to meet the request of the family which need rapid elimination of the recurrent vomiting. These wrong ideas regarding drugs use should to be corrected and modified, and thus, guidelines will be more committed with.

In this study, the practices of zinc prescription was the poorest in comparison to the studies done in South Sudan and Kenya, were 97% and 92% of patients were prescribed zinc sulphate, respectively. This was also the same thing regarding to antimicrobial use, where antibiotics were prescribed in 76 of 255 (30%) cases during management of AD in a study conducted in Botswana (Boonstra et al., 2005).

Nwolisa and et al. (2006) described the prescribing practices of doctors attending to under-fives in a children's outpatient clinic in Owerri, Nigeria. The study has documented significant flaws in the prescribing practices of these doctors, particularly the low rate of prescription in generic names, high rate of antibiotics prescription (Nwolisa and et al. 2006).

In another study, the researcher found that over-prescription of antibiotics is a real issue among Nigerian pediatric prescribers, where 71.1% of patients had at least one antibiotic prescribed with antibiotics accounting for 28.2% of all drugs prescribed (Joseph and et al. 2015).

Kebede (2017) found that antimicrobials use in pediatric patients (in a teaching hospital in Ethiopia) was over prescribed (86.4%) and the number of drugs per prescription was also

far from WHO recommendation (Kebede and et al. 2017). Also the same problem was found in two Middle East countries (Syria and Jordan), where the main drug use problems include excessive use of antibiotics and antidiarrhoeals. The main causes of irrational use of drugs were poor medical records, lack of patient education about illnesses and drugs, no family doctor system, lack of standard treatment guidelines and lack of continuing medical education for doctors and pharmacists (Otoom and Sequeira, 2006).

The suggested interventions to improve rational medicines use in GC, are to provide treatment protocols for the most common diseases and continuous education for the medical staff (Younis, 2009; Kebede and et al. 2017; Nwolisa and et al. 2006).

4.2.8. Physicians' practices regarded feeding and measuring of serum electrolytes for AD cases according to WHO guidelines:

Reviewing all physicians' documentation in AD cases' records, the researcher didn't find any physician's documenting or hint regarding feeding which was focused on by the guidelines. In the other hand, 54.2% of the records interfered with the guidelines in the measuring of serum electrolytes which called it as unhelpful practice.

Another study represented that the condition is more better in Lebanon, where 67% of the teaching hospital practitioners follow early feeding as recommended by the guidelines, while the practitioners who worked in rural areas tended to allow early feeding more often (73.8%) (Alameddine et al., 2010).

4.3 Interviews' answers V/S Records' documented practices

4.3.1. Comparison between physicians' knowledge and actual practices:

Table 4.8: Knowledge V/S Practices

Comparison aspect		physicians' knowledge	physicians' practices	P- value
No. of identified AD danger signs	0/4	27.4%	25.6%	0.367
	1/4	27.4%	27.2%	
	2/4	34.7%	28.2%	
	3/4	7.4%	14.6%	
	4/4	3.2%	4.3%	
	Total	100.0%	100.0%	
No. of identified dehydration signs	0/3	3.2%	17.3%	0.00
	1/3	25.3%	35.2%	
	2/3	58.9%	35.9%	
	3/3	12.6%	11.6%	
	Total	100.0%	100.0%	
Correct classification of dehydration	Yes	4.2%	27.2%	0.00
	No	95.8%	14.3%	
	NA	0%	58.5%	
	Total	100.0%	100.0%	
Measuring serum electrolytes		88.4%	54.2%	0.00
Correct indications of ORS		23.2%	65.4%	0.00
Correct indications of IVF		85.3%	16.3%	0.00
Use of zinc		86.3%	24.3%	0.00
Use of antiemetic		24.2%	65.1%	0.00
Use of antimicrobials		18.9%	59.1%	0.00
Use of antidiarrheal		4.2%	5.6%	0.586

As physicians' knowledge and practices were identified, it was crucial to compare between them. The comparison focused on various aspects which were: the number of identified AD danger signs, the number of identified dehydration signs, the correct classification of dehydration, measuring serum electrolytes, correct indications of ORS, correct indications of IVF, the use of zinc, the use of antiemetic, the use of antimicrobials, and use of antidiarrheal.

For the number of identified AD danger signs, the differences between knowledge and practices were very small except in identifying three from the four signs (3/4) specified by the guidelines, where practices doubled what were mentioned during the interview.

For dehydration signs, 3.2% of physicians couldn't mention any signs of dehydration, while 17.3% of records didn't mention any one of them. A quarter of physicians could identify one sign, while 35.2% was the practice percentage. In spite the highest percentage of physicians (58.9%) identified two of the three signs, only 35.9% were in the practice. Lastly little difference in percentages was observed between knowledge and practices in identifying all signs mentioned by the guidelines.

For the correct classification of dehydration, only 4.2% of the physicians classified dehydration correctly, while 27% of the classification practices were correct. While the highest percentage (88.4%) measured serum electrolytes, 54.2% of records contained serum electrolytes results.

The sharp differences between knowledge and practices were in correct indication of IVF, and use of zinc during management of AD, where the percentages 85.3%, and 86.3% respectively were in knowledge, compared with 16.3%, and 24.3% in the practice. The opposite were in the use of antiemetic, antimicrobials, and correct indications of ORS where the sharp high percentages were in the practice.

The difference in percentages between knowledge and practice in the use of antidiarrheal was very small(1.4%).

The researcher sees that the presence of differences between the percentages of knowledge and practice indicates that there was a disparage in these knowledge; the thing that requires

the importance of combining the training and the raising of awareness with regular assertive audit and feedback.

It is noted in the comparison between knowledge and practice in the number of danger signs of AD, identified by the respondents, that there was shortage in the both; theory and practice

The discrepancy in findings found in GC study (knowledge 23.2% V/S practice 65.4%) is much and much wider what was found in a study done in Utter Pradish (India) (knowledge 68.1% V/S practice 77.3%) in regard to the use of ORS. This also was found in regard to the use of antimicrobials (knowledge 18.9% V/S 59.1% practice in GC and knowledge 65.9% V/S practice 61.9% in Uttar Pradish) (Walker et al., 2016).

In spite of a wide discrepancy was found in two studies (GC and Utter Pradish)in the use of zinc, this was a good for India, where practice was doubled what was said (knowledge 14, 36% V/S practice %29.9 in Utter Pradish) (Walker et al., 2016).

Although the practitioners recommended antidiarrheal less than what they reported (knowledge 21.6 % V/S practice 17.5%)(Walker et al., 2016), the finding in GC study is much better (lower percentages and lower discrepancy).This is a surprising finding as more medical staff in Walker study (67% as versus GC study 22.1%)had been trained in DD management, and thus the expectation was that they would adhere better to the WHO guidelines.

5. Conclusion and Recommendations

5.1 Conclusion

In an attempt to assess the medical management practices of AD cases admitted to pediatric hospitals, the current study was conducted at the two general pediatric hospitals in GC.

The study findings might help in improving medical adherence to the universal guidelines which enforce effective, standardized, ideal, safe, and correct management of AD.

The study included two tools; the first was interviewed questionnaire which by the physicians' knowledge regarding WHO AD management guideline were assessed, including obstacles impeding application of guidelines and view of physicians regarding availability of commodity necessary for guidelines application. the second was a retrieval sheet through which the documented actual practices were assessed compared also with the guidelines. Lastly the researcher compared the physicians' knowledge with the documented actual practices.

Firstly, the interviewed questionnaire targeted all physicians who were practicing pediatrics and who were involved in the day-to-day management of pediatric illnesses in GC during the study period, where the response rate was 93%.

The data reveals that the mean age of the study population was 41.78 ± SD 9.78 years, most of them were males (60%)and 40% were females. the majority of the study population were married (87.4%). The selected sample of physicians working at AL-Nasser Pediatric hospital constituted 60% of the total sample size, while the remain 40% was selected from Al-Durra Pediatric hospital. About half of physicians (51.6%) had bachelor degree in medicine, 16.8% had master degree, 29.5% had the Palestinian board, and 2.1% of them had doctoral degree (PhD).Years of experience ranged from 1 to 36 years, with the mean of 13.44 ± SD 9.352 years. More than 61% of study population had less than15 years of experience; in other words, the majority of study participants had good opportunity for improvement, training and development.

Only about one-fifth (22.1%)of the physicians informed that they received training courses regarded management of DD. The percentage of availability of DD treatment guidelines

was 40%. In addition the places of availability of these guidelines were varied, where the percentage 40%; the majority of the them were available in the wards (24.2%).

More than 66% of the respondents informed that they didn't know the WHO manual for DD treatment. Only 32.6% of them defined AD correctly as the WHO definition. Only 3.2% of then could identified the main fourth danger signs of AD, while the highest share (34.7%) was for mention 2 sings. The percentage 58.9% was the highest for mention two signs of the three main signs of dehydration indicated by the WHO, while inability to mention any one of the signs was the least one (3.2%). It is worth mentioning that most of the physicians (91/95) classified dehydration incompatibly with WHO classification.

The assessment indicated that 85% of the physicians know that IVF are indicated only for severely dehydrated cases. Strikingly, only 23.2% of the physicians know that ORS recommended for all AD cases. The researcher asked the participants about the type of fluid used in the management of severe dehydration according WHO guidelines in the 1st hour, the answers included: Ringer lactate (2.1%), Normal Saline (46.3%), and the correct answer which included both fluids was answered by 51.6% of the respondents.

While zinc sulphate is the only drug recommended for all cases of AD, the percentages of physicians informed that they used to recommend drugs during management of AD cases were: using zinc sulphate 86.3%, using antimicrobials 18.9%, using antiemetic 24.2%, and using antidiarrheal 4.2%.

Most of physicians (93/95, 97.9%) in GC complied with the WHO guidelines in supporting continuous feeding (as it is appropriate for child's age) during management of AD cases, while their knowledge interfered with the guidelines in the unhelpful routine of measuring serum electrolytes for the same type of cases, where 88.4% of them used to do it.

The most difficult problems that face GC pediatrics physicians in application of WHO guidelines for the management of DD are lot of work and unavailability of guidelines represented the highest rank; 48.5% and 28.9% respectively. The lowest rank (2.8%) was shared by other obstacles included child refusing of ORS and lack of health education among patient's family.

The commodities necessary for DD management which are: intravenous fluid giving sets, syringes, intravenous cannulas, normal saline 0.9%, ORS (low osmolarity), ringers lactate solution, burette, nasogastric tubes, zinc sulphate, intravenous fluid charts, guidelines on management of diarrhea /dehydration. The intravenous fluid giving sets were the most available commodities as per the views of the physicians (98.9%).The least available commodities were guidelines on management of diarrhea /dehydration with 14.7% always availability percentage.

Secondly, to identify the GC pediatricians' actual practices, the researcher reviewed 301 AD cases' records from the two hospitals to as the required calculated sample. Most of cases' weights were between 5.1.-10 Kg(65.8%). It is noted that as age increased, the percentage of the disease decreased. The highest share of the study sample cases were males (59.8%) and lived in GC (62.8%).

The researcher retrieved the history of the AD cases which was illustrated as followings:
For diarrhea frequency, 200 out of the 301 AD cases (66.4%) had a history of 1 to 3 times of diarrhea, (15.6% (47cases) had more than 3 times, while the other were with no information. For presence of vomiting, most of the cases (89.5%) were had a history of vomiting while more than quarter of cases were with no information. The last sign illustrated was convulsion, where only 2.3% of the cases (7 cases) were with history of convulsion, while the majority (74.1%) were with no information. The high percentage of cases with no information mentioned was a serious defect which represents to poor documentation and lack appreciation of the importance of identifying the danger signs of dehydration.

General examinations of AD cases admitted to GC pediatric hospitals were retrieved which were illustrated as followings:
For sunken eyes, 55.1% had a sunken eyes, while 31.6% were with no information.
Only 17.3% (52 files) were documented for skin pinch. For the Level of consciousness, 46.1% of the cases were documented for consciousness level; 17.6% of cases were altered consciousness and 38.5% were alert, while 43.9% of cases were with no information. Lastly, Ability to drink/breastfeed was only documented for the quarter of the cases (25.3%); classified as 14.3% able to drink/breastfeed and 11% didn't able to do. The

highest percentage of cases (74.8%) were with no mentioned information regarding level of consciousness.

The result indicated that classification of 27.2%(82/301) of the total retrieved files were compatible with the guidelines, the majority (58.5%, 176/301) were absolutely unclassified, while the rest (14.3%, 43/301) were incompatibly classified; where they were classified as mild dehydration, moderate dehydration, and mild to moderate dehydration.

Thirty –nine (13%) out of the 301 AD cases files were specified by admitting physicians as a co- morbid conditions. These co-morbid diseases are: Anemia, Upper Respiratory Tract Infection (URTI), Fever for Investigation (FFI), Bronchiolitis, and Pneumonia.

Fluids used for AD management included Pediatric Dextrose saline (PDS), Oral Rehydration Salts (ORS), Normal Saline, and Ringer Lactate (RL). According to the physician's documentations, half of AD cases were managed using ORS and PDS, nearly one third using PDS, while the least (0.7%) was managed only using ORS. Compared with the WHO, the researcher classified the fluids choices. It was found that most of cases (83.7%)were managed using incompatible fluids

Only less than quarter of the records included zinc sulphate, Interfering with WHO guidelines, Antimicrobials, antiemetic, and antidiarrheal were prescribed. For using of Antibiotics, the percentages of using Ampicillin was the highest (30.2%), in addition to combining with other antibiotics (10.7%). Most of AD cases in Al-Durra hospital received Ampicillin; that was justified by the hospital's physicians that it is used as prophylactic antibiotics for all AD cases to prevent nosocomial infection.

For Antiemetic, 65.1% of the cases were received the drug; metchloropramide (63.8%),and metchloropramide combined with promethazine (1.3%), while using of antidiarrheal had the least percentage (5.6%).

Reviewing all physicians' documentation in AD cases' records, the researcher didn't find any physician's documenting or hint regarding feeding which was focused on by the guidelines. In the other hand, 54.2% of the records interfered with the guidelines in the measuring of serum electrolytes which called it as unhelpful practice.

5.2 Recommendations

1. Adoption and application of universal guidelines such as the WHO in the management of the DD.

2. Provision copies of WHO AD treatment manual among health practitioners.

3. Improving knowledge and practices among GC physicians regarding the WHO AD management guidelines which include:

- The importance of the appropriate use of IVF.
- Avoid inappropriate use of antidiarrheal, antiemetic and antibiotics which are inconsistent with the WHO guidelines.
- Comprehensive use of ORS and zinc suphate which are recommended for all cases of AD by the WHO guidelines.

4. Regular in-the job training with audit and regular feedback should be given.

5. Improving documentation which reflects the actual practices of health practitioners.

6. Elimination of obstacles impeding application of the guidelines.

7. Provision of the commodities necessary for application of the guidelines.

5.3 Research Recommendations

1. A similar study is needed to explore the management of AD among other health professionals staffs such as nurses.

2. Another studies are needed to evaluate the management of other DD such as persistence diarrhea and dysentery .

3. Another study is needed to explore the management of AD among other health providers staffs such as UNRWA, NGOs, and private providers in order to have national figure in this regard.

4. A similar study of primary care physicians' AD practices might be necessary.

5. Further study could help in demonstrating whether improvement has took place or not, after considering the findings of this study by the physicians and policy makers.

6. Another study is needed at the national level including all health providers in both GS and WB in order to have national figure in this regard.

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Annexes

Annex 1: Gaza Strip Map

Source: (Gaza Strip Map), http://www.Welt-Atlas.de

Annex 2: Helsinki Committee Approval

المجلس الفلسطيني للبحث الصحي

Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار

Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee
For Ethical Approval

Date: 01/08/2016 **Number:** PHRC/HC/130/16

Name: IBRAHIM O. LUBBAD **الاسم:** ابراهيم عمر لبد

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:

Assessment of Medical Management Practices of Acute Diarrhea among Children Admitted to Pediatric Hospitals in Gaza City

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/130/16 in its meeting on 01/08/2016

و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه

Signature

Member 11/8/2016

Chairman 2016

Member

Genral Conditions:-

1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

E-Mail:pal.phrc@gmail.com

Gaza - Palestine غزة - فلسطين

شارع النصر - مفترق العيون

Annex 3: Sample Size Calculation by Equation of Stephen Sampson:

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(E^2 \div z^2\right)\right] + E(1-p)\right]}$$

n: Sample size = 301 files.

N: Population size = Total number of AD cases in Al-Nasser Pediatric hospital and Al-Durra Pediatric hospital during the peak period of AD (May, June, July and August) = 1376 cases.

Z: Confidence Level at 95%(standard value of 1.96).

E: Error Proportion = 0.05.

P: Proportion of records, adhering to guidelines estimated to be 50%.

Annex 4: The questionnaire

Interviewed Questionnaire

CONSENT FORM

Al-Quds University

School of Public Health

Dear Participant

You are selected to participate in a research about the assessment of medical management practices of acute diarrhea among children less than 5 years old in Gaza city.

This self-funded study is a part of the requirements of the master degree of public health/epidemiology at Al-Quds University- Palestine.

The aim of the study is to assess the medical management of acute diarrhea among the children less than five years old in Gaza city, which might enforce effective, standardized, ideal, safe, and correct application in dealing with acute diarrhea.

The time needed interview will not exceed 10 minutes. All the information will be used for the purpose of scientific research, and will be kept confidential.

Please answer the asked questions as your opinion appropriate, there is no right or wrong answer. You have the right to participate, or to refuse, and the right to withdraw at any time.

Thank you for your kind participation.

The researcher

Ibrahim O. Lubbad

Serial number ……

Please answer the following questions:

Hospital Name	1- Al-Nasser pediatric hospital	2- Al-Durra pediatric hospital
Department	1- Emergency room	2- General ward
	3- ICU	4- Outpatient clinic

i. Section 1. : Personal and professional information			
1.	Gender	1- Male	2- Female
2.	Age: ……... years		
3.	Marital status	1- married	2- single
		3- divorced	4- widow
4.	Degree of education	1- Bachelor degree	2- Master degree
		3- Doctoral degree (PhD)	4- Board
5.	Years of pediatric experience: …… years		

ii. Section 2.			
6.	Did you receive any training courses regarding the management of pediatric diarrheal diseases?	1- Yes	2- No
	If Yes, how many courses?.....		
7.	Are any of the diarrheal disease management guidelines available at your work place?	1- Yes	2- No
	If yes, where are the guidelines available?	1- In your office	2- in the wards
		3- in the management office	4- other place ……(specify)
8.	Do you know about the WHO manual for diarrhea treatment?	1- Yes	2- No

SECTION 3.

DEFINITION OF ACUTE DIARRHEA

The diagnosis of acute diarrhea was specified through the WHO definition of clinical types of diarrheal diseases.

9) Define acute diarrhea?

In the management of children with acute diarrhea, there are certain key signs that are associated with high risk of death according to the WHO guidelines. These are called danger signs of illness.

10) List the danger signs, you know.

ASSESSMENT OF DEHYDRATION

In the management of a child with acute diarrhea, according to WHO, there are certain signs for assessment of dehydration.

11) List the signs of dehydration you recognize.

CLASSIFYING THE CHILD

In the management of acute diarrhea, according to WHO guidelines, there is a classification of child with dehydration.

12) How do you classify a child with dehydration (mention degrees of dehydration)?

CASE MANAGEMENT

After classification of a child with dehydration, there are certain conditions you should consider for case management.

13)	**which degree of dehydration is an indication for ORS?**	
1. No dehydration	2. Some dehydration	3. Severe dehydration
4. No + Some dehydration	5. Some + Severe dehydration	6. All degrees of dehydration

14)	**which degree of dehydration is an indication for IV fluids?**		
1. No dehydration	2. Some dehydration	3. Severe dehydration	4. All degrees of dehydration

15)	**What type of fluid do you recommend to treat severe dehydration in the 1st hour?**		
1. N/S	2. Ringer Lactate	3. Pediatric D/S	4. Ringer Lactate **or** N/S

16)	Do you recommend zinc sulphate for the child with diarrhea?	1- Yes	2- No
17)	Do you recommend antimicrobials (or antibiotics) for child with acute diarrhea?	1- Yes	2- No
If Yes, what they are?.....			
18)	Do you recommend antiemetic for child with acute diarrhea?	1- Yes	2- No
If Yes, what they are?.....			
19)	Do you recommend antidiarrheal for child with acute diarrhea?	1- Yes	2- No
If Yes, what they are?.....			
20)	Do you support continuous feeding(as it is appropriate for child's age) for the child with acute diarrhea?	1- Yes	2- No
21)	Do you support measuring serum electrolytes for the child with acute diarrhea?	1- Yes	2- No

CHALLENGES

22) What are the most difficult problems that you face in application of WHO guidelines for the management of acute diarrhea?

COMMIDITIES (Supply) SECTION

23) Indicate the availability of the following commodities

Commodity		Always available (1)	Mostly available (2)	Rarely available (3)	Never available (4)
1)	Oral Rehydration Salts (low osmolarity)				
2)	Ringers lactate solution				
3)	Normal Saline 0.9%				
4)	Zinc Sulphate				
5)	Intravenous fluid giving sets				
6)	Nasogastric tubes				
7)	Burette				
8)	Intravenous cannulas				
9)	Syringes				
10)	Guidelines on management of diarrhea/dehydration.(Wall charts, booklets)				
11)	Intravenous fluid charts				

Annex 5: The retrieval sheet

Clinical Record Data Retrieval Form

Questionnaire number: .....

Hospital name: Al-Nasser pediatric hospital …….. Al-Durra pediatric hospital……...

Child weight on admission: .....

1) Demographic characteristics of the patient.

1.) Age in months: .....

2.) Address: Gaza city ..... North of Gaza ..... Others…….

3.) Sex: Male ..... Female .....

2) History (As documented by the admitting clinician?)

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

If yes, proceed, if no discontinue filling the questionnaire.

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

6.) Bloody diarrhea: Y..... N..... No information.....

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

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

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

10.) Convulsions: Y.....N..... No information.....

3) General examination (as documented).

11.) Sunken eyes present? Y..... N.....

No information.....

12.) Was Skin Pinch documented? Y..... N.....

If yes, what was the duration? Immediate/(1-2 Sec)....., slow/prolonged/

>2sec..... No information.....

13.). Level of consciousness: Alert..... Altered consciousness.....

No information.....

14.) Ability to drink/breastfeed: Y..... N.....

No information.....

4) Classification on admission

15.) Admission diagnosis and classification of dehydration by admitting ward clinician:

……..……..……..……

16.) Was the classification correct using of WHO guidelines?

Y..... N……... N/A ……..…..

17.) Was there other co-morbid conditions specified by admitting clinician?

Y..... N……...

If yes, specify these co-morbid conditions?

i. .....

ii. .....

iii. .....

5) Management

18.) What fluid were given? ORS ..... RL …..… N/S ..... PDS .....

Others..... No information .....

19.) Was choice of rehydration therapy followed as recommended as in WHO guidelines?

Y..... N..... N/A ……..

20.) Was the amount of IVF given in the first hour correct?

Y..... N..... N/A (IVF not given) ..... No information .....

21.) Was zinc sulphate prescribed? Y..... N.....

22.) Was any antibiotic prescribed? Y……. N……

If yes, specify these antibiotics? .....

23.) Was any antidiarrheal prescribed? Y……. N……

If yes, specify these antidiarrheal? .....

24.) Was any antiemetic prescribed? Y……..…N……

If yes, specify these antiemetic? .....

25.) Was serum electrolytes test requested? Y……..…N……

Annex 6: Validity of the study tools

9.1 Validity of the interviewed questionnaire

The table (5.1) shows the correlation coefficient between each paragraph of section 2, section 3, and commodities section respectively and the total score of the each field, which shows that the correlation coefficients indicated a function at the level of moral $0.05 \geq \alpha$, and so all of the fields is honest to put the measure.

Table 6.1: Validity of the interviewed questionnaire

Section Name	Question Name	Pearson Correlation	P-value
Section 2	Q6a	0.668*	0.000
	Q7a	0.756*	0.000
	Q8	0.710*	0.000
Section 3	Q16	0.356*	0.000
	Q17a	0.571*	0.000
	Q18a	0.737*	0.000
	Q19a	0.356*	0.001
	Q20	0.373*	0.001
	Q21	0.440*	0.000
Commodities Section	Q23.1	0.371*	0.000
	Q23.2	0.350*	0.000
	Q23.3	0.390*	0.000
	Q23.4	0.468*	0.001
	Q23.5	0.353*	0.001
	Q23.6	0.506*	0.000
	Q23.7	0.358*	0.001
	Q23.8	0.353*	0.001
	Q23.9	0.385*	0.001
	Q23.10	0.618*	0.000
	Q23.11	0.653*	0.000

*Correlation is significant at the 0.05 level

9.2 Validity of the retrieval sheet

The table (5.2) shows the correlation coefficient between each paragraph of history section, general examination section, and management section respectively and the total score of the each field, which shows that the correlation coefficients indicated a function at the level of moral $0.05 \geq \alpha$, and so all of the fields is honest to put the measure.

Table 6.2: Validity of the retrieval sheet

Section Name	Question Name	Pearson Correlation	P-value
History	Q4	0.981*	0.000
	Q6	0.465*	0.000
	q7	0.369*	0.000
	Q9	0.771*	0.000
	Q10	0.554*	0.000
General Examination	Q11	0.749*	0.000
	Q14	0.566*	0.000
Management	Q21	0.606*	0.000
	Q22a	0.565*	0.000
	Q23a	0.399*	0.000
	Q24a	0.514*	0.000
	Q25	0.370*	0.000

*Correlation is significant at the 0.05 level

Annex 7: Reliability of the study tools

The steadfastly questionnaire means to give this questionnaire the same result if the questionnaire re-distributed more than once under the same circumstances and conditions. In other words, the stability of the questionnaire means stability in the results of the questionnaire and not to change significantly as if it were re-distributed to individuals several times during certain periods of time. The researcher has checked the stability of the interviewed questionnaire as well as the retrieval sheet study through: Cronbach's alpha coefficient of Cronbach's Alpha Coefficient and Split-Half Coefficient. The researcher used Cronbach's alpha method and Split-Half Coefficient for measuring the stability of the questionnaire, and the results were as shown in table (5.3).

Table 6.3: Cronbach's alpha coefficient and Spilt -half

Tool Name	Factor	No. of items	Cronbach's Alpha	Spilt - half
Interviewed Questionnaire	6a,7a, 8	3	0.614*	0.635*
	16,17,18,19,20,21	6	0.658*	0.694*
	23.1-23.11	11	0.712*	0.722*
Retrieval Sheet	Q4,Q6,Q7,Q9,Q10	5	0.652*	0.640*
	Q11,QQ14	2	0.621*	0.651*
	Q21,Q22a,q23a,24a,25	5	0.723*	0.747*

*Correlation is significant at the 0.05 level

Annex 8: THE TREATMENT OF DIARRHOEA (A manual for physicians and other senior health workers, WHO, 2005)

1. ESSENTIAL CONCEPTS CONCERNING DIARRHOEA

1.1 Definition of Diarrhoea

Diarrhoea is the passage of unusually loose or watery stools, usually at least three times in a 24 hour period. However, it is the consistency of the stools rather than the number that is most important. Frequent passing of formed stools is not diarrhoea. Babies fed only breastmilk often pass loose, "pasty" stools; this also is not diarrhoea.

Mothers usually know when their children have diarrhoea and may provide useful working definitions in local situations.

1.2 Clinical types of diarrhoeal diseases

It is most practical to base treatment of diarrhoea on the *clinical type* of the illness, which can easily be determinedwhen a child is first examined. Laboratory studies are not needed. Four clinical types of diarrhoea can be recognized, each reflecting the basic underlying pathology and altered physiology:

- *acute watery diarrhoea* (including cholera), which lasts several hours or days: the main danger is dehydration; weight loss also occurs if feeding is not continued;
- *acute bloody diarrhoea*, which is also called *dysentery*: the main dangers are damage of the intestinal mucosa, sepsis and malnutrition; other complications, including dehydration, may also occur;
- *persistent diarrhoea*, which lasts 14 days or longer: the main danger is malnutrition and serious non-intestinal infection; dehydration may also occur;
- *diarrhoea with severe malnutrition* (marasmus or kwashiorkor): the main dangers are severe systemic infection, dehydration, heart failure and vitamin and mineral deficiency.

The management of each type of diarrhoea should prevent or treat the main danger(s) that each presents.

1.3 Dehydration

During diarrhoea there is an increased loss of water and electrolytes (sodium, chloride, potassium, and bicarbonate) in the liquid stool. Water and electrolytes are also lost through

vomit, sweat, urine and breathing. Dehydration occurs when these losses are not replaced adequately and a deficit of water and electrolytes develops.

The volume of fluid lost through the stools in 24 hours can vary from 5 ml/kg (near normal) to 200 ml/kg, or more.

The concentrations and amounts of electrolytes lost also vary. The total body sodium deficit in young children with severe dehydration due to diarrhoea is usually about 70-110 millimoles per litre of water deficit. Potassium and chloride losses are in a similar range. Deficits of this magnitude can occur with acute diarrhoea of any aetiology.

The most common causes of dehydration are rotavirus, enterotoxigenic *Escherichia coli* (ETEC) and, during epidemics, *Vibrio cholerae* O1 or O139.

The degree of dehydration is graded according to signs and symptoms that reflect the amount of fluid lost:

· *In the early stages of dehydration,* there are no signs or symptoms.

· *As dehydration increases*, signs and symptoms develop. Initially these include: thirst, restless or irritable

behaviour, decreased skin turgor, sunken eyes, and sunken fontanelle (in infants).

· *In severe dehydration*, these effects become more pronounced and the patient may develop evidence of hypovolaemic shock, including: diminished consciousness, lack of urine output, cool moist extremities, a rapid and feeble pulse (the radial pulse may be undetectable), low or undetectable blood pressure, and peripheral cyanosis. Death follows soon if rehydration is not started quickly.

1.4 Malnutrition

Diarrhoea is, in reality, as much a nutritional disease as one of fluid and electrolyte loss. Children who die from diarrhoea, despite good management of dehydration, are usually malnourished and often severely so. During diarrhoea, decreased food intake, decreased nutrient absorption, and increased nutrient requirements often combine to cause weight loss and failure to grow: the child's nutritional status declines and any pre-existing malnutrition is made worse. In turn, malnutrition contributes to diarrhoea which is more severe, prolonged, and possibly more frequent in malnourished children. This vicious circle can be broken by:

- continuing to give nutrient rich foods *during and after diarrhoea*;
- giving a nutritious diet, appropriate for the child's age, *when the child is well*.

When these steps are followed, malnutrition can be prevented and the risk of death from a future episode of diarrhoea is much reduced.

1.5 Zinc

Zinc deficiency is widespread among children in developing countries and occurs in most part of Latin America, Africa, the Middle East, and South Asia. Zinc has been shown to play critical roles in metallo-enzymes, polyribosomes, the cell membrane, and cellular function, leading to the belief that it also plays a central role in cellular growth and in function of the immune system. Although the theoretical basis for a potential role of zinc has been postulated for some time, convincing evidence of its importance in child health has only come recently from randomized controlled trials of zinc supplementation. Numerous studies have now shown that zinc supplement (10-20 mg per day until cessation of diarrhoea) significantly reduces the severity and duration of diarrhoea in children less than 5 years of age. Additional studies have shown that short course supplementation with zinc (10-20 mg per day for 10 to 14 days) reduces the incidence of diarrhoea for 2 to 3 months.Based on these studies, it is now recommended that zinc (10-20 mg/day) be given for 10 to 14 days to all children with diarrhoea.

1.6 Use of antimicrobials and "antidiarrhoeal" drugs

Antimicrobials should not be used routinely. This is because, except as noted below, it is not possible to distinguish clinically episodes that *might* respond, such as diarrhoea caused by enterotoxigenic *E. coli*, from those caused by agents unresponsive to antimicrobials, such as rotavirus or *Cryptosporidium*. Moreover, even for potentially

responsive infections, selecting an effective antimicrobial requires knowledge of the likely sensitivity of the causative agent, information that is usually unavailable. In addition, use of antimicrobials adds to the cost of treatment, risks adverse reactions and enhances the development of resistant bacteria. Antimicrobials are reliably helpful *only* for children with bloody diarrhoea (probable shigellosis), suspected cholera with severe dehydration, and serious non-intestinal infections such as pneumonia. Anti-protozoal drugs are *rarely* indicated.

"Antidiarrhoeal" drugs and anti-emetics have *no practical benefits* for children with acute or persistent diarrhoea. They do not prevent dehydration or improve nutritional status, which should be the main objectives of treatment. Some have dangerous, and sometimes fatal, side-effects. These drugs should *never* be given to children below 5 years3.

2. ASSESSMENT OF THE CHILD WITH DIARRHOEA

A child with diarrhoea should be assessed for dehydration, bloody diarrhoea, persistent diarrhoea, malnutrition and serious non-intestinal infections, so that an appropriate treatment plan can be developed and implemented without delay. The information obtained when assessing the child should be recorded on a suitable form.

2.1 History

Ø *Ask* the mother or other caretaker about:

• presence of blood in the stool;

• duration of diarrhoea;

• number of watery stools per day;

• number of episodes of vomiting;

• presence of fever, cough, or other important problems (e.g. convulsions, recent measles);

• pre-illness feeding practices;

• type and amount of fluids (including breastmilk) and food taken during the illness;

• drugs or other remedies taken;

• immunization history.

2.2 Physical examination

First, check for signs and symptoms of dehydration.

Ø *Look* for these signs:

• General condition: is the child alert; restless or irritable; lethargic or unconscious?

• Are the eyes normal or sunken?

• When water or ORS solution is offered to drink, is it taken normally or refused, taken eagerly, or is the child unable to drink owing to lethargy or coma?

Ø *Feel* the child to assess:

• Skin turgor. When the skin over the abdomen is pinched and released, does it flatten immediately, slowly, or very slowly (more than 2 seconds)?

Then, check for signs of other important problems.

Ø *Look* for these signs:

• Does the child's stool contain red blood?

• Is the child malnourished? Remove all upper body clothing to observe the shoulders, arms, buttocks and thighs, for evidence of marked muscle wasting (marasmus). Look also for oedema of the feet; if this is present with muscle wasting, the child is severely

malnourished. If possible, assess the child's weight-for-age, using a growth chart, or weight-for-length. Alternatively, measure the mid-arm circumference.

• Is the child coughing? If so, count the respiratory rate to determine whether breathing is abnormally rapid and look for chest indrawing.

Ø *Take* the child's temperature:

• Fever may be caused by severe dehydration, or by a non-intestinal infection such as malaria or pneumonia.

[4] Diagnosis of moderate or severe malnutrition

Assessment	Weight-for-age[a]	Weight-for-height[a]	Mid-arm circumference[b]	Other
Moderate malnutrition	60-75%	70-80%	Yellow band 11.0 - 12.5 cm	
Severe malnutrition	<60%	<70%	Red band Less than 11.0 cm	Obvious marasmus or oedema with muscle wasting

2.3 Determine the degree of dehydration and select a treatment plan

2.3.1 Determine the degree of dehydration

Use the chart in Table 1 to determine the degree of dehydration and select the appropriate plan to treat or prevent dehydration. The signs typical of children with *no signs of dehydration* are in column A, the signs of *some dehydration* are in column B, and those of *severe dehydration* are in column C.

If two or more of the signs in column C are present, the child has "severe dehydration". If this is not the case, but two or more signs from column B (and C) are present, the child has "some dehydration". If this also is not the case, the child is classified as having "no signs of dehydration". Signs that may require special interpretation are accompanied by footnotes in Table 1. Annex 5 explains how these categories are related to the terms "no, mild, moderate or severe" dehydration used in some textbooks.

2.3.2 Select a plan to prevent or treat dehydration

Choose the *Treatment Plan* that corresponds with the child's degree of dehydration:

• *No signs of dehydration* - follow *Treatment Plan A* at home to prevent dehydration and malnutrition

• *Some dehydration* - follow *Treatment Plan B* to treat dehydration5

• *Severe dehydration* - follow *Treatment Plan C* to treat severe dehydration *urgently*

2.3.3 Estimate the fluid deficit

Children with some dehydration or severe dehydration should be weighed without clothing, as an aid in estimating their fluid requirements. If weighing is not possible, a child's age may be used to estimate the weight (see Table 2).

Treatment should never be delayed because a scale is not readily available.

A child's fluid deficit can be estimated as follows:

Assessment	Fluid deficit as % of body weight	Fluid deficit in ml/kg body weight
No signs of dehydration	<5%	<50 ml/kg
Some dehydration	5-10%	50-100 ml/kg
Severe dehydration	>10%	>100 ml/kg

For example, a child weighing 5 kg and showing signs of "some dehydration" has a fluid deficit of 250-500 ml.

2.4 Diagnose other important problems

• Diagnose *dysentery*: if the stool contains red blood or the mother says she saw blood.

• Diagnose *persistent diarrhoea*: if diarrhoea began at least 14 days ago (and any period without diarrhoea has not exceeded two days).

• Diagnose *malnutrition*: if weight-for-length or weight-for-age, using the child's weight after rehydration, indicate moderate or severe malnutrition; or there is oedema with muscle wasting; or the child has obvious marasmus.

• Diagnose a *serious non-intestinal infection*: based, for example, on signs of pneumonia or sepsis; in areas with falciparum malaria, fever or a history of recent fever is sufficient to suspect and treat malaria. If sepsis or meningitis are suspected, the child should be referred to the hospital.

Table 1: Assessment of diarrhoea patients for dehydration			
	A	B	C
LOOK AT: CONDITION[a]	Well, alert	Restless, irritable	Lethargic or unconscious
EYES[b]	Normal	Sunken	Sunken
THIRST	Drinks normally, not thirsty	Thirsty, drinks eagerly	Drinks poorly, or not able to drink
FEEL: SKIN PINCH[c]	Goes back quickly	Goes back slowly	Goes back very slowly
DECIDE	The patient has **NO SIGNS OF DEHYDRATION**	If the patient has two or more signs in B, there is **SOME DEHYDRATION**	If the patients has two or more signs in C, there is **SEVERE DEHYDRATION**
TREAT	Use Treatment Pan A	Weigh the patient, if possible, and use Treatment Plan B	Weigh the patient and use Treatment Plan C URGENTLY

3. MANAGEMENT OF ACUTE DIARRHOEA

3.1 Objectives

The objectives of treatment are to:

• *prevent dehydration*, if there are no signs of dehydration;

• *treat dehydration*, when it is present;

• *prevent nutritional damage*, by feeding during and after diarrhoea; and

• *reduce the duration and severity of diarrhoea, and the occurrence of future episodes*, by giving supplemental zinc.

These objectives can be achieved by following the selected treatment plan, as described below..

3.2 Treatment Plan A: home therapy to prevent dehydration and malnutrition

Children with no signs of dehydration need extra fluids and salt to replace their losses of water and electrolytes due to diarrhoea. If these are not given, signs of dehydration may develop.

Mothers should be taught how to prevent dehydration at home by giving the child more fluid than usual, how to prevent malnutrition by continuing to feed the child, and why these actions are important. They should also know what signs indicate that the child should be taken to a health worker. These steps are summarized in the *four rules of Treatment Plan A*:

3.2.1 Rule 1: Give the child more fluids than usual, to prevent dehydration

What fluids to give

Many countries have designated recommended home fluids. *Wherever possible, these should include at least one fluid that normally contains salt* (see below). Plain clean water should also be given. Other fluids should be recommended that are frequently given to children in the area, that mothers consider acceptable for children with diarrhoea, and that mothers would be likely to give in increased amounts when advised to do so.

Suitable fluids

Most fluids that a child normally takes can be used. It is helpful to divide suitable fluids into two groups:

Fluids that normally contain salt, such as:

• ORS solution

• salted drinks (e.g. salted rice water or a salted yoghurt drink)

• vegetable or chicken soup with salt.

Teaching mothers to add salt (about 3g/l) to an unsalted drink or soup during diarrhoea is also possible, but requires a sustained educational effort.

A home-made solution containing 3g/l of table salt (one level teaspoonful) and 18g/l of common sugar (sucrose) is effective but is not generally recommended because the recipe is often forgotten, the ingredients may not be available or too little may be given.

Fluids that do not contain salt, such as:

• plain water

• water in which a cereal has been cooked (e.g. unsalted rice water)

• unsalted soup

• yoghurt drinks without salt

• green coconut water

• weak tea (unsweetened)

• unsweetened fresh fruit juice.

Unsuitable fluids

A few fluids are potentially dangerous and should be avoided during diarrhoea. Especially important are drinks

sweetened with sugar, which can cause osmotic diarrhoea and hypernatraemia. Some examples are:

• commercial carbonated beverages
• commercial fruit juices
• sweetened tea.

Other fluids to avoid are those with stimulant, diuretic or purgative effects, for example:
• coffee
• some medicinal teas or infusions.

How much fluid to give

The general rule is: give as much fluid as the child or adult wants until diarrhoea stops. As a guide, after each loose stool, give:
• children under 2 years of age: 50-100 ml (a quarter to half a large cup) of fluid;
• children aged 2 up to 10 years: 100-200 ml (a half to one large cup);
• older children and adults: as much fluid as they want.

3.2.2 Rule 2: Give supplemental zinc (10 - 20 mg) to the child, every day for 10 to 14 days

Zinc can be given as a syrup or as dispersible tablets, whichever formulation is available and affordable. By giving zinc as soon as diarrhoea starts, the duration and severity of the episode as well as the risk of dehydration will be reduced. By continuing zinc supplementation for 10 to 14 days, the zinc lost during diarrhoea is fully replaced and the risk of the child having new episodes of diarrhoea in the following 2 to 3 months is reduced.

3.2.3 Rule 3: Continue to feed the child, to prevent malnutrition

The infant usual diet should be continued during diarrhoea and increased afterwards. Food should *never* be withheld and the child's usual foods should *not* be diluted. Breastfeeding should *always* be continued. The aim is to give as much nutrient rich food as the child will accept. Most children with watery diarrhoea regain their appetite after dehydration is corrected, whereas those with bloody diarrhoea often eat poorly until the illness resolves. These children should be encouraged to resume normal feeding as soon as possible.

When food is given, sufficient nutrients are usually absorbed to support continued growth and weight gain.

Continued feeding also speeds the recovery of normal intestinal function, including the ability to digest and absorb various nutrients. In contrast, children whose food is restricted

or diluted lose weight, have diarrhoea of longer duration, and recover intestinal function more slowly.

What foods to give

This depends on the child's age, food preferences and pre-illness feeding pattern; cultural practices are also important. *In general, foods suitable for a child with diarrhoea are the same as those required by healthy children*. Specific recommendations are given below.

Milk

• *Infants of any age who are breastfed* should be allowed to breastfeed as often and as long as they want. Infants will often breastfeed more than usual; this should be encouraged.

• *Infants who are not breastfed* should be given their usual milk feed (or formula) at least every three hours, if possible by cup. Special commercial formulas advertised for use in diarrhoea are expensive and unnecessary; they should *not* be given routinely. Clinically significant milk intolerance is rarely a problem.

• *Infants below 6 months of age who take breastmilk and other foods* should receive increased breastfeeding. As the child recovers and the supply of breastmilk increases, other foods should be decreased. (If fluids other than breastmilk are given, use a cup, not a bottle.) This usually takes about one week. If possible, the infant should become exclusively breastfed (see Annex 6).

There is no value in routinely testing the stools of infants for pH or reducing substances. Such tests are oversensitive, often indicating impaired absorption of lactose when it is not clinically important. It is more important to monitor the child's clinical response (e.g. weight gain, general improvement). Milk intolerance is only clinically important when milk feeding causes a prompt increase in stool volume and a return or worsening of the signs of dehydration, often with loss of weight.

Other foods

If the child is at least 6 months old or is already taking soft foods, he or she should be given cereals, vegetables and other foods, in addition to milk. If the child is over 6 months and such foods are not yet being given, they should be started during the diarrhoea episode or soon after it stops.

Recommended foods should be culturally acceptable, readily available, have a high content of energy and provide adequate amounts of essential micronutrients. They should be well cooked, and mashed or ground to make them easy to digest; fermented foods are also easy

to digest. Milk should be mixed with a cereal. If possible, 5-10 ml of vegetable oil should be added to each serving of cereal7. Meat, fish or egg should be given, if available. Foods rich in potassium, such as bananas, green coconut water and fresh fruit juice are beneficial.

How much food and how often

Offer the child food every three or four hours (six times a day). Frequent, small feedings are tolerated better than less frequent, large ones.

After the diarrhoea stops, continue giving the same energy-rich foods and provide one more meal than usual each day for at least two weeks. If the child is malnourished, extra meals should be given until the child has regained normal weight-for-height.

3.2.4 Rule 4: Take the child to a health worker if there are signs of dehydration or other problems

The mother should take her child to a health worker if the child:

- starts to pass many watery stools;
- has repeated vomiting;
- becomes very thirsty;
- is eating or drinking poorly;
- develops a fever;
- has blood in the stool; or
- the child does not get better in three days.

3.3 Treatment Plan B: oral rehydration therapy for children with some dehydration

Children with some dehydration should receive oral rehydration therapy (ORT) with ORS solution in a health facility following Treatment Plan B, as described below. Children with some dehydration should also receive zinc supplementation as described above.

3.3.1 How much ORS solution is needed?

Use Table 2 to estimate the amount of ORS solution needed for rehydration. If the child's weight is known, this should be used to determine the *approximate* amount of solution

needed. The amount may also be estimated by multiplying the child's weight in kg times 75 ml. If the child's weight is not known, select the approximate amount according to the child's age.

The *exact* amount of solution required will depend on the child's dehydration status. Children with more marked signs of dehydration, or who continue to pass frequent watery stools, will require more solution than those with less marked signs or who are not passing frequent stools. *If a child wants more than the estimated amount of ORS solution, and there are no signs of over-hydration, give more.*

Oedematous (puffy) eyelids are a sign of *over-hydration*. If this occurs, stop giving ORS solution, but give breastmilk or plain water, and food. Do not give a diuretic. When the oedema has gone, resume giving ORS solution or home fluids according to Treatment Plan A.

Table 2: Guidelines for treating children and adults with some dehydration						
APPROXIMATE AMOUNT OF ORS SOLUTION TO GIVE IN THE FIRST 4 HOURS						
Age[a]	Less than 4 months	4 – 11 months	12 – 23 months	2 – 4 years	5 – 14 years	15 years or older
Weight	Less than 5 kg	5–7.9 kg	8-10.9 kg	11-15.9kg	16-29.9kg	30 kg or more
In ml	200-400	400-600	600-800	800-1200	1200-2200	2200-4000
in local measure						

3.3.2 How to give ORS solution

A family member should be taught to prepare and give ORS solution. The solution should be given to infants and young children using a clean spoon or cup. Feeding bottles should *not* be used. For babies, a dropper or syringe (without the needle) can be used to put small amounts of solution into the mouth. Children under 2 years of age should be offered a teaspoonful every 1-2 minutes; older children (and adults) may take frequent sips directly from the cup.

Vomiting often occurs during the first hour or two of treatment, especially when children drink the solution too quickly, but this rarely prevents successful oral rehydration since most of the fluid is absorbed. After this time vomiting usually stops. If the child vomits,

wait 5-10 minutes and then start giving ORS solution again, but more slowly (e.g. a spoonful every 2-3 minutes).

3.3.3 Monitoring the progress of oral rehydration therapy

Check the child from time to time during rehydration to ensure that ORS solution is being taken satisfactorily and that signs of dehydration are not worsening. If at any time the child develops signs of severe dehydration, shift to Treatment Plan C.

After four hours, reassess the child fully, following the guidelines in Table 1. Then decide what treatment to give next:

• If signs of *severe dehydration* have appeared, intravenous (IV) therapy should be started following Treatment Plan C. This is very unusual, however, occurring only in children who drink ORS solution poorly and pass large watery stools frequently during the rehydration period.

• If the child still has signs indicating *some dehydration*, continue oral rehydration therapy by repeating Treatment Plan B. At the same time start to offer food, milk and other fluids, as described in Treatment Plan A, and continue to reassess the child frequently.

• If there are *no signs of dehydration*, the child should be considered fully rehydrated. When rehydration is complete:

- the skin pinch is normal;
- thirst has subsided;
- urine is passed;
- the child becomes quiet, is no longer irritable and often falls asleep.

Teach the mother how to treat her child at home with ORS solution and food following Treatment Plan A. Give her enough ORS packets for two days. Also teach her the signs that mean she should bring her child back (see section 3.2.4).

3.3.4 Meeting normal fluid needs

While treatment to replace the existing water and electrolyte deficit is in progress the child's *normal daily fluid requirements* must also be met. This can be done as follows:

• *Breastfed infants*: Continue to breastfeed as often and as long as the infant wants, even *during* oral rehydration.

• *Non breastfed infants under 6 months of age*: If using the old WHO ORS solution containing 90 mmol/L of sodium, also give 100-200ml clean water during this period. However, if using the new reduced (low) osmolarity ORS solution containing 75mmol/L

of sodium, this is not necessary. After completing rehydration, resume full strength milk (or formula) feeds. Give water and other fluids usually taken by the infant.

• *Older children and adults*: Throughout rehydration and maintenance therapy, offer as much plain water to drink as they wish, *in addition* to ORS solution.

3.3.5 If oral rehydration therapy must be interrupted

If the mother and child must leave before rehydration with ORS solution is completed:

• show the mother how much ORS solution to give to finish the four-hour treatment at home;

• give her enough ORS packets to complete the four hour treatment and to continue oral rehydration for two more days, as shown in Treatment Plan A;

• show her how to prepare ORS solution;

• teach her the four rules in Treatment Plan A for treating her child at home.

3.3.6 When oral rehydration fails

With the previous ORS, signs of dehydration would persist or reappear during ORT in about 5% of children. With the new reduced (low) osmolarity ORS, it is estimated that such treatment "failures" will be reduced to 3%, or less. The usual causes for these "failures" are:

• continuing rapid stool loss (more than 15-20 ml/kg/hour), as occurs in some children with cholera;

• insufficient intake of ORS solution owing to fatigue or lethargy;

• frequent, severe vomiting.

Such children should be given ORS solution by nasogastric (NG) tube or Ringer's Lactate Solution intravenously (IV) (75 ml/kg in four hours), usually in hospital. After confirming that the signs of dehydration have improved, it is usually possible to resume ORT successfully. Rarely, ORT should not be given. This is true for children with:

• abdominal distension with paralytic ileus, which may be caused by opiate drugs (e.g. codeine, loperamide) and hypokalaemia;

• glucose malabsorption, indicated by a marked increase in stool output when ORS solution is given, failure of the signs of dehydration to improve and a large amount of glucose in the stool when ORS solution is given.

In these situations, rehydration should be given IV until diarrhoea subsides; NG therapy should *not* be used.

3.3.7 Giving Zinc

Begin to give supplemental zinc, as in Treatment Plan A, as soon the child is able to eat following the initial fourhour rehydration period.

3.3.8 Giving food

Except for breastmilk, food should not be given during the initial four-hour rehydration period. However, children continued on Treatment Plan B longer than four hours should be given some food every 3-4 hours as described in Treatment Plan A. *All children* older than 6 months should be given some food before being sent home. This helps to emphasize to mothers the importance of continued feeding during diarrhoea.

3.4 Treatment Plan C: for patients with severe dehydration

3.4.1 Guidelines for intravenous rehydration

The preferred treatment for children with severe dehydration is rapid intravenous rehydration, following Treatment Plan C. If possible, the child should be admitted to hospital. Guidelines for intravenous rehydration are given in Table 3.

Children who can drink, even poorly, should be given ORS solution by mouth until the IV drip is running. In addition, *all* children should start to receive some ORS solution (about 5 ml/kg/h) when they can drink without difficulty, which is usually within 3-4 hours (for infants) or 1-2 hours (for older patients). This provides additional base and potassium, which may not be adequately supplied by the IV fluid.

Table 3: Guidelines for intravenous treatment of children and adults with severe dehydration

Start IV fluids immediately. If the patient can drink, give ORS by mouth until the drip is set up. Give 100 ml/kg Ringer's Lactate Solution[a] divided as follows:

Age	First give 30 ml/kg in:	Then give 70 ml/kg in:
Infants (under 12 months)	1 hour[b]	5 hours
Older	30 minutes[b]	2½ hours

3.4.2 Monitoring the progress of intravenous rehydration

Patients should be reassessed every 15-30 minutes until a strong radial pulse is present. Thereafter, they should be reassessed at least every hour to confirm that hydration is improving. If it is not, the IV drip should be given more rapidly.

When the planned amount of IV fluid has been given (after three hours for older patients, or six hours for infants), the child's hydration status should be reassessed fully, as shown in Table 1.

Ø *Look* and *feel* for all the signs of dehydration:

• If signs of *severe dehydration* are still present, repeat the IV fluid infusion as outlined in Treatment Plan C. This is very unusual, however, occurring only in children who pass large watery stools frequently during the rehydration period.

• If the child is improving (able to drink) but still shows signs of *some dehydration*, discontinue the IV infusion and give ORS solution for four hours, as specified in Treatment Plan B.

• If there are *no signs of dehydration*, follow Treatment Plan A. If possible, observe the child for at least six hours before discharge while the mother gives the child ORS solution, to confirm that she is able to maintain the child's hydration. Remember that the child will require therapy with ORS solution until diarrhoea stops.

If the child cannot remain at the treatment centre, teach the mother how to give treatment at home following Treatment Plan A, give her enough ORS packets for two days and teach her the signs that mean she should bring her child back (see section 3.2.4).

3.4.3 What to do if intravenous therapy is not available

If IV therapy is not available at the facility, but can be given nearby (i.e. within 30 minutes), send the child *immediately* for IV treatment. If the child can drink, give the mother some ORS solution and show her how to give it to her child during the journey.

If IV therapy is not available nearby, health workers who have been trained can give ORS solution by NG tube, at a rate of 20 ml/kg body weight per hour for six hours (total of 120 ml/kg body weight). If the abdomen becomes swollen, ORS solution should be given more slowly until it becomes less distended.

If NG treatment is not possible but the child can drink, ORS solution should be given by mouth at a rate of 20 ml/kg body weight per hour for six hours (total of 120 ml/kg body weight). If this rate is too fast, the child may vomit repeatedly. In that case, give ORS solution more slowly until vomiting subsides.

Children receiving NG or oral therapy should be reassessed at least every hour. If the signs of dehydration do not improve after three hours, the child must be taken immediately to the nearest facility where IV therapy is available.

Otherwise, if rehydration is progressing satisfactorily, the child should be reassessed after six hours and a decision on further treatment made as described above for those given IV therapy.

If neither NG nor oral therapy is possible, the child should be taken *immediately* to the nearest facility where IV or NG therapy is available.

3.5 Electrolyte disturbances

Knowing the levels of serum electrolytes rarely changes the management of children with diarrhoea. Indeed, these values are often misinterpreted, leading to inappropriate treatment. It is usually *not helpful* to measure serum electrolytes. The disorders described below are *all* adequately treated by ORT with ORS solution.

3.5.1 Hypernatraemia

Some children with diarrhoea develop *hypernatraemic dehydration*, especially when given drinks that are hypertonic owing to their excessive content of sugar (e.g. soft drinks, commercial fruit drinks, too concentrated infant formula) or salt. These draw water from the child's tissues and blood into the bowel, causing the concentration of sodium in extra-cellular fluid to rise. If the solute in the drink is not fully absorbed, the water remains in the bowel, causing osmotic diarrhoea.

Children with hypernatraemic dehydration (serum Na >150 mmol/l) have thirst that is out of proportion to other signs of dehydration. Their most serious problem is convulsions, which usually occur when the serum sodium concentration exceeds 165 mmol/l, and especially when IV therapy is given. Seizures are much less likely when

hypernatraemia is treated with ORS solution, which usually causes the serum sodium concentration to become normal within 24 hours.

3.5.2 Hyponatraemia

Children with diarrhoea who drink mostly water, or watery drinks that contain little salt, may develop hyponatraemia (serum Na <130 mmol/l). Hyponatraemia is especially common in children with shigellosis and in severely malnourished children with oedema. Severe hyponatraemia can be associated with lethargy and, less often, seizures. ORS

solution is safe and effective therapy for nearly all children with hyponatraemia. An exception is children with oedema (see section 8), for whom ORS solution provides too much sodium.

3.5.3 Hypokalaemia

Inadequate replacement of potassium losses during diarrhoea can lead to potassium depletion and hypokalaemia (serum K+ <3 mmol/l), especially in children with malnutrition. This can cause muscle weakness, paralytic ileus, impaired kidney function and cardiac arrhythmia. Hypokalaemia is worsened when base (bicarbonate or lactate) is given to treat acidosis without simultaneously providing potassium. Hypokalaemia can be prevented, and the potassium deficit corrected, by using ORS solution for rehydration therapy and by giving foods rich in potassium during diarrhoea and after it has stopped

Annex 9: Time Table of the work plan Activities

Activity \ Date	May 2016		June 2016		July 2016		August 2016		Sept. 2016		Oct. 2016	
Revision of proposal												
Preparation of material												
Approval of Helsinki												
Approval of MOH												
Pilot study												
Sample collection												
Data entry and coding												
Data analysis												
Data interpretation												
Research writing												

Arabic Abstract

الملخص العربي لدراسة

تقييم المداواة الطبية لحالات مرض الإسهال الحاد عند الأطفال في مدينة غزة

إعداد: إبراهيم عمر لبد

إشراف: د. أشرف يعقوب الجدي

ملخص الدراسة

يعتبر الإسهال من أكثر الأمراض انتشارا بين الأطفال، وهو يشكل مشكلة كبيرة في قطاع غزة، حيث يشكل نسبة تتجاوز ١١% من أمراض الأطفال دون الخامسة، مما يشكل عبئا كبيرا، الحل الوحيد لهذه المشكلة هو اتباع المعايير المبنية على الدليل البحثي في مداواة الإسهال، ولا سيما معايير منظمة الصحة العالمية.

في محاولة لتقييم الالمام المعرفي والأدائي للأطباء في مداواة الإسهال الحاد طبقا لمعايير منظمة الصحة العالمية، أجريت هذه الدراسة الوصفية والتحليلية في فترة ذروة المرض (مايو– أغسطس/ ٢٠١٦) في مدينة غزة; لتحسين الالتزام بالمعايير العالمية التي تعزز المداواة الفعالة والمثالية والآمنة والسليمة لمرض الإسهال الحاد.

استخدمت الدراسة استبيان مقابلة، استهدفت فيه جميع الأطباء العاملين في مستشفى النصر والدرة للأطفال (١٠٢ طبيبا)، لتقييم إلمامهم المعرفي عن المعايير، حيث فاقت نسبة الاستجابة ٩٣%، إضافة لذلك تم استخدام نموذج استرجاع لتقييم الأداء الفعلي، حيث تمت مراجعة ٣٠١ من ملفات حالات المرض من كلا المستشفيين.

كانت نسبة معرفة معظم العلامات الخطرة للإسهال الحاد (٣ و ٤ من العلامات) المحددة من قبل المعايير منخفضة (١٠,٦% معرفة و١٨,٩% ممارسة)، في الجانب الآخر كانت نسبة معرفة معظم علامات الجفاف(٢ و ٣ علامات)عالية لكنها أقل في الممارسة، فقط ٤,٢% من الأطباء صنفوا الجفاف بطريقة صحيحة، بينما كانت٢٧% من ممارسات التصنيف صحيحة، على الرغم أن نسبة طلب فحص معدلات أملاح الدم ٨٨,٤% في الجانب المعرفي كانت ٥٤,٢% من السجلات تحتويها الفروقات الكبيرة بين الإلمام العلمي و الممارسة، وجدت في الاستخدام الصحيح للمحاليل الوريدية وفي استخدام عقار الزنك حيث كانت نسبهم ٨٥,٣% و٨٦,٣% في الإلمام المعرفي على الترتيب مقارنة بـ

١٦,٣% و ٢٤,٣% في الممارسة. وجد الضد من هذا في استخدام مضادات القيء(٢٤,٢%* ٦٥,١%)، المضادات الحيوية(١٩,٩* ٥٩,١%)، و الاستخدام الصحيح لمحلول الاشباع. بالنسبة لمضادات الاسهال كان الفرق بين الالمام المعرفي (٤,٢%) و الممارسة(٥,٦%) قليل جدا.

أشارت النتائج أن معظم ما يعيق تطبيق المعايير في مداواة أمراض الاسهال هو ضغط العمل الشديد(٤٨,٥%). كما أشارت أن (IV set) هو أكثر المستهلكات اللازمة لتطبيق المعايير في مداواة المرض توافرا (٩٨,٩%) ، بينما كان تواجد كتيبات هذه المعايير هو الأندر(١٤,٧%).

دعا الباحث في نهاية البحث إلى ضرورة تبني وتطبيق المعايير العالمية، لاسيما معايير منظمة الصحة العالمية، بالإضافة للتدريب الدوري في ميدان العمل و المتابعة الإدارية و التغذية الراجعة.