Risk Factors of Severe/Moderate Dehydration among Children under Five Years Old with Acute Diarrhea Hospitalized in the "Nork" Infectious Clinical Hospital in Armenia

A Case-Control Study

Master of Public Health Integrating Experience Project

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By

Anna Mkhoyan, MD, MPH candidate

Advising Team:

Anahit Demirchyan, MD, MPH

Ruzanna Grigoryan, MD, MPH

Arusyak Harutyunyan, MD, MPH

School of Public Health

American University of Armenia

Yerevan, Armenia

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LIST OF ABBREVATIONS

ADHS   -Armenian Demographic and Health Survey

AUA   -American University of Armenia

CHSR   -Center for Health Services Research and Development

CI   -Confidence Interval

Cm   -Centimeter

CRT   -Capillary Refill Time

EAggEC   -Enteroaggregative Escherichia Collies

EHEC   -Enterohemorrhagic Escherichia Collies

EIEC   -Enteroinvasive Escherichia Collies

EPEC   -Enteropathogenic Escherichia Collies

ETEC   -Enterotoxigenic Escherichia Collies

HIV   -Human Immunodeficiency Virus

IMCI   -Integrated Management of Childhood Illnesses

IRB   -Institutional Review Board

OR   -Odds Ratio

ORS   -Oral Rehydration Solutions

SD   -Standard Deviation

SES   -Socio-economic Status

UNICEF   -United Nations International Children's Emergency Fund

USAID   -United States Agency for International Development

WGO   -World Gastroenterology Organization

WHO   -World Health Organization

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ABSTRACT

Introduction: According to the World Health Organization "diarrhea" is the defecation of three or more loose or watery stools per day, which could lead to the failure of absorption of the necessary minerals and water for the organism resulting in dehydration. Dehydration is the leading cause of hospitalizations from diarrhea among children under five years old. Dehydration existence and degree are measured using Capillary Refill time, skin turgor, respiratory rates and signs of shock (based on the Royal Children's Hospital Melbourne guideline). In Armenia, according to Armenia Demographic and Health Survey 2010, diarrheal disease prevalence was 9% among under five children and 7% of all infant deaths were related to diarrheal diseases.

Objective: The aims of this study were to identify risk factors for severe/moderate dehydration among children less than five years old hospitalized because of acute diarrhea and to develop recommendations for early management of acute diarrheal disease to prevent severe/moderate dehydration and reduce hospitalization rates among targeted children.

Method: The study utilized a case-control study design to identify the main risk factors of severe/moderate dehydration among children under five years old. Cases (n=62) were under five children admitted to "Nork" infectious clinical hospital with the initial diagnosis of acute diarrhea and with the diagnosis of severe or moderate dehydration at the admission defined by the Royal Children's Hospital Melbourne guidelines. Controls (n=125) were children under five years old who had been admitted to "Nork" infectious clinical hospital with the initial diagnosis of acute diarrhea and with no or mild dehydration at the admission defined by the same guideline. The student investigator conducted face to face interviews with mothers of the children from both groups using interviewer-administered questionnaire. The response rate was 98%. Simple and multiple logistic regression analyses were performed by the student investigator to test the associations between dehydration severity and its possible determinants, while controlling for the potential confounders.

Results: This study identified several independent determinants of child's severe/moderate dehydration. Mother's higher KAP (Knowledge, Attitude and Practices) score on correct diarrhea home management was negatively associated with the child's dehydration status. Each additional unite increase in this score decreased the risk for a child of being severely/moderately dehydrated by 32%. Being vaccinated against rotavirus, child's good general health rating by the mother, living in Yerevan compared to other regions, child's age, child's high weight before the disease and high socio economic status score (the sum of perceived rating of family's living standards and monthly expenditures) of the family were among factors protecting from severe/moderate dehydration, while higher birth order, repeating vomiting during the disease and female gender were among its risk factors.

Conclusions: Based on these findings, the study recommends increasing mother's knowledge, attitudes and practices on diarrhea home management through public education interventions and improved counseling in Primary Health Care facilities. Also, the coverage of under-five children with rotavirus vaccination and mothers' awareness about diarrhea danger signs (especially on repeating vomiting) should be increased. Future research is needed to understand reasons of mothers' poor knowledge on and barriers against right practices of diarrhea home management**.**

1. INTRODUCTION

According to the World Health Organization (WHO), "diarrhea" is the defecation of three or more loose or watery stools per day[1]. The stool should be changed by consistency and frequency in the same time. Only frequent defecation is not diarrhea, and only watery defecation less than three times a day also is not considered as a diarrhea[1]. Diarrhea causes dehydration for the human body because it leads to failure of absorption of the necessary minerals and water[1].

1.1 Diarrhea classification

Based on the duration of the symptoms, diarrhea is classified as acute, persistent and chronic.[2] Diarrhea is considered as acute when symptoms last less than two weeks.[2] The main causes of acute diarrhea are infectious agents such as bacteria, viruses and parasites, which enter the body with food or water or from one person to another when hygiene rules are not kept[2]. According to World Gastroenterology Organization (WGO), from the infectious agents of diarrhea, the most common ones are diarrheagenic Escherichia collies (Enterohemorrhagic E. coli (EHEC), Enteropathogenic E. coli (EPEC), Enterotoxigenic E.coli (ETEC), Enteroinvasive E. coli (EIEC), Enteroaggregative E. coli (EAggEC)), Vibrio choleraees, Campylobacter, Shigella speci, and Salmonella[3]. From viruses the most common ones are rotavirus (the leading cause of severe dehydration among under five year children), sapoviruses (the second leading causes of dehydration), noroviruses and adenoviruses[3]. The most common parasitic causes of acute diarrhea among children under five years are Cryptosporidium parvum, Giardia intestinalis, Cyclospora cayetanensis, and Entamoeba histolytica[3]. In addition, acute diarrheas could be a result of other causes such as a new medication or non-infectious diseases like ulcerative colitis, Crohn's disease, mesenteric thrombosis or diverticulosis[2].

Persistent diarrheas are the conditions when watery and frequent defecations last from two weeks to a month[2]. They could happen when the exposure to a causative agent is continued (for instance, child continues drinking unclean water).

Diarrheas are considered chronic when symptoms are lasting more than one month[2]. This phenomenon could be a secondary sign of other diseases such as HIV (human immunodeficiency infection) or conditions caused by particular infections like Gardia lamblia, entamoeba hystolitica and worms. Diarrhea related dehydration is the one big single killer for children under five years and the main cause of hospitalization from diarrhea.[4]

1.2 Dehydration classification

According to the WGO guidelines, the dehydration is considered severe when a child has more than two of the following signs: abnormally sleepy, sunken eyes, drinking poorly, very slow pinch skin (more than two seconds)[3]. The dehydration is considered mild when a child under five years has two or more of the following symptoms: sunken eyes, drinks eagerly, slow skin pinch (less than two seconds), restless or irritable[3]. And, finally, the absence of dehydration is defined as a child having normal alertness, eyes not sunken, enough liquids and immediate skin punc[3]. Clinical practice guidelines from the Royal Children's Hospital Melbourne define dehydration degrees as mild when a child has only increased thirst and no any clinical signs[5]. The dehydration is considered as moderate when a child has the following clinical signs: delayed CRT[6] (Central Capillary Refill Time)>2 sec, increased respiratory rate, mildly decreased tissue turgor.[5] And dehydration is considered as severe when a child has very delayed CRT>3 sec, signs of shock (tachycardia, hypotension, irritable or reduced conscious level), deep acidotic breathing, and decreased tissue turgor.[5] Other measures of dehydration could be used in the dehydration assessment, but they are less valid and reliable than the ones that the Royal Children's Hospital Melbourne provided[5] (Appendix 1). The signs that are included in Royal Children's Hospital Melbourne guidelines are recommended

by many other international guidelines[7] and the main strength of this guideline is detecting mild dehydration, when WGO global guideline provides measures for only moderate and severe dehydration. There are studies that prove that CRT, skin turgor test and respiratory pattern are the most useful criteria for diarrhea-caused dehydration assessment[8].

1.3 Burden of diarrhea worldwide

According to the WHO factsheet 2013, children less than five years of age are at a high risk of diarrheal disease and it is the second main cause of dying among this age group[1]. It is estimated that annually diarrhea is responsible for killing around 760,000 children worlwide[1]. According to the WHO and the UNICEF, the incidence of diarrheal disease in the world is about two billion, and 1.9 million under five years old children,, mostly from developing countries, dye from this disease annually[9]. Food borne and waterborne diarrheal diseases (mainly infectious diarrheas) are the cause of death for 2.2 million people each year, the main part of them are children under five years old[10].

The danger from diarrhea is dehydration, which is the main reason for hospitalization of the children, because it can lead to serious health issues such as organ damage, coma or shock[11].

1.4 Risk factors of diarrhea hospitalization and dehydration

Various studies investigated the risk factors of hospitalization of children with acute, persistent and chronic diarrhea. A study conducted in Rio De Janeiro, Brazil showed that the age of under three months increases the risk of hospitalization 3.2 times, underweight children, who's weight-for-age is below the third percentile, had higher risk of hospitalization than those with better nutritional status, and 50% of hospitalized or died children had concomitant illnesses that increased the risk of hospitalization 2.8 times. All these three variables were significantly related to the risk of hospitalization[12].

Another study conducted in Indonesia showed that from all hospitalized diarrhea cases, 49.8% were children with cases of rotavirus infection, and among them vomiting was

significantly higher compared to non-rotavirus cases. Male to female ratio among rotavirus patients was 1.6:1[13].

A case-control study in Brazil found that the following variables significantly increased the risk of dehydration for children under two years old: absence of the father from home (working outside of the country), lack of breast feeding, and age less than two months (this age poses 28 times higher risk of dehydration compared to 9-11 months old children).[14] They also found that children with third or higher birth order have two times greater risk of dehydration than firstborns.[14] Children with low birth weight had three times higher risk of getting dehydrated than other children.[14]

A case-control study conducted in India found that stopping the breast feeding during diarrhea and not providing Oral Rehydration Solutions (ORS) during diarrhea are significant risk factors for severe and moderate cases of dehydratation[15].

Another study found that caregiver's low knowledge score related to prevention and treatment of dehydration and diarrhea is a risk factor for dehydration [16] Those caregivers who did not hear about ORS had high risk of dehydration as well[16]. Another study showed that low SES, poor hygiene practices among the child's family members, and mother's low educational level are risk factors for dehydration[17].

1.5 Treatment of diarrhea

The United States Agency for International Development (USAID), United Nations International Children's Emergency Fund (UNICEF) and WHO diarrhea treatment guidelines suggest that diarrhea treatment should be firstly directed to the prevention of dehydration, and if diarrhea had led to dehydration, to its treatment[18]. The best treatment for dehydration is ORS, usage of which is simple, hence makes diarrhea treatment at home feasible and prevents complicated cases. Early ORS provision reduces hospitalization and mortality rates[19]. Also, existing guidelines recommend zinc supplements to be given to a child with

diarrhea. Zinc is an important microelement for overall health and diarrhea causes big loses of it, therefore the replacement of these loses contribute to quick recovery [18]. Adsorbents are not useful to treat diarrhea in a child, they make stool look better for mothers but they do not prevent the loss of water and minerals[18]. Anti-motility drugs are not only useless but could harm the child's health because they limit evacuation of the causal pathogen from the child's body. The use of these drugs could even lead to child's death[18].

Children with diarrhea should eat small portions of food (digestible) more frequently than usually. Antibiotics are not recommended for viral diarrheas and are not included in the treatment of many types of bacterial diarrheas, where they may lead to complications[18].

1.6 Situation in Armenia

In Armenia, about 7% of all infant deaths is associated with diarrheal diseases [20]. According to Armenia Demographic Health Survey 2005 (ADHS 2005), 17% of children under-five years of age had diarrhea in the two weeks prior to the survey[20]. From all these children, 42.0% were taken to a provider or health facility for treatment and 5.1% had not been treated at all[20]. According to ADHS 2010, diarrhea disease prevalence was 9% among under five years old group, meaning that compared to 2005 survey, it has decreased about two times[21]. However, the reported rate of diarrhea in the 2010 report could be biased because of the change of the season when the field work took place (the fieldwork for the ADHS 2010 was conducted from October to late December, whereas the fieldwork for the 2005 ADHS began in early September when it was still hot in our country and ended in December)[21]. Hot climate increases the rates of disease replication and survival duration and also hospitalization rates[22]. Based on the 2010 survey data, 12% of children with diarrhea were given antibiotics, 18% were given anti-motility drugs, and less than two percent were given a zinc supplement[21]. The use of antibiotics to treat diarrhea has decreased since 2005 (25% in 2005 compared to 12% in 2010), but the use of anti-motility drugs has increased dramatically

(1% in 2005 compared to 18% in 2010), which may be the cause of advertisement of these drugs by television[21] .

In Armenia, parents often use remedies such as pomegranate crust juice or boiled mint juice to treat diarrhea in a child. They also use probiotics in case of diarrhea. The usage of home remedies and other self-remedy drugs have not changed over the past five years (constituting 27% in 2005 and 26% in 2010[21]).

A cross-sectional study conducted in Armenia in 2009 found an association between age of mothers and their mean knowledge score about diarrhea[23]. The same study also showed that the reported mean duration of child's diarrhea was longer for children who were less than 9 months of age compared to older ones, and the children whose mothers were less than 30 years-of-age had longer mean duration of diarrhea as well[23].

In Yerevan, all diarrhea cases (mainly acute forms) that need hospitalization are referred to "Nork" infectious clinical hospital for treatment. Additionally, this hospital admits all cases of diarrhea referred from marz (regional) health facilities.

1.7 Rationale of this study

To our knowledge, to date there are no studies in Armenia that investigated the risk factors of severe/moderate dehydration among hospitalized children under five years with diarrhea. The findings of such study could help to make recommendations for mothers and primary healthcare providers to prevent severe/moderate cases of dehydration among children less than five years old and to prevent hospitalizations from diarrhea.

Thus, the main goals of this study are:

1. To identify risk factors for severe/moderate dehydration compared with mild/no dehydration among children less than five years old hospitalized because of acute diarrhea.

2. To improve recommendations for early management of acute diarrheal disease to prevent severe/moderate dehydration and reduce hospitalization rates among children under five years old.

The research questions are:

- What are the risk factors of severe/moderate dehydration due to acute diarrhea among children less than five years old hospitalized in "Nork" infectious clinical hospital? Particularly, does mother's poor knowledge, attitude and practice (KAP) score about home management of acute diarrhea increases the risk of diarrhea-caused severe/moderate dehydration among children less than five years old hospitalized during the period of February 21 to April 30, 2015, in the "Nork" infectious clinical hospital?

2. METHODS AND MATERIALS

To answer the research questions, a case-control study design was chosen, as this is a cost-effective way of conducting an epidemiological study, which takes into account multiple factors and tests many hypotheses[24].

2.1 Study population

The target population is mothers or main caregivers who have children under five year old living in Armenia and their under five years old children. Study population are the mother/main caregiver and under-five years old child couples who were admitted to "Nork" infectious clinical hospital due to acute diarrhea during the period from February 21, 2015 to April 30, 2015.

2.1.1 Definition of cases:

Cases are children under five years old who were admitted to "Nork" infectious clinical hospital during the period from February 21, 2015 to April 30, 2015 with the initial diagnosis

of acute diarrhea and with a diagnosis of severe or moderate dehydration at the admission defined by Royal Children's Hospital Melbourne guidelines.

2.1.2 Definition of controls:

Controls were children under five years old who were admitted to "Nork" infectious clinical hospital starting during the period from February 21, 2015 to April 30, 2015 with the initial diagnosis of acute diarrhea and with a diagnosis of no or mild dehydration at the admission defined by the Royal Children's Hospital Melbourne guidelines.

Exclusion criteria

For both cases and controls the exclusion criteria were the residency in countries other than Armenia, inability of mothers or main caregivers (a family member or guardian who takes care of a child starting from birth) to speak Armenian, and absence of a mother or main caregiver at the admission.

2.2 Sample size

The sample size was calculated by the student investigator based on the formula for two sample comparison of proportions:

$$n = (Z_{\alpha/2}+Z_\beta)^2 * (p_1 (1-p_1) + p_2 (1-p_2)) / (p_1-p_2)^2$$

Based on the main independent variable (% of children with diarrhea who were given ORS at home), where $Z_{\alpha/2}$ represents the level of statistical significance and Z_β represents the desired power. P_1 is the proportion of the main variable under study among cases and p_2 is the same proportion among controls. For this study, with 0.95 level of significance, $Z_{\alpha/2}$=1.96, Z_β=0.84 (for 80% study power), p_1= 0.33 (the proportion of children with diarrhea who were given ORS at home according to ADHS survey 2010[21]), and p_2 is equal 0.53, with the aim to be able to detect a 20% difference between the groups of cases and controls, the sample size for one group was calculated as:[25]

$$n= (1.96+0.84)^{2*} ((0.33*0.47) + (0.53*0.67))/ (0.2)^2= 92$$

The total sample was, thus, 184 participants (estimated 92 cases and 92 controls). The student investigator conducted data collection until the total sample size was slightly exceeded. However, the actual sample size for the cases was not achieved, as the final sample included 62 cases and 125 controls (instead of 92 in both groups). The power analysis of the final sample showed that the study power was 70%.

2.3 Data collection

The data on cases and controls were collected at "Nork" infectious clinical hospital after getting permission from the hospital. The student investigator attempted to interview each subsequent mother/main caregiver of an under five child admitted to the hospital with acute diarrhea during the study period of February 21 to April 30, 2015. The eligible mothers or main caregivers (a family member or guardian who takes care of a child from birth) were interviewed by face to face interviews after providing oral consent to participate. The dehydration status of the child was assessed according to the Royal Children's Hospital Melbourne guideliness[5], after interviews with mothers and assenting the child (those who were able to communicate). After that, the interviewed and assessed mother/child couples were assigned to the groups of cases and controls, based on the dehydration status/degree of the child.

2.4 Study instrument

The same interviewer-administered structured questionnaire (Appendices 5, 6) was used for interviewing cases and controls. It included the following main domains: demographics (e.g., child's and mother's age, gender, marital status and education), potential risk factors of dehydration identified through the literature search (e.g. mother's knowledge about management of diarrhea[26,27], current nutritional status (weight-for-age percentile) of the child, family's SES, breastfeeding during diarrhea, ORS provision at home, provision of other liquids at home, change in food consumption, concomitant illnesses), symptoms of the

current diarrhea and care-seeking practices (duration of the disease before admission, average frequency of defecation, vomiting, fever, etc.), child's general health rating, practices of diarrhea home management, child's nutrition and the cause (pathogen) of the disease. Before data collection, the instrument was pre-tested among mothers or main caregivers of five patients admitted to "Nork" infectious clinical hospital with acute diarrhea diagnosis. Student investigator checked the presence of dehydration and its degree by objective examination of the admitted child after the interview with mothers or caregivers. The criteria for dehydration presence and degree were taken from the royal children's hospital Melbourne clinical practice guidelines (Appendix 1)[5].

2.5 Study variables

The dependent (outcome) variable of the study was moderate /severe versus mild/no dehydration at the admission to the "Nork" infectious clinical hospital among children under five years old with acute diarrhea.

The main independent variables included mother's KAP score on correct diarrhea home management (which was the sum of the answers to 10 questions on diarrhea home management knowledge and attitude, and the sum of reported right practices of diarrhea home management including ORS usage at home, resulting in a score with a possible range of 0-14), as well as antibiotic usage at home, antimotility drugs usage at home, zinc supplements usage at home, breastfeeding and exclusive breastfeeding duration (taken as equal to the current age of the child if the child was currently on breastfeeding), feeding during diarrhea, and duration of the disease before seeking qualified care.

The control variables were child's age, gender, child's current nutritional status (weight, height), family's SES score (the sum of perceived rating of family's living standards and monthly expenditures – both on a 5-point ordinal scale, resulting in a score with a range of 0-8), which was treated as continuous variable, presence of concomitant illnesses (chronic

conditions), educational level of the mother, employment status of the mother (main

caregiver), number of children in the family, child's birth order (treated as continuous

variable), mother's age, clinical symptoms of the current disease: vomiting, fever, average

number of defecations per day, blood in the stool, mother's rating of child's general health

status before diarrhea (subsequently dichotomized into good/very good vs. fair/poor).

2.6 Data management and analysis

Data entry was done in parallel to data collection process and was continued after completing

the data collection, using SPSS 17 statistical software package (SPSS Inc. Released 2008.

SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc.). After recoding and

cleaning procedures through sorting and spot-checking, the data was transferred into STATA

12 statistical software package for the statistical analysis.

Descriptive statistics (means, standard deviations, ranges, and frequencies) were generated

for controls and cases by using chi2 test and t-test statistics. To assess the relationships

between the dependent and each independent variable, simple logistic regression was

performed. All the variables from simple logistic regression analysis provided in Table 2

with p-values less than 0.25 and all potential risk factors for severe/moderate dehydration

provided from the existing literature were included in the multiple logistic regression analysis

in different combinations. In the process of model fitting, we excluded mainly those variables

that were not related to the outcome (p-value<0.1) when controlling for the remaining

variables in the model. Multiple logistic regression models were used to control for potential

confounders and to identify the independent determinants of dehydration. Odds ratios (OR)

and 95% confidence intervals (CI) were calculated for estimating the strength of associations

between dependent and independent variables, while controlling for potential confounders.

2.7 Ethical considerations

The IRB within the College of Health Sciences at the American University of Armenia School of Public Health approved the study protocol. The data collection process has been started after obtaining their approval. All possible ethical issues of privacy and confidentiality had been taken into account while conducting the study. The interviewees did not receive any incentives. Consent (Appendix 3) and assent forms (Appendix 2) were developed by student investigator. Oral consent (Appendix 3) was obtained from all participants before the interview. The student investigator asked mothers' or main caregivers' permission to assess the dehydration degree in children and an oral assent (Appendix 2) was obtained from all those children who were able to communicate. Participants were informed about their right to skip any question and stop the interview at any time. Participants were informed that they are participating in a research on risk factors of dehydration and they were not exposed to any kind of risk. The study did not include sensitive questions. Personal information about the participants was available only for the research team and was not used for other purposes. All participants were provided with AUA IRB telephone numbers in case of complaints or other questions.

3. RESULTS

3.1 Response rate

The student investigator have approached 220 patients during data collection for conducting interview, 32 patients did not meet the eligibility criteria and one refused to participate. From those 32 patients 20 mothers were not in the hospital and children were staying with grandmothers who were not the main caregivers of the child, seven of them were not residents of Armenia and five mothers had poor knowledge of Armenian language. The response rate was 98% as only one refused to participate in the survey. The student

investigator stopped the data collection when 187 interviews were completed due to feasibility issues. The data analysis was based on 62 cases and 125 controls.

3.2 Descriptive statistics

From all 187 children, 105 (56.1%) (39 cases and 66 controls) were males and 82 (43.9%) (23 cases and 59 controls) were females. From 187 children, 178 (95.2%) (59 cases and 159 controls) had no concomitant disease. Only one case had a genetic disease, one control had diabetes and seven children (5 controls and 2 cases) had other diseases (inflammation of urinary tract, allergy, and hydrocephalus). Most of the mothers (91%) were married, only 2.7% of mothers were divorced (4 cases and 1 control). Almost 80% of the mothers were currently unemployed. The mean number of days past from the beginning of the child's disease was 4.4 (SD 3.4).

Out of 187 children 42.2% (79) (31 cases and 48 controls) had also respiratory complains during diarrhea. Table 1 presents descriptive statistics of the study population by cases and controls.

The descriptive statistics showed that children with severe/moderate dehydration were younger (mean age was 14.8 months (SD =14.6)) compared with children with mild/no dehydration (mean age 24.4 months (SD 15.4), p-value<0.001). Cases were living in bigger families than controls: the mean number of people living in the families of cases was 6.0 (SD 2.1) while in control group it was 5.0 (SD 1.7), p-value <0.001. Cases and controls were statistically significantly different with respect of child's age; child's weight before diarrhea, child's height, child's birth weight, rotavirus vaccination status, and child's general health status before the diarrhea by mother's rating. Cases had lower birth weight (2.9 kg (SD 0.56)), lower height (60.8 cm (SD 7.8)) and weight (8.5 kg (SD 3.6)) before the given diarrhea episode than those in mild/no dehydration group (3.1kg (SD 0.54), 74.6 cm (SD 12.4) and 11.6 kg (SD 3.1) respectively, p<0.001). The proportion of vaccinated children

against rotavirus infection was lower in cases group (35.5%) compared to controls (62.4%), p<0.001. The mothers of cases rated their child's health as fair or poor more frequently (61.3%) than mothers of controls did (28.2%), p-value<0.001.

Significant differences were observed also in the child's diarrhea-related characteristics including number of watery stools within the last 24 hours, the existence and duration of repeating vomiting, child's unwillingness to drink and the number of days when child was unwilling to drink. All the listed clinical signs and symptoms were more severe in cases' group than in the control group, p<0.05.

This study helped to understand that less than 1% of mothers were aware about protective effect of zinc supplements for diarrhea treatment, although this preventive measure is mentioned in the IMCI (Integrated Management of Childhood Illnesses) protocols.

The mothers of controls were more knowledgeable in diarrhea home management: they provided more correct answers to the questions regarding Rehydron's preventive effect against dehydration, for what is Rehydron for, sweetened drinks could increase the risk of dehydration, knowledge about frequent breastfeeding during diarrhea and knowledge about signs of danger during diarrhea. Among diarrhea home management practice variables, significant differences were observed in the amount of fluids, any kind of ORS or other fluids given to a child during diarrhea for prevention of dehydration at home. Higher proportion of children from the control group (38.4%) than those from the case's group (17.7%) received more than usual amount of fluids at home during diarrhea, p-value<0.004.

Significant differences were found in mother's overall KAP score on diarrhea home management. The mean KAP score among cases was lower (5.1 (SD2.0)) compared with the mean KAP score among control group (6.7 (SD 1.9)), p-value<0.001. Among child's nutritional variables, significant differences were identified in proportions of those children being ever breastfed, in the duration of exclusive and any breastfeeding and whether breast

milk was replaced with other milks before six months, also the average frequency of meals per day before diarrhea. The percentage of children who had been ever breastfed was lower in the group of cases (79%) than in the group of controls (88.8%), p-value=0.074, and the duration of breastfeeding (both exclusive and any breastfeeding) was lower among cases (5.0 months (SD 5.4) and 2.1months (SD 2.1), respectively) compared with controls (8.4 months (SD 6.4) and 3.1months (SD 2.4), respectively, p-value<0.05. Among cases, the usage of non-adapted milks before six months of age was higher (43.6%) than among controls (8.8%), p-value<0.001. Also, among cases, the breastfeeding rate before six months was lower (38.7%) than among controls (63.2%), p-value<0.001.

Some significant differences were identified between the groups in the following demographic features: child's living region, mother's educational level, marital status, whether father was living with the child or not, number of people living in the family, and child's birth order. The percent of children living in Yerevan was much higher among controls (71.2%) than among cases (37.1%), p-value=0.004. The percentage of mothers with institute or postgraduate education was higher (45.6%) among controls than among cases (29%), p-value=0.018. The birth order of the child was higher in the families of cases (1.9 (SD 0.7)) than in the families of controls (0.6 (SD 0.7), p=0.008. Finally, the percentage of children who lived together with the father was greater in the control group (81.6%) than in the cases' group (67.7%), p=0.034.

3.3 Simple logistic regression

Table 2 presents the results of the simple logistic regression analysis for the associations between the case/control status of a child and independent variables, presented by crude odds ratios, CIs, and p-values. Mother's higher KAP score on correct diarrhea home management was identified as protective factor for severe/moderate dehydration (OR=0.6, p <0.001). Mother's ever hearing about Rehydron was found to be protective, as well as hearing about

Rehydron from physicians or from hospitals (OR=0.1, p <0.001). Child's age, birth weight, weight before diarrhea, current height, being vaccinated against rotavirus infection, mother's rating of child's health as good or very good before the diarrhea, giving the child more than usual amount of fluids during diarrhea, being ever breastfed, duration of exclusive breastfeeding, non-breastfed children's replacement of breast milk with infant formula (compared with other substitutes), living in Yerevan, having a mother with institute or postgraduate education and an employed mother, living together with the father and family's SES score greater or equal to average were all identified as potential protective factors for severe/moderate dehydration in a child. Treatment with antimotility drugs such as Imodium, child's unwillingness to drink, and other clinical symptoms, such as repeating vomiting, number of watery stools within last 24 hours, having respiratory complains, and being male were identified as risk factors.

3.4 Multiple logistic regressions

Multiple logistic regression analysis was conducted to identify factors associated with the dependent variable while controlling for other significant variables and potential risk factors from the literature. After examining the fit of several models, the preference was given to the one provided in Table 3 (due to better fit indices and the highest number of variables in the model). Child's weight before diarrhea and SES score were marginally significantly associated with the outcome but were not excluded from the model as they are identified as risk factors from the literature.

Based on this model, the main independent determinants of child's severe/moderate dehydration were mother's KAP score, child's age, gender, mother's good/very good rating of child's health (before the disease), child's weight before diarrhea, being vaccinated against rotavirus, higher birth order, family's SES score, child's living region (Yerevan versus other regions) and repeating vomiting during the current diarrhea episode.

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Dehydration severity was negatively associated with the KAP score (OR=0.68, p=0.003). Each additional increase in this score decreased the odds of a child to develop severe/moderate dehydration by 32%. Each additional month of child's age was associated with 6% less odds for him to be severely/moderately dehydrated. Being male was identified as a risk factor for severe/moderate dehydration. In comparison with males, being female decreased the odds of being severely/moderately dehydrated by 66%. Children, whose mothers rated their health before the diarrhea as good or very good, had 77% less odds of being severely/moderately dehydrated compared to those children whose mothers rated their health before the diarrhea as fair or poor. Child's higher weight before diarrhea was identified as protective factor as well. With each kilogram increase of the birth weight the odds of developing severe/moderate dehydration decreased by 9%. According to this model, rotavirus vaccination was identified as a protective factor against dehydration. Those children who have been vaccinated against rotavirus infection had 78% less odds to be severely/moderately dehydrated compared with those who were not. High birth order of the child was also significantly associated with the outcome and was found to be risk factor for severe/moderate dehydration. With each increase of the number of older siblings, the child had 2.2 times higher odds of being severely/moderately dehydrated. Family's higher SES score was identified as a protective factor and each unit increase in this score decreased the child's odds of developing severe/moderate dehydration by 30%. Also, living in Yerevan was independently associated with lower odds of developing severe/moderate dehydration. Compared with children who live in marzes, children living in Yerevan had 73% lower odds of being severely/moderately dehydrated. Children who had repeating vomiting during the disease had 5.1 times higher risk of developing severe/moderate dehydration. The model achieved very good fit statistics (Table 3).

4. DISCUSSION

The study identified several risk factors associated with the risk of severe/moderate dehydration among under five years old children hospitalized with acute diarrhea in Armenia. The results were consistent with the findings from other countries. Mothers'/caregivers' KAP score was identified as protective factor against severe/moderate dehydration in the studies conducted in the low income countries, such as Kingston of Jamaica[16], Ghambia[28], India[29], Northern Vietnam[30], while one study conducted in Canada identified that mothers have better knowledge about ORS and its usage was much higher there than in the low-income countries but, still, there were problems with positive thinking about antimicrobial drugs and lack of knowledge on danger signs for seeking professional care.[31] Almost in all studies in different countries [12],[13,14] child's higher age was identified as protective factor (with different degrees) for severe/moderate dehydration (with different OR) as in our study. Different studies had different cut points for identifying the age for children most risky for developing dehydration (2 months, 3 months, 6 months and 9months[12, 13, 14]). The difference in the OR in different studies might be due to differences in the age cut points as well as might be due to adjustments by different factors. Being female as a protective factor for severe/moderate dehydration is supported by similar studies conducted in Brazil and Indonesia[12,13] but is not consistent with the findings from India[32]. Our study found a strong association between mothers' rating of child's general health status before the diarrhea and the severity of the dehydration in a child, which is consistent with the reports indicating that child's worse pre-morbid status (e.g. existence of chronic conditions in a child) is a risk factor for dehydration[12].

In the current study, the association between lack of breastfeeding and the risk of severe/moderate dehydration lost its significance after controlling for other potential risk factors. However, shorter duration of exclusive breastfeeding and cessation of breastfeeding

during diarrhea are well-established risk factors for dehydration[14,15,32]. This study did not identify significant associations for these variables in the multivariate analysis, which might be because of small number of cases in the sample.

The literature suggests that lower weight-for-age percentile is a risk factor for severe/moderate dehydration[12,32]. Due to lack of data on the height and weight of children prior to diarrhea in our sample, the weight-for-age percentiles were not calculated, but our study found an association between child's prior-diarrhea weight and the severity of the dehydration among those for whom this variable was available.

One of the interesting findings of the study was statistically significant protective effect of the rotavirus vaccination (first vaccination is done in 6 weeks in Armenia and at 3 months revaccination) against severe/moderate dehydration. Here we could make parallels with the study in Indonesia, where almost half of the hospitalized children with severe/moderate dehydration were diagnosed with rotavirus infection[13] and with a study from India[29] showing high rate of severe dehydration among rotavirus infected children .

High birth order was found as a risk factor for developing moderate/severe dehydration in our study and this finding is supported by the literature as well[33]. Even the OR (2 times greater risk) found for this association was similar to that in the study conducted in Brazil[14]

The family's SES score was found as protective factor for severe/moderate dehydration and this is consistent with other studies, where low income is described as risk factor for severe/ moderate dehydration and is related to many other risk factors for dehydration, such as undernutrition, poor household conditions and low food security[34,17,35]. In our study, having repeating vomiting during the diarrhea disease also was found as a strong risk factor for severe/moderate dehydration, which is also supported by the literature.[32,15].

4.1 Study limitations

One of the limitations of this study is that the targeted sample size was not achieved for cases because of feasibility issues. Instead of equal 92 participants in each group, the actual number of cases was 62 and the number of controls was 125. Although it was previously planned to determine dehydration severity after the interviews with mothers for avoiding interviewer bias, this was not achieved at all, because the main part of the cases were placed in the reanimation department, which gave a hint for the student investigator about their case/control status. Also, due to lack of time, the student investigator couldn't collect data on pathogens that caused the disease, as it was planned previously, in order to identify the most dangerous ones that increase the likelihood for under-five children to develop severe/moderate dehydration. There is also the possibility of instrument bias as the durations of breastfeeding and exclusive breastfeeding were underestimated: for those who were currently breastfed, the current age of a child was taken as an estimate for the duration of breastfeeding. Finally, reporting bias could be present in this study because the study variables were self-reported by mothers, including the duration of exclusive breastfeeding, and some other variables, which could be one of the reasons for not finding some associations that were expected based on the literature.

4.2 Strengths of the study

Firstly, a valid and reliable guide was used for identification of dehydration severity among children and each participant was assessed with the same criteria and same person, which eliminated inter-observer bias and increased intra-observer reliability. Secondly, cases and controls were taken from the same hospital.

Though the intended sample size for the cases was not achieved, still the case:control ratio was 1:2, which increased the study power and allowed the study to find many important risk factors of child dehydration.

5. CONCLUSIONS/RECOMMENDATIONS

The study identified several risk and protective factors for severe/moderate dehydration. Among protective factors were: rotavirus vaccination, mother's higher KAP score on correct diarrhea home management, child's good general health rated by mothers, living in Yerevan compared with other regions, child's higher age, child's higher weight before the disease and higher SES score. Also, the student investigator identified some risk factors such as high birth order, repeating vomiting and female gender. The study confirmed the importance of socio-economic factors, indicating that improving the living standards in the country might dramatically change the rates of severe/moderate dehydration among young children. Also, this study indicates the importance of increasing mother's knowledge, attitudes and practices on diarrhea home management through public education interventions or improved counseling in Primary Health Care facilities. Another important recommendation derived from the study findings is increasing the coverage of young children with rotavirus vaccination to decrease the rates of dehydration among them. Mother's awareness about diarrhea danger signs of (especially on repeating vomiting) should also be increased. Future research is needed to understand the reasons of mother's low knowledge on diarrhea home management and the barriers for right practices of diarrhea home management. Also further studies are needed to better understand the real relationship between breastfeeding and severe/moderate dehydration.

6. REFERENCES

1.   WHO | Diarrhoeal disease. Available at:

        http://www.who.int/mediacentre/factsheets/fs330/en/. Accessed February 17, 2014.

2.   Sisson V. Types of Diarrhea and Management Strategies. 2014:1–17.

3.   WGO. Acute diarrhea Epidemiologic features. 2008;(March):1–29.

4.   Dehydration: Why It Is So Dangerous - Diarrhoea, Diarrhea, Rehydration. Available

        at: http://rehydrate.org/dehydration/. Accessed January 16, 2015.

5.   Clinical Practice Guidelines : Dehydration. Available at:

        http://www.rch.org.au/clinicalguide/guideline_index/Dehydration/. Accessed January

        19, 2015.

6.   Pandey A, John BM. Capillary refill time. Is it time to fill the gaps? *Med journal,*

        Armed Forces India. 2013;69(1):97–8. doi:10.1016/j.mjafi.2012.09.005.

7.   Dehydration in Children. Free medical information. Patient | Patient.co.uk. Available

        at: http://www.patient.co.uk/doctor/dehydration-in-children. Accessed February 17,

        2015.

8.   Ball TM. Review: capillary refill time, abnormal skin turgor, and abnormal respiratory

        pattern help to detect dehydration in children. *Evid Based Med*. 2005;10(1):24–24.

        doi:10.1136/ebm.10.1.24.

9.   Farthing M, Salam M a, Lindberg G, et al. Acute diarrhea in adults and children: a

        global perspective. *J Clin Gastroenterol*. 2013;47(1):12–20.

        doi:10.1097/MCG.0b013e31826df662.

10.   WHO | Foodborne diseases. Available at:

        http://www.who.int/foodsafety/areas_work/foodborne-diseases/en/. Accessed January

        14, 2015.

11.   Diarrhea | National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).

        NIH. 2011. Available at: http://www.niddk.nih.gov/health-information/health-

        topics/digestive-diseases/diarrhea/Pages/facts.aspx. Accessed May 30, 2015.

12.   Leal M, Gama S Da, Vasconcelos AG. Redalyc.Risk factors for hospitalization and

        death from diarrhea in a public pediatric hospital in Rio de Janeiro, Brazil.

        1996;38:29–36.

13.   Salim H, Karyana IPG, Sanjaya-putra IGN, Budiarsa S, Soenarto Y. Risk factors of

        rotavirus diarrhea in hospitalized children in Sanglah Hospital , Denpasar : a

        prospective cohort study. *BMC Gastroenterol*. 2014;14(1):1–6. doi:10.1186/1471-

        230X-14-54.

14.   Victora CG, Fuchs SC, Kirkwood BR, Lombardi C, Barros FC. Breast-feeding,

        nutritional status, and other prognostic factors for dehydration among young children

        with diarrhoea in Brazil. *Bull World Health Organ*. 1992;70(4):467–75. Available at:

        http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2393380&tool=pmcentrez

        &rendertype=abstract. Accessed December 24, 2014.

15.   Bhattacharya S, Bhattacharya M, Manna B, et al. Risk factors for development of

        dehydration in young children with acute watery diarrhoea: a case-control study. *Acta

        Paediatr*. 1995;84(2):160–164. doi:10.1111/j.1651-2227.1995.tb13602.x.

16. Bachrach LR, Gardner JM. Caregiver knowledge, attitudes, and practices regarding childhood diarrhea and dehydration in Kingston, Jamaica. *Rev Panam Salud Publica*. 2002;12(1):37–44. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12202023. Accessed January 17, 2015.

17. Cáceres DC, Estrada E, DeAntonio R, Peláez D. [Acute diarrheal disease: a public health challenge in Colombia]. *Rev Panam Salud Publica*. 2005;17(1):6–14. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15720876. Accessed January 19, 2015.

18. Phumaphi J, Judd J. Diarrhoea Treatment Guidelines Including new recommendations for the use of ORS and zinc supplementation for Clinic-Based Healthcare Workers. *Available from whqlibdoc who int/publications/2005*. 2005.

19. Ghasemi AA, Talebian A, Alavi NM, Mousavi GA. Knowledge of Mothers in Management of Diarrhea in Under-Five Children, in Kashan, Iran. *Nurs Midwifery Stud*. 2013;1(3):158–62. doi:10.5812/nms.10393.

20. NatinalStatistical Service [Armenia], Ministry of Health [Armenia], and ORC Macro. *Armen Demogr Heal Surv*.

21. Armenia] [National Statistical Service, [Armenia] M of H. Armenia Demographic and Health Survey. *Armen Demogr Heal Surv*. 2010.

22. Diarrheal Infectious. 2010:156–159.

23. Framework PP, Papikyan S. The Association of Maternal Knowledge and Management With Prevalence and Duration of Childhood Diarrheal Disease in Yerevan. 2009.

24.   Armenian H. Applications of the case-control method. Overview and historical perspective. *Johns Hopkins Univ Press*. 1994;16(1):1–5.

25.   Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med*. 2013;35(2):121–6. doi:10.4103/0253-7176.116232.

26.   Programme for the Control of Diarrhoeal diseases. The Selection of Fluids and Food for Home Therapy to Prevent Dehydration from Diarrhoea: Guidelines for Developing a National Policy. 1993.

27.   Diarrhoea Treatment Guidelines Including new recommendations for the use of ORS and zinc supplementation for Clinic-Based Healthcare Workers. *Diarrhoea Treat Guidel*. 2005.

28.   Saha D. Acute diarrhoea in children in rural Gambia: Knowledge, attitude and practice, aetiology, risk factors and consequences among children less than five years of age. 2013. Available at: https://ourarchive.otago.ac.nz/handle/10523/4414. Accessed May 15, 2015.

29.   Promoting Appropriate Management of Diarrhea: A Systematic Review of Literature for Advocacy and Action: UNICEF-PHFI Series on Newborn and Child Health, India. Available at: http://www.indianpediatrics.net/aug2012/aug-627-649.htm. Accessed May 15, 2015.

30.   Bjune G, Minh NB. The most common causes of and risk factors for diarrhea among children less than five years of age admitted to Dong Anh Hospital, Northern Vietnam. 2006;(May):1–86.

31. Mclennan JD. Home Management of Childhood Diarrhoea in a Poor Periurban Community in Dominican Republic. *Jounal Heal Popul Nutr*. 2002;20(3):245–254.

32. Zodpey SP, Deshpande SG, Ughade SN, Hinge A V, Shirikhande SN. Risk factors for development of dehydration in children aged under five who have acute watery diarrhoea: a case-control study. *Public Health*. 1998;112(4):233–6. Available at: http://www.ncbi.nlm.nih.gov/pubmed/9724946. Accessed May 15, 2015.

33. Yilgwan CS, Okolo SN. Prevalence of diarrhea disease and risk factors in Jos University Teaching Hospital, Nigeria. *Ann Afr Med*. 2012;11(4):217–21. doi:10.4103/1596-3519.102852.

34. Framework PP, Hovhannisyan L. Primary Health Care providers ' adherence to child growth monitoring protocols and prevalence and predictors of stunting , wasting and underweight among children aged 5-17 months residing in Yerevan. 2011;(c).

35. Mediratta RP, Feleke A, Moulton LH, Yifru S, Sack RB. Risk factors and case management of acute diarrhoea in North Gondar Zone, Ethiopia. *J Health Popul Nutr*. 2010;28(3):253–63. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2980890&tool=pmcentrez &rendertype=abstract. Accessed May 7, 2015.

36. Egton Medical Information Systems Limited. Dehydration in Children. *Lancet*. 1942;239(6192):535–536. doi:10.1016/S0140-6736(00)70105-X.

37. Pediatric Respiratory Rates Age Rate (breaths per minute) Pediatric Pulse Rates Age Low-Normal Pediatric Systolic Blood Pressure Age * Low Normal Pediatric CUPS Assessment Category C ritical Assessment U nstable P otentially unstable.

38.   Healthwise_staff. Level of Consciousness in Children. 2014. Available at:

https://myhealth.alberta.ca/health/pages/conditions.aspx?hwid=not48952&. Accessed

February 5, 2015.

Table 1.a. Descriptive statistics: general characteristics of under-five children hospitalized in Nork Infectious Hospital with acute diarrhea by their dehydration status: severe/moderate (cases) versus no/mild (controls), Armenia, 2015

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
Child's gender, % (n)	187				
Male		62.9 (39)	52.8 (66)		56.2%
Female		37.1 (23)	47.2 (59)	<0.191	43.8%
Child age (months), mean (SD)	187	14.8 (14.6)	24.4 (15.4)	<0.001	21.2 (15.8)
Child weight before diarrhea (kg),mean (SD)	106	8.5 (3.6)	11.6 (3.1)	<0.001	10.7 (3.5)
Child's height (cm), mean (SD)	52	60.8 (7.8)	74.6 (12.4)	<0.001	69.8 (12.8)
Child birth weight (kg), mean (SD)	186	2.9 (0.56)	3.1 (537.6)	<0.001	3.0 (0.58)
Concomitant diseases % (n)	187				
Diabetes		0.0 (0)	0.8 (1)		0.5%
Genetic diseases		1.6 (1)	0.0 (0)		0.5%
Other diseases		3.23 (2)	4 (5)		3.7%
No disease		95.2 (59)	95.2 (119)	0.898	95.2%
Rotavirus vaccination % (n)	187				
Yes		35.5 (22)	62.4 (78)		53.5%
No		40.3 (25)	16.8 (21)		24.6%
Don't know		20.8 (15)	20.8 (26)	<0.001	21.9%
Mother's rating of child's health (before the disease % (n)	187				
Very good		9.7 (6)	22.6 (28)		18.3%
Good		29.0 (18)	49.2 (61)		42.5%
Fair		58.1 (36)	25.8 (33)		36.6%
Poor		1.6 (1)	2.4 (3)		2.1%
Very poor		1.6 (1)	0.0 (0)	<0.001	0.5%

Table 1.b. Descriptive statistics: current diarrhea history and symptoms of under-five children hospitalized in Nork Infectious Hospital with acute diarrhea by their dehydration status: severe/moderate (cases) versus no/mild (controls), Armenia, 2015

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
The number of days past after beginning of the disease, mean (SD)	187	4.8 (4.0)	4.2 (3.1)	0.245	4.4 (3.4)
# of watery stools within last 24 hours, % (n)	187				
0		3.2 (29)	0.0 (0)		15.5%
1-2 times a day		27.4 (17)	48 (60)		41.2%
3-4 times a day		11.3 (7)	16 (20)		14.4%
More		56.4 (35)	34.4 (43)		41.7%
Don't know		1.6 (1)	1.6 (2)	0.017	1.6%
Repeating vomiting of child, % (n)	187	77.4 (48)	22.6 (14)	0.002	61.5%
# of days when child had repeated vomiting, mean (SD)	187	2.1 (2.2)	1.1 (1.6)	<0.001	1.4 (1.9)
Blood in the stool of the child, % (n)	187				
Yes		16.1 (10)	21.6 (27)		19.8%
No		83.9 (52)	78.4 (98)	0.378	80.2%
# of days when child had blood in the stool, mean (SD)	37	0.2 (0.5)	0.4 (0.9)	0.087	0.3 (0.8)
Child's unwillingness to drink, % (n)	187				
Yes		74.2 (46)	22.8 (28)		39.6% (74)
No		25.8 (16)	77.6 (97)	<0.001	60.4% (113)
# of days when child was unwilling to drink, mean (SD)	187	2.6 (3.0)	0.5 (1.3)	<0.001	1.2 (2.3)
Child had respiratory complains, % (n)	187				
Yes		50.0 (31)	38.4 (48)		42.3% (79)
No		50.0 (31)	61.6 (77)	0.131	57.7% (108)
Child had abdomen pain, % (n)	187				
Yes		64.5 (40)	59.2 (74)		60.1%
No		35.5 (22)	40.8 (51)	0.483	39.0%

Table 1.c. Descriptive statistics: mother's diarrhea home management attitude and practice of under-five children hospitalized in Nork Infectious Hospital with acute diarrhea by their dehydration status: severe/moderate (cases) versus no/mild (controls), Armenia, 2015

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
Mother heard about Rehydron, % (n)	187				
Yes		17.7 (11)	62.4 (78)		47.6% (89)
No		82.3 (51)	37.6 (47)	<0.001	52.4 (98)
Mother heard about Rehydron from, % (n)	89				
Physician/med. Staff		63.6 [1](7)	87.2 (68)		84.3% (75)
Other sources		36.4 (4)	12.8 (10)	0.067[1]	15.7%
Mother's knowledge score, mean (SD)[2]	187	4.3 (1.7)	5.5 (1.6)	<0.001	5.1 (1.7)
Patient received advice or treatment for the diarrhea prior to admission, % (n)	187				
Yes		74.2 (46)	76.0 (95)		75.4% (141)
No		25.8 (16)	24.0 (30)	0.787	24.6% (46)
Person/institution where from the care was sought prior to admission, % (n)	187				
Hospital		1.6 (1)	1.6 (2)		1.6% (3)
Health center or clinic		24.2 (15)	10.4 (13)		14.9% (28)
Private physician		1.6 (1)	5.6 (7)		4.3% (8)
Pediatrician		40.3 (25)	56.0 (70)		50.8% (95)

1. Fisher's Exact
2. This score was constructed from 10 question related to mother's knowledge
Min=0
Max=10
3. This score was constructed from 4 variables
Min=0
Max=4

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
Pharmacy		3.2 (2)	0.0 (0)		1.1% (2)
Nurse		1.6 (1)	0.0 (0)		0.5% (1)
None		27.4 (17)	26.4 (33)	0.021	26.7% (50)
The day of diarrhea when the first advice was sought, mean (SD)	187	2.4 (1.8)	2.1 (14)	0.255	2.2 (1.6)
Practice score [3], mean (SD)	187	0.8 (0.7)	1.2 (0.9)	0.004	1.1 (0.8)
Gave antibiotics, % (n)	187				
Yes		24.2 (15)	19.2 (24)		20.9 (39)
No		75.8 (47)	80.8 (101)	0.429	79.1 (148)
Gave antimotility drugs, % (n)	187				
Yes		4.8 (3)	1.6 (2)		2.7 (5)
No		95.2 (59)	98.4 (123)	0.196	97.3 (182)
The quantity of water given to a child during diarrhea, % (n)	187				
More than usual		17.7 (11)	38.4 (48)		31.5%
No fluids/less than usual/the same amount/don't know		82.2 (51)	61.6 (77)	0.004	68.5% (128)
The amount of food given to a child during diarrhea, % (n)	187				
More than usual		1.6 (1)	4.0 (5)		3.2% (6)
No food/less than usual/the same amount/don't know		98.4 (61)	96.0 (120)	0.383	96.8% (181)
KAP score % (n)	187	5.1 (2.0)	6.7 (1.9)	<0.001	6.2(2.05)

Table 1.d. Descriptive statistics: nutrition of under-five children hospitalized in Nork Infectious Hospital with acute diarrhea by their dehydration status: severe/moderate (cases) versus no/mild (controls), Armenia, 2015

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
Breastfeeding duration[2], mean (SD)(months)	187	**5.0 (5.4)**	**8.4 (6.4)**	**<0.001**	**7.3 (6.3)**
Child ever breastfed, % (n)	187				
Yes		79.0 (49)	88.8 (111)	0.074	85.6% (160)
NO		20.97 (13)	11.2 (14)		14.4% (27)
Current breastfeeding, % (n)	187				
Yes		29.0 (18)	20.8 (26)	0.212	23.5% (44)
No		70.9 (44)	79.2 (99)		76.5% (143)
Continued breastfeeding during diarrhea, % (n)	57				
Yes		70.8 (17)	78.8 (26)	0.491	24.6 (14)
No		29.2 (45)	21.2 (99)		75.4 (43)
Duration of exclusive breastfeeding(months) ,mean (SD)	183	2.1 (2.1)	3.1 (2.4)	0.004	2.7 (2.4)
Before 6 months child's nutrition, % (n)	187				
Breast milk		38.7 (24)	63.2 (79)		55.1% (103)
Infant formula		17.7 (11)	28.0 (35)	<0.001	24.6% (46)
Non adapted substitutes		43.6 (27)	8.8 (10)		20.3% (38)
Average amount of meals per day before diarrhea, mean (SD)	187	5.9 (2.7)	4.5 (1.7)	<0.001	4.9 (2.2)
Average amount of meals per day during diarrhea, mean (SD)	187	2.5 (2.5)	2.3 (2.5)	0.597	2.4 (2.5)

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[2] For those children who were currently breastfed, the child's age at the time of the interview was taken as breastfeeding duration.

Table 1.e. Descriptive statistics: socio-demographic data of under-five children hospitalized in Nork Infectious Hospital with acute diarrhea by their dehydration status: severe/moderate (cases) versus no/mild (controls), Armenia, 2015

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
Child's living region, %	187				
Yerevan		37.1	71.2		59.9%
Aragatsotn		8.1	2.4		4.3%
Ararat		6.5	4.8		5.4%
Armavir		4.8	1,60		2.7%
Gegharkunik		12.9	7.2	0.004	9.1%
Kotayk		24.2	8.8		13.9%
Lori		1.6	0.8		1.1%
Syunik		1.6	2.4		2.1%
Tavush		1.6	0		0.5%
Vayots Dzor		1.6	0.8		1.1%
City	187	46.8	84	<0.001	71.7%
Village		53.2	16		28.3%
Mother's age(years), mean (SD)	186	26.9 (4.3)	27.1 (4.3)	0.775	27.1 (4.3)
Level of education, % (n)	187				
Incomplete secondary		1.6 (1)	1.6 (2)		1.6 (3)
School (10 years)		64.5 (40)	39.2 (49)		47.6 (89)
Professional/technical		4.8 (3)	13.6 (17)	0.018	10.7 (20)
Institute/ University		29.0 (18)	44.0 (55)		39.0 (73)
Post-graduate		0.0 (0)	1.6 (2)		1.1 (2)
Current working status, % (n)	187				
Employed		14.5 (9)	23.2 (29)	0.165	79.7 (149)
Unemployed		85.5 (53)	76.8 (96)		20.3 (38)
Marital status, % (n)	187				
Single		0.0 (0)	8.0 (10)		5.4 (10)
Married		91.9 (57)	91.2 (114)	0.008	91.4 (177)
Widowed		1.6 (1)	0.0 (0)		0.5 (1)
Divorced/Separated		6.5 (4)	0.8 (1)		2.7 (5)
Father of child lived with him/her, % (n)	187				
Yes		67.7 (42)	81.6 (102)	0.034	77.0 (144)
No		32.3 (20)	18.4 (23)		23.0 (43)
# of months father left, mean (SD)	38	8.7 (6.2)	6.1 (4.4)	0.131	7.1 (5.3)
SES[3] score, mean (SD)	167	5.4 (1.4)	6.2 (1.3)	<0.001	5.9 (1.4)
# of people living in the family, mean (SD)	187	6.1 (2.1)	5.0 (1.7)	<0.001	5.4 (1.9)
# of siblings in the family, mean (SD)	187	1.95 (0.7)	1.7 (0.7)	0.054	1.8 (0.7)
Child's birth order, mean(SD)	187	1.9 (0.7)	0.6 (0.7)	0.008	1.7 (0.7)

Table 1.f. Descriptive statistics: correct answers to questions related to attitude and knowledge on correct diarrhea home management of mothers of under-five children hospitalized in Nork Infectious Hospital with acute diarrhea by their dehydration status: severe/moderate (cases) versus no/mild (controls), Armenia, 2015

Characteristic	N	Cases (n=62)	Controls (n=125)	p – value	Total
Rehydron could prevent dehydration, %	187	38.7	60.8	0.004	53.5%
Sweetened drinks could make diarrhea worse , %	187	30.6	54.4	0.002	46.5%
Salted waters or soups are helpful for diarrhea home therapy, %	187	32.3	41.6	0.216	38.5%
You should give water to a child with diarrhea in smaller amounts than usual, %	187	79.2	79.3	0.979	79.1%
The breast fed children should be breastfed less frequently during diarrhea, %	187	56.5	86.4	<0.001	76.5%
If the child is on formula feeding, you should give it to child in usual amount during diarrhea, %	187	30.6	20.8	0.138	24.1%
Children with diarrhea should eat less than usually, %	187	17.7	28.0	0.125	24.6%
What is Rehydron for, %	187	11.3	27.2	0.013	21.93%
A child with diarrhea should be taken to a hospital if his/her symptoms do not get better in 3 days, %	187	95.1	92.8	0.535	93.6%
Signs of danger of diarrhea, %	187	41.9	60.8	0.015	54.6%

Table 2. Simple logistic regression analysis

Unadjusted associations between dehydration degree of children and child's general characteristics, current diarrhea history and symptoms, diarrhea home practices, child's nutritional variables among children under five years old in Armenia

Table 2.a. Child's general characteristics

Variable	Crude OR	CI (95%)	P-value
Child's female gender	0.7	(0.35; 1.23)	0.191
Child's age	0.95	(0.93; 0.97)	<0.001
Child weight before diarrhea	0.99	(0.99; 0.99)	<0.001
Child's height	0.8	(0.76; 0.93)	<0.001
Child's birth weight	0.99	(0.99; 0.99)	<0.001
Received Rotavirus vaccination	0.3	(0.18; 0.62)	<0.001
Mother's rating of child's health (before the disease (%))	2.3	(1.50; 3.60)	<0.001

Table 2.b. Current diarrhea history and symptoms

Variable	Crude OR	CI (95%)	P-value
Repeating vomiting	2.9	(1.48; 5.92)	0.002
# of days past after beginning of the disease	1.1	(0.96; 1.14)	0.250
# of watery stools within last 24 hours	0.5	(0.25; 0.91)	0.025
# of days when child had repeated vomiting	1.3	(1.10; 1.57)	0.002
Child was unwilling to drink	9.9	(4.9; 20.20)	<0.001
# of days when child was unwilling to drink	1.8	(1.42; 2.32)	<0.001
Child had respiratory complains	1.6	(0.86; 2.96)	0.132

Table 2.c. Diarrhea home practices

Variable	Crude OR	CI (95%)	P-value
Mother heard about Rehydron	0.1	(0.06; 0 .27)	<0.001
Mother's knowledge score	0.6	(0.53; 0.79)	<0.001
Mother heard about Rehydron from a Physician/med. Staff	0.3	(0.06; 1.03)	0.057
The care was received from physician/hospital	0.8	(0.38; 1.46)	0.403
Practice score (0-4)	0.6	(0.38; 0.83)	0.004
Gave antimotility drugs	3.1	(0.51; 19.22)	0.218
More than usual amount of water was given to a child during diarrhea (%)	0.3	(0.16; 0.72)	0.005
KAP score	0.6	(0.54; 0.78)	<0.001

Table 2.d. Child's nutrition

Variable	Crude OR	CI (95%)	P-value
Child was ever breastfed	0.5	(0.20; 1.08)	0.078
Currently breastfed	1.6	(0.78 ; 3.13)	0.213
Exclusive breastfeeding duration	0.8	(0.71 ; 0.94)	0.006
Before 6 months breast milk was replaced with infant formula	013	(0.05; 0.34)	<0.001
Child's living region Yerevan vs. other regions	0.23	(0.12; 0.45)	<0.001
Level of education (Institute/ University/postgraduate)	0.5	(0.25; 0.94)	0.031
Current working status (Employed)	0.6	(0.25; 1.28)	0.168
Father of child lived with him/her	0.5	(0.23; 0.95)	0.036
#of months father left	1.1	(0.96; 1.26)	0.141
SES score	0.6	(0.49; 081)	<0.001
# of people living in the family, mean (SD)	1.3	(1.11; 1.56)	<0.001
# of children mother has, mean (SD)	1.5	(0.98; 2.31)	0.057
Higher birth order, mean (SD)	1.7	(1.14; 2.70)	0.010

Table 2.e. Mothers right answers on diarrhea home management

Variable	Crude OR	CI (95%)	P-value
Rehydron could prevent dehydration	0.4	(0.22; 0.76)	0.005
Sweetened drinks could make diarrhea worse	0.4	(0.19; 0.70)	0.003
Salted waters or soups are helpful for diarrhea home therapy	0.7	(0.35; 1.27)	0.218
You should give water to a child with diarrhea in smaller amounts than usual	0.9	(0.47; 2.09)	0.979
The breast fed children should be breastfed less frequently during diarrhea	0.2	(0.09; 0.41)	<0.001
If the child is on formula feeding, you should give it to child in usual amount during diarrhea	1.6	(0.84; 3.35)	0.140
Children with diarrhea should eat less than usually	0.5	(0.25; 1.18)	0.128
What is Rehydron for	0.3	(0.14; 0.82)	0.016
A child with diarrhea should be taken to a hospital if his/her symptoms do not get better in 3 days	1.5	(0.25; 087)	0.538
Signs of danger of diarrhea	0.5	(0.25; 086)	0.016

Table 3. Determinants of severe/moderate dehydration among under-five children in

Armenia hospitalized with acute diarrhea (final model, n=166)

Characteristics	Adjusted OR	95% CI	*P* value
Total KAP score of diarrhea home management	0.68	(0.53; 0.87)	0.003
Child's age	0.94	(0.90; 0.97)	<0.001
Child's Gender (male)	0.34	(0.13; 0.90)	0.031
Mother's rating of child's health (before the disease) good/very good	0.23	(0.09; 0.62)	0.004
Child's weight before diarrhea (kg)	0.91	(0.83; 1.00)	0.053
Rotavirus vaccination+	0.29	(0.08; 0.61)	0.003
Higher birth order	2.21	(1.10; 4.42)	0.025
SES score>=average	0.70	(0.49; 1.01)	0.059
Yerevan vs. other regions	0.27	(0.10; 0.72)	0.009
Repeating vomiting during diarrhea	5.10	(1.84; 14.08)	0.002
Model's fit statistics:		*Hosmer & Lemeshow goodness of fit test, p=0.418*	
		Area under the ROC curve=0.905	
		Pseudo R2=0.458	

Appendix

Appendix 1. Dehydration assessment tool

Mild /No dehydration signs	Severe/moderate dehydration signs
Normal	Moderately/severely decreased tissue turgor[36]
	Increased respiratory rate [37]or deep, acidotic breathing
Increased thirst	Signs of shock (tachycardia, irritable or reduced conscious level[38], hypotension)
No other clinical signs	Delayed CRT >2 sec or Mottled skin

Appendix 2. Assent forms (Armenian, English versions)

Assent form for Children Ages under five years old (English version).

Hi. My name is Anna. If you allow me I will touch your belly now and your finger. You will not feel pain at all. Your mom/dad will be with us the whole time. Can you show me your belly?

Իրազեկ համաձայնության ձև մինչև 5 տարեկան երեխաների համար

(Armenian version)

Բարև, ես Աննա եմ: Եթե դեմ չես, ես հիմա կկպնեմ քո փորիկին և կբռնեմ քո եղունգը: Դու ընդհանրապես ցավ չես զգա: Մայրիկդ/հայրիկդ կողքդ կլինի: Դե հիմա փորիկդ ցույց կտա՞ս:

Appendix 3. Oral consent form (English version)

Consent form for mothers or main caregivers of children under five years

Hello, my name is Anna Mkhoyan. I am a physician and a graduate student at School of Public Health at the American University of Armenia. My master thesis is dedicated to the investigation of risk factors of severe/moderate dehydration as a result of acute diarrhea among children under five years old. As your child have diarrhea, I would like you to answer to several questions. You will be one of approximately 200 mothers who will participate in this study. Your participation in this study is voluntary. There is no penalty if you refuse to participate in this study. Your participation will involve in depth interview with the duration of 15 minutes. You can skip any questions you don't want to answer or even stop the interview. Your participation in the study poses no risk for you or for your child. The information received from you is important for the study. If you don't mind I will also collect information from your child's medical record regarding to the cause of your child's disease and assess his dehydration degree by pinching skin of belly and putting pressure to his/her fingernails. There is no direct benefit from the participation in this study, but your participation will help to understand risk factors of severe/mild dehydration among children with acute diarrhea and may reduce severe/mild dehydration rates in future. Whether or not you decide to participate will not affect Whether or not you decide to participate will not affect future treatment of your child. The information provided by you and the data obtained from the medical records are fully confidential and will be used only for the study. Your name and your child's name will not appear on the questionnaire. Only the general findings will be presented in the report. If you have any questions regarding this study you can contact the Principal Investigator Dr. Anahit Demirchian by following phone number (374 60) 61 25 61. If you feel you have not been treated fairly o ɳ think you have been hurt by joining the study you should contact Dr. Kristina Akopyan, the Human Subject Protection Administrator of the American University of Armenia (37460) 61 25 61. Do you agree to participate? Thank you. If yes, shall we continue? Where would you like to do the interview, in this room or I can suggest separate room for interview?

Appendix 4. Oral consent form (Armenian version)

Գիտահետազոտական էթիկայի հանձնաժողով

Իրազեկ համաձայնության ձև այն մայրերի կամ հիմնական խնամակալների

համար

Բարև Ձեզ, իմ անունը Աննա է: Ես բժիշկ եմ և Հայաստանի ամերիկյան համալսարանի Հանրային առողջապահության բաժնի ուսանող: Իմ դիպլոմային աշխատանքի շրջանակներում հարցումներ եմ անցկացնում, որի նպատակն է պարզել փորլուծություն ունեցող մինչև 5 տարեկան երեխաների մոտ ջրազրկման ռիսկի գործոնները: Քանի որ Ձեր բալիկը փորլուծություն ունի, կխնդրեի, որ պատասխանեք մի քանի հարցերի: Ձեր պես ևս 200 երեխաների մայրեր մասնակցելու են այս հարցմանը: Ձեր մասնակցությունը կամավոր է, այսինքն Դուք կարող եք որոշել մասնակցել, թե ոչ: Եթե համաձայնվեք մասնակցել, մեզ կօգնեք հասկանալ, թե երեխաների մոտ ինչու է առաջանում ջրազրկում փորլուծության ժամանակ: Այդպիսով դուք Ձեր մասնակցությամբ կօգնեք ուրիշ երեխաների: Ձեզանից կպահանջվի ընդամենը 15 րոպե ժամանակ: Ես հարցերը կկարդամ ու կխնդրեմ, որ հերթով պատասխանեք: Դուք կարող եք չպատասխանել ցանկացած հարցի կամ ցանկացած պահի ընդհատել հարցազրույցը: Ձեր մասնակցությունն այս հարցմանը որևէ ուղղակի օգուտ կամ որևէ վտանգ չի ներկայացնում ոչ Ձեր և ոչ էլ Ձեր բալիկի համար: Մասնակցության որոշումը չի ազդի Ձեր երեխայի բուժման վրա: Ձեր տրամադրած տվյալների մեջ Ձեր անունը, Ձեր երեխայի անունը կամ որևէ այլ տվյալ, որը կարող է Ձեզ բացահայտել, չի նշվելու: Վերջում բոլոր մայրիկների տրամադրած տվյալները ամփոփվելու են և ներկայցվելու են ընդհանրացված ձևով: Եթե այս հարցման մասին հարցեր ունենաք, կարող եք զանգել դիմպլոմային աշխատանքիս ղեկավարին՝ Անահիտ Դեմիրճյանին, հետևյալ հեռախոսահամարով՝ (374 60) 61 25 62: Եթե կարծում եք, որ հարցման ընթացքում Ձեզ կամ Ձեր բալիկին լավ չեմ վերաբերվել կամ որևէ կերպ Ձեզ անհանգստություն է պատճառվել, կարող եք զանգահարել Հայաստանի ամերիկյան համալսարանի Էթիկայի հանձնաժողովի քարտուղար Քրիստինա Հակոբյանին՝ (374 60) 61 25 61 հեռախոսահամարով:
Եթե դեմ չեք ես հիվանդության հարուցչի վերաբերյալ տվյալներ կվերցնեմ նաև Ձեր բալիկի հիվանդության պատմությունից, ինչպես նաև այս հարցագրույցից հետո կատուգեմ ջրազրկման աստիճանը բալիկի մոտ՝ թեթևակի հպվելով որովայնի մաշկին և սեղմելով եղունգի ծայրը:
Կարո՞ղ ենք սկսել: Որտե՞ղ կցանկանաք, որ անցկացնենք հարցումը: Ես կարող եմ առաջարկել իմ առանձին աշխատասենյակը: Եթե ցանականում եք, կարող ենք նաև խոսել Ձեր պալատում:

Appendix 5. Questionnaire (English version)

Patient's ID_____   Start of the interview_____: _____

Date of the interview_____ ____day/month/year   *hour   minute*

Child's general health status	
1) When was your child born?	---------------------- (Day/Month/Year)
2) Sex of the child	1. Male 2. Female
3) What was the weight of the child (kg) before this diarrhea episode?	_____ 999. Don't know
4) What is the current height of the child (cm)?	_____ 999. Don't know
5) What was the child's birth weight (kg/g)?	___ _____ 999. Don't know
6) Does your child have any of these diseases?	1. Diabetes 2. Mediterranean fever 3. Genetic disease 4. Other disease_____ 5.No
7) How would you rate the general health of your child before this diarrhea episode?	1. Very good 2. Good 3. Fair 4. Poor 5. Very poor
8) Has your child been vaccinated against rotavirus infection?	1. Yes 2. No 3. Don't know
Current diarrhea history/symptoms	
9) How many days have passed since the beginning of this disease?	_____

10) On the average, how many watery stools did he /she have within 24 hours?	1.1-2 times a day
	2. 3-4 times a day
	3. More
	4. Don't know
11) Have the child had repeated vomiting?	1. Yes
	2. No
	3. Don't know
11.1) How many days	
12) Was the child unwilling to eat?	1. Yes
	2. No
	3. Don't know
12.1) How many days	
13) Was the child unwilling to drink?	1. Yes
	2. No
	3. Don't know
13.1) How many days	
14) Have you noticed blood in the child's stool?	1. Yes
	2. No
	3. Don't know
14.1) How many days	
15) Has the child difficulties with breathing or any other respiratory complain during this diarrhea?	1. Yes
	2. No
	3. Don't know
16) Where there any other symptoms? (pain in abdomen, rash, jaundice)	1. Yes
	2. No
	3. Don't know
16.1) What symptom?	_____

Maternal knowledge about diarrhea home management	
Please, tell whether you think each of the following statements is true or false	
1) Rehydron can prevent dehydration in a child with diarrhea.	1. True 2. False 3. Don't know
2) Sweetened drinks could make diarrhea worse (including sweetened tea, sweetened fruit juices).	1. True 2. False 3. Don't know
3) Salted waters or soups are not helpful for diarrhea home therapy.	1. True 2. False 3. Don't know
4) You should give water to a child with diarrhea in smaller amounts than usual.	1. True 2. False 3. Don't know
5) The breast fed children should be breastfed less frequently during diarrhea.	1. True 2. False 3. Don't know
6) If the child is on formula feeding, you should give it to child in usual amount during diarrhea.	1. True 2. False 3. Don't know
7) Children with diarrhea should eat less than usually.	1. True 2. False 3. Don't know
8) Zinc supplements can relieve severity of diarrhea.	1. True 2. False 3. Don't know
9) A child with diarrhea should be taken to a hospital if his/her symptoms do not get better in 3 days.	1. True 2. False 3. Don't know

10) Please, list what danger signs of diarrhea in a child indicate the need to take the child to a hospital. *(Check all)*	1. Bloody stool 2. Severe vomiting 3. Eating poorly 4. Drinking poorly 5. Being sleepy 6. Other _____ 7. Don't know
Practices of diarrhea home management	
17) Have you heard about Rehydron?	1. Yes 2. No *(Go to Q 31)*
18) What is it for?	_____
18.1) Where from you heard about it?	_____
19) Did you receive advice or treatment for the diarrhea from any person/ institution before admission?	1. Yes 2. No *(Go to Q. 34)*
20) Where or from whom did you receive care?	1. Hospital 2. Health center or clinic 3. Private physician 4. Family doctor 5. Nurse 6. Pharmacy 7. Traditional healer 8. Relative 9. Friend 10. Other _____

21) How many days after the diarrhea began did you first seek advice or treatment?	1. The same day
	2. After 1 day
	3. After 2 days
	4. After 3 days
	5. After more than 3 days
	6. Don't remember
22) Did you give her/him a fluid made from a special packet called "Rehydron" at home to prevent dehydration?	1. Yes
	2. No
	3. Don't know
23) Did you give other fluids at home for the same purpose?	1. Yes
	1.1 Specify_____
	2. No
	3. Don't know
24) What else did you give the child at home to treat the diarrhea?	1. Antibiotic
	1.1 Specify_____
	2. Anti-motility medicine
	2.1 Specify_____
	3. Homemade/herbal medicine
	3.1 Specify_____
	4.Zinc supplements
	5. Other (specify) _____
25) During this diarrhea, how much fluid did you give your child to drink?	1. No fluids
	2. Much less than usual
	3. About the same amount
	4. More than usual
	5. Don't know
26) During this diarrhea, how much food did you give your child to eat?	1. No food
	2. Much less than usual
	3. About the same amount
	4. More than usual
	5. Don't know

Child's nutrition	
27) Did you ever breastfeed your child? Has the child ever been breast feed?	1. Yes 2. No *(Go to Q. 44)* 3. Don't know
28) How long did you breastfeed your child (months)?	_____
29) Do you still breastfeed him/her?	1. Yes
(Ask if the child is under 2 years)	2. No *(Go to Q 44)*
30) If yes, did you continue breast feeding during this diarrhea?	1. Yes 2. No
31) For how long (in months) did you give your child only breast milk – allowing no water, no other liquids or foods?	_____
32) If never/less than six months, what kind of food did you give your child to replace breast milk?	1. Infant formula 2. Animal milk (specify _____) 3. Yogurt 4. Narine 5. Other milk (specify_____) 6. Other food (specify_____)
33) In average, how many times did you feed your child per day when he/she was healthy (count all meals/feedings)?	_____
34) In average, how many times did you feed your child per day during this diarrhea?	_____
Socio-demographic data	
35) From what Marz you are?	1. Yerevan 2. Aragatsotn 3. Ararat 4. Armavir 5. Gegharkunik 6. Kotayk 7. Lori 8. Shirak 9. Syunik 10. Tavush 11. Vayots Dzor
35.1) Your residency City or Village?	_____

36) Please tell me your (mother's) date of birth.	_____ (day/month/year)
37) What is your completed educational level?	1. Incomplete secondary (less than 10 years) 2. School (10 years) 3. Professional technical (10-13) 4. Institute/ University 5. Post-graduate
38) Are you currently employed?	1. Employed 2. Unemployed 3. Student 4. Housewife 5. Other_____
39) What is your current marital status?	1. Single 2. Married 3. Widowed 4. Divorced
40) Is the father of the child living with you?	1. Yes *(Go to Q8)* 2. No
41) If no, how long he doesn't live with you?	_____
42) On average, what are your household expenditures per month?	1. Less than 50.000 drams 2. From 50,001 - 100,000 drams 3. From 100,001 - 200,000 drams 4. From 200,001 - 300,000 drams 5. Above 300,000 drams
43) How would you rate your family's general standard of living?	1. Substantially below average 2. Little below average 3. Average 4. Little above average 5. Substantially above average
44) How many people live in your family, including you?	_____
45) How many children do you have?	_____
46) How many older siblings does the child have?	_____

End of the interview_____: _____

Hour   minute

Patient's ID_____

Dehydration degree assessment tool

Objective examination	_____
1) CRT (Central Capillary Refill Time in seconds)	
2) Respiratory rate (breaths per minute)	_____
3) Tissue turgor	1.not decreased (immediately skin retracts) 2.slow retract<2 sec 3.very slow>2sec
4) Signs of shock (tachycardia, hypotension, irritable or reduced conscious level)	1. Yes 2. No
Laboratory finding (pathogen)	

Appendix 6. Questionnaire (Armenian version)

ID_____   Հարցագրույցի սկիզբ (Ժամ_____: _____ *րոպե)*

Հարցագրույցի ամսաթիվ __ ___ _____ օր/ամիս/տարի

Երեխայի ընդհանուր առողջական վիճակը	
1) Երեխայի ծննդյան ամիս ամսաթիվը:	---------------------օր/ամիս/տարի
2) Երեխայի սեռը:	1. Արական 2. Իգական
3) Որքա՞ն էր երեխայի քաշը մինչև այս փորլուծության սկիզբը (կգ):	_____ 999. Չգիտեմ
4) Որքա՞ն է երեխայի հասակը (սմ) :	_____ 999. Չգիտեմ
5) Ի՞նչ քաշով է է ծնվել Ձեր երեխան(կգ/գ):	____ ____կգ/գ 999. Չգիտեմ
6) Ձեր բալիկը ունի՞ այս հիվանդություններից որևէ մեկը:	1. Դիաբետ 2.Պարբերական հիվանդություն 3.Գենետիկ հիվանդություն 4. Այլ հիվանդություն. _____ 5. Ոչ
7) Ինչպե՞ս կգնահատեիք երեխայի ընդհանուր առողջությունը մինչև այս վերջին լուծը:	1. Շատ լավ 2.Լավ 3. Բավարար 4. Վատ 5. Շատ վատ
8) Ստացե՞լ է արդյոք Ձեր երեխան ռոտավիրուսի դեմ պատվաստում:	1. Այո 2. Ոչ 3. Չգիտեմ

Ընթացիկ հիվանդության պատմություն /ախտանիշներ	
9) Քանի՞ օր է անցել այս հիվանդության սկզբից :	_____
10)Վերջին 24 ժամում քանի՞ անգամ է լուծել Ձեր երեխան:	1.1-2 անգամ 2. 3-4 անգամ 3. Ավելի շատ 4. Չգիտեմ
11) Այս փորլուծության ընթացքում երեխան ունեցե՞լ է կրկնվող փսխումներ:	1. Այո 2. Ոչ 3. Չգիտեմ
11.1) Քանի՞ օր:	_____
12) Այս փորլուծության ընթացքում երեխայի մոտ ախորժակի կորուստ նկատվե՞լ է:	1. Այո 2. Ոչ 3. Չգիտեմ
12.1) Քանի՞ օր:	_____
13) Այս փորլուծության ընթացքում երեխան հրաժարվե՞լ է հեղուկ խմելուց:	1. Այո 2. Ոչ 3. Չգիտեմ
13.1) Քանի՞ օր:	_____
14) Այս փորլուծության ընթացքում երեխայի կղանքում երբևէ նկատե՞լ եք արյուն:	1. Այո 2. Ոչ 3. Չգիտեմ
14.1) Քանի՞ օր:	_____
15) Այս փորլուծության ընթացքում երեխայի մոտ նկատվե՞լ է դժվարացած շնչառություն կամ շնչական համակարգի հետ կապված այլ զանգատ:	1. Այո 2. Ոչ 3. Չգիտեմ
16) Այս փորլուծության ընթացքում որևէ այլ ախտանիշ նկատվե՞լ է երեխայի մոտ (ցավ որովայնում, ցան, դեղնուկ):	1. Այո 2. Ոչ 3. Չգիտեմ
16.1) Ի՞նչ ախտանիշ	_____

Մայրիկների գիտելիքները տնային պայմաններում դիարեայի բուժման վերաբերյալ Խնդրեմ, նշեք՝ Ձեր կարծիքով այս պնդումները ճի՞շտ են, թե սխալ:	
1) Ռեհիդրոնը կարող է կանխարգելել ջրազրկումը փորլուծությամբ հիվանդ երեխաների մոտ:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
2) Քաղցր ըմպելիքները կարող են վատացնել լուծի ընթացքը (այդ թվում՝ քաղցր թեյը և մրգային հյութերը):	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
3) Աղ պարունակող հեղուկները կամ ջրիկ ապուրները օգտակար չեն լուծի տնային բուժման համար:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
4) Լուծով հիվանդ երեխային ջուր պետք է տալ ավելի քիչ քանակությամբ՝ քան սովորաբար:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
5) Կրծքով կերակրվող լուծով հիվանդ երեխան պետք է ստանա կրծքի կաթը ավելի պակաս հաճախականությամբ:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
6) Եթե երեխան սնվում է արհեստական կաթով, լուծի ժամանակ պետք է այդ կաթը տալ սովորական քանակությամբ:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
7) Լուծով հիվանդ երեխաները ավելի քիչ պետք է ուտեն, քան սովորաբար:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
8) Ցինկի հավելումները կարող են թեթևացնել լուծի ընթացքը:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
9) Լուծով հիվանդ երեխային պետք է տեղափոխել հիվանդանոց, եթե 3 օրում ախտանիշների լավացում չի նկատվում:	1. Ճիշտ է 2. Սխալ է 3. Չգիտեմ
10) Խնդրեմ՝ թվարկեք լուծի վտանգի նշանները երեխայի մոտ, որոնք վկայում են երեխային հիվանդանոց տեղափոխելու անհրաժեշտության մասին: *(Նշեք բոլորը)*	1. Արյունոտ լուծ 2. Խիստ փսխումներ 3. Վատ ուտելը 4. Վատ խմելը 5. Քնկոտություն 6. Այլ _____ 7. Չգիտեմ
Տան պայմաններում փորլուծության վարման հմտությունները	
17) Երբևէ լսե՞լ եք ռեհիդրոնի մասին:	1. Այո

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	2. Ոչ *(անցում Հ.19)*
18) Որտեղի՞ց եք լսել ռեհիդրոնի մասին:	
18.1) Ինչի՞ համար է այն:	
19) Նախքան հիվանդանոց ընդունվելը երեխայի փորլուծության վերաբերյալ խորհրդի կամ բուժման համար դիմե՞լ եք որևէ մարդու կամ հաստատության:	1. Այո 2. Ոչ *(անցում Հ 34)*
20) Որտեղ կամ ու՞մ եք դիմել:	1. Հիվանդանոց 2. Բժշկական կենտրոն կամ կլինիկա 3. Մասնավոր բժշկի 4. Մանկաբույժի կամ ընտանեկան բժշկի 5. Բուժքրոջ 6. Դեղատուն 7. Հեքիմի 8. Բարեկամի 9. Ընկերոջ 10. Այլ _____
21) Փորլուծության սկզբից քանի՞ օր անց եք առաջին անգամ դիմել օգնության կամ բուժման:	1. Նույն օրը 2. Մեկ օր անց 3. 2 օր անց 4. 3 օր անց 5. 3-ից ավելի օրեր անց 6. Չեմ հիշում
22) Այս փորլուծության ընթացքում ջրազրկման կանխարգելման նպատակով տանը երեխային տվե՞լ եք ռեհիդրոնի լուծույթ :	1. Այո 2. Ոչ 3. Չգիտեմ

23) Այս փորլուծության ընթացքում նույն նպատակով տվե՞լ եք Ձեր երեխային որևէ այլ հեղուկ:	1. Այո 1.1 Մանրամասնեք՝ ինչ հեղուկ_____ 2. Ոչ 3. Չգիտեմ
24) Այս փորլուծության ընթացքում ուրի՞շ ի՞նչ եք տվել երեխային ՝ լուծի բուժման նպատակով:	1. Անտիբիոտիկ 1.1 Մանրամասնեք_____ 2. Աղիների շարժունակությունը նվազեցնող դեղորայք 2.1 Մանրամասնեք_____ 3. Տնային պատրաստման/բուսական դեղորայք 3.1 Մանրամասնեք_____ 4.Ցինկի հավելումներ 5.Այլ (մանրամասնեք) _____
25) Փորլուծության ժամանակ ո՞րքան հեղուկ եք տվել երեխային :	1. Չեմ տվել 2. Ավելի քիչ, քան տալիս եմ սովորաբար 3. Գրեթե նույն քանակությամբ, ինչ տալիս եմ սովորաբար 4. Ավելի շատ, քան սովորաբար 5. Չգիտեմ
26) Փորլուծության ընթացքում որքա՞ն սնունդ եք տվել երեխային:	1. Չեմ տվել 2. Ավելի քիչ, քան սովորաբար 3. Գրեթե նույն քանակությամբ 4. Ավելի շատ, քան սովորաբար 5. Չգիտեմ

Երեխայի սնուցումը	
27) Ձեր երեխային կերակրե՞լ եք կրծքով:	1. Այո 2. Ոչ *(անցում Հ. 32)* 3. Չգիտեմ
28) Ո՞րքան ժամանակ եք երեխային կերակրել կրծքով (ամիսներ):	_____
29) Դեռ կերակրու՞մ եք երեխային կրծքով: *(Հարցնել եթե երեխան փոքր է 2 տարեկանից*	1. Այո 2. Ոչ *(անցում Հ. 32)*
30) Եթե այո, ապա արդյոք շարունակե՞լ եք կերակրել Ձեր երեխային կրծքով այս փորլուծության ընթացքում:	1. Այո 2. Ոչ
31) Որքա՞ն ժամանակ եք (ամիսներով) Ձեր երեխային կերակրել բացառապես կրծքի կաթով՝ չտալով ոչ ջուր, ոչ որևէ այլ հեղուկ կամ սնունդ:	_____ *(եթե 6 ամիս և ավելի, անցում Հ.33)*
32) Եթե մինչև 6 ամսական հասակը երեխան ստացել է այլ սնունդ՝ բացի կրծքի կաթից կամ դրա փոխարեն, ապա ի՞նչ տեսակի սնունդ է ստացել: *(Նշեք բոլոր ճիշտ պատասխանները)*	1. Կաթնախառնուրդ (արհեստական կաթ) 2. Կենդանու կաթ (մանրամասնեք _____) 3. Մածուն 4. Նարինե 5. Այլ կաթ (մանրամասնեք_____) 6. Այլ սնունդ (մանրամասնեք_____)
33) Միջինում օրական քանի՞ անգամ էիք կերակրում Ձեր երեխային առողջ ժամանակ (հաշվեք բոլոր սննդաբաժինները/կերակրումները):	_____
34) Միջինում քանի՞ անգամ էիք կերակրում երեխային երեխայի փորլուծության ժամանակ:	_____

Սոցիալ – դեմոգրաֆիկ տվյալներ	
35) Ո՞ր մարզից եք:	1. Երևանից 2. Արագածոտնից 3.Արարատից 4. Արմավիրից 5. Գեղարքունիքից 6. Կոտայքից 7. Լոռուց 8. Շիրակից 9. Սյունիքից 10. Տավուշից 11. Վայոց Ձորից
35.1) Ձեր բնակավայրը գյո՞ւղ է, թե՞ քաղաք:	_____
36) Ասացեք, խնդրեմ, Ձեր (մայրիկի) ծննդյան ամիս ամսաթիվը:	_____(օր/ամիս/տարի)
37) Ձեր կրթությունը:	1. Թերի միջնակարգ (10 տարուց քիչ) 2. Դպրոց (10 տարի) 3. Ուսումնարան/տեխնիկում (10-13 տարի) 4. Բարձրագույն 5. Հետդիպլոմային
38) Ներկայումս աշխատու՞մ եք:	1. Այո, աշխատում եմ 2. Ոչ չեմ աշխատում 3. Ուսանող եմ 4. Տնային տնտեսուհի եմ 5. Այլ _____
39) Ամուսնացա՞ծ եք:	1. Չամուսնացած 2. Ամուսնացած 3. Այրի 4. Բաժանված/ամուսնալուծված
40) Ձեր երեխայի հայրիկը Ձեզ հե՞տ է ապրում:	1. Այո *(անցում Հ.42)* 2.Ոչ

41) Որքա՞ն ժամանակ (ամիս) է, ինչ երեխայի հայրը Ձեզ հետ չի ապրում :	_____
42) Մոտավորապես որքա՞ն են կազմում Ձեր ընտանիքի ամսական ծախսերը միջինում:	1. մինչև 50.000 դրամ 2. 50,001 - 100,000 դրամ 3. 100,001 - 200,000 դրամ 4. 200,001 - 300,000 դրամ 5. 300,000 դրամից ավելի
43) Ի՞նչպես կգնահատեիք Ձեր ընտանիքի նյութական վիճակը:	1. Միջինից զգալի ցածր 2. Միջինից մի փոքր ցածր 3. Միջին 4. Միջինից մի փոքր բարձր 5. Միջինից զգալի բարձր
44) Քանի՞ հոգի են բնակվում Ձեր տանը:	_____
45) Քանի՞ երեխա ունեք:	_____
46) Քանի՞ իրենից մեծ քույր կամ եղբայր ունի երեխան:	_____

Հարցազրույցի ավարտ (ժամ_____ : _____ *րոպե)*

ID_____

Օբյեկտիվ զննում 1) Կենտրոնական մագանթալցման ժամանակ	_____
2) Շնչառության հաճախականություն (մեկ րոպեում)	_____
3) Մաշկի տուրգորը	1.Նվազած չէ (մաշկի անմիջապես ուղղում) 2.Դանդաղած մաշկի ուղղում'<2 վայրկյան 3.Շատ դանդաղած' >2 վարկյան
4) Շոկի նշաններ (տախիկարդիա, հիպոտենզիա, գրգռված կամ արգելակված զիտակցություն)	1. Այո 2. Ոչ
Լաբորատոր հետազոտության տվյալներ (հարուցիչ)	