Clinical Practice Guideline and Pathway for the Evaluation and Management of Children with Diarrhea in Family and Community Practice

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Background: Diarrhea is among the common causes of morbidity and mortality in children. It 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). It does not include frequent passing of formed stool and passing of loose, pasty stools by breastfed babies. It is usually a symptom of an infection in the intestinal tract, caused by variety of organisms, which is spread through contaminated food or drinking water, or from person-to-person as a result of poor hygiene. Diarrhea can last several days and can leave the body without the water and salts that are necessary for survival causing significant number of mortality and morbidity among children. At the level of primary care, diagnosis, management and treatment of food- and waterborne-diseases, which commonly present as diarrhea, lack the necessary protocols and standards, thus, the creation of this clinical pathway.

Objective: The main goal of this clinical pathway was to provide guidance to family and community physicians, and other primary care physicians in managing acute diarrhea among immunocompetent pediatric patients.

Methods: ADAPTE process was used in CPG development. Existing guidelines on acute diarrhea among pediatric patients were retrieved and appraised using the AGREE II tool. Recommendation statements from the guidelines that passed the AGREE II tool were reviewed. Recommendation statements that will help answer the clinical questions posed in the creation of the clinical pathway were adapted. For clinical questions were not answered by the available guideline recommendations, a de novo method was conducted. The adapted recommendation statements and the supporting summary of evidences were sent for external review prior to consensus development. Suggestions provided in both steps were discussed and incorporated in the final manuscript, as appropriate.

Key Recommendation Statements:

These key recommendation statements addressing the clinical assessment, diagnosis, interventions (pharmacologic and non-pharmacologic), and patient outcomes that are relevant in the outpatient or primary care setting in the Philippines were based on the summarized key evidences from the systematic review of literature conducted using the ADAPTE process.

Clinical Assessment

- Recommendation 1. A focused medical history that includes questions on duration, frequency, characteristics, associated symptoms, consumption of raw, ill-prepared, or rotten food; intake of antibiotics, contaminated food or water; and history of travel should be obtained. (Strong recommendation, High quality evidence)
- Recommendation 2. Physical examination should be done to assess the nutritional status, degree of dehydration, severity of disease, and presence of complications and comorbid conditions. (Strong recommendation, High quality evidence)
- Recommendation 3. Degree of dehydration should be classified into No Dehydration, Mild to Moderate Dehydration, or Severe Dehydration. (Weak recommendation, Moderate quality evidence)
- Recommendation 4. Children with acute infectious diarrhea who have any of the following conditions should be admitted to the hospital: severe dehydration, inability to tolerate fluids orally, suspected electrolyte abnormalities, altered consciousness, abdominal distention, respiratory distress, pneumonia, meningitis/encephalitis, sepsis, moderate to severe malnutrition,

suspected surgical condition, or conditions for safe follow-up and home management are not met. (Strong recommendation, High quality evidence)

Diagnostic Tests

- Recommendation 5. Routine diagnostic tests are not necessary among children with acute diarrhea. (Strong recommendation, Low quality evidence)
- Recommendation 6. Stool examination may only be requested if the patient present with moderate to severe condition, bloody diarrhea, or amoebiasis and parasitism is being considered at time of epidemic. (Strong recommendation, High quality evidence)
- Recommendation 7. Diagnostic tests may be requested if concomitant conditions like pneumonia, urinary tract infection, sepsis or meningitis are suspected; or if abdominal distension is observed post-hydration. (Strong recommendation, High quality evidence)
- Recommendation 8. Stool culture, serologic test, rapid diagnostic test, PCR determination and serum biomarkers are not recommended in family and community practice. (Strong recommendation, High quality evidence)

Pharmacologic Treatment

- Recommendation 9. Reduced osmolarity oral rehydration solution (ORS), commercial or home-made is recommended to replace previous and ongoing losses. (Strong recommendation, High quality evidence)
- Recommendation 10. The volume and frequency of reduced osmolarity oral rehydration solution (ORS) should be dependent on patient's age or weight, severity of dehydration and ongoing losses. (Strong recommendation, High quality evidence)
- Recommendation 11. Severe dehydration should be managed in the hospital with intravenous hydration. (Strong recommendation, High quality of evidence)
- Recommendation 12. Routine empiric antibiotic treatment is not recommended in children with acute infectious diarrhea. (Strong recommendation, Very low quality evidence)
- Recommendation 13. Antibiotic treatment may be given to children with Cholera, Shigella, typhoidal Salmonella, amoebiasis, and giardiasis. The choice of antibiotic must be guided by the local Antibiotic Surveillance Program. (Strong recommendation, High quality evidence)
- Recommendation 14. In general, antibiotic treatment should not be given in children with non-typhoidal Salmonella. It may be given in children with underlying conditions i.e., immunodeficiency, corticosteroid or immunosuppressive therapy. (Strong recommendation, Very low quality evidence)
- Recommendation 15. Among children older than six months, zinc supplementation of 10-20 mg per day for 10-14 days may be offered to reduce the duration and severity of diarrhea, and recurrence in the next two to three months (Strong recommendation, High quality evidence)
- Recommendation 16. Racecadotril may be offered to reduce ongoing loss of water and electrolytes. (Strong recommendation, High quality evidence)
- Recommendation 17. Probiotics may be offered to reduce the duration of diarrhea. Lactobacillus rhamnosus GG (LGG), Saccharomyces boulardii and Lactobacillus reuteri are strains with evidence of effectiveness. (Strong recommendation, High quality evidence)
- Recommendation 18. Anti-emetics and antidiarrheal drugs are generally not recommended because of their side-effects. (Strong recommendation, High quality evidence)

Non-pharmacologic Interventions

- Recommendation 19. Among children with acute diarrhea, age-appropriate feeding should be continued. There is no need to modify or restrict diet. (Strong recommendation, Moderate quality of evidence)
- Recommendation 20. Among infants with diarrhea, breastfeeding must be continued. (Strong recommendation, High quality evidence)
- Recommendation 21. If diet was restricted because of frequent vomiting, early refeeding must be done. (Strong recommendation, Moderate quality evidence)
- Recommendation 22. All members of the family must be encouraged regular hand washing with soap and water. (Strong recommendation, Moderate quality evidence)
- Recommendation 23. Family members must observe proper food handling, have access to safe drinking water, and observe proper waste disposal. (Strong recommendation, Low quality evidence)
- Recommendation 24. Community level intervention that encourages hand washing, proper food handling, appropriate waste disposal and ensuring safe drinking water must be done. (Strong recommendation, Low quality evidence)

Expected Patient Outcomes

- Recommendation 25. After each encounter the patient or guardian must understand the nature of acute diarrhea, its management and potential complications. (Strong recommendation, Low quality evidence)
- Recommendation 26. The management plan must be a mutual agreement between the family physician and the guardian. (Strong recommendation, Low quality evidence)
- Recommendation 27. For the management of a child with acute diarrhea, the family physician must target for resolution of dehydration, resolution of diarrhea, prevention of relapse, hospitalization, complications and early detection of adverse events. (Strong recommendation, High quality evidence)

Dissemination and Implementation

This clinical pathway will be published in the "The Filipino Family Physician" journal, which is accessible in the PAFP journal website. PAFP's Committee on Research will disseminate the clinical pathway through distribution to its subspecialty and affiliate societies, chapters, training programs, and primary care practitioners; and continuing development sessions of the PAFP. Monitoring of the uptake of the clinical pathway will be through the number of downloads at the website and requests for copies. This clinical pathway may be used as a guide by family and community physician and primary care physicians in a primary care setting. Tabular presentation of the clinical pathway was included as a tool for implementation. Monitoring of implementation will be via continuous quality improvements activities, which can be a self-initiated activity of the member as recommended in the Universal Healthcare, or as a chapter or group activity.

Introduction

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). It does not include frequent passing of formed stool and passing of loose, pasty stools by breastfed babies. It is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of viral, bacterial, and parasitic organisms. Infection is spread through contaminated food or drinking water, or from person-to-person as a result of poor hygiene, with the former contributing to the greatest number of cases. Diarrhea can last several days and can leave the body without the water and salts that are necessary for survival. In the past, severe dehydration was the main cause of diarrheal deaths but now, other causes such as septic bacterial infections affecting malnourished or immunocompromised children may be contributing to the increasing proportion of all diarrhea-associated deaths.[1]

In 2017, the World Health Organization stated that diarrhea is the second leading cause of death in children under five years old killing around 525,000 children and contributing nearly 1.7 billion cases every year. In low-income countries, children under three years old experience an average of three episodes of diarrhea every year depriving the child of the nutrition necessary for growth. As a result, diarrhea causes malnutrition, and malnourished children are more likely to fall ill from diarrhea.[1] In 2021, the Philippine Integrated Disease Surveillance and Response (PIDSR) reported a 38% decrease in the number of cases of acute bloody diarrhea from that in 2020 (from 5,460 to 3360) but the number of deaths increased by 53% (from 33 to 62).2 The target set by the Food and Water-borne Diseases Prevention and Control Program (FWBD-PCP) of reducing the morbidity rate was met while eliminating deaths due to diarrhea remains to be far from reach.[3]

The fluctuating trend in the morbidity and mortality rates of diarrhea has been noted for years and gaps were identified in the different sectors. At the level of primary care, diagnosis, management and treatment lack the necessary protocols and standards. The hospitals continue to manage and treat diarrhea, following different protocols and guidelines as the DOH was still finalizing the clinical practice guideline (CPG)3. With the Philippine Academy of Family Physicians' (PAFP') clinical pathways on diarrhea (in adult and in pediatric population), this gap may be addressed.

Scope and Purpose

This clinical guideline and pathway are meant to guide family and community physicians, and other primary care physicians in managing acute diarrhea among immunocompetent pediatric patients. It covers recommendations for clinical assessment, diagnosis, and intervention (pharmacologic and non-pharmacologic) to provide resolution of symptoms, and prevention of recurrent disease. It may be used in patients younger than 19 years of age with no known disease affecting the immunity, who presents with diarrhea for a period of less than 14 days. Patients presenting with symptoms for at least 14 days and/or with complications that would necessitate care beyond the outpatient setting are not covered by this pathway.

Objectives

With the main goal of providing guidance to family and community physicians, and other primary care physicians in managing acute diarrhea among immunocompetent pediatric patients, the following specific objectives were set in the creation of this pathway:

1. To present and synthesize the best available evidence in the clinical assessment, diagnosis, and management of acute diarrhea among immunocompetent pediatric patients

2. To provide recommendations in the clinical assessment, diagnosis, and management of acute diarrhea among immunocompetent pediatric patients that may be adapted to the existing health care delivery system
3. To standardize the clinical assessment, diagnosis, and management of acute diarrhea among immunocompetent pediatric patients in an outpatient setting

Methods of Development

Development Team

The PAFP's clinical pathway development group (CPDG) consists of the technical working group (TWG) and the consensus panel (CP). The PAFP Research Committee served as the steering committee. In forming the TWG, invitations were sent to PAFP members in active practice and/or academe, and who have a background in writing research, critical appraisal and/or developing guidelines. The CP comprised of family and community physicians, and other primary care physicians representing different areas of practice [government, private, health maintenance organization and school].

The TWG is the lead clinical pathway developer. It is responsible for the definition of the scope and the target audience of the clinical pathway, development of clinical questions, conduct of search and appraisal of evidence, synthesis of evidence summaries, and drafting of recommendation statements. The CP, on the other hand, is responsible for the review, revision, and the decision to adopt the recommendation statements.

The members of the TWG and CP were requested to provide a summary of their conflicts of interest (COIs) related to acute diarrhea. These COIs, which may either be financial and non-financial (intellectual), and participation of the member to the group were in agreement with the Manual for CPG Development by the Department of Health (DOH and Philippine Health Insurance Corporation (PHIC).[4] The members of the TWG, CP and their COIs, and how these were managed are presented in Appendix A).

Formulating the Scope and Review Questions

After defining the scope, the PICO format, which identifies the target population, intervention/s or exposure/s, comparison/s, (if appropriate) and outcome/s, was used to define the clinical questions to be addressed in the recommendations. The TWG met online to discuss the key clinical questions, which were similar to those identified in the clinical pathways previously developed by PAFP. The clinical questions were developed in the context of an outpatient setting. Consultation with primary care physicians, physicians from other specialties, and patients (i.e., the use of antibiotic, antimotility, probiotics, etc.) were conducted to obtain their views, perspective and preferences in the management of diarrhea and were considered in the development of key clinical questions.

Searching, Selecting and Appraising the Evidence

Since ADAPTE was the method used in the development of this clinical pathway, a systematic search for clinical practice guidelines in PubMed, Cochrane and Google Scholar was performed in February 2022 using the keywords "diarrhea" and "guidelines" as MeSH terms. An alert was created for the search strategy should there be updates on the topic. The search yielded 56 articles, which upon review provided only three relevant CPGs. Four other CPGs, two of which are local, were provided by the members of the TWG from individual scoping searches giving a total of seven CPGs for evaluation and appraisal. (See Appendix B & C for PRISMA & the Search Strategy, respectively)

The guidelines were then evaluated for quality, currency, content, consistency and applicability; and appraised using the Appraisal of Guidelines Research and Evaluation (AGREE) II instrument, which provides a framework for assessing the quality of CPGs6. Each CPG was appraised by two members of the TWG. All domains were checked but focus was given to rigor and total scores. Only two CPGs scored above 70 for both rigor and total scores making them the main source of recommendations for adoption or adaptation. These are "The CPG on the Management of Acute Infectious Diarrhea in Children and Adults" by DOH, et al.[7] and "Use of Probiotics for the Management of Acute Gastroenteritis in Children: An Update" by Szajewska, et al.[8]

Formulating the Recommendation

The recommendations for the clinical pathway were adapted mainly from the CPGs, which passed AGREE's set cut-off score. If the answers to the key questions cannot be obtained from these CPGs, other CPGs were reconsidered and/or de novo search for the specific question was conducted. The evidence reviewers drafted the initial recommendation statements based on the data provided

Table 1. PICO components of the pediatric diarrhea clinical pathway development.

	Scope
Population	Pediatric population (<19 years old) with diarrhea ≤ 14 days
Intervention	Clinical assessment, diagnosis, intervention (pharmacologic and non-pharmacologic)
Comparator	Appropriate comparator
Outcomes	Awareness of condition, diagnostic accuracy, resolution of symptoms, avoidance of hospitalization and complications

by the literature. Evidences were then extracted and summarized to provide a basis for the generated recommendation statements. The generated recommendation statements with the supporting summary of key evidence were then sent for external review by a pediatric gastroenterologist, for assessment of applicability and feasibility; and for feedback. Minor revisions on the recommendation statements and summary of key evidences were suggested and incorporated in the manuscript prior to distribution to the members of the CP.

Consensus Panel

The revised recommendation statements and summary of key evidence were presented to the members of the CP for consensus building. The following outcomes - resolution of dehydration and diarrhea, and avoidance of hospitalization, complication and mortality were set as priorities to consider in developing the recommendations. Each CP member were given evidence to decision framework to base their vote on whether approve, modify, or delete the recommendation.

Grading of the Recommendations

With the initial recommendation statements are the levels of quality of evidence based on the source guidelines and references. The two guidelines included utilized the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach in grading the quality of evidence and strength of recommendation.6 GRADE defines the quality of evidence for guideline panels as the extent to which the confidence in an estimate of the effect is adequate to support a particular recommendation. Quality of evidence was ranked as high, moderate, low and very low. For decisions on intervention, meta-analysis of RCTs and RCTs were initially graded as high quality while observational studies including metanalysis of observational studies were initially graded as low quality. For decisions on clinical assessment, observational studies were initially graded as high quality. For decisions on diagnostic tests, cross-sectional, cohort studies and meta-analysis of such studies were initially graded as high quality while case-control studies and meta-analysis of case control studies are initially graded as low quality. The quality of the evidence was downgraded if there was significant risk of bias, inconsistency, indirectness, imprecision and publication bias; while grade was upgraded when there was large effect dose, dose response, and methods of addressing confounders.

The members of the consensus panel must make judgments about the quality of evidence relative to the specific context for which they are using the evidence. It may involve separate grading of quality of evidence for each patient-important outcome followed by determining an overall quality of evidence across outcomes.6 The strength of the recommendation was based on the votes of the members of the CP that were obtained during the consensus building. Each member votes to adopt the recommendation or not based on his/her confidence that the desirable effects of an intervention outweigh its undesirable effects or that the undesirable effects of an intervention outweigh its desirable effects. If all the members of the CP agree to adopt the recommendation statement, the recommendation is considered strong. If more than 70% to less than 80% of the CP agree to adopt the recommendation, the recommendation is graded moderate, while if the agreeing panel members were 70% or less, the recommendation statement is graded weak.

Updating

This clinical pathway guideline will be revisited for updates every five years or when new significant evidence that would entail revision of recommendations arise. Existing methodology on clinical pathway development will be utilized should the guideline need updating.

Recommendations

Clinical Assessment

Clinical Question: Among pediatric patients presenting with diarrhea, what should be the components of the clinical assessment?

Recommendation 1. A focused medical history that includes questions on duration, frequency, characteristics, associated symptoms, consumption of raw, ill-prepared, or rotten food; intake of antibiotics, contaminated food or water; and history of travel should be obtained. (Strong recommendation, High quality evidence)

Table 2. Quality of evidence grades[6]

Grade	Definition
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very Low	We have very little confidence in the effect estimate=: The true effect is likely to be substantially different from the estimate of effect

Clinical Pathway

VISIT	PATHWAY TASKS				
	History and Physical Examination	Diagnostic tests	Pharmacologic Intervention	Non- pharmacologic Intervention	Patient Outcomes
FIRST VISIT	For ALL pediatric patients presenting with diarrhea: Elicit: ___ duration, frequency and characteristics of stool and associated symptoms ___ history of consumption of raw, ill-prepared or rotten food; intake of antibiotics contaminated food or water, and history of travel Physical Examination: _ Assess nutritional status, degree of dehydration, severity of disease, & presence of complications, and comorbid conditions. _ Classify dehydration into No Dehydration, Mild to Moderate Dehydration, and Severe Dehydration	_ Recommend against the use of routine diagnostic tests _ May request for stool examination among patients with moderate to severe dehydration, bloody diarrhea, amoebiasis, parasitism at times of epidemic. _ May request diagnostic tests in presence of concomitant conditions (i.e., pneumonia, UTI, sepsis, meningitis, Covid-19) _ Recommend against the use of stool culture, serologic test, rapid diagnostic test, PCR determination and serum biomarkers	<u>Rehydration</u> _ Recommend reduced osmolarity oral rehydration solution (ORS) to replace previous and ongoing losses. _ The volume and frequency of reduced osmolarity ORS should depend on the patient's age or weight, severity of dehydration and ongoing losses. _ Manage severe dehydration in a hospital setting <u>Antibiotics</u> _ Recommend against routine empiric antibiotic therapy _ May give antibiotics in the following conditions: ● Suspected cholera ● Shigella ● Typhoidal Salmonella ● Amoebiasis ● Giardiasis based local antibiotic surveillance program as guide. _ May give antibiotic in non-typhoidal Salmonella among children with underlying conditions.	Educate parents/caregivers/patients with the following recommendations: _ Continue age-appropriate feeding with no modification nor restriction. _ Continue breastfeeding. _ Early refeeding if continuous feeding not tolerated. **Family** _ Encourage hand washing with soap and water. _ Observe proper food handling, utilization of safe drinking water, and proper waste disposal. **Community** _ Promote hand washing, proper food handling, assurance of safe drinking water, and proper waste disposal.	_ Resolution of dehydration, diarrhea, fever, and other symptoms; and prevention of complication, relapse; and mortality. _ The parent or guardian understands the nature of acute diarrhea its management, and potential complications. _ The family physician and the guardian has mutually agreed with the management plan.
	_ Check for conditions that may warrant admission to hospital (see Recommendation 4 statement)		<u>Zinc</u> _ May give routine zinc supplementation (not in combination with vitamins and minerals) at 20mg/day for 10-14 to shorten the duration of diarrhea and severity of diarrhea among children older than six months. <u>Racecadotril</u> _ May offer racecadotril (1.5 mg/kg/dose) to reduce the duration of diarrhea.		

			Probiotics _ May offer probiotics as an adjunct therapy throughout the duration of the diarrhea. Antiemetic & Antidiarrheal Drugs _ Do not recommend antiemetic and antidiarhheal drugs because of their side effects.		
Variation	If the duration is more than 14 days or there possible comorbid medical or surgical conditions, exit acute diarrhea pathway			_	
SECOND VISIT (After 2-3 days) and SUCCEEDING VISITS	_ Reevaluate clinically as described during the first visit. _ Among patients with persistent symptoms, assess compliance if with prescribed medications from the first visit. _Interpret results of diagnostic tests done during the first visit	_ May request for diagnostic tests as described during the first visit as necessary	_ May initiate or continue management as described during the first visit as necessary	_ Continue provision of education on non-therapeutic interventions as described during the first visit.	Same as above
Variation	If the duration has gone more than 14 days and there are evident comorbid medical or surgical conditions that would require care beyond outpatient setting, exit acute diarrhea pathway and refer accordingly				

Diarrhea is defined as a decrease in the consistency of stool leading to liquid stools and/or an increase in the frequency of stools to three or more in 24 hours, with or without fever or vomiting. It does not include frequent passing of formed stool and passing of loose, pasty stools by breastfed babies.[1] Acute vomiting and/or diarrhea, often referred to as acute gastroenteritis, is a frequent cause of outpatient visits and hospitalizations. Acute watery diarrhea (i.e., cholera) and acute bloody diarrhea (i.e., dysentery, which manifests as frequent scant stools with blood and mucus) lasts less than seven days.[9] Acute infectious diarrhea is suspected if a patient presents with passage of three or more stools, watery or bloody, within 24 hours that may be accompanied by any of the following: nausea, vomiting, abdominal pain, or fever.[7]

Questions on duration, frequency, characteristics, associated symptoms, and contributory factors would help identify the type and probable cause of diarrhea. However, studies showed that there is no single factor that can really predict the etiology of an acute infectious diarrhea. Most of the studies that predicted the likelihood of acute bacterial diarrhea among pediatric patients utilized combination of symptoms and diagnostic test results. A study reported bowel movement of more than four times a day with no associated vomiting has a high probability of bacterial diarrhea (Sn 86%, Sp 60%).[10] Another study utilized the presence of fever, vomiting, and mucoid and bloody stool (Sn 90%, Sp 42%) with increased specificity with the addition of high fecal WBC (Sp 86%).[11] Summer season, frequency of diarrhea, frequency of vomiting, and eating of shrimp or crab were also among the other factors identified to be highly associated with acute bacterial diarrhea[12] while younger age, dry and cold season, increased height-for-age z-score, lack of bloody diarrhea, and presence of vomiting were

identified on the other hand to predict acute viral diarrhea.[13]

Recommendation 2. Physical examination should be done to assess the nutritional status, degree of dehydration, severity of disease, and presence of complications and comorbid conditions. (Strong recommendation, High quality evidence)

Physical examination of pediatric patients presenting with acute diarrhea should include vital signs; weight; and evaluation for signs of dehydration, complications, and comorbid conditions.

Dehydration reflects disease severity among patients with diarrhea and the percentage of body weight lost remains to be the best measure of dehydration. However, in most circumstances, pre-illness weight is frequently not available to estimate weight lost during an episode of diarrhea.[14] Nutritional status should also be assessed to delineate changes brought about by dehydration.

Physical examination findings indicative of dehydration that should be ascertained among children with diarrhea include abnormal vital signs (tachycardia, tachypnea), depressed level of consciousness, depressed fontanels, sunken eyes, decreased or absent tears, poor skin turgor, prolonged capillary refill time, abnormal respiratory pattern, and decreased urine output.[7] Of these signs, prolonged capillary refill time, abnormal skin turgor, and abnormal respiratory pattern were identified to be the top three signs that best predict the likelihood of dehydration.[3] (See Table 3)

Recommendation 3. Degree of dehydration should be classified into No Dehydration, Mild to Moderate Dehydration, or Severe Dehydration. (Weak recommendation, Moderate quality evidence)

The members of the CP did not all agree with the adoption of the recommendation statement on the basis that in actual practice, mild and moderate dehydration are treated differently, thus, the weak strength of recommendation. The physical findings, together with patient's thirst status and ability to drink, are used to determine the degree of patient's dehydration, which serves as a guide in the management of pediatric patients with acute diarrhea. (See Table 4)

Table 3. Summary test characteristics for clinical findings to detect 5% dehydration.

Clinical Manifestations	Likelihood Ratio Value (95% CI) or Range		Sensitivity Value (95% CI) or Range	Specificity Value (95% CI) or Range
	LR +	LR -		
Prolonged capillary refill	4.1 (1.7-9.8)	0.57 (0.39-0.82)	0.60 (0.29-0.91)	0.85 (0.72-0.98)
Abnormal skin turgor	2.5 (1.5-4.2)	0.66 (0.57-0.75)	0.58 (0.40-0.75)	0.76 (0.59-0.93)
Sunken eyes	1.7 (1.1-2.5)	0.49 (0.38-0.63)	0.75 (0.62-0.88)	0.52 (0.22-0.81)
Dry mucous membranes	1.7 (1.1-2.6)	0.41 (0.21-0.79)	0.86 (0.80-0.92)	0.44 (0.13-0.74)
Cool extremity	1.5-18.8	0.89-0.97	0.10-0.11	0.93-1.00
Weak pulse	3.1-7.2	0.66-0.96	0.04-0.25	0.86-1.00
Absent tears	2.3 (0.9-5.8)	0.54 (0.26-1.13)	0.63 (0.42-0.84)	0.68 (0.43-0.94)
Increased heart rate	1.3 (0.8-2.0)	0.82 (0.64-1.05)	0.52 (0.44-0.60)	0.58 (0.33-0.82)
Sunken fontanelle	0.9 (0.6-1.3)	1.12 (0.82-1.54)	0.49 (0.37-0.60)	0.54 (0.22-0.87)
Poor overall appearance	1.9 (0.97-3.8)	0.46 (0.34-0.61)	0.80 (0.57-1.04)	0.45 (-0.1-1.02)

Table 4. Clinical manifestations of dehydration in children according to severity.

Parameters		No signs of dehydration	Mild to Moderate dehydration	Severe dehydration
Fluid Deficit (% body weight)	Infant	<5%	5 – 10 %	> 10%
	Child	3%	6%	9%
Condition[a]		Well, alert	Restless, irritable	Lethargic, unconscious
Thirst		Drinks normally, not thirsty	Thirsty, drinks eagerly	Drinks poorly, not able to drink
Fontanel/Eyes[a]		Normal	Slightly depressed/ slightly sunken	Sunken
Tears		Present	Present or decreased	No tears
Cutaneous Perfusion/ Capillary Refill Time[b]		<2 seconds	Around 2 seconds	>3 seconds
Respiration		Normal	Deep, may be rapid	Deep and rapid 2mo-12mo: ≥50 breaths/min >12mo-5yrs: ≥40 breaths/min
Skin Pinch		Goes back quickly	Goes back slowly	Goes back very slowly
History of Urine Output		Normal	Decreased (<0.5 mL/kg/hr in 8 hrs)	Minimal (<0.3ml/kg/hr in 16 hours) or none (no urine output in 12 hours)
Interpretation			If the patient has two or more of the above signs, there is MILD to MODERATE DEHYDRATION	If the patient has two or more of the above signs, there is SEVERE DEHYDRATION

Source: CPG AID

[a]These parameters are unreliable for patients with severe malnutrition. Use other parameters to distinguish malnutrition from dehydration.

[b]Capillary refill time is the time required for return of color after application of blanching pressure to a distal capillary bed.

Recommendation 4. Children with acute infectious diarrhea who have any of the following conditions should be admitted to the hospital: severe dehydration, inability to tolerate fluids orally, suspected electrolyte abnormalities, altered consciousness, abdominal distention, respiratory distress, pneumonia, meningitis/encephalitis, sepsis, moderate to severe malnutrition, suspected surgical condition, or conditions for safe follow-up and home management are not met. (Strong recommendation, High quality evidence)

After a thorough clinical assessment based on medical history and physical examination, a decision must be made regarding the options for the place of management i.e., home management or hospital admission. Poor oral intake is one parameter to be considered for hospital admission. Presence of symptoms and diseases, which were summarized in Table 5, contribute to increased risk for mortality among pediatric patients with acute diarrhea necessitating prompt hospital admission upon recognition. Undocumented fever, however, was not found to be associated with mortality [OR 0.8 (0.5–1.2)].[15] Although there is no direct evidence available, the presence of suspected surgical condition should be considered for admission for further evaluation.

Diagnostic Tests

Clinical Question: Among pediatric patients with acute diarrhea, what diagnostic tests may be included in the patient's workup to determine its etiology?

Recommendation 5. Routine diagnostic tests are not necessary among children with acute diarrhea. (Strong recommendation, Low quality evidence)

The reviewed guidelines recommended different diagnostic options in the management of acute diarrhea among pediatric patients. They included stool examination, stool culture, and serologic tests. The judicious and cost-effective use of diagnostic work up for pediatric patients with diarrhea is important, especially in geographically isolated and/or economically challenged situations. According to these guidelines, diagnostic tests, in general, are NOT recommended for children with mild or moderate dehydration.[14,31,32]

Recommendation 6. Stool examination may only be requested if the patient present with moderate to severe condition, bloody diarrhea, or amoebiasis and parasitism is being considered at time of epidemic. (Strong recommendation, High quality evidence)

The characteristics of stool may be a useful indicator in gaining insight on suspected cause. For example, non-inflammatory diarrhea that does not contain white blood cell are mostly caused by virus or toxin-producing bacterial infections. On the other hand, diarrheal stool mixed with mucus, blood and pus are mostly results from invasive bacterial infection.[33] Meta-analysis of 15 studies with 7,161 patients evaluating the utility of fecal leukocytes in distinguishing bacterial vs. non-bacterial diarrhea revealed using a threshold level of greater than 5 cells/hpf for fecal leukocyte determination had a sensitivity of 50%, specificity of 83%, (+) LR of 2.93, and (-) LR of 0.6.7 Darkfield microscopy to detect motile vibrios may be used to confirm the diagnosis of cholera. While acute bloody diarrhea may reveal presence of red blood cell-containing Entamoeba trophozoites which aids in the direction of treatment.[32]

Recommendation 7. Diagnostic tests may be requested if concomitant conditions like pneumonia, urinary tract infection, sepsis or meningitis are suspected; or if abdominal distension is observed post-hydration. (Strong recommendation, High quality evidence)

Reviewed guidelines recommended that diagnostic tests should be requested based on the patient's clinical status.[7,34] They may be requested in patients with moderate to severe cases, in the hospital setting, or among patients suspected to have complications of acute infectious diarrhea; or pneumonia, sepsis, meningitis, and urinary tract infection.[7,35]

Diarrhea is also recognized to be a common symptom across SARS-CoV2 variants, thus diagnostic testing for COVID-19 may be recommended among pediatric patients presenting with acute diarrhea, particularly when the patient has symptoms consistent with or there is a strong suspicion of COVID-19. Patients are tested for confirmation of COVID-19 since there is no specific symptom or combination of symptoms that reliably differentiate SARS-CoV-2 with those of other viral conditions.36,37 Gastrointestinal symptoms (i.e., nausea, vomiting, or diarrhea) are common across SARS-CoV-2 variants and often times, they may be the only presenting symptoms among pediatric patients with COVID-19 infection.36-38 Diarrhea and abdominal pain are some of the clinical symptoms of COVID-19 found in 6.5% of cases among children.

Recommendation 8. Stool culture, serologic test, rapid diagnostic test, PCR determination and serum biomarkers are not recommended in family and community practice. (Strong recommendation, High quality evidence)

Even if the clinical assessment and stool examination suggest an infectious type of diarrhea, stool culture is not routinely recommended for several reasons. First, identification of pathogenic bacterium, virus, or parasite in a stool specimen does not indicate in all cases that it is the cause of illness.[39] Second, most cases of watery diarrhea in family and community practice are self-limiting condition and may have resolved when the results are available. The stool culture may not have an influence in the management. Third, the test is costly, time consuming, and covers few microorganisms for detection in accessible laboratories for family and community practice. Stool culture can only be helpful in choice of antibiotics when patients are managed in the hospital setting to avoid development of antibiotic resistant strain.[7] However, stool culture may be useful for surveillance to detect epidemics, and in the evaluation of antimicrobial susceptibility patterns of selected pathogens for public health monitoring. In such cases it should be done in the clinical laboratory, or at public health laboratory to ensure

Table 5. Risk factors for mortality in pediatric patients with acute diarrhea[15-28]

Parameter	OR/RR (95% CI)	Study
Abdominal distention	OR 1.67 (1.16-2.41)	Nathoo, 1998
	OR 4.31 (1.20-16.19)	Bhutta, 1996
Absent peripheral pulses after rehydration	OR 10.9 (2.1-56.8)	Chisti, 2011
Altered consciousness (drowsiness)	OR 4.41 (1.27-15.35)	Bhutta, 1996
Altered consciousness (lethargy or coma)	OR 4.80 (1.64-14.04)	Bennish, 1990
Anion gap >14.9	OR 1.76 (1.21-2.57)	Islam, 1986
Anorexia	OR 3.90 (1.40-10.87)	Bhutta, 1996
Bicarbonate <20 mmol/L	OR 1.90 (1.28-2.57)	Islam, 1986
Birth weight <2 kg	OR 13.6 (5.0, 34.3)	Santhanakrishnan, 1987
Dehydration not improving after 12 hours	RR 16.0 (2.4-170.1)	Griffin, 1998
Diarrhea >3 days	OR 3.63 (1.07-12.33)	Abhulimhen-Iyoha, 2013
Diarrhea >6 times/day	OR 23.63 (6.5-55.84)	Abhulimhen-Iyoha, 2013
Diarrhea >8 times/day	OR 4.1 (2.4-7.0)	Bhattacharya, 1995
Electrolyte disorder	RR 2.7 (2.4-2.9)	Kilgore, 1995
Frequency of vomiting (>2 times/day)	OR 2.4 (1.4-4.0)	Bhattacharya, 1995
Hyperkalemia >5.5 mmol/L	OR 1.74 (1.01-1.97)	Nathoo, 1998
Hypernatremia >150 mmol/L	OR 15.8 (3.00-81.80)	Chisti, 2011
Hypothermia	OR 5.7 (1.5-22.1)	van den Broek, 2005
	OR 2.12 (1.33-3.39)	Nathoo, 1998
Kwashiorkor	RR 2.0 (1.1 to 3.7)	Creek, 2010
Major infection -pneumonia, measles, sepsis, meningitis -pneumonia, sepsis, meningitis	 RR 7.7 (2.5-24.2) OR 4.7 (3.9-5.6)	 Griffin, 1998 Sachdev, 1991
Malnutrition	OR 4.2 (2.1, 8.7)	O'Reilly, 2012
	OR 3.06 (1.79, 11.89)	Abhulimhen-Iyoha, 2013
Moderate/severe dehydration	OR 4.10 (1.62-16.93)	Abhulimhen-Iyoha, 2013
	OR 8.17 (1.53-43.67)	Uysal, 2000
Nausea and vomiting	RR 2.5 (1.9-3.2)	Kilgore, 1995
Non-usage of ORS	OR 2.1 (1.2-3.6)	Bhattacharya, 1995
	OR 16.52 (3.81-41.58)	Abhulimhen-Iyoha, 2013
Pneumonia	OR 2.5 (1.1-5.5)	van den Broek, 2005
	OR 17.8 (3.7-84.5)	Chisti, 2011
	OR 16.38 (3.36-97.54)	Abhulimhen-Iyoha, 2013
Pneumonia among 1—11 months old	RR 4.8 (3.9-5.9)	Kilgore, 1995
Pneumonia among 12—59 months old	RR 3.1 (2.2-4.4)	Kilgore, 1995
Pneumonia and protein energy malnutrition	OR 2.17 (1.02-4.60)	Islam, 1986
Pneumonia and sepsis	OR 21.16 (5.09-87.92)	Islam, 1986
Positive blood culture	OR 8.71 (2.47, 30.65)	Bhutta, 1996
Protein <50 g/L	OR 4.5 (2.01, 10.47)	Islam, 1986
Respiratory distress	OR 7.03 (1.35-36.63)	Bhutta, 1996
Sepsis	OR 2.42 (1.12-5.24)	Islam, 1986
	OR 37.26 (6.94-200.06)	Uysal, 2000
Severe dehydration	OR 1.70 (1.15-2.53)	Nathoo, 1998
Severe malnutrition	OR 3.1 (1.6, 5.9)	Bhattacharya, 1995
	OR 84.2 (9.1, 775.9)	Teka, 1996
	OR 7.9 (1.8, 34.8)	Chisti, 2011
Severe stunting (≤85% height for age)	OR 1.9 (1.6, 2.3)	Sachdev, 1991
Severe wasting (≤50% weight for age)	OR 3.3 (2.7, 4.0)	Sachdev, 1991
Sodium <120 mmol/L	OR 1.57 (1.17-2.11)	Nathoo, 1998
Sodium <130 mmol/L	OR 1.97 (1.31-2.99)	Islam, 1986

Adapted from CPG AID

that outbreaks of similar organisms are detected and investigated. In this scenario, stool specimens should also be collected among people involved in the outbreak and be tested for pathogens as its need be advised by the public health authority.[40]

The use of serologic tests, like Widal test, have been discouraged for several years now because of their unreliability. Rapid diagnostic tests may be used during suspected outbreaks of cholera and shigella, but confirmation with stool cultures is still recommended. Rapid diagnostic test for cholera has sensitivity of 58-100% and specificity of 60-100%.[7] Rapid molecular tests for bacterial identification may be useful since it can detect eight out of 22 pathogens in a matter of minutes or hours. However, its cost and limited availability restricts its use in lower middle-income countries.[35] In addition, there is no robust evidence that molecular panels are informative for the consequent diarrhea management of patients, along with uncertain cost-effectiveness of the diagnostic test in patient management limiting its usefulness as of this time.[7]

Investigation using real-time polymerase chain reaction (PCR) detection has also been used. Studies which employed PCR to re-examine the stool samples showed increased enteropathogen detection rate from 53% to 75% among the cases, and from 19% to 42% among the controls. Its applicability in resource limited setting, however, is restrictive.[7] Other serum biomarkers like lactoferrin, C-reactive protein (CRP), cytokines, and calprotectin have been found to be useful in some studies but also has limited value in family and community practice.[39]

Pharmacologic Treatment

Clinical Question: Among pediatric patients with acute diarrhea, what therapeutic intervention may be offered to effect resolution of symptoms, and avoidance of hospitalization and complications?

Recommendation 9. Reduced osmolarity oral rehydration solution (ORS), commercial or home-made is recommended to replace previous and ongoing losses. (Strong recommendation, High quality evidence)

Reduced osmolarity oral rehydration solution (ORS) is recommended to replace previous and ongoing losses. In the absence of commercial ORS, homemade ORS may be given. A family member should be taught to prepare and give ORS. Homemade ORS can be done by mixing 18 grams (four to five teaspoonfuls) of sugar/sucrose and three grams (one teaspoonful) of salt in one liter of clean drinking water while commercially available reduced ORS solutions should contain the following: glucose 75 mmol/L, sodium 75 mmol/L, potassium 20 mmol/L and citrate 10 mmol/L.

Recommendation 10. The volume and frequency of reduced osmolarity oral rehydration solution (ORS) should be dependent on patient's age or weight, severity of dehydration and ongoing losses. (Strong recommendation, High quality evidence)

No Signs of Dehydration

Rehydration through fluid administration is the mainstay of management for diarrhea and it should be based on the hydration status of the child. A child even with no signs of dehydration should be given ORS to replace ongoing losses7 To replace ongoing losses ORS salts should be provided for every bout of loose stools. The amount of ORS to be given is based on the age of the child.

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 two years of age should be offered a teaspoonful every one to two minutes; older children (and adults) may take frequent sips directly from the cup. If the child drinks the solution quickly, vomiting often occurs, but this rarely prevents successful oral rehydration since most of the fluid is absorbed. When the child vomits, wait for five to ten minutes, and then start giving ORS solution again, but more slowly (e.g., a spoonful every two to three minutes).[1]

Monitor the progress of hydration status from time to time during rehydration. Ensuring that the ORS is being taken satisfactorily and dehydration is not worsening. If ever there is a worsening of the child's status manage the child accordingly based on the level of dehydration.

Mild to Moderate Dehydration

The recommendation of the DOH guidelines in the management of mild to moderate dehydration, is ORS replacement of previous and ongoing losses. If oral rehydration is not feasible, administration of ORS via nasogastric tube (NGT) is preferred over IV hydration.[7] NGT administration of ORS may be considered at the Emergency Room Department (ERD) or at a facility where the patient can be observed during hydration. Patient can then be sent home after no dehydration has been achieved. However, the members of the CP recommended against the administration of ORS via NGT at the outpatient setting with considerations to minimal personnel and resources available in the facility and the risks that the procedure might bring to the patient.

Oral rehydration therapy (ORT) is as effective as intravenous fluid in rehydration of children with mild to moderate dehydration—there is no difference in failure rate or hospital admission rate between the two treatments.[41] The amount of ORS to be given to the child with a known

Table 6. Amount of ORS to be given according to age.

Age in years	Amount of ORS to be given in ml
Less than 2	50 to 100 ml (1/4 to 1/2 cup)
2 to 10	100 ml (1/2 cup)
More than 10	As much fluid wanted

Table 7. Amount of ORS to be given according to age for children with mild to moderate dehydration.

Age	Required amount in 4 hours (mL)
Less than 4 months	200 to 400
4 to 11 months	400 to 600
12 to 23 months	600 to 800
2 to 4 years	800 to 1200
5 to 14 years	1200 to 2200
15 years and older	2200 to 4000

weight can be estimated by multiplying the child's weight in kg times 75 ml given for four hours. If the child's weight is not known, select the approximate amount according to the child's age.

You can give more than the estimated amount of ORS solution to a child who wants more if there are no signs of overhydration. If signs of overhydration such as puffy eyelids occur, breast milk, plain water and food must be given instead of the ORS. Do not give diuretics.[1]

Nasogastric tube enteral rehydration over IV hydration is preferred when oral rehydration is not feasible.[1,42] Oral rehydration solution via nasogastric hydration is well tolerated as a rehydration treatment, hence it is a better alternative to intravenous therapy for patients with poor oral intake. It is also less expensive than intravenous therapy. Nasogastric tube placement significant complications are rare and failure rate is significantly less than that of intravenous lines. However, for failed response using nasogastric hydration, IV hydration at 75 mL/kg in four hours with frequent reassessment may be done. During intravenous fluid therapy, attempts to reintroduce oral rehydration therapy must be continued. If oral rehydration is tolerated, intravenous fluids should be discontinued, and rehydration should be completed with oral rehydration therapy.[7] The following are the indications for intravenous hydration; shock, dehydration with altered level of consciousness or severe acidosis, worsening of dehydration or lack of improvement despite oral or nasogastric rehydration therapy, persistent vomiting despite appropriate oral or nasogastric fluid administration, severe abdominal distention, paralytic ileus, and glucose malabsorption as indicated by increased stool output when ORS is given.[42]

Recommendation 11. Severe dehydration should be managed in the hospital with intravenous hydration. (Strong recommendation, High quality of evidence)

Rapid intravenous rehydration is reserved for children with severe dehydration and those initially managed with oral rehydration therapy but developed signs of severe dehydration.[1,42] Isotonic solution using Lactated Ringer's solution or Normal Saline solution is recommended. Patient should be admitted to a hospital.[1]

Recommendation 12. Routine empiric antibiotic treatment is not recommended in children with acute infectious diarrhea. (Strong recommendation, Very low quality evidence)

Rotavirus is the most common cause of acute diarrhea, accounting for 7-34% of cases followed by Escherichia coli, Salmonella and Shigella.[43-45] The study done by Bravo, et al. (1989) detected mixed isolates (13.4%). The primary management for acute diarrhea in children is still rehydration therapy since the most common cause is self-limiting. Routine empiric antibiotic therapy is not recommended.

Empiric antimicrobial therapy is given in suspected cases of cholera, bloody diarrhea, and those associated with other acute infections. A local study conducted in a tertiary hospital showed that Entamoeba histolytica, Salmonella and Shigella were the most common causes of bloody diarrhea; hence, the use of antibiotics in bloody diarrhea is warranted.[43] These are also in accordance with the WHO guidelines in the treatment of gastroenteritis.

Guidelines recommend giving of antibiotic in certain cases. European Society for Pediatric Gastroenterology, Hepatology, and Nutrition/European Society for Pediatric Infectious Diseases recommended to give antibiotic therapy to those patients who has travelled or may have been exposed to cholera.[42] While WHO (2005) recommended antimicrobials are reliably helpful only for children with bloody diarrhea (probable shigellosis), suspected cholera with severe dehydration, and serious non-intestinal infections such as pneumonia. Anti-protozoal drugs are rarely indicated.[1] Table 9 shows the recommended antibiotics based on the etiologic agent.

Table 8. Common etiology of acute diarrhea in children in the Philippines.

Etiologic agent	Lucero 1984 (n=620)	Saniel 1985 (n=453)	Bravo 1989 (n=172)	San Pedro 1991 (n=186)
Rotavirus	17%	7.1%	31.9%	33.9 %
Escherichia coli (ETEC)	15%	9.4%	6.4%	9.1%
Salmonella	15%	10.1%	5.8%	5.4%
Shigella	3%	4.1%	2.3%	4.8%

Table 9. First line antibiotic treatment for infectious diarrhea based on etiology.

Drug	Stock Dose	Dosage	Duration of treatment	Side Effects*
Cholera				
Azithromycin	**Suspension** 200 mg/5 mL	10 mg/kg/dose every 24 hours 20 mg/kg/dose max dose: 500 mg/24 hours	3 days Single dose	Diarrhea (≤14% high single dose), Nausea (5-18%) Altered cardiac conduction, including prolonged QT interval on ECG and polymorphic ventricular tachycardia, (<1%) *C. difficile* (<1%) infection, cholestatic hepatitis, hepatocellular hepatitis (<1%), Hypersensitivity reaction (≤1%), Ototoxicity
Doxycycline (for > 8-year-old child)	**Syrup/Suspension** 25 mg/5 mL	2 mg/kg/dose Max dose: 200mg/dose	Single dose	Bone growth suppression in premature infants (40%), photosensitivity (≥4% to ≥10%), esophagitis (<1%), esophageal ulcer (<1%), and/or stenosis, skin pigmentation (<1%), dental discoloration
Shigella				
Azithromycin	**Suspension** 200 mg/5 mL	10 mg/kg/dose once a day Max dose: 500 mg/24 hours	3 days	Diarrhea (≤14% high single dose), Nausea (5-18%) Altered cardiac conduction, including prolonged QT interval on ECG and polymorphic ventricular tachycardia, (<1%) *C. difficile* (<1%) infection, cholestatic hepatitis, hepatocellular hepatitis (<1%), Hypersensitivity reaction (≤1%), Ototoxicity
Non-typhoidal Salmonella (Source: National Antibiotics Guidelines)				
Azithromycin	**Suspension** 200 mg/5 mL	6 mg/kg/day PO	5 days	Diarrhea (≤14% high single dose), Nausea (5-18%) Altered cardiac conduction, including prolonged QT interval on ECG and polymorphic ventricular tachycardia, (<1%) *C. difficile* (<1%) infection, cholestatic hepatitis, hepatocellular hepatitis (<1%), Hypersensitivity reaction (≤1%), Ototoxicity
Salmonella typhi **(First line antibiotics) (source: National Antibiotic Guidelines)**				
Amoxicillin	**Drops** 100 mg/1 mL **Suspension** 125 mg/5 mL 250 mg/5 mL	75-100 mg/kg/day every 8 hours Max dose: 500 mg 2 caps every 6 hours	14 days	Diarrhea (2%), nausea (2%), vomiting, *C. difficile* infection, Vulvovaginal infection (2%), Headache (1%)
Chloramphenicol	**Suspension** 125 mg/5 mL	50-75 mg/kg/day every 6 hours Max dose: 500mg 2 caps every 6 hours	14-21 days	Serious and fatal blood dyscrasias, gray syndrome,
Co-trimoxazole **Trimethoprim (TM)** **Sulfamethoxazole (SMZ)**	**Per 5 mL syrup** SMZ 200 mg TM 40 mg	8 mg/kg/day (TMP component) Every 12 hours Max dose: 160/800mg 1 tab every 12 hours	14 days	*C. difficile* infection, drug-induced liver toxicity, agranulocytosis, hemolytic anemia, leukopenia, and thrombocytopenia, hyperkalemia, hypoglycemia, hyponatremia, hypersensitivity reaction, kernicterus
Salmonella Typhi **(Second Line Antibiotics)**				
Cefixime	**Drops** 20 mg/1 mL **Suspension** 100 mg/5 mL	15-20 mg/kg/day every 12 hours Max dose: 200mg 1 tab every 12 hours	7-10 days	Diarrhea (16%), Abdominal pain, nausea, dyspepsia, flatulence,
Azithromycin	**Suspension** 200 mg/5 mL	20 mg/kg/day every 24 hours Max dose: 500 mg 1-2 tabs every 24 hours	5-7 days	Diarrhea (≤14% high single dose), Nausea (5-18%) Altered cardiac conduction, including prolonged QT interval on ECG and polymorphic ventricular tachcardia, (<1%) *C. difficile* (<1%) infection , cholestatic hepatitis, hepatocellular hepatitis (<1%), Hypersensitivity reaction (≤1%), Ototoxicity
Entamoeba histolytica **(source: National Antibiotic Guidelines)**				
Metronidazole	**Suspension** 125 mg/ 5 mL	35-50 mg/kg/day IV/PO every 8 hours	7-10 days	Nausea (10%-12%), Vaginitis (15%), Headache (18%), peripheral neuropathy, aseptic meningitis, ataxia, neurocerebral toxicity, confusion, dysarthria, encephalopathy, seizures, optic neuropathy and vertigo. Disulfiram-like reaction when used with alcohol
Giardia **(source: National Antibiotic Guidelines)**				
Metronidazole	**Suspension** 125 mg/ 5 mL	15 mg/kg/day PO	5-7 days	Nausea (10%-12%), Vaginitis (15%), Headache (18%), peripheral neuropathy, aseptic meningitis, ataxia, neurocerebral toxicity, confusion, dysarthria, encephalopathy, seizures, optic neuropathy, and vertigo. Disulfiram-like reaction when used with alcohol

Recommendation 13. Antibiotic treatment may be given to children with Cholera, Shigella, typhoidal Salmonella, amoebiasis, and giardiasis. The choice of antibiotic must be guided by the local Antibiotic Surveillance Program. (Strong recommendation, High quality evidence)

Cholera

According to the updated global burden of cholera in endemic country the incidence rate per 1,000 population at risk of the Philippines is 0.1. with an estimated annual number of cases of 2,430, a case fatality rate of 1.00 % with an estimated death of 24. The average annual incidence in 2010–2013 was 9.1 per 100,000 population.[46] A systematic review and meta-analysis found out that, overall, antimicrobial therapy shortened the mean duration of diarrhea by about one and a half day compared to placebo or no treatment (mean difference -36.77 hours, 95% CI, -43.51 to -30.03 hours) involving 19 trials with 1,013 participants. Antimicrobial therapy also reduced the total stool volume by 50% (ratio of mean 0.5, 95% CI, 0.45 to 0.56) involving 18 trials with 1,042 participants and reduced the amount of rehydration fluids required by 40% (ratio of mean 0.60, 95% CI, 0.53 to 0.68) involving 11 trials with 1,201 participants. The mean duration of fecal excretion of vibrio was reduced by almost three days (mean difference -2.74 days, 95% CI, -3.07 to - 2.40) involving 12 trials with 740 participants.[47]

Based on the Antimicrobial Resistance Surveillance Program Annual Report (ARSP) 2021, antibiotic resistance rates of V. cholerae to ampicillin was 9.6%, co-trimoxazole was 3.2% and tetracycline was 1.1%. No resistance was noted for chloramphenicol and azithromycin. Ampicillin resistance decreased from 28.9% in 2020 to 9.6% in 2021 and the noted decrease was statistically significant (p=0.0042). Tetracycline, chloramphenicol and co-trimoxazole remain good treatment options for cholera cases.[48]

Shigella

Shigellosis is endemic in most developing countries and is the most important cause of bloody diarrhea worldwide. It is estimated to cause at least 80 million cases of bloody diarrhea and 700,000 deaths each year. Ninety-nine percent of infections caused by Shigella occur in developing countries, and most cases (~70%), and of deaths (~60%), occur among children less than five years of age.1 Limited data to show that antibiotics reduce the episodes of diarrhea at follow-up.[48]

Resistance to ceftriaxone and ciprofloxacin for 2021 among Shigella are above 10%. Ciprofloxacin resistance had been noted to increase in the past three years while resistance to ceftriaxone has been in the 10-12% range in the past four years. No azithromycin resistance was reported, this is according to the 2021 ARSP annual report.[48]

Salmonella typhi

In 2019, the number of typhoid and paratyphoid fever cases amounted to approximately 3.75 thousand. This reflected a significant decrease compared to the previous year, which recorded around 7.55 thousand. The number of deaths amounted to 242. This reflected a slight decrease in the number of deaths by typhoid and paratyphoid fever compared to the previous year, which recorded 297 deaths.[49] In the ARSP 2021 report, *S. typhi* isolates' resistance to ciprofloxacin was at 2.6%, while no resistance was observed against ampicillin, cotrimoxazole, ceftriaxone, cefotaxime, azithromycin, and chloramphenicol. As there were few *S. typhi* isolates reported for 2021, continued efforts to improve the surveillance of antibiotic resistance among these pathogens must be done.[48]

According to the National Antibiotics Guidelines (2017), microbiological data is recommended to aid in pathogen directed therapy in view of increasing reports of nalidixic acid resistant and ciprofloxacin non-susceptibility of *S. typhi* which may result to clinical treatment failure. The use of second line antibiotics should be reserved for suspected or proven multi-drug resistant typhoid fever (MDRTF). Multi-drug resistant typhoid fever is defined as typhoid fever caused by *S. typhi* strains which are resistant to the first line recommended drugs for treatment namely chloramphenicol, ampicillin and TMP-SMX.[50] Multi-drug resistant typhoid fever should be suspected in any of the following situations: failure to respond after 5-7 days treatment with a first line antibiotic; household contact with a documented case or during an epidemic of MDRTF; and/or clinical deterioration or development of complications during conventional antibiotic treatment.

A meta-analysis done to evaluate the use of fluroquinolones for the treatment of enteric fever revealed that overall, a seven-day course of any fluoroquinolone appears at least as effective as a 14-day course of chloramphenicol at reducing clinical and microbiological treatment failures (eight trials, 916 participants). Compared to a seven-day course of azithromycin, a seven-day course of ofloxacin had a higher rate of clinical failures in populations with both multi-drug resistance (MDR) and nalidixic acid resistance (NaR) enteric fever.[51]

According to the ARSP annual report (2021) *S. typhi* isolates remained susceptible to ampicillin, chloramphenicol, and azithromycin with no resistance detected against these antibiotics for 2021. Resistance to ciprofloxacin remained below 5% for the past 10 years with 2021 resistance at 2.6%.[49]

Amoebiasis

In patients with amoebic colitis, treatment with tinidazole reduced clinical failure by 72% compared with treatment with metronidazole with 477 participants in 8 trials for outcomes evaluated 15 to 60 days after end of treatment and may be as effective as metronidazole in eradicating *E. histolytica* from stools. The incidence of mild to moderate gastrointestinal complaints also appeared to be lower among those given tinidazole (low certainty of evidence). Compared with metronidazole alone, combination therapy resulted in a reduction of about 60% with 1,025 participants in three trials (very low-certainty evidence) for both clinical and parasitological failure. The advantage of combination therapy is attributed to the distinct activities of different drugs against cysts and trophozoites found at the different sites.[52]

Giardiasis

The prevalence of giardiasis in children in 2008 was recorded at 2% and was highest among five to nine years old.53 According to

the National Antibiotics Guidelines (2017) the drug of choice for the treatment of giardiasis is Metronidazole.

Recommendation 14. In general, antibiotic treatment should not be given in children with non-typhoidal Salmonella. It may be given in children with underlying conditions i.e., immunodeficiency, corticosteroid or immunosuppressive therapy. (Strong recommendation, Very low quality evidence)

Among children with non-typhoidal Salmonella, a Cochrane review which included 12 studies with 767 adult and pediatric participants found no significant difference between antibiotics and placebo on the diarrhea duration, presence of diarrhea at five to seven days, clinical failure, duration of fever, and duration of illness.[54] However, the ESPGHAN/ESPID 2014 guidelines recommend antibiotic therapy for neonates, young infants <3 months old, and children with underlying conditions (immunodeficiency, anatomical or functional asplenia, corticosteroid or immunosuppressive therapy, inflammatory bowel disease, and achlorhydria) since they have higher occurrence of secondary Salmonella bacteremia and extra-intestinal focal infections. Ceftriaxone (50–100 mg/kg/day) is the drug of choice in the ESPGHAN/ESPID guidelines. Alternative drugs include azithromycin (10 mg/kg/day), ciprofloxacin (20–30 mg/kg/day), and for known susceptible strains, co-trimoxazole (8 mg/kg/day of trimethoprim component).[42]

Based on the ARSP (2021), resistance of nontyphoidal Salmonella to ampicillin, cotrimoxazole and chloramphenicol are higher compared to *S. typhi* with noted increase in resistance rates to these antibiotics for 2021 compared to the rates in 2020. Resistance to ciprofloxacin remained within 10-12% range in the past seven years with 2021 resistance at 11.2%.[48]

Recommendation 15. Among children older than six months, zinc supplementation of 10-20 mg per day for 10-14 days may be offered to reduce the duration and severity of diarrhea, and recurrence in the next two to three months (Strong recommendation, High quality evidence)

Zinc supplementation of 10-20 mg per day could help reduce the duration and severity of diarrhea, and therefore have benefit in addition to ORS in reducing children mortality. A systematic review analyzed nine trials on 2,581 children aged >6 months demonstrated that zinc supplementation shortened the duration of diarrhea by 12 hours and reduced the risk of diarrhea persisting up to the seventh day. Among children less than six months old, meta-analysis of two trials consisting of 1,334 children revealed that zinc supplementation may have no effect on the duration of diarrhea and stool frequency and may in fact increase the risk of diarrhea persisting until the seventh day.[55]

Recommendation 16. Racecadotril may be offered to reduce ongoing loss of water and electrolytes. (Strong recommendation, High quality evidence)

Racecadotril is an anti-secretory agent that inhibits enkephalinase, an enzyme that degrades pro-absorptive and anti-secretory neuropeptides known as enkephalins. Racecadotril ultimately reduces hypersecretion of water and electrolytes without affecting intestinal motility.[56] It can be used as adjunct to ORS therapy in acute diarrhea in children. Racecadotril treatment should be started following three episodes of watery diarrhea in a 24-hour period, until two normal stools have been produced. The product should be used for a maximum of seven days. A more recent systematic review and meta-analysis of seven RCTs was conducted to determine the efficacy of racecadotril in children with acute diarrhea. Three studies in 642 children showed that racecadotril decreased the duration of diarrhea by 53 hours compared to placebo or no intervention. Based on nine studies on 949 children, there was no significant difference in adverse events between racecadotril and placebo. No serious adverse events were reported in any of the studies.[57]

Recommendation 17. Probiotics may be offered to reduce the duration of diarrhea. Lactobacillus rhamnosus GG (LGG), Saccharomyces boulardii and Lactobacillus reuteri are strains with evidence of effectiveness. (Strong recommendation, High quality evidence)

Probiotics are "live microorganisms, which when administered in adequate amounts, confer a health benefit on the host". Administration of probiotics in infectious diarrhea may act against enteric pathogens by competing for available nutrients and binding sites, acidifying gut contents, producing a variety of chemicals, and increasing specific and non-specific immune responses.[58] Because of these mechanisms, the use of probiotics in treating and preventing diarrheal diseases have been studied. Various systematic reviews and meta-analyses have evaluated the effects of probiotics on the treatment of acute diarrhea.

A systematic review and meta-analysis which included 82 studies with a total of 12,127 participants on the use of probiotics in acute infectious diarrhea showed no difference detected between probiotic and control groups for the risk of diarrhea lasting ≥ 48 hours or for duration of diarrhea. No serious adverse events were attributed to probiotics. In the subgroup analysis of the said meta-analysis, three strains of probiotics were found to be beneficial in terms of reducing the risk of diarrhea lasting for > 48 hours and decreasing the mean duration of diarrhea.[59]

Table 10. Recommended probiotic strains for acute diarrhea.

Probiotic Strain	Dosage	Duration of Treatment
Saccharomyces boulardii	250-750 mg/day	5-7 days
Lactobacilllus rhamnosus GG	$\geq 10^{10}$ CFU/day	5-7 days
Lactobacillus reuteri DSM 17938	10^8 to $4x10^8$ CFU/day	5-7 days

Probiotics was also considered for antibiotic associated diarrhea (AAD). In a meta-analysis, there was a moderate protective effect of probiotics for preventing AAD (RR 0.45, 95% CI, 0.36 to 0.56). In the subgroup analysis based on the dose of probiotics, it was found that high dose probiotics (≥ 5 billion CFUs per day) prevents ADD (RR 0.37, 95% CI, 0.30 to 0.46) in 20 trials with 4,038 participants (moderate certainty of evidence). Adverse event rates were low and no serious adverse events were attributable to probiotics.[60] *S. boulardii* or *L. acidophilus plus L casei* at a dose of 10 to 50 billion CFUs per day has also been shown to prevent *C. difficile*-associated diarrhea.[61]

Recommendation 18. Anti-emetics and antidiarrheal drugs are generally not recommended because of their side-effects. (Strong recommendation, High quality evidence)

A systematic review of ten trials in 1,479 children with acute gastroenteritis investigated the effectiveness of five anti-emetics. Data from four trials in 574 children showed that there was clear evidence that ondansetron (oral or intravenous) compared with placebo increased the proportion of patients with cessation of vomiting (orally administered) (RR 1.44, 95% CI, 1.29 to 1.61), reduced the immediate hospital admission rate (orally administered) (RR 0.40, 95% CI, 0.19 to 0.83) and the need for intravenous rehydration therapy (orally administered) (RR 0.41, 95% CI, 0.29 to 0.59). However, three studies reported a significant increase in the incidence of diarrhea in the ondansetron group. Although ondansetron is effective in stopping vomiting in children with diarrhea, clinicians should be aware of potential adverse including the potential to increase the episodes of diarrhea. There are no or limited evidence in the use of other antiemetics.[62]

Loperamide is an opiate agonist that acts on μ receptors, leading to inhibition of peristalsis and increased intestinal transit time. This results in decreased stool output and prevents fluid loss. A systematic review and meta-analysis analyzed the effect of loperamide in children with acute diarrhea included 13 trials in 1,788 children younger than 12 years old. In four trials, the risk of persistence of diarrhea at 24 hours (prevalence ratio 0.66, 95% CI, 0.57 to 0.78) and 48 hours (prevalence ratio 0.59, 95% CI, 0.45 to 0.78) were decreased in the loperamide group compared to the placebo group. In six trials, loperamide was found to significantly reduce the duration of diarrhea (mean difference 0.8 days, 95% CI, 0.7 to 0.9 days), the number of stools within 24 hours was lower in the loperamide group (count ratio 0.84, 95% CI, 0.77 to 0.92). However, serious adverse effects such as ileus, lethargy or death were reported in eight out of 927 children in the loperamide group, while there were none in the placebo group. All serious side effects occurred in children younger than three years of age.[63]

Non-pharmacologic Interventions

Clinical Question: Among pediatric patients with acute diarrhea, what non-therapeutic intervention may be offered to effect resolution of symptoms, avoidance of hospitalization and complications, and prevention of relapse?

Recommendation 19. Among children with acute diarrhea, age-appropriate feeding should be continued. There is no need to modify or restrict diet. (Strong recommendation, Moderate quality of evidence)

In general, age-appropriate, non-restrictive feeding with no milk modification, is recommended to be continued among children with acute diarrhea during and after rehydration.[42] Age-appropriate foods from varied sources are recommended to optimize health outcomes. Restrictive feeding is not recommended because of the risk of malnutrition from its inadequate nutritional value. Dietary management should be balanced, providing all the three major macronutuaririents and the dietary reference intakes for micronutrients.[7] Systematic review

Table 11. Comparison of different strains of probiotics.

Strain	Number of trials (Number of participants)	Effect Size Point estimate (Interval estimate)
Diarrhea lasting for ≥ 48 hours		
Lactobacillus rhamnosus GG	6 (1557)	RR 0.79 (95% CI 0.65 to 0.97)
Saccharomyces boulardii	9 (1823)	RR 0.70 (95% CI 0.37 to 1.33)
Mean Duration of Diarrhea		
Lactobacillus rhamnosus GG	14 (3344)	MD -22.50 (95% CI -32.73 to -12.26)
Saccharomyces boulardii	11 (1617)	MD -24.64 (95% CI -35.30 to -13.98)
Lactobacillus reuteri DSM 17938	6 (433)	MD -22.83 (95% CI -31.95 to -13.72)

Table 12. Comparison of different strain and the number of strains of probiotics.

Strain	Number of trials (Number of participants)	Effect Size Point estimate (Interval estimate)
Incidence of Diarrhea		
Lactobacillus rhamnosus GG	6 (686)	RR 0.37 (95% CI 0.24 to 0.55)
Saccharomyces boulardii	9 (3165)	RR 0.36 (95% CI 0.24 to 0.54)
Single strain	20 (4900)	RR 0.42 (95% CI 0.32 to 0.56)
Multi-strain	13 (1452)	RR 0.53 (95% CI 0.37 to 0.75)

of studies on lactose-free diet were mostly on inpatient and cannot be extrapolated to outpatient management.

Carbonated, sweetened, caffeinated, sports, and commercialized probiotic drinks are not recommended for fluid replacement. Carbonated and sweetened beverages (i.e., fruit juice and sweetened tea) may cause osmotic diarrhea and hypernatremia while caffeinated drinks have stimulating, diuretic and purgative effect that may worsen diarrhea. These drinks should be avoided in children with diarrhea.[64]

Recommendation 20. Among infants with diarrhea, breastfeeding must be continued. (Strong recommendation, High quality evidence)

Breastfeeding should be continued in addition to hydration among breastfed infants while standard full-strength formula should be given to formula-fed infants. A randomized trial has shown that children with acute infectious diarrhea who were breastfed and given ORS had significantly fewer passage of stools compared to children given ORS alone (mean number of stools passed 12.1 vs 17.4, $p < 0.05$). Breastfed children also required lesser amount of ORS for rehydration compared to those given ORS alone (1570.4 vs 2119.2 mL/patient, $p = 0.02$).[7]

Recommendation 21. If diet was restricted because of frequent vomiting, early refeeding must be done. (Strong recommendation, Moderate quality evidence)

If feeding is not tolerated, early refeeding may be started as soon as the child is able. Early and late refeeding showed no significant different effects among children with diarrhea. In a meta-analysis of 12 trials among children less than five years old, early and late refeeding showed no significant difference in the duration of diarrhea (MD = -6.90 hours; 95% CI -18.70, 4.91), need for intravenous therapy (RR=0.87; 95% CI 0.48, -1.59), vomiting episodes (RR=1.16; 95% CI 0.72, 1.86) and development of persistent diarrhea (RR=0.57; 95% CI 0.18, 1.85).[65]

Recommendation 22. All members of the family must be encouraged regular hand washing with soap and water. (Strong recommendation, Moderate quality evidence)

Hand hygiene is the most convenient and efficient way to remove pathogens from hands.[66] Families should be taught to practice regular hand washing with soap and water, and at times when hands are visibly dirty, visibly soiled, and after using the toilet.[67] After hand washing, hands should be dried thoroughly with paper towels since moist hands transfer microorganisms more readily when compared to dry hands.[66]
If soap and water are not available, alcohol-based hand sanitizers that contain at least 60% alcohol can be used. One study reported that giving alcohol-based hand disinfectants to office workers can reduce absences due to diarrhea compared to no intervention (OR=0.11; 95% CI 0.01, 0.93).68 Hand sanitizers can quickly reduce the number of microbes on hands in some situations, but sanitizers do not eliminate all types of germs. A meta-analysis showed that no significant reduction in the number of gastrointestinal illnesses with the use of alcohol-based sanitizers and educational intervention (RR=0.77; 95% CI 0.52, 1.13) or the use of benzalkonium chloride-based hand sanitizers (RR=0.58; 95% CI 0.30,1.12) when compared to control.[69]

Recommendation 23. Family members must observe proper food handling, have access to safe drinking water, and observe proper waste disposal. (Strong recommendation, Low quality evidence)

Proper Food Handling

Food hygiene refers to measures that ensure consumption of safe food and it must be observed by any domestic or professional food handler to prevent foodborne illnesses. There are limited studies on effective and sustainable food hygiene interventions, however, WHO promotes the Five Keys to Safer Food Manual as a tool to promote the principles of safe food handling. This manual identified the following five keys to safer food: 1) Keep clean, 2) Separate raw and cooked, 3) Cook thoroughly, 4) Keep food at safe temperatures, and 5) Use safe water and raw materials.[70]

Safe Drinking Water

Drinking water should be clean and safe.[7] Point-of-use interventions are available to achieve safe supply of drinking water. A systematic review evaluating the different point-of-use methods to improve water quality and their effects on prevention of diarrhea showed that chlorination, flocculation, filtration, and solar disinfection (SODIS) were all beneficial in reducing the incidence of diarrhea. Filtration had the highest reduction rate at 52%, while chlorination had the lowest reduction rate at 33%.[71]

Boiling of drinking water for one to three minutes is an effective way to kill all water-borne pathogens such as enteric bacteria, protozoa and viruses. The boiled water must then be allowed to cool down without adding ice to prevent contamination. If the water is turbid and needs to be clarified for aesthetic reasons, this should be done before boiling.[72]

If boiling water is not possible, a combination chlorination, iodination, portable filtering devices, and SODIS can be done especially in geographically isolated areas. The household bleach (5% solution of sodium hypochlorite) may be used for chlorination. Four drops of the bleach should be added to clear water. For iodination, five drops of tincture of iodine (2% solution) may be added to a liter of clear water. For both chlorination and iodination, the water to be used must have been settled or clarified at room temperature (25°C) and must have been left to stand for at least 30 minutes before use. If the water is cold, the time is doubled before use for every 10°C drop in temperature. Both chlorination and iodination are highly effective against bacteria and viruses but not against cryptosporidium.[7]

Different filtration techniques were also studied, but the effectiveness depends on the pore size of the filter, amount and particle size of the contaminant, and charge of the contaminant particle. Filtration prevents protozoa but it has no effect on viruses. The SODIS method uses the combined effects of UV light-induced DNA damage, thermal inactivation and photo-oxidative destruction to inactivate

disease-causing organisms. It is done by filling 0.3-2.0 liter plastic bottles with low turbidity water. The bottles are shaken to allow oxygenation, and then placed on a roof or rack for six hours (if sunny) or two days (if cloudy). Although UV light alone is effective, this technique requires pre-filtering of water because of its dependence on low water turbidity.[7]

Proper Waste Disposal

Safe stool disposal, in addition to hand hygiene, is another key behavior in preventing infectious diarrhea. DOH recommends the excreta disposal facilities approved by the Code on Sanitation of the Philippines: 1) Flush toilet connected to a community sewer, Imhoff tank, septic tank, digester tank, or chemical tank; 2) Ventilated improved pit (VIP) latrine, sanitary pit in rural areas, pit type, or "antipolo" toilet; or 3). Any disposal device approved by the Secretary of health or his duly authorized representative.[7]

A systematic review of 13 studies evaluated double pit latrines, sanitary platforms and VIP latrines, biogas latrine connected to fermentation reactor, bored hole privy, shared double pit latrine, water-sealed pour flush latrine, relocation of toilets away from water sources, toilets connected to septic tank, and double urn funnel toilet. The studies were assessed to have low quality due to heterogeneity of outcomes and methods used. Eleven of the studies demonstrated beneficial effects while there are two studies that showed no beneficial effect.[73] Another systematic review of four quasi-RCTs that evaluated the effect of proper human excreta disposal alone showed that the relative risk of morbidity from diarrhea ranged from 0.37 to 0.92.[74]

Recommendation 24. Community level intervention that encourages hand washing, proper food handling, appropriate waste disposal and ensuring safe drinking water must be done. (Strong recommendation, Low quality evidence)

Hand Hygiene Promotion

Hygiene promotion interventions consist of activities that encourage individuals and communities to adopt safer practices in domestic and community settings to prevent hygiene-related diseases such as diarrhea. A Cochrane review studied several interventions that promote handwashing, such as hygiene education (group trainings, reminders, peer trainers, booklets, newsletters, songs about hand hygiene) and provision of equipment. These studies show that hand washing promotion could prevent 33% of diarrhea episodes. Handwashing promotion among communities in low to middle-income countries in Asia (six studies), South America (one study), and Africa (one study) resulted in prevention of around one quarter of diarrhea episodes.[75]

Proper Food Handling

The Code on Sanitation of the Philippines recommend that food handlers should obtain a health certificate from local health units prior to food handling. Health certificates are issued only after compliance with necessary requirements including education and training.[76]

Safe Drinking Water

DOH recommends that drinking water should comply with the Philippine National Standards for Drinking Water (DENR Administrative Order No. 26-A. Series 1994). The Philippine National Standards for Drinking Water recommend regular testing to determine water potability should be done routinely and adequate treatment will have to be instituted to deal with changes in the quality of the raw water. The aim is to produce a clean and safe water supply.[7]

Proper Waste Disposal

The Department of Health through its administrative order (AO) 2010-0021 made Sustainable Sanitation as a National Policy and a National Priority Program to lay down clear policies and action programs to improve sanitation facilities. The AO called for community initiatives and behavioral modification, with cooperation from the local government units and other departments to help make improved sanitation facilities should be accessible and safely managed through sanitation safety planning.[77]

Expected Patient Outcome

Clinical Question: Among pediatric patients with acute diarrhea, what outcomes should be expected from the primary care consultation?

Recommendation 25. After each encounter the patient or guardian must understand the nature of acute diarrhea, its management and potential complications. (Strong recommendation, Low quality evidence)

R**ecommendation 26.** The management plan must be a mutual agreement between the family physician and the guardian. (Strong recommendation, Low quality evidence)

Recommendation 27. For the management of a child with acute diarrhea, the family physician must target for resolution of dehydration, resolution of diarrhea, prevention of relapse, hospitalization, complications and early detection of adverse events. (Strong recommendation, High quality evidence)

The guidelines reviewed considered the following outcomes: predictive accuracy of clinical assessment, accuracy for diagnostic tests and for the treatment, resolution of dehydration, duration of diarrhea, resolution of diarrhea, prevention or reduction of hospital stay, prevention of relapse, resolution of fever and other symptoms, prevention of complications and adverse events.

None of the reviewed guidelines for diarrhea in children recommended expected patient outcomes to be monitored but all guidelines discussed the expected outcomes in the narrative section of the recommended treatment/intervention i.e., resolution of dehydration, duration of hospital stay, duration of diarrhea, resolution of diarrhea, relapse, fever, other symptoms, prevention of complications and adverse events. The guidelines also have recommendations for

admission based on association with increased mortality. All the guidelines suggested that not all acute diarrheas are infectious in nature, and most are likely to resolve with home management.

Observational studies suggest that the presence of fever, vomiting and abdominal pain in patients with diarrhea is sensitive for diarrhea caused by Salmonella, Shigella, E. coli, Campylobacter and rotavirus. Bloody diarrhea is a specific sign for Shigella, Campylobacter, rotavirus and norovirus. In the absence of these symptoms, there is no need for further work-up and management can just be directed towards rehydration. In this situation outpatient management is adequate and usually lead to resolution of diarrhea within one week and reduced need for IV rehydration and hospital admission. Similarly, there are factors that increase the risk of mortality among children with acute infectious diarrhea. Several observational studies evaluated various clinical and laboratory parameters as risk factors for mortality in admitted children with acute diarrhea were found. The presence of these factors in a child with diarrhea warrant close medical attention and admission to a hospital.[9]

Guardians of children with acute diarrhea must be able to understand this and agree with the plan of management.

Systematic review and meta-analysis of rehydration with reduced osmolarity ORS measured resolution of dehydration, reduced frequency of diarrhea and decrease need for intravenous rehydration. While those who underwent antibiotic treatment, the outcomes measured were mean duration of diarrhea, reduced total stool volume, reduced amount of required rehydration fluids and resolution of symptoms associated with infectious diarrhea or dysentery and adverse events. Adjunctive treatment interventions were also evaluated and measured duration of diarrhea, risk of diarrhea persisting and recurrence or relapse. Few reported deaths in the studies included in the reviews.[9]

The integrated promotion of safe water supply, sanitation and hygiene practices is beneficial in preventing infectious diarrhea. A systematic review showed that it reduced the incidence of diarrhea by 20% to 80%.[9] Decreased incidence may be measured from public health statistics. In family practice, a surrogate outcome like behavior and practice change related to good hygiene and sanitation may be measured.

In summary, moderate to high quality evidence cited by the guidelines for home management strategies of acute diarrheas resulted to resolution of diarrheas and avoidance of IV rehydration and hospital admission. There is high quality evidence that the individual strategies like oral rehydration, appropriate antimicrobial use and adjunctive treatment result to adequate rehydration, shortened duration and resolution of diarrhea and associated symptoms, prevention of complications and adverse events. Among admitted patients, the outcomes measured in different trials were shortened duration of hospital stay. Lastly, there is moderate to high quality evidence that preventive strategies like good hygiene and sanitation practices lead to decrease incidence of diarrhea.

Discussion

With the creation of this clinical pathway for the management of pediatric patients with acute diarrhea, a CPG-based clinical pathway may be made available for all primary care physicians.

Having a CPDG who are mostly in primary care practice is an identified facilitator of this guideline. The recommendation statements that the group were able to come up with were a product of integration of the evidences and the availability of the resources in an outpatient setting in both government and non-government institutions. The specific barrier identified in the implementation of this pathway was secondary to limitation of services that can be provided due to uncontrollable circumstances (i.e., the COVID-19 pandemic).

This clinical pathway will be published in the "The Filipino Family Physician" journal, which is accessible in the PAFP journal website. PAFP's Committee on Research will disseminate the clinical pathway through distribution to its subspecialty and affiliate societies, chapters, training programs, and primary care practitioners; and continuing development sessions of the PAFP. The clinical pathway table included in the manuscript may serve as a handy guide for all primary care physicians in the field in the management of diarrhea and the manuscript itself may serve as reference for the recommendations that the primary physician could resort to should he/she need elaboration on the recommendation.

Monitoring of the uptake of the clinical pathway will be through the number of downloads at the website and requests for copies. Monitoring of implementation will be via continuous quality improvements activities, which can be a self-initiated activity of the member as recommended in the Universal Healthcare, or as a chapter or group activity.

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