draft

FIRST LADY HILLARY RODHAM CLINTON
PSA FOR ORAL REHYDRATION THERAPY
OCTOBER 29, 1996

This is a message for mothers and fathers of young children across our nation.

Diarrhea is one of the most common illnesses children suffer. Without proper fluid intake, they will need to be hospitalized, get costly I-V treatment, ~~or die~~. Some may even die.

We have a solution, proven effective across the globe for a quarter century.

Ask your pediatrician or pharmacist about oral rehydration therapy, or O-R-T. It is available in your local drug store and costs only dollars a dose. It will save your child needless pain and suffering, and you, hundreds of dollars. - and unbold unnecessary worry about your child's death.

it can save

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FIRST LADY HILLARY RODHAM CLINTON
VIDEO MESSAGE FOR 25TH ANNIVERSARY CELEBRATION:
ORAL REHYDRATION THERAPY IN THE UNITED STATES
NOVEMBER 14, 1996

Good afternoon. Last March, I was delighted to accept an invitation to be Honorary Chair of this important conference. I am sorry I can't be with you today as you launch your nationwide campaign to promote oral rehydration therapy. I would particularly like to thank the Johns Hopkins School of Public Health for spearheading this initiative.

On my trip to Bangladesh two years ago, I visited a center supported by Johns Hopkins and USAID where doctors have saved millions of lives through their pioneering use of oral rehydration therapy. I also watched mothers and fathers and sisters and brothers administer this therapy to family members seriously ill with diarrhea. I saw a simple yet effective treatment give health and hope to children and families.

While I was in Bangladesh, I met a doctor from Louisiana who had come to learn about oral rehydration therapy. He told me that back home he was seeing increasing numbers of children hospitalized and dangerously ill because of diarrhea. So he had travelled to a country that we think of as less developed to learn a basic, cost-effective method to treat our children.

This simple therapy, costing only cents a dose, now saves the lives of millions of infants around the world every year. The therapy was developed in this country and has been proven safe and effective for use here, but we have failed to teach health care providers and families to use it as the first line of treatment for diarrhea.

Today, 300 to 400 babies in the United States die each year from diarrheal dehydration. At least 200,000 children are hospitalized. And our failure to use oral rehydration therapy costs more than $1 billion each year.

As we mark the 25th anniversary of the introduction of oral rehydration therapy in the United States, it is so important that we educate and reach out to health care professionals and parents in our own country about the use of one of the best and most basic tools to prevent disease and death. Twenty-five years ago, the White Mountain Apache Tribe had the foresight to enter into a partnership with Johns Hopkins to use oral rehydration therapy, and they reduced deaths from diarrheal dehydration to zero. Every community in America can and should follow in their footsteps.

Thanks to and Thanks to you

The campaign you are launching today, ~~will mean that doctors in our country will no longer travel thousands of miles to learn about a therapy that was developed right here.~~ Because of your determination and expertise, we can look forward to the end of unecessary suffering, disease and death from diarrheal disease and dehydration.

~~Thank you and best of luck.~~

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You should feel proud of your efforts. Often you are helping to save lives, ~~and~~ ~~we are all grateful for your skill + dedication to this~~

First Lady Hillary Rodham Clinton
Honorary Chair, ORT Symposium
Draft Video Message
November 14, 1996, 2:25 pm
The Johns University School of Public Health

Good afternoon.

Last March I was delighted to accept Johns Hopkins' invitation to be Honorary Chair of this important conference. We are here to celebrate one of the best and most basic tools known in the world today to prevent disease and premature death.

Today we gather to mark the 25th Anniversary of the introduction of the WHO-recommended Oral Rehydration Solution in the United States and to increase its use among our medical practitioners and families. This simple therapy, costing only a few cents a dose, now saves the lives of millions of infants around the world every year. While the therapy was developed by US scientists, and proven effective for children in the U.S., we have failed to teach our parents to use it.... or our medical students to apply it as the first line of treatment for common diarrhea. Today, three hundred to four hundred U.S. babies die a year from diarrheal dehydration. At least 200,000 children are hospitalized. Tweny-six hundred (2,600) elderly die. Added to this toll of human suffering, our failure to promote ORT wastes more than 1 billion health care dollars per year.

You who have gathered here today have the determination and know-how to stop this

intolerable waste of lives and resources.

When I was in Bangladesh 2 years ago, I saw little babies who would have died from diarrhea being saved by this miracle solution -- ORS. There is no reason why our own children should not benefit from this simple technology.

I am delighted that you who are international experts have met over the last two days to formulate a plan to stop the unnecessary death and suffering from diarrheal disease and dehydration. The nation awaits your wisdom and strategies.

In closing, I must commend the foresight and courage of the White Mountain Apache Tribe, who 25 years ago, entered into a partnership with Johns Hopkins to measure the effectiveness of ORS among their children. It was at a time when no other medical or lay community was willing to test this solution, given the alternative of "high tech"--*and high cost*--intravenous care.

I also add my personal congratulations to Johns Hopkins School of Public Health, and the conference coordinator, Dr. Mathu Santosham, for spearheading this initiative to prevent unnecessary death and suffering among our most vulenerable populations. Be assured that the Clinton Administration will do its part to continue to support humane, accessible, effective and affordable medical treatments like ORS, treatments that save lives, and improve the quality of life for all citizens of the U.S.

Thank you and best of luck.

JOHNS HOPKINS
UNIVERSITY

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615 North Wolfe Street
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(410) 955-6931 / FAX (410) 955-2010

Center for American Indian and Alaskan Native Health

MEMORANDUM

To: Sabrina Corlette
From: Allison Barlow Bova
Subject: ORT Information
Date: October 24, 1996

Please find attached information to explain the thrust and purpose of the *25th Anniversary Celebration of the use of Oral Rehydration Therapy in the United States.*

Mrs. Clinton's video message will be shown at a large Public Forum (250-500 attendees) on November 14 at approximately 2:25 pm. It will be introduced by Alfred Sommer, MD, MHS, Dean of the Johns Hopkins School of Public Health. A draft script for the video message is attached. Stapled to it is the agenda for the Public Forum. In addition, I have attached a 30 second script for a PSA that would be sent to all major networks, local stations in DC, MD, VA, and if funds permit, the nine major media markets throughout the US.

Additional background information I have attached for you and Brenda Costello includes:

- Overview of the purpose of the event
- Information about ORT (fact sheet)
- Agenda for the symposium culminating with the public forum
- Draft of consensus statement to be read at the Public Forum
- List of symposium participants
- Invitation to public forum

Thank you for your help and interest. We can only imagine what a busy time this is for the White House staff, and we are grateful for you time. If we can answer additional questions, please do not hesitate to contact me (410-614-2072) or Liz Pettengill, Division of Public Affairs (410-955-6878).

List of invitees to Oral Rehydration Therapy 25th Anniversary Celebration:

- World experts in ORT, Pediatrics, Health Care Economics and Policy
- Representatives from USAID, UNICEF, WHO, American Academy of Pediatrics, US Health and Human Services and the Indian Health Service
- Symposium Participants
- Johns Hopkins Medical Institutions
- Faculty, staff and students, University of Maryland Medical System
- Faculty, staff and students, Pediatric Infectious Disease and GI departments in medical schools in New York, New Jersey, Virginia, DC, West Virginia
- Representatives of manufacturers of ORT: Wyeth-Ayerst, Ross, CERA, etc.
- Officers and CEO's, managed Care and Health Maintenance Organizations, nationwide

In the United States, **300-400 children die** each year due to dehydration from diarrheal disease. While diarrheal disease in this country, compared with that affecting children in developing countries, is mild, it accounts for **4.5-5.5 million outpatient and emergency room visits**, and an excess of **$1 billion hospital costs.** Oral Rehydration Therapy (ORT), in use in developing nations for the past twenty-five years, saves children's lives as well as health care dollars. Using ORT instead of an IV to rehydrate a child with diarrheal dehydration is both humane and cost-efficient, and parents can be trained to recognize the signs of dehydration and initiate treatment in the home, before a child becomes moribund.

In November, 1996, at Johns Hopkins School of Public Health in Baltimore, leaders in public health, pediatrics, managed care, preventive medicine and the insurance industry will come together to inaugurate a nation-wide campaign to promote ORT as first-line treatment of diarrheal disease and dehydration in the US medicine. A public ceremony on November 14, 1996, with appropriate significant media coverage, will launch an intense public effort to alter the practice of using high-tech, high cost medical procedures, when simpler treatments are as effective, less expensive and less traumatic, particularly to children.

As stated in the ORT Consensus statement, to be signed by representatives of the American Academy of Pediatrics, the World Health Organization, UNICEF, Centers for Disease Control, and pediatric infectious disease faculty from across the country at the November 14 event, the **proximate goal is to reduce diarrheal mortality and hospitalizations in the US by 50% in the next four years -- by the Year 2000.**

These goals can be accomplished by:

1. Encouraging the use of ORT promptly to correct dehydration from diarrhea
2. Distributing guidelines set forth by the AAP (3/96); ORT should be used as **first line therapy for all children with mild-to-moderate dehydration**.
3. Making sure that medical facilities treating children have Oral Rehydration Solution readily available.
4. Teaching new parents about the use of ORT.
5. Providing all pediatric practitioners with continuing education opportunities regarding management of diarrhea.
6. Utilizing well-baby visits to educate parents about the management of diarrhea and the use of ORT.
7. Educating the general public about the use of ORT and management of diarrheal disease by developing and widely circulating appropriate materials.
8. Developing regional ORT demonstration and training centers throughout the country.

Dr. Mathuram Santosham, Professor of Pediatrics and International Health at Johns Hopkins, and Director of the Center for American Indian and Alaskan Native Health, is the co-ordinator of the Anniversary Celebration. A quarter century ago, Dr. Santosham was a researcher on the White Mountain Apache Reservation in east central Arizona. Infant mortality rates due to diarrheal disease on the reservation rivaled those in the Third World. Introduction of ORT to the community through the use of "fieldworkers" resulted in an almost immediate reduction of death due to diarrheal dehydration to zero. The White Mountain Apache Chairman, Ronnie Lupe, will offer an opening blessing at the public portion of the 25th Anniversary Celebration, and, on behalf of the tribe, accept an award recognizing the contribution that Indian people played in confirming the importance of ORT in US medicine.

Dr. Santosham will act as facilitator of the the scientific symposium and welcome participants and guests to Johns Hopkins for the celebration. A recognized world authority on ORT and diarrheal disease, Dr. Santosham is responsible for much of the interest in the medical community in altering current treatment of diarrheal disease.

ORT FACTSHEET

There are more than 20 million episodes of diarrhea in American children each year. Each year 4.5-5 million children are seen in emergency rooms and outpatient settings for diarrheal dehydration. Of those children seen, 180,000 -200,000 are hospitalized. Between 300-400 children die each year in the United States because of diarrheal disease and dehydration. It costs $1 billion each year to treat diarrhea and dehydration in American children using the current protocol of intravenous therapy.

- Childhood diarrhea accounts for 20% of acute care visits in city hospitals in the United States.

- Diarrhea is responsible for approximately 10 percent of preventable deaths of children in the United States.

- Fewer than 25 percent of children in the United States receive the benefits of ORT when ill with diarrhea.

- Antibiotics and antidiarrheal drugs have little role to play in combatting childhood diarrhea. They are ineffective and may have damaging side effects on small children.

- ORT is labor intensive: small amounts of rehydrating solution are fed to children over a period of several hours to days. It is not a "quick fix", but it is as effective as IV therapy, less invasive, and far less expensive.

- The technique for the administration of ORT can be taught to those with no medical background.

ORT can and should be made the first line treatment of diarrheal disease and dehydration

National Symposium
Celebrating 25 Years of ORT Use in the United States

ORT: We have the Solution. What is the Problem?

November 13-14, 1996

Hosted by The Johns Hopkins School of Public Health
Baltimore, MD

Goals:

- **Review current status of ORS globally**
- **Review diarrhea morbidity and mortality and economic impact in US**
- **Review ORS knowledge and attitudes among US health care**
- **Review ORS use rates**
- **Make recommendations for increased ORT rates in the US**

Sponsors:

Ross Products Division, Abbott Laboratories
World Health Organization
Wyeth-Ayerst Laboratories
American Academy of Pediatrics
US Agency for International Development
UNICEF

Scientific Symposium
Day 1
November 13, 1996

12:00-1:15 pm	Welcome and Opening Remarks	Mathuram Santosham, JHSPH Robert E. Black, JHSPH
	Special Guest Speaker	
	LUNCHEON	
1:15-1:45 pm	Development of ORS: Physiologic Basis and Early Studies	Bradley Sack, JHSPH
1:45-2:15 pm	First use of WHO-recommended ORS in USA: Apache Studies	Bert Hirschhorn, University of Minnesota
2:15-2:45 pm	Current Status of ORS and New, Improved Formulations	Jim Tulloch, WHO Olivier Fontaine, WHO
2:45-3:15 pm	Clinical Trials of ORS in the United States	Chris Duggan Children's Hospital, Boston
3:15-3:30 pm	BREAK	
3:30-4:00 pm	Morbidity and Mortality from Diarrhea in the United States	Roger Glass, CDC
4:00-4:30 pm	Feeding Issues in Diarrhea	Ronald E. Kleinman Massachusetts General Hospital
4:30-5:00 pm	Problems with Diarrhea in AIDS Patients and the Elderly: Use of ORS in Special Populations	William Greenough, JHH
5:00 pm	Distribution of Draft Consensus Statement	

Scientific Symposium
Day 2
November 14, 1996

8:00-8:30 am	BREAKFAST	
8:30-9:30 am	Adoption of Consensus Statement	
9:30-10:00 am	Physicians and Parents: Knowledge, Attitudes and Behaviors Toward ORS	John Snyder UCSF
10:00-10:30 am	Parent Compliance with Provider Recommendations for Treatment In Pediatric Diarrhea	Anita Chawla MEDSTAT
10:30-10:45 am	BREAK	
10:45-11:15 am	Implementation of ORT Program In Pediatric Clinics and Emergency Rooms In the United States	Julius Goepp, JHH
11:15-11:45 pm	Economic Impact of Diarrheal Disease In the United States	Gerard Anderson, JHSPH
11:45-12:15 pm	General Discussion Concluding Remarks for Symposium	Mathuram Santosham, JHSPH
12:15-1:30 pm	LUNCHEON	

The Scientific Symposium is funded by a grant from Ross Laboratories, Columbus, Ohio and the World Health Organization.

25th Anniversary Celebration:
Oral Rehydration Therapy in the United States

Public Forum and Campaign Launch

November 14, 1996

2:00-2:10 pm	Introduction and Welcome	Mathuram Santosham, M.D.
2:10-2:30 pm	Blessing Ceremony	Ronnie Lupe, Chairman White Mountain Apache Tribe
	Presentation of Recognition Award to White Mountain Apache Tribe	Everett R. Rhoades, M.D. Former Director, Indian Health Service
	Special Message from the Honorary Chair	First Lady Hillary Clinton
2:30-2:50 pm	Keynote Address	J. Brian Atwood, Administrator USAID
2:50-3:00 pm	Reading of Consensus Statement	Antonia Novello, M.D., M.P.H.
3:00-3:30 pm	Panel Discussion	David Brandling-Bennett M.D. WHO Denis Broun, M.D. UNICEF Edward Keenan, M.D. AAP
3:30-3:45 pm	Concluding Remarks	Mathuram Santosham, M.D.
3:45-5:45 pm	RECEPTION	

List of Scientific Symposium Attendees

Gerard Anderson - JHU
Susan Baker - University of South Carolina
Richard Cash - Harvard University
Anita Chawla - MEDSTAT Group
Robert Clay - USAID
Larry Croll - IHS
Chris Duggan - Harvard Medical School
Olivier Fontaine - WHO
Stephan Foster - IHS
Steve Garrett - IHS
Mark Gilger - Texas Children's Hospital
Roger Glass - CDC
Julius Goepp - JHU
William Greenough - JHU
Joyce Harper - MD State Health Department
Norbert Hirschhorn - Minnesota Department of Health
Maurice Keenan - AAP
Ron Kleinman - Harvard Medical School
William Klish - Texas Children's Hospital
Alan Lake - JHU
Alan Myers - Boston City Hospital
Caryn Miller - USAID
David Nalin - Merck Research Laboratories
Antonia Novella - NIH
David Oot - USAID
Robert Parker - Washington County Health Department
Nate Pierce - JHU
John Ryan - Health Officer, Talbot County
Bradley Sack - JHU
David Sack - JHU
John Snyder - University of California
Jim Tulloch - WHO
Ron Waldman - BASICS

Consensus Statement

Oral Rehydration Therapy (ORT) is a well established form of therapy for the treatment of dehydration due to diarrhea. The principles of ORT are: early adequate rehydration therapy using an appropriate oral rehydration solution (ORS), replacement of ongoing stool losses with ORS, and frequent feeding of appropriate foods as soon as dehydration is corrected.

Diarrhea is a major cause of morbidity and an important cause of mortality in the US. Each year, approximately 300 to 400 children die as a result of diarrhea and 180,000 to 200, 000 are hospitalized. Among the elderly (60^{+} years of age), there are approximatley 2,600 diarrheal deaths per year. There are 4.5 to 5 million clinic visits for diarrhea resulting in a total estimated cost of more than one billion dollars for children alone.

The effective use of ORT has saved millions of lives around the world. However, in the US, ORT is often not used optimally. Contrary to the recommendations of the American Academy of Pediatrics (AAP), pediatric practitioners overuse IV hydration, prolong rehydration therapy, delay re-introduction of feeding, and inappropriately withhold ORT especially in children who are vomiting. The experts gathered at the Scientific Symposium on November 13,1996 would like to propose the following measures that could reduce diarrhea mortality by 25% and reduce hospitalizations by 50% in the next 5 years:

I. Implementation of AAP guidelines:

a) The guidelines published by the AAP in March 1996 that recommend **ORT** as the **first line of therapy** for all children with mild to moderate dehydration secondary to diarrhea should be widely distributed.

b) All general pediatric and emergency departments, clinics and pediatrician offices should have ORS readily available and implement its use according to the AAP guidelines.

c) Parents of infants seeking medical care for diarrhea should be provided education about the use of ORS and early feeding.

II. Prevention of dehydration:

a) Educational material about the prevention and treatment of diarrhea, emphasizing the importance of early hydration with home available fluids and ORS, should be developed and widely distributed.

b) All providers should be encouraged to educate and provide materials to parents during well-baby visits about the management of diarrhea, particularly the appropriate use of ORS. Families should be encouraged to have ORS available at home.

III. Training of Providers:

a) Continuing education opportunities regarding the management of diarrhea, should be provided to all pediatric practitioners, nurses and health care providers to infants.

b) Regional ORT demonstration and training centers should be established at several sites around the country, to act as training centers and for ongoing development of strategies and skills to implement ORT programs.

4. **Third party payment for services:**

a) All third party payers should be encouraged to reimburse physicians and hospitals appropriately when ORS is used for the treatment of diarrhea.

List of Scientific Symposium Attendees

Gerard Anderson - JHU
Susan Baker - University of South Carolina
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William Greenough - JHU
Joyce Harper - MD State Health Department
Norbert Hirschhorn - Minnesota Department of Health
Maurice Keenan - AAP
Ron Kleinman - Harvard Medical School
William Klish - Texas Children's Hospital
Alan Lake - JHU
Alan Myers - Boston City Hospital
Caryn Miller - USAID
David Nalin - Merck Research Laboratories
Antonia Novella - NIH
David Oot - USAID
Robert Parker - Washington County Health Department
Nate Pierce - JHU
John Ryan - Health Officer, Talbot County
Bradley Sack - JHU
David Sack - JHU
John Snyder - University of California
Jim Tulloch - WHO
Ron Waldman - BASICS

REVIEW ARTICLE

CURRENT CONCEPTS

JANE F. DESFORGES, M.D., *Editor*

ORAL THERAPY FOR ACUTE DIARRHEA

The Underused Simple Solution

MARY ELLEN AVERY, M.D.,
AND JOHN D. SNYDER, M.D.

IN an editorial in the *Journal* in 1982,[1] Charles Carpenter wrote:

> We physicians all presumably accept the "primum non nocere" principle. On the basis of . . . studies . . . this principle would dictate that oral rehydration be accepted not only as an equal, but perhaps as the superior, means of treating acute diarrheal illnesses in the sophisticated and sanitized medical centers of the Western world as well as in rural Bangladesh.

Despite such editorials based on the large volume of research data available and despite the endorsements of such organizations as the American Academy of Pediatrics, the World Health Organization (WHO), and the United Nations Children's Fund (UNICEF), appropriate oral therapy for diarrhea remains underused in this country as well as in developing countries. Fluid therapy often continues to consist of clear liquids, such as fruit juice and carbonated beverages, that are not suitable for rehydration therapy because of their high osmolality or inappropriate ratio of sodium to carbohydrate.[2] These liquids may suffice in mild self-limited diarrhea, but they are not effective in more severe cases that lead to dehydration. Although newer recommendations also include feeding as an integral part of oral therapy for diarrhea, the tendency to pursue the now discredited policy of sharply reducing or eliminating the intake of solid food at the onset of diarrhea persists.[2-4]

Although diarrheal illness is not the overwhelming health problem in the United States that it is in developing countries, outpatient visits for diarrhea still account for as much as 20 percent of the acute care visits by young children at large urban hospitals,[5] and the incidence of hospital admissions because of diarrhea was reported to be 7.9 per 1000 infants in 1984.[6] Diarrhea accounts for as much as 10 percent of the potentially preventable deaths in children in this country.[7]

HISTORY

Modern oral rehydration was introduced in the United States in the early 1950s by Harrison in Baltimore and Darrow at Yale. Harrison and his colleagues devised an oral solution that contained 60 mmol (60 meq) of sodium per liter, 20 mmol (20 meq) of potassium per liter, 54 mmol (54 meq) of chloride per liter, and 33 mmol (33 meq) of lactate per liter to replace losses of these ions in the stool.[8] They added 3.3 g of glucose per deciliter on the basis of data on protein sparing.[8,9] Soon after, the first commercial glucose–electrolyte solution became available, which unfortunately had a much higher carbohydrate content and osmolality than Harrison's solution and was one of several factors implicated in the outbreak of hypernatremia in the United States in the mid-1950s.[10,11] At the time, the epidemic was incorrectly linked to the sodium content of the solution, not the excessive carbohydrate concentration,[12] and a persistent misconception about the potential harmfulness of sodium in oral electrolyte solutions was born.

One of the earliest balance studies in infants with diarrhea was carried out by Chung in 1948.[13,14] He described the effect of oral feeding on the absorption of food at different levels of the intestine and concluded:

> These studies indicate clearly that effective intestinal absorption of all food stuffs occurs even in the severest of diarrheas, and that the absorption is roughly proportional to the intake. Unless it can be shown that a high intake is in some ways deleterious or delays recovery . . . , it would seem desirable to feed such infants liberally and to disregard the appearance of the stools. . . . From the point of view of absorption, it would seem desirable not to restrict food in infantile diarrhea.

These observations had little effect on the traditional practices of admitting children with dehydration to the hospital for intravenous therapy and withholding feedings until the diarrhea stopped.[1]

The critical scientific discovery underlying the development of effective oral rehydration therapy occurred in the early 1960s with the discovery of the coupled transport of sodium and glucose.[15] This discovery led to a series of clinical studies in adults and children that helped determine the effectiveness of oral rehydration solutions of electrolytes and carbohydrate, even in the presence of extraordinary water losses caused by cholera.[16-18] More than a decade ago, UNICEF and WHO incorporated oral rehydration as the cornerstone of their child-survival efforts and recommended its widespread implementation as an effective, simple, and inexpensive therapy for dehydration caused by severe enteritis in infants.[19] Subsequently, carefully controlled trials of various regimens and solutions for oral rehydration have been conducted in nearly every country in the world.[20,21] By 1985, the American Academy of Pediatrics Committee on Nutrition endorsed the use of oral fluid therapy and post-treatment feeding on the basis of a careful review of the experience at the time.[4] Despite such endorsements and the large number of successful clinical trials, WHO estimates that, worldwide, less than 25 percent of those who could benefit from

From Harvard Medical School, 221 Longwood Ave., Boston, MA 02115, where reprint requests should be addressed to Dr. Avery.

the therapy are treated with appropriate oral rehydration.[3]

Rationale

The physiologic basis of the effectiveness of oral rehydration solutions is the coupled transport of sodium and glucose or other actively transported small organic molecules.[15] Studies in animals and humans have demonstrated that the maximal uptake of water and electrolytes occurs when the ratio of carbohydrate to sodium approaches 1.[15,22] The American Academy of Pediatrics recommends a carbohydrate-to-sodium ratio of <2:1,[4] whereas WHO recommends a ratio of <1.4:1.[23] In clinical studies, a variety of solutions with ratios of less than about 3:1 have proved successful.[24-27] Complete oral rehydration solutions also contain potassium, chloride, and base to replace that lost in the stool of patients with diarrhea.[28] Bicarbonate and citrate also enhance the absorption of water and electrolytes.[29]

Table 1. Composition of Some Oral Glucose–Electrolyte Solutions and Other Clear Liquids.*

Solution	Manufacturer	Na	K	Cl	Base	Glucose†	Osmolality
				mmol/liter			
Rehydration							
WHO–UNICEF oral rehydration salts	—	90	20	80	10‡	111 (20)	310
Rehydralyte	Ross	75	20	65	10‡	140 (25)	305
Maintenance							
Infalyte	Pennwalt	50	20	40	10‡	111 (20)	278
Lytren	Mead Johnson	50	25	45	10‡	111 (20)	290
Pedialyte	Ross	45	20	35	10‡	140 (25)	250
Resol	Wyeth	50	20	50	11‡	111 (20)	270
Clear liquid							
Cola	—	2	0.1	2	13§	730¶	750
Ginger ale	—	3	1	2	4§	500¶	540
Apple juice	—	3	28	30	0§	690¶	730
Chicken broth	—	250	8	250	0§	0	450
Tea	—	0	0	0	0§	0	5

*The solutions labeled "clear liquids" are inappropriate when used alone for rehydration in the presence of diarrhea. The composition of all other solutions is within acceptable ranges.

†Values in parentheses are grams per liter.

‡Citrate is used.

§Bicarbonate is used.

¶Combination of glucose and fructose.

Current Practice

The most widely used solution throughout the world is the WHO–UNICEF mixture of oral rehydration salts, which is provided in the form of packets of glucose (20 g per liter) and three salts — sodium chloride (3.5 g per liter), potassium chloride (1.5 g per liter), and either trisodium citrate (2.9 g per liter) or sodium bicarbonate (2.5 g per liter). These salts are usually packaged in aluminum foil in amounts suitable for use in whatever containers are commonly used for water in a given region. In the United States, a variety of premixed solutions of glucose, electrolytes, and water are available that have compositions approximating that of the WHO–UNICEF mixture of oral rehydration salts (Table 1).

Several limitations are associated with the use of these packets. Although distribution has improved in some countries, logistical problems in production, transportation, storage, and distribution persist. In addition, cultural acceptance has often limited the use of oral therapy because it may not diminish the frequency or volume of diarrhea.[3]

Homemade solutions of sugar and salt can also be used for oral rehydration and could potentially overcome many of the logistical problems associated with packets. An appropriate mixture is half a teaspoon of salt (3.5 g) and 8 teaspoons of sugar (40 g) in 1 liter of water. However, these homemade solutions lack the needed potassium and base and are therefore inadequate to treat hypokalemia and acidosis.[23] In addition, potentially harmful errors in mixing have commonly been reported,[30-32] although an intensive educational program carried out in Bangladesh demonstrated that a high rate of successful preparation is possible initially.[33]

Improved absorption of water and electrolytes in a mixture that reduces stool volume would overcome a major limitation of oral rehydration. The introduction of food additives that contain some glucose polymers and L-amino acids and their dipeptide and tripeptide forms has been examined.[34] Some foods actually increase the effective absorption of salt and water from the intestine and provide more calories than oral electrolyte solutions. Starchy foods, including rice, wheat, potatoes, and lentils, that contain high concentrations of glucose polymers have been studied most extensively.[35] Although solutions containing starches have more potentially cotransporting molecules, the polymers have low osmotic properties in solution. Starchy foods also have the advantage of containing a small percentage of simple proteins that are easily hydrolyzed and well absorbed.[34] These staple cooked foods are now being studied to determine whether they can be used as effectively for the feeding component of oral therapy as they are for oral rehydration.

Once rehydration is complete, food may be reintroduced while the oral electrolyte solution is continued to replace ongoing losses from stool and for maintenance.[4] The rehydration fluid can be safely continued if other foods or fluids are introduced; maintenance fluids (40 to 60 mmol of sodium per liter) may also be used if they are available.[4,36] Clinical studies are under way to help identify optimal feeding regimens, but breast milk and lactose-free, carbohydrate-rich foods are usually well tolerated.[4]

The American Academy of Pediatrics Committee on Nutrition has made the following recommendations regarding oral therapy for enteritis.[4] Glucose-

electrolyte solutions should be used for rehydration (75 to 90 mmol of sodium per liter) and maintenance (40 to 60 mmol of sodium per liter) therapy. Rehydration solutions can be used to provide maintenance fluid and electrolytes when given with water, breast milk, or low-carbohydrate juice. The ratio of carbohydrate to sodium should not exceed 2:1 in rehydration and maintenance solutions. Oral rehydrating solutions may be used to treat mild, moderate, and severe dehydration. Successful therapy can be accomplished in a vomiting child. Mixing of dry ingredients and water at home is acceptable if a container of an appropriate volume is distributed with the dry ingredients. Feeding should be reintroduced within the first 24 hours of the onset of diarrhea and should initially include breast milk and diluted formula or milk for infants and rice cereal, bananas, potatoes, and other lactose-free, carbohydrate-rich foods for older infants and children. Infants should be followed closely to detect dehydration.

Antibiotics and antidiarrheal agents are sometimes given to children, but they are not considered important components of oral therapy, since most episodes of diarrhea are self-limited.[37] Antibiotics do have a role, however, in cholera, shigellosis, and infections due to *Clostridium difficile* and salmonella in infants less than three months old and in some parasitic infections, such as that caused by *Giardia lamblia*.[37,38]

Antimotility drugs, including synthetic opioids and agents containing atropine, can slow intestinal transit time. They have little effect on the total stool volume and may have serious side effects, including ileus.[39,40] For these reasons, they are not advised for infants or children. Antisecretory drugs have been shown to have a small clinical effect but require such high doses that they are impractical or potentially toxic in children.[41,42] Other commonly used agents, such as kaolin, pectin, or charcoal, act by binding to some bacterial toxins and adsorbing water. In clinical trials, however, they have not been shown to change stool weight or water content.[43] None of the drugs studied to date have been shown to be of sufficient benefit and safety to justify their use in acute diarrheal episodes in children.

Why Is Oral Therapy Underused?

Since intravenous therapy has long been used successfully in hospitals, there is sometimes reluctance to introduce oral rehydration, in part because it is labor intensive. This is especially true for vomiting infants, who are best treated by frequent spoon feeding of small amounts of liquid. In the developing world, where many people are underemployed and families traditionally care for the sick, it is possible to find people who will take the time to administer the liquid slowly enough. In hospitals in the United States, it usually takes more time to teach the parents how to administer oral therapy than it does to provide liquids intravenously. However, the loss of an opportunity for teaching preventive measures becomes an added long-term cost. Finally, the family's expectations may also contribute to hospital use of intravenous-fluid therapy. Parents may be reluctant to seek the same type of therapy they have been trying to use at home, and they often expect treatment to include intravenous hydration.

Future Directions

Future efforts in oral therapy will be focused on increasing its effective use in treating acute diarrhea and on research on polymeric solutions, especially those that could be prepared from inexpensive, widely available foods. Such solutions may well reduce diarrheal output while overcoming the logistical and cultural limitations currently associated with the use of packaged materials.

Further attention should also be given to the use of oral electrolyte solutions in other diseases or injuries noted for fluid and electrolyte losses, such as burns. As long as the patient is alert enough to swallow small amounts frequently and has no intestinal contraindications, oral therapy is appropriate, especially if intravenous access must be delayed. The volumes that are appropriate are the same as would be given intravenously, since the mixture is well absorbed. Ileus, shock, and severe vomiting are the chief contraindications. In other conditions, such as inflammatory bowel disease or the gastroenteritides of infection with the human immunodeficiency virus, evaluation of food-based oral hydration mixtures and appropriate early feeding would be worthwhile.

Conclusions

Not only is appropriate oral therapy effective, but it is less painful, much safer — since the child's thirst protects against overhydration — and far less costly than intravenous hydration.[1,26] One impediment to its wide acceptance may be that it is counterintuitive for a simpler and much less expensive treatment to be an improvement over an effective but more complicated technology. WHO and UNICEF have taken the lead in promoting oral rehydration therapy in many developing countries with remarkable success, but there is a continuing need for education and application in many others. Not nearly enough progress has been made in the United States, where the issue is not so much saving lives as preventing dehydration that may require hospitalization by the early administration of appropriate liquids at home.

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Public Forum and Campaign Launch

November 14, 1996

2:00-2:10 pm	Introduction and Welcome	Mathuram Santosham, M.D.
2:10-2:30 pm	Blessing Ceremony	Ronnie Lupe, Chairman White Mountain Apache Tribe
	Presentation of Recognition Award to White Mountain Apache Tribe	Everett R. Rhoades, M.D. Former Director, Indian Health Service
	Special Message from the Honorary Chair	First Lady Hillary Clinton
2:30-2:50 pm	Keynote Address	J. Brian Atwood, Administrator USAID
2:50-3:00 pm	Reading of Consensus Statement	Antonia Novello, M.D., M.P.H.
3:00-3:30 pm	Panel Discussion	David Brandling-Bennett M.D. WHO Denis Broun, M.D. UNICEF Edward Keenan, M.D. AAP
3:30-3:45 pm	Concluding Remarks	Mathuram Santosham, M.D.
3:45-5:45 pm	RECEPTION	

30-SEC PSA SCRIPT:

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****

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