

Barriers To Use of Oral Rehydration Therapy

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ABSTRACT. *Objective.* To identify potential barriers to the use of oral rehydration therapy (ORT) by pediatric practitioners.

Design. Cross-sectional, anonymous, self-administered survey of physicians' ORT knowledge, attitudes, and practice.

Setting. A national continuing medical education conference.

Participants. One hundred four general pediatricians primarily in private practice (66%) who completed training after 1980 (76%).

Measurements and results. Most respondents (83%) reported that ORT plays an important role in their management of dehydration. However, compliance with guidelines from the American Academy of Pediatrics for use of oral therapy is limited: 30% withhold ORT in children with vomiting or moderate dehydration, 50% fail to advise prompt refeeding, and only 3% advise use of a spoon or syringe. The degree of importance of ORT in physicians' practice was negatively associated with reported lack of convenience of ORT administration in the practice setting ($P < .001$), support staff preference for intravenous versus ORT ($P < .001$), need for additional training of support staff to implement ORT ($P < .01$), and likelihood of reimbursement for intravenous versus ORT ($P = .07$). Notably, degree of importance of ORT was not associated with physician ORT knowledge.

Conclusion. Efforts to improve use of ORT should be expanded beyond physician education and focus on such barriers as support staff limitations and financial constraints. *Pediatrics* 1994;93:708-711; *oral rehydration therapy, oral rehydration solution, fluid therapy, dehydration, diarrhea.*

ABBREVIATIONS. ORT, oral rehydration therapy; ORS, oral rehydration solution; CME, continuing medical education; AAP, American Academy of Pediatrics; IV, intravenous.

Management of acute diarrheal disease is a common problem in pediatric practice. In the United States, up to 38 million cases of acute diarrhea occur each year in children <5 years old, accounting for nearly four million physician visits annually.¹ In addition to its high incidence, acute diarrheal illness creates significant morbidity among children who are

inadequately treated. Each year 220 000 children <5 years of age are hospitalized for dehydration, the primary complication of diarrhea in the United States. In fact, dehydration accounts for 10% of all pediatric hospital admissions.¹ Although mortality is relatively low in this country, approximately 400 children die each year from complications of diarrhea.¹ Moreover, diarrhea is responsible for as many as 10% of the preventable postnatal deaths in the United States, especially among the children born to disadvantaged women.²

Although effective vaccines are not yet available to prevent acute diarrheal disease, its primary complication, dehydration, can be prevented with prompt and appropriate management. Oral rehydration therapy (ORT), which combines use of a balanced oral solution of electrolytes and carbohydrates with early refeeding, restores and maintains fluid and nutritional status.³ Numerous clinical trials have confirmed that ORT is as effective as intravenous (IV) therapy in rehydrating both hospitalized and ambulatory patients.⁴⁻⁷ Furthermore, ORT has numerous advantages over IV therapy. Due to the oral route of administration, ORT is a noninvasive, low-technology, and inexpensive therapy. In many developing countries, reliance on this simple therapy has been credited with dramatically reducing the death rate from infectious diarrhea.⁸ Because ORT can be readily taught to a child's caregivers, oral rehydration can be performed in the home, or under supervision in the pediatrician's office. In most cases, prompt and appropriate oral therapy can prevent progression to severe dehydration, and thereby markedly reduce the number of emergency department referrals and hospitalizations for management of acute diarrhea.

Despite the endorsement and published recommendations for use of oral therapy by the American Academy of Pediatrics (AAP) Committee on Nutrition,⁹ ORT is not universally accepted by US pediatricians. In a survey of private and academic pediatricians, fewer than 30% advised use of oral solutions meeting AAP guidelines for management of acute diarrhea; instead, most recommended nonphysiologic clear liquids, such as soda, popsicles, and tea.¹⁰ Another survey revealed that fewer than 50% of pediatric practitioners advised prompt refeeding,¹¹ as outlined in the AAP guidelines.

To date, reasons for this lack of physician acceptance of ORT have not been described. Therefore, we conducted the present study to identify potential barriers to the use of ORT by pediatric practitioners using

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an anonymous, cross-sectional survey of pediatricians' ORT knowledge, attitudes, and practice.

METHODS

Study Sample

The study sample was drawn from pediatric practitioners attending a national continuing medical education (CME) conference coordinated by the AAP in June 1992. ORT was not one of the topics presented at the conference. All attendees were invited to complete an anonymous questionnaire about their management of acute diarrheal illness. All surveys completed by US pediatricians were included in the study sample.

Study Definition of Appropriate Oral Rehydration Solutions

Appropriate oral rehydration solutions contain 45 to 90 mEq/L sodium, 1% to 3% carbohydrate, and osmolality ≤ 310 . Solutions that meet these criteria include World Health Organization Oral Rehydration Solution and the commercially available electrolyte solutions, Pedialyte, Ricelyte, Rehydralyte, Lytren, and Reosol.

Study Instrument

The study instrument consisted of a two-page, anonymous, self-administered questionnaire. This survey assessed three content areas: (1) physicians' knowledge of ORT, as based on published AAP recommendations; (2) physicians' own attitudes, and perceived attitudes of families and support staff, toward ORT; and (3) physicians' self-reported practice of fluid management and refeeding for acute diarrheal illness with dehydration. Table 1 outlines these three major content areas of the study instrument. Demographic information was also requested, including type, setting, and location of physician practice and decade in which pediatric training was completed.

Statistical analysis consisted of univariate and bivariate analysis. Descriptive summary measures for each of the ORT knowledge, attitudes, and practice variables were calculated for the sample as a whole. Population parameters for the variables found to be barriers to the use of ORT were estimated using sample proportions and 95% confidence intervals. In bivariate analysis, the Mann-Whitney nonparametric test was used to test for associations between knowledge and attitude variables and practice variables.

TABLE 1. Content of Study Instrument

1. Knowledge of oral rehydration therapy (ORT): Closed-ended multiple choice questions about
Indications for ORT
Contraindications for ORT
Balanced components of oral rehydration solutions
Timing of refeeding
2. ORT attitudes: Five-point Likert scale to assess agreement with statements about
ORT safety/effectiveness in treating dehydration
Role of ORT in preventing dehydration
Convenience of teaching/administering ORT
Patient/family preferences for ORT vs intravenous (IV)
Support staff preferences for ORT vs IV
Financial considerations related to ORT vs IV
3. ORT practice
Open-ended questions about
Indications for ORT
Contraindications for ORT
Standard fluid recommendations (brand, amount, route)
Standard refeeding recommendations
Five-point Likert scale to assess agreement with the statement
"ORT is important in the management of acute diarrhea in my practice"

RESULTS

Sample

One hundred-sixteen CME attendees (51%) completed the survey. Selecting all US pediatricians from this group of respondents yielded the study sample of 104. Ninety-nine percent of the sample described themselves as "general pediatricians." Most identified their practice setting as "private practice" (66%) or "health maintenance organization" (20%); the remainder identified community or teaching hospital sites. Twenty-six different states and the District of Columbia were represented. Finally, pediatric training spanned pre-1950 to 1990s, with 76% having completed training after 1980.

ORT Knowledge

Mild dehydration was correctly identified as an indication for using ORT by 95% of the sample; moderate dehydration was correctly identified by 86%. Seventy-two percent correctly indicated that vomiting is not an absolute contraindication to use of ORT. Sixty-two percent correctly selected sodium and carbohydrate as the two balanced components in oral rehydration solutions. Fifty-eight percent of the sample correctly identified that refeeding should be initiated within 24 hours of the onset of diarrhea.

ORT Attitudes

More than 90% of the pediatricians in the sample expressed positive attitudes toward the role of ORT in the prevention of both dehydration and the subsequent need for referral to emergency or inpatient facilities. However, negative attitudes were expressed about the convenience of administering ORT in the practice setting (12%), as well as the ability of parents to provide ORT effectively in the home (11%). Physicians also expressed perceived negative attitudes of patients and families toward ORT, including the belief that children refuse ORT because of the taste (40%). Negative attitudes about support staff limitations were also revealed, including perceived staff preference for IV therapy over ORT (13%) and the need for additional staff training in ORT (21%). In addition, many pediatricians expressed negative attitudes toward the financial constraints related to use of ORT: 44% indicated that they are more likely to be reimbursed for use of IV therapy, and 15% thought that ORT is too expensive for their patients' families to purchase.

ORT Practice

Nearly all pediatricians in the sample use both oral therapy (98%) and IV therapy (95%) in managing dehydration. Table 2 summarizes physician responses to open-ended questions about their standard use of oral fluid therapy and refeeding. The vast majority reported using oral therapy for mild dehydration (97%). However, in contrast to AAP guidelines, moderate dehydration and vomiting were identified as contraindications to use of oral fluids by approximately one third. Most pediatricians prescribe "appropriate" oral fluid solutions (as defined in "Methods") for their patients with diarrhea and de-

TABLE 2. Physician-Reported ORT Practice*

Practice Item	Physician Response, %
Indications for ORT	
Mild dehydration†	97
Moderate dehydration†	66
Severe dehydration†	8
Contraindications for ORT	
Severe dehydration	63
Vomiting	36
Moderate dehydration	30
Patient unable/refuses to take by mouth	29
Social/family reasons	22
Oral fluids prescribed	
Pedialyte‡	93
Ricelyte‡	73
Sports drinks (Gatorade/10K)	17
Clear liquids/soda/juice/tea/water	14
Rehydralyte‡	8
WHO/UNICEF solution‡	1
Amount, means of administration	
Small amounts	43
Frequent feedings	34
Spoon/syringe feedings†	3
Timing of refeeding	
<24 h from onset of symptomst	48
24–48 h	47
48–72 h	5

* Abbreviations used: ORT, oral rehydration therapy; WHO/UNICEF, World Health Organization/United Nations International Children’s Emergency Fund.

† In accordance with American Academy of Pediatrics guidelines.

‡ Meets study definition of “appropriate” oral solution.

hydration; however, 17% advise use of “sports drinks” and 14% advise use of inappropriate “clear liquids.” Overall, 94% of respondents use an appropriate oral solution for at least mild dehydration. Unfortunately, pediatricians rarely give parents specific, quantitative instructions for administering oral fluids; rather, many prescribe “small amounts” in “frequent feedings.” Only 3% of the sample instruct parents to use a syringe or spoon, as recommended by the AAP, to control the rate and volume of fluid ingested. Finally, less than half the respondents adhere to the AAP recommendation for prompt refeeding. Although very few pediatricians follow all AAP recommendations for use of oral rehydration and refeeding, as described above, 83% reported that “ORT is important in the management of acute diarrhea in my practice.”

Potential Barriers to Use of ORT

To identify potential barriers to use of ORT by physicians, associations were sought between the physician ORT knowledge and attitude variables and the reported degree of importance of ORT in practice. Four attitudinal statements were found to be negatively associated with the degree of importance of ORT in physician practice. The first significant attitude variable relates to the lack of convenience of ORT administration in the practice setting. Of the pediatricians who expressed that ORT is convenient to administer, 94% agreed that ORT is important in their practice; in contrast, of those who felt that ORT is not convenient to administer, only 40% agreed that ORT is important in their practice ($P < .001$). The other significant attitude variables are greater support staff preference for IV therapy over ORT ($P < .001$), need for additional staff training in ORT ($P < .01$), and greater likelihood of reimbursement for IV therapy ($P = .07$). The prevalence of these attitudinal barriers to use of ORT is illustrated in Table 3. Of interest, physician ORT knowledge variables, practice setting, and decade of training were not significantly associated with the importance of ORT in practice.

DISCUSSION

Nearly all of the pediatricians sampled (94%) use an appropriate oral solution for at least mild dehydration resulting from diarrheal illness. In addition, most respondents (83%) reported that ORT plays an important role in their management of diarrhea and dehydration. However, approximately one third of the pediatricians in our sample withhold oral therapy in children with vomiting or moderate dehydration, half fail to advise prompt refeeding, and only 3% recommend using a spoon or syringe. Confirming the findings of previous studies by Snyder¹⁰ and Bezerra et al,¹¹ our results demonstrate that many pediatricians still fail to comply with AAP guidelines for use of oral fluid therapy.

The lack of universal acceptance of AAP recommendations has been hypothesized to result from ineffective physician education programs.¹⁰ However, in our study the lack of physician knowledge of ORT does not seem to have an impact on the role of ORT in practice. Our finding is consistent with the conclusions of reviews of numerous educational interventions aimed at physicians.^{12,13} These reviews have shown that dissemination of printed materials alone, such as the publication of AAP recommendations, has a weak effect on physician performance and little or no effect on patient outcome. The variables we iden-

TABLE 3. Prevalence of Attitudinal Barriers to use of ORT*

Physician Attitude	Percent Agreement (95% CI)
ORT is not convenient to administer in my practice setting.	12 (7, 17)
My staff would prefer IV therapy to ORT.	13 (9, 17)
My staff would require additional training to implement ORT.	21 (16, 26)
My practice is more likely to be reimbursed for IV than ORT.	44 (38, 50)

* ORT, oral rehydration therapy; CI, confidence interval.

tified as negatively associated with the role of ORT in practice reflect the physicians' perceived lack of convenience of ORT administration, support staff limitations, and financial constraints. All of these potential barriers to the use of ORT are external factors, rather than insufficient physician knowledge, that seem to have an adverse impact on pediatricians' compliance with AAP recommendations. Our findings suggest that efforts to improve use of ORT should expand beyond physician education and focus on further study of these external factors.

Financial barriers to physician ORT practice, which were identified by 44% of the pediatricians in our sample, have not been described previously. However, one case report has described the economic barrier of purchasing oral rehydration solution among families living in poverty.¹⁴ A 9-month-old Medicaid patient died of hypernatremic dehydration because his mother could not afford to buy the prescribed oral rehydration solution at a local pharmacy (average price \$5.66/L). Although the cost of ORT was not found to be a significant barrier to use of ORT by physicians in our study, perhaps due to the distribution of practice settings represented, 15% of pediatricians agreed that oral rehydration solutions are too expensive for their families to purchase. Of note, Medicaid programs in most of the U.S. (including all Southern states, where a disproportionate number of diarrheal deaths occur²) cover few or no over-the-counter medications, such as oral rehydration solutions. In addition, many children in low-income families receive no medical assistance.¹⁴

The main limitation of this study is its reliance on physician self-report of ORT practice. To confirm our findings, more direct measures of physician behavior are needed, such as direct physician observation, patient and staff interviews, and chart review. Future studies would also benefit from more representative sampling of various practice settings, especially those serving low-income families. In addition, the response rate of 51% raises concern of a possible self-selection bias. However, because the survey was presented as a study of diarrheal illness management, not of ORT, a selection bias favoring ORT advocates is unlikely.

CONCLUSION

We found that most pediatricians (94%) use an appropriate oral solution for at least mild dehydration.

Furthermore, most (83%) reported that ORT plays an important role in their management of diarrhea and dehydration. However, as previously reported, compliance with AAP guidelines is limited: 30% withhold ORT in children with vomiting or moderate dehydration, 50% fail to advise prompt refeeding, and only 3% direct use of a spoon or syringe. Significant barriers to use of ORT in pediatric practice include physicians' perceived lack of convenience of ORT administration, support staff limitations, and financial disincentives. Interestingly, physician knowledge does not seem to have an impact on ORT practice. Our results suggest that efforts to improve pediatrician use of ORT should expand beyond physician education and focus on the impact of barriers including support staff limitations and financial constraints.

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