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Rachel Hall-Clifford
Agnes Scott College

Roxanne Amerson
Clemson University, roxanna@clemson.edu

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From Guidelines to Local Realities:

Evaluation of oral rehydration therapy and zinc supplementation in Guatemala

Rachel Hall-Clifford^{a*}

Roxanne Amerson^b

Objectives: Diarrhea remains a leading cause of morbidity and mortality for children in low- and middle-income countries throughout the Americas. WHO guidelines have been developed to incorporate zinc supplementation (ZS) with traditional oral rehydration therapy (ORT) to shorten duration and reduce poor health outcomes. Guatemala adopted these guidelines in 2011, but they have not yet been fully implemented at the community level. The objectives of this study were to co-design an ORT/ZS training program with community health promoters appropriate to the local context and to understand how training with the promoters changes attitudes and behaviors of community members.

Methods: In an observational study, community health promoters were trained in rural Guatemala according to WHO guidelines and collaboratively developed training curriculum to implement in their community. Community-based surveys, interviews, and focus group discussions were used to assess acceptability, accessibility, and availability of oral rehydration therapy and zinc supplementation.

^a Agnes Scott College, Departments of Anthropology and Public Health, 141 E. College Ave., Decatur, GA 30030 USA

^b Clemson University, School of Nursing, Clemson, SC 29634 USA

*Corresponding author: Tel: +1-404-471-6238; Email: rhallclifford@agnesscott.edu

Results: Knowledge of oral rehydration therapy increased from 63% to 95% following training by local community health promoters. Satisfaction with the service offered by community health promoters increased from 63% to 90% amongst community members trained by local promoters. However, knowledge and use of zinc supplementation remained low, which was attributable to unavailability of zinc in the study community.

Discussion: Use of trained community health promoters is an effective way to translate WHO guidelines to local contexts and overcome sociocultural barriers to care. However, the health systems structure must support availability of essential medicines for effective implementation.

Keywords: DIARRHEA; GUATEMALA; ORAL REHYDRATION THERAPY; ZINC

Introduction

For many decades, diarrhea has remained the second leading cause of death in children under five and the leading cause of child undernutrition globally (1). Nearly all of these preventable deaths occur in low- and middle-income countries (LMICs) and would be prevented with effective case management of diarrhea (2). In 2004, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) issued a joint statement adding zinc supplementation (ZS) to the recommended formula for low osmolarity oral rehydration therapy (ORT) for case management of diarrhea. Zinc supplements given for 10-14 days during acute episodes of diarrhea can decrease the severity and duration of the episode, as well as the recurrence of the diarrhea in the next 2-3 months (3,4,5). However, implementation of ZS coupled with long-standing ORT protocols in LMICs has been weak (6).

Issues with previous ORT programming efforts have included: 1) lack of knowledge by parents on recognition of diarrhea and the signs and symptoms of severe dehydration, leading to delays in treatment-seeking (7,8); 2) poor training and knowledge retention on the dosage and uses of ORT (9,10); and 3) reliance on manufactured ORT products and poor availability of those products (11). Food-withholding in cases of diarrhea and increased stool output as a deterrent to ORT use have been widely reported (7, 12). In Guatemala, ineffective ORT training among parents and health promoters has been a barrier to effective ORT uptake, in addition to the widespread belief that commercial ORT products carry greater health benefits than homemade solutions (11).

The inclusion of ZS with ORT in standard childhood diarrheal treatment protocols marks a hopeful point for improvement in morbidity and mortality outcomes in Guatemala, where diarrhea is the third leading cause of death in children under five years and an estimated 70% of

children face chronic undernutrition (13). Low household economic status and indigenous cultural beliefs about anticipated episodes of diarrhea at certain milestones of child development are known to delay treatment-seeking for childhood diarrhea in Guatemala (7,8,14). Despite ample clinical evidence in support of ZS and potential for high acceptability by target populations, the new protocols have not yet been widely field-tested or adequately implemented in many LMICs. The Guatemalan Ministry of Health announced the implementation of ZS with ORT protocols and the funding of 4 million doses of zinc in 2011 (15); however, the diffusion of ZS as an addition to Guatemala's national ORT protocols has not been systematically evaluated.

The objectives of this study were to co-design an ORT/ZS training program with community health promoters that is appropriate to the local context in a rural indigenous Guatemalan community and to understand how implementation of this training changed attitudes and behaviors of community members.

Materials and Methods

This observational study was conducted in a rural Mayan community with a population of approximately 15,000 in Guatemala's highland Department of Sololá. The community is spread across mountains and ravines surrounding a small central district in the valley floor with municipal offices, a church, and a few shops. The departmental capital, with the nearest health facility staffed by a doctor, is approximately 45 minutes by bus. Formal health services in the community consist of a health post in the central district staffed by one nurse and a small team of assistants and four community centers in the furthest districts. The community has two pharmacies and several privately-owned shops that stock a variety of medicines, largely analgesics, antibiotics, and antimicrobials.

Field activities for this study were conducted between January 2013 and June 2014. In January 2013, in-depth interviews were conducted with the mayor, health post staff, local pharmacists, existing health promoters, the director of health services for the municipality, and the head of the pediatric unit at the departmental hospital (n= 8). Four focus group discussions were held with local women (n=25), and 24 household surveys were conducted to understand local perceptions of childhood diarrhea, its prevalence in the community, and normative ideas about the types and sources of treatments used for childhood diarrhea.

This baseline community information was used to develop an interactive curriculum of five half-day sessions to train community health promoters incorporating local cultural norms and resources with the WHO ORT/ZS guidelines on: symptoms and severity of dehydration, differentiation types of diarrhea, homemade oral rehydration solution (ORS), and dosages of zinc (16). They were also trained in principles of adult education and how to work as health promoters in their community. Twenty women, selected by local leaders, attended a training session in June 2013. Seven of the 20 women met the study criteria of a post-training knowledge assessment, using both demonstration, pictorial, and written methods, and became community health promoters.

Over the 12 months following the training, June 2013 to June 2014, the promoters reported training or being consulted by 55 local women. The first author communicated with group leaders on a monthly basis by phone call and SMS (text message) to encourage continued participation and answer questions about training materials. In the final phase of the study, a household survey (n=21) was conducted with women who had been trained by the project's promoters. The municipal health director and local health post nurse were interviewed (n=2).

Finally, in-depth interviews and a group discussion were held with six promoters who completed the project for their insights on implementation and efficacy.

Ethical approval for this study was received from the Institutional Review Boards of Clemson University and Agnes Scott College in the United States in addition to local approval by the ethics board of Wuqu' Kawoq, a Guatemalan health provision NGO respected in the region, and the town council of the study location. Informed consent was obtained from all study participants, and community health promoters received an adapted version of the U.S. National Institutes of Health human subjects protection training. All personal identifiers were removed during data entry to a secure database, and written materials were destroyed to protect confidentiality of participants. All quantitative data were analyzed using MatLab (Version R 2014A), and qualitative data were coded and analyzed using QSR NVivo 10 software.

Results

Community level

Diarrhea was widely recognized in the community as a serious problem for children (Table 1). During baseline community assessment, one focus group participant stated, “[Diarrhea] is a common illness but it is dangerous and can kill if there’s no way of treating it” (Focus Group Discussion 4). Ideas about treatment for childhood diarrhea centered largely on medicines, primarily tablets, at baseline. Availability of money was the most-mentioned determinant of where health care is sought, with a preference for pharmaceuticals or paid trips to doctors for most conditions that are not resolved with home treatment. The village mayor observed, “The economics make it difficult [for treatment-seeking]. Also, the distance to Sololá [to the free health center or hospital] is a problem – people have to pay to get there.” However, the more expensive bottled solutions were favored over the dry packets given free through the

health post or at low cost in shops. One focus group participant stated, “We buy it in packets, make it with boiled water, and sometimes buy it in liquid [bottled]...the children prefer the bottled. They don’t like the packets because it tastes salty” (Focus Group Discussion 2).

Although knowledge of ORT at baseline was 79%, only 63% reported having ever used ORT (Table 1). After training with a community health promoter, both knowledge of ORT and actual reported use of ORT increased significantly. Community members most often cited homemade ORS as the most frequent type of ORT used following training. They often expressed surprise and satisfaction with the knowledge that an effective ORS could be made at home for very low cost and without the hassle of a trip to the health post or pharmacy. The percentage of community members who had heard of ZS did increase significantly through the promoter training, building on a baseline of 0%. Use of zinc for childhood diarrhea did not increase because zinc was unavailable through the health post or village pharmacies during the study period. The promoters voiced frustration about zinc availability and confusion from community members when an unavailable treatment was recommended during training sessions; many of the health promoters reported excluding the information about zinc from their training sessions because of these factors.

At baseline, the role of health promoters was found to be unclear among community members, with some “promoters” operating as a part of the government health service and others working as private providers. Although government services are supposed to be free, community members most frequently reported that the help of a promoter, public or private, was expensive. Community members who received training reported significant increases in having consulted a health promoter and the opinion that health promoters offer good assistance in times of illness (Table 2). The women who participated as health promoters reported feelings of self-

efficacy and pride in their roles. One stated, “I feel useful to society and satisfaction knowing that people practice it [the ORT education she gives]” (Promoter Follow-up Interview 1).

Health system level

During the 18 months of field implementation of the project, zinc was never available in the research community through the government health post or private pharmacies and shops. The promoters reported that the nurse in charge of the village health post told people that they “don’t have the right” to ask for specific medicines such as zinc and that the long-term stock-out was beyond local control, although traveling to the municipal health center to pick up supplies of medications is an assigned duty. The job of health post nurse changed hands in the final six months of the study, and the new nurse stated a desire to make changes in how the post had been run. Some community members reported feeling that the nature of a salaried job in the post made personnel lazy, while others felt the post was an important health resource in the community. At the conclusion of the study, three of the women trained as promoters explored a continuing relationship with the health post as a way to reach more families in the community.

Zinc was typically available at the municipal health center, the primary point of referral from the community health post. Stock outs were reported at the departmental hospital, where many local community members reported seeking care when cases of childhood diarrhea became severe or when services were unavailable at the local health post. No private pharmacies in either the nearest town with bus connections or the departmental capital had zinc in tablet form that would meet the WHO guidelines on dosage. Some pharmacies had zinc in syrup format, but none said they would recommend it for a child with diarrhea. The municipal health center has a rehydration unit where children with diarrhea can have ORT administered. The nurses who

operate the rehydration unit reported being out of zinc entirely for two months of 2012 and intermittent shorter periods of stock outs in 2013.

The municipal health center is the administrative unit that oversees the operation of local-level health posts. The nurse responsible for the health post in the study community is tasked with traveling to the municipal health center to pick up medicines and transport them back to the post. Health center employees reported that the health post in the study community had been out of zinc for 9 months during 2012-2013. The non-indigenous director of the municipal health center stated a belief that the biggest challenge in providing health care is culture [of rural, indigenous populations] because, “people only want a tablet and a cure. They don’t like prevention. Health is only a focus in [times of] illness.” Further, he said that for the rural population such as the research community, “it’s normal for a child to have diarrhea.”

Discussion

Rates of ORT knowledge and reported use increased in the study community. Even in contexts where comprehensive ORT and ZS implementation efforts have been made, behavior change according to the 2004 WHO/UNICEF protocol has been difficult to achieve (9,17,18). A previous study conducted in Guatemala demonstrated increased ORT/ZS knowledge of community health workers, but it was unclear if the training was effectively disseminated into the community and how parental behaviors related to ORT and ZS were influenced by the training (19). Our study demonstrates increased knowledge of ORT and ZS among community members trained by the promoters. Training on homemade ORT increased both accessibility and affordability for community members who otherwise had to undertake a trip to a government health facility or pay for ORT in a pharmacy or shop. Also, since many community members

mentioned use of home and natural remedies for diarrhea, homemade ORT fit well with local cultural norms and may help overcome delays in diarrheal treatment-seeking (7).

Parents in Guatemala frequently express concerns that ORT does not relieve diarrhea and base decisions not to use it on this basis, indicating a lack of knowledge of the expected outcomes of ORT use (11). Co-administration of ORT and ZS, which shortens duration of diarrheal episodes and has growth benefits for nutritionally vulnerable children (20,21), could carry the dual benefits of sustained ORT uptake while meeting parental expectations of effective treatment (22). A 2011 study found that approximately 30% of children who experience diarrhea are treated with ORT and 0% receive zinc for treatment of diarrhea in Guatemala (23); a subsequent study in 2013 found that the percent of children treated with ORT was only 8% and the use of zinc has remained low or non-existent (8). Following our study, knowledge of ZS also remains low and no usage was reported. Expressed desirability of ZS was high among both the promoters and community members when made aware of its ability to shorten diarrheal episodes and prevent recurrence. However, we were unable to document uptake or satisfaction with ZS as intended since it was unavailable in the community during the study period. We believe health system staffing and zinc stock-outs were the key barriers to household implementation of the WHO/UNICEF ORT/ZS protocol observed in this study rather than sociocultural factors, which were the presumptive cause labeled by upper-level Ministry of Health staff. Local health post staff and municipal level staff cited conflicting reasons for the local stock-outs and, at times, denied them. ZS was adopted into the national formulary to come into line with WHO guidelines but no changes in supply chain management were made to facilitate consistent delivery to the local level.

Previous interventions have used a community health promoter model for delivering health information in Guatemala with positive results (24). The training of local women as health promoters was well accepted by the community, where all but one previous health promoter had been male. Promoters within the community had historically been primarily men. The model of using local women as promoters was met with satisfaction on both the part of the promoters themselves as well as the female community members they trained. Because women are the primary caregivers of children, female promoters focusing on childhood diarrhea were well accepted in the community and likely had greater opportunity to build rapport during in-home training sessions. Follow-up surveys of participants indicated that this rapport would yield confidence in asking for help from a promoter in future cases of illness. The promoters reported some suspicion from some women who they approached to participate in training because of concerns that the promoters would financially benefit from them, likely due to the history of promoters expecting payment in the community. Our promoters demonstrated a willingness to undertake their role as a voluntary form of social participation in the community, supported by the significant shift seen in opinions on the quality of assistance offered by health promoters during the study.

Limitations of our study include the small sample size of promoters and of households trained by promoters during the study. Also, the study was unable to achieve one of its objectives to measure attitudes to and uptake of ZS because it was never available in the study community.

Translating a global protocol such as ORT/ZS into reality at the local level presents important challenges at the community level for creating acceptable and achievable health-

seeking options viable for end-users and local implementation teams and at the health systems level for institutionalizing availability and accessibility of the recommended treatment. By working collaboratively with local women to adapt the WHO/UNICEF guidelines to cohere with the experiences and resources in their community, participants were satisfied and confident in the ORT training they received. Our female promoters were able to build rapport with the local women who were their friends and neighbors and who participated in their training sessions where other health workers were not viewed as accessible. While the local adaptations of ORT/ZS guidelines will vary depending on context, this study illustrates potential gains in accessibility, acceptability, and affordability for LMICs implementing ORT/ZS programs. We recommend a process of baseline data collection on knowledge and use of ORT/ZS, co-design of training with local input to create local ownership, and ongoing support of community health promoters. The successful adaptation of WHO protocols to local contexts also relies upon the commitment and ability of the health system to supply the necessary resources and accountability for implementation.

The authors declare that they have no conflicts of interest in this research.

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Table 1: Rural indigenous community member knowledge of diarrhea, ORT, and zinc before and after training with local promoters, Guatemala¹

	Community Baseline, January 2013(n=24)	After Training with Local Promoter, March 2014 (n=21)
Percentage who say children in their community suffer from diarrhea	88%	95%
Most common treatments for diarrhea in their community (listed in order of frequency; some respondents gave more than one answer)	Medicines (n=12) Herbs/natural remedies (n=9) Health professional (n=4) ORT (n=3)	ORT (n=15)* Medicines (n=7) Health professional (n=6) Herbs/natural remedies (n=5)
Percentage who have heard of ORT	79%	100%*
Percentage who have used ORT	63%	95%*
Type of ORT used (listed in order of frequency; some respondents gave more than one answer)	Dry packets (n=14) Bottled (n=7) Homemade (n=0)	Homemade (n=11)* Dry packets (n=10) Bottled (n=5)
Percentage who have heard of zinc as treatment for childhood diarrhea	0%	24%*
Percentage who have used zinc for childhood diarrhea	0%	5%

¹ All data collected by the authors during the study.

*Indicates a statistically significant increase (p<0.05) using Fisher's exact test (25)

Table 2: Rural indigenous community member knowledge and opinion of community health promoters before and after training with local health promoters, Guatemala¹

	Community Baseline, January 2013 (n=24)	After Training with Local Promoter, March 2014 (n=21)
Percentage who say there is a health promoter in their community	79%	86%
Percentage who say they have consulted a health promoter for help with an illness	58%	90%*
Percentage who say health promoters offer good assistance for people who are ill	63%	90%*

¹ All data collected by the authors during the study.

*Indicates a statistically significant increase ($p < 0.05$) using Fisher's exact test (25)

