

## Primary Health Care for Remote Village Communities in Honduras: A Model for Training and Support of Community Health Workers

Wolfgang Rennert MD, DMSc, DTM+H; Elizabeth Koop, MS, CRNA-P

**Background and Objectives:** *We present a model for the development of sustainable primary health care in village communities in Honduras through the training and support of community health workers. The model follows a “bottom-up” approach using community-centered data generation, problem-specific curriculum development, and ongoing knowledge maintenance and support for community-based care givers. Health worker training, evaluation, and support are provided by US-based primary care professionals. **Methods:** The intervention is designed in five stages: (1) background needs assessment based on patient chart reviews to identify prevalent health problems, (2) selection of target communities, (3) obtaining community involvement and prospective health worker commitment, (4) development and implementation of a needs-specific curriculum for health worker training and community health education, and (5) maintenance, evaluation, and expansion of training and support for community health workers. **Results:** Chart review of 725 children identified respiratory tract disease, gastrointestinal infections, and skin infections as predominant health problems. A curriculum for health workers was designed to address these and was implemented in a 1-week training program in two target communities. After 15 months of practice, health workers had attended 2,347 patients. Three monthly review and refresher sessions improved case management accuracy significantly. **Conclusions:** The establishment of sustainable primary health care in remote, underserved communities using community health workers is possible and feasible, even in countries that do not have a national health worker network. Primary care professionals can play an instrumental role in project design, management, and supervision.*

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Honduras, a nation of about 7 million people, is one of the poorest countries in the Western hemisphere.<sup>1</sup> A dependency ratio of 79% demonstrates the small population segment contributing to economic development.<sup>2</sup> Infant mortality, a key indicator of population health, remains about 10 times higher than in Western European countries (31 versus 2 to 4 per 1,000), though it has decreased significantly over the last 30 years.<sup>3</sup>

The economic situation is accompanied by a shortage of health professionals throughout the country. There are 57 physicians and 129 nurses per 100,000 people. In the United States, the corresponding ratios are 256 and 937 per 100,000 respectively. Most Honduran

health professionals practice in urban centers, leaving the bulk of the rural population without access to health care. Of note is the absence of a corps of lay community health workers similar to those prevalent in African and Asian countries of comparable development.<sup>4</sup> Despite the odds, the public health system has achieved an immunization rate of 92% to 99% among 1 year olds<sup>5-6</sup> and maintains a comprehensive tuberculosis control program.

In 1998, much of the country was devastated by Hurricane Mitch. A total of 6,500 Hondurans lost their lives, 11,000 more went missing, and 650,000 people were left homeless. Seventy-five percent of the country's transportation infrastructure was destroyed, whole villages were swept away, and 70% of crops were lost. Outbreaks of cholera and dengue claimed more victims.<sup>7</sup> An international aid and relief effort brought multiple, mainly US-based, aid organizations into the country, which until now provide medical

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From the Department of Pediatrics (Dr Rennert) and the School of Nursing and Health Studies (Ms Koop), Georgetown University.

care to predominantly rural communities.<sup>8</sup> Most of these initiatives did not generate data monitoring the outcome of their interventions or their effects on the target communities. Yet, it is possible to use medical volunteers to generate meaningful data and to translate data interpretation into interventions that address specific local health problems.<sup>9</sup>

### **The Medical Brigade Volunteer Program**

One such group of volunteers is provided by the Virginia Hospital Center Medical Brigade, a privately funded group of about 70 primary care physicians, nurse practitioners, and auxiliary medical professionals who volunteer their time to conduct an annual week-long medical intervention in five rural communities around Comayagua in central Honduras. The brigade has been working in Honduras since 1998 and usually provides primary care services to between 4,000 and 6,000 people each year. To provide more sustainable health services to local communities, the brigade has initiated a longitudinal primary care intervention based on the training and support of community health workers (CHW).

First, brigade members used a chart review of the care of 725 patients they had attended during their annual medical trip to Comayagua in 2005 to obtain demographic and medical data for a background community needs assessment. They established that 24% of their patients had been malnourished, slightly more than had been reported by the World Health Organization (WHO) in a population-based survey in 2000.<sup>10</sup> They also realized that 80% of clinical diagnoses made by brigade physicians attending these patients fell into three broad categories: upper and lower respiratory tract disease (32%), gastrointestinal infections and malnutrition (36.3%), and infections and infestations of the skin (15.3%). These conditions mirror the diseases targeted by WHO in their Integrated Management of Childhood Illness (IMCI) strategy.<sup>11-14</sup> IMCI focuses on acute respiratory infections, diarrhea, malaria, and malnutrition, while the Medical Brigade program excludes a focus on malaria and measles, since malaria is less common in the highlands around Comayagua, and there is an absence of measles due to the Honduran public immunization program.<sup>5,6</sup>

Next, brigade members conducted demographic surveys in two target communities, where they developed a training curriculum for community health workers. This process involved both the theoretical and practical aspects of curriculum implementation and included quarterly follow-up visits for data collection, evaluation, and training reinforcement.

We present this project as a model for a low-cost intervention that can provide resource-poor communities with basic primary health care services, while giving Western primary care professionals an opportunity to engage in meaningful global health activities

with an effect beyond their own presence in the target communities. The project received clearance from the Institutional Review Board at Georgetown University School of Medicine.

### **Methods**

Criteria developed by the brigade for selection of target communities for community health worker training included good physical access to brigade training staff (within 3 hours' drive from Comayagua), no or inadequate local health facilities, the presence or establishment of a community health committee that would oversee the project locally, the availability of community members who were willing to become community health workers, the commitment of these community health workers to remain in their communities for the foreseeable future, and a basic level of literacy for the community health workers comparable to the local third-grade level of education.

### *Communities*

Two rural village communities in the area of Comayagua fulfilled the outlined criteria and were chosen for the CHW training program. Basic demographic data from these communities were obtained in July 2006 (Table 1) using key informant methodology. Health committees were established in both communities. The committees indicated that the CHWs would assume an important leadership role in their respective communities.

In community A, the committee included the mayor, a member from the water board, the director of the local orphanage, two community elders, and the principal from the local school. The committee appointed two nuns, who had been living in the community for many years and who were running the local orphanage, to be trained as CHWs. Diarrheal diseases, respiratory infections, muscle pain, poor water quality, and a strong stigma against tuberculosis were identified as the most pressing health conditions in the community.

In community B the health committee consisted of the mayor, the local church leader, the teacher of the local school, and two village elders. The committee appointed two male coffee farmers to be trained as CHWs. The most pressing health problems identified in community B were respiratory infections, muscle pain, tuberculosis awareness and stigma, lack of clean water, and human waste disposal.

In each community the brigade decided not to intervene in the health worker selection process beyond the basic criteria outlined above. This approach provided community health committees with a maximum level of autonomy.

### *Training*

Next, the brigade developed a didactic curriculum for a week-long training course specific to the needs of

Table 1  
Demographics and Health Care Facilities in Communities A and B

	Community A	Community B
Estimated total target population	8,000	5,000
Estimated population under 15 years of age	2,000	1,200
Estimated population under 1 year of age	300	N/A
Households	205 + 1,000 in surrounding area	131 + 750 in surrounding area
Household income	\$500–\$625 per year	\$500–\$625 per year
Local education availability	Grade 6 level	Grade 3 level
Centro de Salud	4 half days per week	Once a week (1.5 hours walking distance)
TB testing and care available at Centro de Salud	Yes	Yes
Immunizations	Six monthly	Six monthly
Nearest hospital	2 hours by truck	3.5 hours by truck
Running water	Yes (contaminated)	No
Human waste disposal	Latrines	None

The table presents basic demographic data and population estimates for two rural communities targeted for village health worker training program, as obtained by key informant methodology in July 2006.

the individual communities. The CHWs functioned as generalists as defined by the WHO.<sup>15</sup> The curriculum combined classroom instruction, concentrated clinical learning experiences, and individualized instruction at the home clinic site.<sup>16</sup> The curriculum included creation and maintenance of a basic medical record system; weight-for-age assessment; accurate measurement and interpretation of temperature; basic history taking and physical examination skills; diagnosis and management of the most commonly observed diseases, focusing on the three clinical areas identified in the background needs assessment from the previous year; community health education; and recognition of skill limits.

The instructors used the Werner, Thuman, and Maxwell text *Where There Is No Doctor*,<sup>17</sup> and CHWs were each provided the Spanish language corollary *Donde No Hay Doctor*. Instruction used diverse teaching methods including lecture, discussion, role play, simulated patient-CHW encounters, and community education simulation techniques.<sup>18</sup> A set of simplified algorithms was designed by the brigade to supplement CHW instruction.

#### Medical Kit

Upon completion of their training CHWs were provided with a medical kit that included albendazole, paracetamol, vitamins (including prenatal vitamins), basic antibiotics (amoxicillin and/or trimethoprim-sulfamethoxazole), topical antibiotic creams, and scabies ointments. By design the formulary was simple to minimize the possibility of prescribing errors. CHWs were trained to make salt, sugar, and water mixtures to

treat non-severe dehydration. They were also equipped with thermometers, stethoscopes, WHO growth charts, scales, educational posters, first aid, and record-keeping supplies.

#### Interval Visits

Following the initial CHW training sessions in November 2006, quarterly visits were conducted by members of the brigade to evaluate CHW performance, maintain and expand the level of education, and maintain material and technical support. Performance assessments were compared for each community at different points in time. Chi-square and Fisher's Exact tests were used to compare the percentages of tasks performed correctly at each evaluation. We did not compare one community to the other.

#### Results

##### Service Provided

Community health workers began their work in the target communities in November 2006. Each CHW clinic operated on a 5 half-day schedule per week with one CHW on duty at any given day. During the first 15 months of practice CHWs attended 2,347 patients, presenting with 3,025 health problems. Of the patients, 45.5% were children under the age of 15 (Table 2). Brigade members visited both village sites every 3 months to monitor CHW performance, maintain a level of health worker training, and provide continuous support to the CHWs.

Table 2

## Medical Problems Treated and Assessment of Treatment Appropriateness

Community	A			B		
	6 months	12 months	15 months	6 months	12 months	15 months
	#	#	#	#	#	#
Overall patients attended by CHWs	514	759	932	564	1,129	1,415
Children attended by CHWs	278	366	450	238	476	618
Problems handled	772	1,177	1,418	631	1,272	1,607
Respiratory (total)	250	352	421	248	470	582
Viral URI	34	73	117	60	95	177
Parasites	159	282	358	21	84	154
Diarrhea (no parasites)	64	72	81	26	29	34
Dermatologic	37	70	94	1	78	119
Body pain	151	241	271	189	405	529
Fever	88	186	219	N/A	56	75
	%	%	%	%	%	%
Appropriate treatment	50	68	76	27	79	93

Cumulative data on CHW performance in communities A and B between November 2006 and February 2008. Temperature measurements became available in community B only after July 2007.

CHW—community health worker  
URI—upper respiratory infection

### Evaluation

At the 6 months evaluation point, chart reviews revealed inaccurate patient management and treatment decisions by CHWs in more than 50% of cases. Deficiencies were identified in the unwarranted use of antibiotics for simple upper respiratory infections, as well as the use of antibiotics for diarrhea (Table 3). In addition, the inadequate recording of patient weight and temperature, the use of antidiarrheals (supplied by private donors), and the poor use of prenatal vitamins were noted.

Specific “mini-interventions” were conducted in each community to correct the deficiencies. Follow-up visits by brigade evaluation teams documented a significant improvement in CHW patient assessment and prescribing behavior over time (Tables 2 and 3).

The female CHWs in Community A were able to improve their overall performance from 50% accuracy to 76% ( $P < .001$ ). The overuse of antibiotics for both diarrhea and non-febrile upper respiratory tract infections also dropped significantly over the time period of observation (Table 3).

The male CHWs in Community B improved their overall accuracy rate from 27% to 93% ( $P < .001$ ). In this community, accurate patient weight and temperature measurements and the use of prenatal vitamins for pregnant women contributed more to the overall performance improvement than the correct use of antibiotics.

Nevertheless, the overuse of antibiotics for non-febrile upper respiratory tract infections dropped from 31.7% to 16.4% ( $P = .01$ ) (Table 3).

When CHWs were asked by evaluation teams to identify areas for further education and support they requested first aid kits, inclusion of asthma management in treatment algorithms, and teaching tools for community education programs. The brigade responded by designing posters for community education in health behavior modification. The initial set of posters addressed hand and oral hygiene, the preparation of oral rehydration solution for children, and the destigmatization of tuberculosis. These posters were pilot tested with CHWs in community B, modified, and implemented in both communities.

### Costs

Major budget items included drugs and travel costs for brigade education and evaluation teams. The project served about 2,000 patients in the first year for a total of \$12,714.35 or \$6.35 per patient, well below the annual medical expenditure for health care in Honduras (currently about \$184 per person).<sup>1</sup> Drug expenses were restricted to the basic drugs provided to the CHWs and did not include potentially expensive drugs for the further management of other diseases.

The budget also did not include any costs for the reimbursement of CHWs. The health committees in each

Table 3  
Antibiotic Use for Respiratory Infections and Diarrhea

	<i>At 6 Months Before Intervention # (%)</i>	<i>At 15 Months After Intervention # (%)</i>	<i>Significance</i>
Antibiotic use for diarrhea without parasites in community A	64 (26.6%)	81 (9.9%)	<i>P</i> <.01
Antibiotic use for viral URI in community A	34 (73.5%)	117 (30.8%)	<i>P</i> <.001
Antibiotic use for diarrhea without parasites in community B	26 (7.7%)	34 (23.5%)	NS
Antibiotic use for viral URI in community B	60 (31.7%)	177 (16.4%)	<i>P</i> =.01

Antibiotic use for upper respiratory tract infections and for diarrhea before and after “mini-intervention” training sessions in communities A and B. Note the significant decrease in antibiotic use.

URI—upper respiratory infection  
NS—not significant

community had decided that CHWs should donate their time to the project, while the community would support them during harvest time and other periods of need.

### Discussion

Primary health care accessible to all, based on the integration of relevant health services with social, educational, and economic strategies and using community participation in planning and implementation was advocated by WHO, UNICEF, and others in the Alma-Ata Declaration of 1978.<sup>19</sup> Thirty years later, much of primary care funding in lesser developed nations is targeted at specific diseases such as HIV, tuberculosis, or malaria. This strategy drains resources and professionals away from more integrated primary care programs.<sup>20-22</sup> The WHO has identified a global deficit of nearly 4.3 million health workers,<sup>1</sup> a shortage that is exacerbated by the migration of health professionals from poor to rich countries,<sup>23-24</sup> as well as from underfunded public sectors to private sectors within poor countries.<sup>25</sup> Simultaneously, there is an inverse relationship between the density of health workers and maternal mortality, infant and child mortality, and vaccination prevalence.<sup>26,27</sup>

The use of para-professional health workers has been implemented in several countries to close the health worker gap. While community health workers cannot replace a weak health system, they can perform valuable tasks such as case management for common illnesses, promotion of health behavior, immunization, and community mobilization strengthening the existing system.<sup>28</sup>

One way to apply the CHW model has been suggested by WHO and UNICEF in their IMCI program.<sup>13,29-33</sup>

Several years into the project, however, shortcomings and problems have become apparent, including poor health worker support and project maintenance, lack of decentralization beyond existing health facilities, poor community involvement, inappropriate case management, and inadequate response to local problems.<sup>30,34-38</sup> While inappropriate case management was noted in our project as well, we were able to improve CHW performance significantly, using a system of continuing evaluation and re-education. Ongoing support has been identified as an important factor in the success of comparable projects elsewhere.<sup>33,39-40</sup>

Other key factors for our intervention include implementing it where the need is greatest rather than in preexisting health care structures,<sup>38</sup> maximizing community involvement in program design and execution,<sup>41</sup> adjusting guidelines and algorithms to the educational level of CHWs,<sup>42</sup> limiting drugs available to essentials,<sup>34</sup> and implementing training and program evaluation at the CHW practice sites.<sup>16</sup> Future areas of research should include potential differences in the performance and community acceptance of male versus female CHWs, as well as problems and challenges around CHW reimbursement.

### Conclusions

In environments in which there are professional health workforce shortages, community health workers can provide valuable services for case management, preventive care, health education, and community mobilization, relieving an otherwise overloaded public health system. Ongoing evaluation, supervision, in-service training, and guidance are essential to maintain a successful health worker program. Western nongov-

ernmental organizations and primary care professionals can play a meaningful role in supporting and sustaining such programs. We advocate this model as a potential basis for implementation in other communities in Honduras and beyond. The relatively low cost also makes it attractive as a supplemental health provision strategy for local, regional, and national health authorities.

*Corresponding Author:* Address correspondence to Dr Rennert, Georgetown University, Department of Pediatrics, 3800 Reservoir Road, NW, Washington, DC 20007. 202-444-8799. Fax: 202-444-7161. [rennertw@georgetown.edu](mailto:rennertw@georgetown.edu).

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