PRELIMINARY RESULTS FROM THE EVALUATION OF THE INCAP CHOLERA/DIARRHEA DISTANCE EDUCATION COURSE

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ACRONYMS

BASICS	Basic Support for Institutionalizing Child Survival
CDD	Control of Diarrheal Diseases
HW	Health worker
INCAP	Institute of Nutrition of Central America and Panama
IV	Intra-venous
LLL	La Leche League
MOH	Ministry of Health
ORS	Oral rehydration solution
PAHO	Pan American Health Organization
PVO	Private voluntary organization
USAID	United States Agency for International Development
WHO	World Health Organization

I. EXECUTIVE SUMMARY

INCAP implemented a distance education course in diarrhea/cholera in parts of Guatemala, El Salvador, and Nicaragua from June 1995 to August 1996, with support from PAHO. An evaluation of the course's effect on the knowledge and practices of its participants was carried out by INCAP, with support from BASICS. The evaluation included a pre- and post-panel survey in program and control groups, using a modified WHO Diarrhea Health Facility Survey as the data collection instrument. Special qualitative studies and studies of reliability and validity were also planned and carried out to varying degrees. This report presents the results of work done during a trip to Guatemala to analyze the evaluation data and generate preliminary results on the impact of the program.

In the program group, 66 of the original 158 health workers in the pre-survey sample completed the course, and all 66 were located and included in the post-survey. In the control group, 66 of the original 74 health workers were located and included in the post-survey. Nearly complete data was obtained on the entire pre and post samples. However, the number of cases requiring rehydration was small, and so meaningful analysis of hydration practices was not possible with this data.

The preliminary results are encouraging. In general, knowledge and quality-of-practice increased substantially in both the program and control groups, but the increase is substantially greater in the program group in many key indicators. For example, the percentage of correctly assessed child diarrhea cases (according to the INCAP expert observers) increases from 16 percent to 59 percent in the program group, but only from 17 percent to 36 percent in the control. The *net* gain is similar when the WHO definition for correctly assessed cases is used—the program group increases from 43 percent to 55 percent, while the control drops from 43 percent to 36 percent. In 51 quality-of-practice indicators, the largest net gains (program over control) occur in the patient counseling indicators, while in 38 knowledge indicators, the largest net gains occur in the treatment indicators.

The final draft of the evaluation report from INCAP is planned to be ready by the end of January 1997. With regard to the validity study on observer bias, extended (one-week) observation of 20 physicians in the program group proved inadequate due to the small number of diarrhea cases presenting, and so INCAP plans to collect additional data before completing the validity study.

II. INTRODUCTION

BASICS and PAHO are assisting INCAP in the implementation and evaluation of a distance education course in diarrhea and cholera for doctors and nurses. The course began in parts of Guatemala, El Salvador, and Nicaragua in the Summer of 1995, and the Guatemala program was completed on schedule in the Summer of 1996. In order to evaluate the course, a baseline pre-survey of eligible course participants was conducted in Guatemala in the Summer of 1995, and a

post-survey conducted with a portion of the same group one year later. In addition, a special study to assess the validity of the evaluation data was designed and data was collected on a small sample of course participants in the Summer and Fall of 1996. An analysis of the baseline pre-survey data was completed in December 1995. The implementation plan, evaluation plan, validity study plan, and preliminary baseline analysis are documented in numerous prior BASICS trip reports by the author and other BASICS personnel.[1]

The evaluation plan calls for the assessment of improvements in health worker knowledge and practice related to cholera and diarrhea brought about by the course. The evaluation design includes pre- and post-course measurements of program and control groups, and collection of certain other information to address various validity and reliability issues. Trained physician observers collected information about health worker knowledge and practices, patients, and cases using a modified version of the WHO CDD Health Facility Survey for a sample of 232 doctors and nurses in the Summer of 1995 (the pre-survey), and 132 doctors and nurses in the Summer of 1996 (the post-survey). All 132 health workers in the post-survey were also in the pre-survey.

The present trip took place December 1-11, 1996, during which time the author worked with Drs. Rafael Flores and Junio Robles of INCAP to complete a preliminary analysis of the pre- and post-survey data.

III. TRIP ACTIVITIES

Bart Burkhalter traveled to Guatemala during December 1-11, 1996. He worked with Drs. Raphael Flores and Junio Robles throughout this period to analyze the evaluation data and produce and document the preliminary results of the evaluation. Working memos that document the daily progress of the analysis in detail were produced by Drs. Burkhalter, Flores and Robles, along with a draft of a memo summarizing the results for distribution from INCAP to BASICS,[2] PAHO, and WHO. Dr. Burkhalter debriefed Dr. Stan Terrell of USAID/Guatemala about the

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[1] For example, see Burkhalter, Planning for the Follow-up Survey and a Special Validation Study for the Evaluation of the INCAP Cholera/Diarrhea Distance Education Course, April 14-18, 1996; Burkhalter, Preliminary Baseline Analysis and Recommendations for Modification of the Evaluation Plan for the INCAP Cholera/Diarrhea Distance Education Course, Nov 26-Dec 1, 1995; Burkhalter, Preparation of an Evaluation Plan for a Cholera/Diarrhea Education Course in Guatemala, April 2-7, 1995; Burkhalter, Evaluation Plan for Proposal INCAP Long-Distance Learning Course in Cholera/Diarrhea, June 5-11, 1994.

[2] By Burkhalter: Post Memo 1 - Definitions, issues, and intal tasks for the final evaluation, 12/2/96 (rev: 12/3/96); Post Memo 2 - Transforming knowledge variables into performance, 12/3/96; Post Memo 3 - Gain in knowledge of program completers relative to controls, 12/4/96 (rev: 12/9/96, 12/13/96); Post Memo 4 - Gain in practice quality of program completers relative to controls, 12/6/96 (rev: 12/9/96, 12/13/96); Post Memo 5 - Transforming practice variables into quality-of-practice variables, 12/8/96. By Flores: Notas sobre variables de ejecucion, 12/3/96; Notas sobre indicadores de concordancia, 12/5/96; Notas sobre indicadores de OMS, 12/5/96; Resultados indicadores compestos, nd (12/6/96). By Robles: Formulario 1 - Analisis de variables tipo "C," 12/4/96; Post Memo 2, 12/5/96.

early results by "telcon." He also met with representatives of La Leche League/Guatemala to discuss the results of their "small PVO grant" study with BASICS and to visit the study site.

IV. RESULTS

A. Implementation of the Course and Associated Problems

Drs. Flores and Robles reported that the course was completed more or less on schedule in Guatemala where the evaluation is being done, but that two possible problems with the implementation of the course became apparent during the close observation of the post-survey. First, contrary to previous reports, many eligible doctors and nurses who originally were thought to have inscribed in the course, in fact never started. Apparently many health workers who were "inscribed" by service chiefs and others did not themselves make the commitment to participate in the course. Second, the coverage and effectiveness of the tutors was highly variable. On the positive side, course participants generally completed the various modules and received quality comments back on schedule, and the number of course drop-outs was reasonably low as anticipated.

The two implementation problems both have consequences for the evaluation. The high rate of non-starters raises questions about the comparability of the program and control groups. The variability of the tutor component of the course introduces the possibility of a "dosage effect" into the evaluation, and the associated issue of the adequacy of the measurements of that effect.

B. The Samples Used in the Program Evaluation

The evaluation design is a pre/post-panel, program and control group, with supplementary information from qualitative studies and studies on reliability and validity. The primary data set is obtained from a survey of health workers (doctors and nurses) using a modified version of the WHO CDD Health Facility Survey as the data collection instrument, in which a trained physician observes and records data on one diarrhea case for each health worker in the sample. The program data was obtained from health workers in the three Guatemalan districts where the course was implemented (Amatitlan, Escuintla, Guatemala Norte), and the control data from three similar districts where the course was not implemented at that time (Soledad, Sacatepequez, Guatemala Sur). The program pre-survey sample included 155 health workers selected at random from all eligible doctors and nurses registered in the three program districts. The control pre-survey sample included 74 health workers selected at random from all registered doctors and nurses in the three control districts. The program post-survey sample included all 66 health workers in the pre-sample who completed the course ("program completers"). None of the "non-starters" or "drop-outs" (started, but did not finish the course) from the program group were in the post-sample. It is notable that all of the program completers were located and surveyed. The control post-survey sample included 66 of the 74 health workers in the pre-survey control sample. Eight of the original 74 could not be located because they moved away, died, or other unknown reasons. These two groups are referred to as the "controls found" and "controls lost." It

is a coincidence that the program-completers and controls-found samples are both 66. This information on sample sizes is summarized below.

Table 1 - Sample Sizes

	Pre-survey	Post-survey
Program sample:		
Non-starters	78	0
Drop-outs	14	0
Completers found	66	66
Completers lost	0	0
TOTAL Program	158	66
Control sample:		
Found	66	66
Lost	8	0
TOTAL Control	74	66

The analysis compared the knowledge gain in the 66 program completers to the gain in the 66 controls found. Thus the analysis included 132 different health workers and 264 different cases of diarrhea (two per health worker).

As it turned out, the number of cases of dehydration was small in the post samples, and as a result, analyses of the treatment of dehydration cases with ORS, home solution, or IV solution was not meaningful.

C. Data Obtained in the Pre and Post Surveys

The modified version of the WHO Diarrhea Health Facility Survey used to obtain data on health worker knowledge and practice was applied by trained physician observers for all cases in the sample. This yielded information on several different topics related to the case management of diarrhea: assessment by the health worker, summary diagnosis by the health worker and by the trained observer, drug treatment prescribed by the health worker, counseling of the patient or child caretaker by the health worker, and treatment with ORS or IV solution at the facility by the health worker. Complete data was obtained in nearly all cases observed.

The survey questions and answers were then translated into 46 knowledge variables and 84 practice variables for use in Epi-Info 6. These data are stored in ten Epi-Info files, one each for the five different sections of the survey (case, health worker practice, observer case assessment, health worker knowledge, facility) in the pre and the post surveys.

In order to evaluate whether the program had a positive impact on knowledge and practice, correct knowledge and preferred practices were defined based on the 152 knowledge and practice

variables used in Epi-Info 6 and coded into "quality" variables. Some of the quality variables are unconditional in the sense that they are correct or appropriate under all conditions, while others are conditional because their correctness depends on the condition of the case (e.g., the correct treatment depends on the diagnosis). This yielded quality variables of several types: four WHO-defined composite quality-of-practice variables that take into account several practices, 46 unconditional quality-of-practice variables, 5 conditional quality-of-practice variables, and 38 unconditional quality-of-knowledge variables. (Exact definitions of the quality variables are documented in a working memo by the author [Burkhalter, Post Memo 5, Dec 8, 1996] and a memo from J. Bryce of WHO to H. Delgado of INCAP dated Dec 4, 1996.)

D. Preliminary Results of the Analysis

The preliminary analysis compares the pre-to-post gains of the 66 program completers to the gains of the 66 controls found in the post-survey. The results are encouraging.

Diarrhea cases correctly assessed, as defined by WHO. The percentage of correctly assessed diarrhea cases (children under 5 years) rose from 43 percent to 55 percent in the program group, while dropping from 43 percent to 32 percent in the control, a statistically significant difference.

Diarrhea cases correctly assessed, as determined by INCAP expert observers. The percentage of correctly assessed diarrhea cases (children under 5 years) also rose when the criterion was agreement of the health worker with the INCAP expert observer, from 21 percent to 63 percent in the program group, and from 17 percent to 35 percent in the control, a statistically significant difference. For cases of all ages, the program group gain was from 15 percent to 59 percent, while the control group gain was from 17 percent to 36 percent.

Cases of dehydration cases correctly assessed and treated, as determined by INCAP expert observers. The percentage of dehydration cases correctly assessed and treated (all ages) rose from 23 percent to 50 percent in the program group, and from 24 percent to 46 percent in the control.

Quality of specific practices. Fifty-one quality-of-practice indicators were associated with specific practices observed in the health facility survey. In general, while *assessment*, *diagnostic*, and *patient counseling* indicators all increased substantially in the program group, they also increased in the control group. In general, only the *patient counseling* indicators had notably higher average gains in the program group than in the control.

Increase in knowledge. Thirty-eight indicators of the health workers' knowledge of diarrhea case management were defined and assessed based on their responses to questions in the modified health facility survey. While gains in knowledge were seen in

most knowledge indicators in both the program and control groups, the average gain was notably greater in the program group for the *treatment* indicators, but not for the *assessment* and *patient counseling* indicators.

Table 2
Summary of Results of Evaluation: Percent of Cases/HW Correct

Indicator	Program			Control			Net Gain: Program minus Control
	Pre	Post	Gain (pp)	Pre	Post	Gain (pp)	
1. Diarrhea cases correctly assessed:							
a. As defined by WHO (<5 yrs)	43%	55%	12	43%	32%	-11	23 pp
b. According to observer (<5y)	21%	63%	43	17%	35%	18	24 pp
c. According to observr (all ages)	16%	59%	44	17%	36%	19	24 pp
2. Dehydration cases correctly assessed & treated, according to observer (all ages)	23%	50%	27	24%	46%	22	5 pp
3. Average of quality-of-practice variables:							
a. Assessment variables (n=15)	47%	63%	17	45%	59%	14	3 pp
b. Diagnosis variables (n=4)	53%	69%	16	32%	48%	16	0 pp
c. Counseling variables (n=19)	27%	45%	17	20%	28%	8	9 pp
4. Average of qual-of-knowledge variables							
a. Assessment variables (n=13)	49%	61%	12	47%	58%	11	0 pp
b. Treatment variables (n=13)	36%	52%	16	39%	38%	1	17 pp
c. Counseling variables (n=12)	35%	61%	26	30%	53%	23	2 pp

These results are given in more detail in a series of working memos by Drs. Burkhalter, Flores, and Robles. These results are preliminary in several respects: the figures should be double-checked, tests of statistical significance have not yet been done, potential confounders and other possible threats to the validity of the results have not been examined, and the results have not been interpreted in light of the qualitative studies.

E. Other Special Studies

Several other special studies were planned; some have been completed and others have not. Studies that have been undertaken at some level which need to be written up include the inter-observer reliability study and qualitative interviews with course participants and tutors. Special studies not undertaken as planned include the interviews with program drop-outs, and participant diarrhea caseload.

In order to determine whether the data collection instrument is subject to bias due to audience effect (a problem that frequently occurs when data is collected by direct observation), a special validity study was initiated by INCAP, with support from BASICS. INCAP collected extended

observation data for one week on 20 providers in the program group. Unfortunately, the number of diarrhea cases presenting during the week was very low for most of the providers. Only three saw more than two cases. An analysis of those three cases is inconclusive. As a result, additional data collection is planned for January with more careful attention to finding providers who are seeing diarrhea cases.

IV. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

1. INCAP intends to finalize the summary memo of preliminary results for distribution to BASICS, PAHO, and WHO by December 20.

2. INCAP intends to complete the basics analysis of the evaluation data and prepare a final evaluation report by the end of January 1997. That report should include sections on program description, evaluation methodology, evaluation results, and discussion. Issues that should be addressed in the final report beyond what was analyzed during this trip include (1) tests of significance for panel and non-panel comparisons, (2) similarities and differences between program completers, drop-outs and non-starters in the program group, and between found and lost in the control group, (3) analysis of the qualitative data, and (4) documentation of reliability.

3. INCAP should proceed with its plans to obtain extended observation data on additional program physicians, analyze the data, and complete the validity study. The study should address changes in the WHO composite indicators, as well as the simple indicators.

4. BASICS and INCAP should prepare a draft paper suitable for publication in a professional journal that reports the results of the evaluation and estimates program cost-effectiveness within the context of the current literature. Data on the costs of the program needs to be obtained for this paper. Some additional issues that should be considered for inclusion in the paper are (1) relationship of knowledge to quality-of-practice, and gain in knowledge to gain in quality-of-practice, (2) difference between topics covered and not covered in the course on gain in knowledge and quality-of-practice, (3) effect of potential confounders, (4) distribution of the number of correct indicators of quality by health worker, and (5) effect of different levels of program implementation on the outcome ("dosage effect").

5. BASICS, USAID, and INCAP should consider a follow-up survey of the program and control groups in the Summer of 1997 in order to assess the sustainability of the program effects.

6. If the preliminary results hold up in the deeper analysis, INCAP and other approriate organanizations (such as BASICS, PAHO, and WHO) should pursue (1) widespread application of the diarrhea/cholera course in other countries, and (2) development, testing,

and application of the distance education approach in other topical areas, such as ARI and IMCI. It is important to keep in mind that the program implemented in Guatemala included both distance education and hands-on practice (through the tutors), and that development and testing should work to find the best mix of these two components for the topic addressed.

V. PERSONS CONTACTED

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Ms. Maggie Fischer, INCAP
Dr. Rafael Flores, INCAP
Ms. Martiza de Oliva, LLL/Guatemala
Dr. Junio Robles, INCAP
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