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EVALUATION OF AN IMCI COMPUTER-BASED TRAINING COURSE IN KENYA

QUALITY ASSURANCE PROJECT

OPERATIONS RESEARCH RESULTS

AUGUST 2006
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The Integrated Management of Childhood Illness computer-based training (IMCI CBT) course has been in development and improvement for over six years, and many organizations and individuals have contributed to its progress. University Research Co., LLC, through the USAID-sponsored Quality Assurance Project, and the World Health Organization (WHO) Department of Child and Adolescent Health collaborated throughout on this development.

The evaluation reported here was a collaboration of the Kenya Ministry of Health Department of Child Health; the WHO Department of Child and Adolescent Health; WHO/Kenya (Dr. Assumpta Muriithi); and the Quality Assurance Project, represented by University Research Co., LLC (URC), and ARTT International, LLC (ARTT). Many individuals played key roles in the evaluation, including all the Kenya staff and trainees who participated in or helped to implement the training course and evaluation. The technical staff of the evaluation included Dr. Marina Budeyeva (ARTT), who was in charge of the team that developed the CBT course and who helped plan and implement the training courses and data collection of the evaluation; Dr. David Nicholas (URC), who oversaw development and contributed to the planning of the evaluation in Kenya; Hany Abdallah (ARTT), who helped plan and implement the evaluation in Kenya; Dr. Bart Burkhalter (URC), who analyzed the data and drafted this report; Dr. Stephen Kinoti (URC), who assisted in planning the study, developing the data collection tools, and interpreting the data; Laurie Winter (URC consultant), who managed the feasibility test of the CBT course in Eritrea and prepared the cost budget data; and Dr. Cathy Antonakos (URC consultant), who did the equivalence statistical analysis.

EXECUTIVE SUMMARY

The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) developed the Integrated Management of Childhood Illness guidelines (IMCI) in the mid-1990s to enable a holistic approach to the care of children presenting at developing-country healthcare facilities with symptoms of common childhood illnesses. To train healthcare providers (here "clinicians") to use the IMCI guidelines, WHO/UNICEF developed a three-part training program typically consisting of an 11-day course where clinicians attend lectures in the morning and have clinical practice in the afternoon and a preceptorship where the clinicians receive three site visits about a year after they take the course. The 11-day "standard" course requires about six facilitators for about 20 clinicians.

In hopes of reducing the time and cost of the traditional training method while maintaining or improving the knowledge transfer, the Quality Assurance Project (QAP) developed a computer-based version of the training course. Where the standard course involves lectures, the computer-based training (CBT) program provides the same content through use of a CD-ROM (compact disc read-only memory). A classroom of about 20 trainees can study the CD-ROM content in about six days with about four facilitators available to provide assistance. Like the standard lectures, the CD-ROM content requires clinical practice and preceptorship.

To compare the effectiveness and cost of the course, QAP tested 48 clinicians who had been randomly assigned to either the standard or computer-based training in Kenya in 2005.

The effectiveness of the two methods was essentially the same. An equivalence statistical test showed that both groups of trainees scored equivalently on a knowledge test and in observed performance with two simulated, standardized cases of childhood illness. Budgeted costs per trainee were $230 less for the CBT program: The standard program cost $793 per trainee versus $565 for each CBT trainee, a reduction of 29%. Including the cost of the preceptorships ($1,078 per trainee for either program) changes the percentage but not the amount of the savings: The standard program with preceptorship was budgeted at $1,870 per trainee while the CBT plus preceptorship was budgeted at $1,640, 12% less. These results of equivalent effectiveness and lower cost confirm the findings of a previous study that used an early version of the CBT program and concluded that the CBT course is more cost-effective than the standard course.

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ABBREVIATIONS

AART	AART International, LLC
CBT	Computer-based training
CD-ROM	Compact disc read-only memory
IMCI	Integrated management of childhood illness
MOH	Ministry of Health
ORS	Oral rehydration salts
QAP	Quality Assurance Project
UNICEF	United Nations Children's Fund
URC	University Research Co., LLC
USAID	United States Agency for International Development
WHO	World Health Organization

EVALUATION OF AN IMCI COMPUTER-BASED TRAINING COURSE IN KENYA

I. INTRODUCTION

Developed by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), the Integrated Management of Childhood Illness (IMCI) guidelines have been introduced in developing countries worldwide. If performed properly, IMCI is expected to reduce mortality and morbidity associated with the five main childhood diseases and malnutrition in developing countries (Kolstad et al. 1998). However, a major challenge to implementing IMCI is training clinicians (doctors, nurses, and other health professionals) in its algorithmic, holistic approach to the case management of sick children. The "standard" IMCI training course requires 11 days of lectures and clinical practice, with about six facilitators for about 20 clinicians. In addition, each trainee receives a preceptorship of three on-the-job coaching visits during the year after taking the course.

The Quality Assurance Project (QAP) develops computer-based training (CBT) in efforts to make professional development more accessible to clinicians in developing countries. QAP developed a CBT version of the IMCI lecture content and makes it available on CD-ROM (compact disc read-only memory). Using the CD-ROM, 20 clinicians can learn the IMCI content in about six days, with about four facilitators available to supplement the content and assist with computer interface. The IMCI CBT content, like the standard course lectures, is intended to be used in combination with clinical practice and followed up with a preceptorship. It can be used as a core learning tool within in-service or continuing education (or refresher) training or within pre-service academic programs. Copies are sufficiently inexpensive that students may keep them as reference material.

An early version of QAP's IMCI CBT program was field-tested and evaluated in Uganda in 1999–2000 (Tavrow et al. 2002) with post-training knowledge tests and later with field compliance observations. Results showed that participants scored equally well whether they used the standard or CBT program, but the latter proved less costly and was therefore more cost-effective.

Since then, QAP has improved the CBT CD-ROM content in response to concerns raised about the original and subsequent test applications. The updated content mirrors the standard course more closely and provides instruction in a user-friendly, self-paced format intended to sustain participants' interest. It also explains how to use the program for those without previous computer experience.

Usability testing of the updated CD-ROM in Eritrea, the first phase of this study, showed that health workers could use it without difficulty. The current evaluation was the second phase and aimed to assess the actual effect of the CBT product relative to the standard course in an application in Kenya. ARTT International, a QAP subcontractor, performed the application of the CBT training in cooperation with the Kenya Ministry of Health (MOH) and WHO. This report summarizes the findings from that evaluation.

II. METHODS

After agreeing to run two IMCI training sessions, one using the standard course and one the CBT course, the MOH identified 49 clinicians who wanted to take IMCI training and randomly assigned them to either the standard or CBT program. One of the clinicians assigned to the standard program dropped out, leaving 23 in that program and 25 in the CBT program. The sessions were held sequentially: the standard program from June 6 to 16, 2005, and the CBT program from June 27 to July 2, 2005.

A demographic questionnaire collected information on the relevant characteristics of trainees (e.g., previous experience using computers).

The MOH conducted the standard course. Participants attended 11 days of classroom work and clinical practice with eight facilitators. Participants usually spent mornings at the hospital and then went to a classroom in the afternoon to listen to lectures, read textbooks, and participate in discussions.

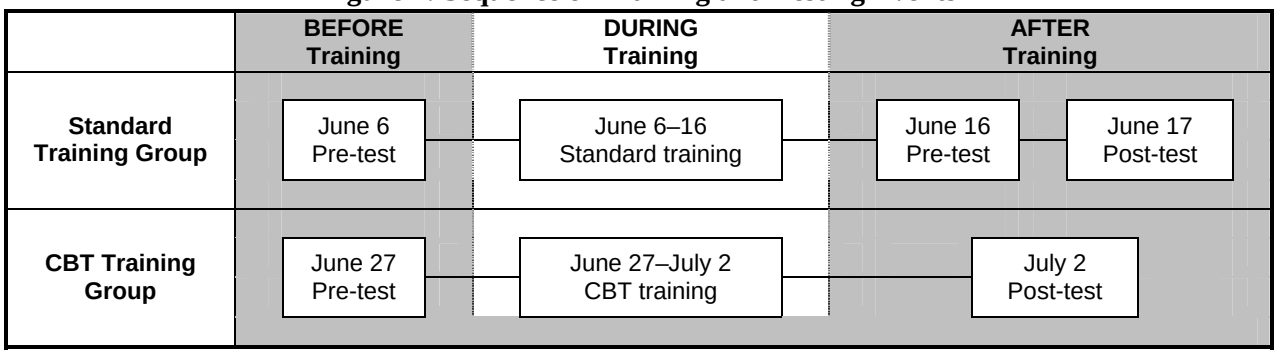
The CBT course started with a one-day orientation for four facilitators, where they became familiar with the CBT program, asked questions about it and the evaluation, participated in a focus group, and offered suggestions related to training and observation. This day was also used to confirm that the computers met specifications and were functioning properly. Given the self-guided nature of the CBT program, the user usually determines the time taken to complete the content. All participants finished in six days or less. As in the standard course, most CBT participants spent mornings at the hospital and then went to a classroom in the afternoon to study the CBT content (tutorials, interactive exercises, case studies). Participants who wanted/needed more time tended to stay later to finish any day's work; several returned during the evening. They spent on average 24 hours in front of a computer.

We measured the effectiveness of both training courses in two ways. First, knowledge about IMCI was measured with written tests given before and after the courses. Two very similar tests were developed, a "pre-test" and a "post-test." Both contained the same 37 multiple-choice questions, but in a different order and with several minor changes in wording (e.g., different patient name in examples) so trainees would not so easily recognize that both tests had essentially the same questions. (Annex A has a copy of the post-test and answer key. They show 34 questions including one four-part question for a total of 37 questions.) The study protocol called for giving the pre-test to trainees on the day before the course and the post-test on the day after.

Second, after the post-test, two skilled observers completed a pre-coded form (Annex B) while observing the clinicians "treat" two standardized, simulated cases of childhood illness: one of simple diarrhea with some dehydration in a 20-month-old child and the second, very severe febrile disease in a 24-month-old child. The form enabled the observers to record whether tasks were performed as required by the IMCI guidelines. The tasks involved IMCI's four functions: assessment, classification, treatment, and counseling.

In fact, the pre-test was given by mistake to the group in the standard program both before and after the course. When this error was recognized, the post-test was given to this group the following day. The CBT group received the pre-test before and only the post-test after. For this report, we disregard the scores of the mistakenly given test, except to discuss the implications of having administered it. Figure 1 illustrates the timing of the different measurements.

Figure 1: Sequence of Training and Testing Events



The two measures of effectiveness (knowledge tests and observed performance) evaluated only the immediate relative effectiveness of the two courses and not the effect of the later preceptorship.

Scoring the knowledge tests: Several alternative methods of scoring the knowledge tests were possible. Although all 37 questions were multiple choice, the number of choices varied from two to ten, and the number of correct choices varied from one to eight. An exactly correct answer was one where all the correct choices were checked and none of the incorrect ones; each exactly correct answer earned one point. (Thus, the total test score using this method would be the percentage of the 37 questions answered exactly correct.) We also calculated scores giving credit for partially correct answers. Several methods

were possible to score partially correct answers; we selected the following: a half point was given if the answer was not exactly correct but at least one of the correct choices was checked, whether or not any incorrect choice(s) was checked. In other words, a trainee's test score was the sum of exactly correct answers (each worth one point) plus partially correct answers (worth a half point) divided by the number of questions on the test: 37. (No partial credit was possible for questions with only two choices, such as Yes or No.)

Scoring the performance tests: The four functions of IMCI case management vary substantially in the number of tasks required. The assessment function has 25 required tasks, so an assessment score was the percentage of assessment tasks performed correctly out of 25. If the observers disagreed on whether a task was performed correctly, a half point was given for that task. The classification and treatment functions each had only one task. The classification was either right or wrong, with no partial credit possible. Treatment was correct for the first case (diarrhea) if the treatment included ORS and for the second case (febrile disease) only if it was immediate referral. The counseling function for the diarrhea case included 15 tasks, so the score was the percentage of these tasks done correctly, again with half credit if the observers disagreed on whether a task was performed correctly. Counseling would not be appropriate for the febrile disease case since it requires immediate referral. The total performance score was the sum of the scores for each function and case divided by seven: This accounts for four function scores for the diarrhea case plus three function scores for febrile disease.

Scoring data were entered into SPSS and EXCEL. We used using equivalence testing[1] (Hwang and Morikawa 1999) to compare the scores of the two groups.

The cost of the two training approaches was estimated from the budgets for the two approaches rather than measured directly. These budgets were developed from the Eritrea field test and costs in Kenya.

Additional details about the implementation of the trainings and the collection of data for evaluation are in the Trip and Interim Progress Report (ARTT International 2005).

III. RESULTS

A. Knowledge Test Scores

Table 1 uses the knowledge test scores for both groups based on the scoring method that counts only exactly correct answers (i.e., without awarding partial credit). Test scores for each trainee are the percentage of questions answered exactly correctly out of the 37 questions. The table presents the mean scores for both groups. It shows that the mean score on the post-test was significantly higher (28–29 percentage points, with 10–11 more correctly answers questions) than that for the pre-test for both groups. There was very little difference between the two groups: The pre-test scores were slightly higher for the CBT group, and the post-test scores were slightly higher for the standard group. The overall difference in mean post-test scores between the two groups was less than one percentage point.

When partial credit was given for answers that were partially correct, the same pattern emerged, with partial credit scores adding about 20 percentage points (seven questions). As with exactly correct scoring, there were substantial improvements from pre-test to post-test scores, but little difference between the two groups.

[1] In this paper we use the term "equivalent" rather than "non-inferiority" for ease of communication. Equivalence tests are more stringent than non-inferiority tests, but all analyses here passed both tests even though the non-inferiority test is sufficient for this study.

Table 1: Mean Percentage of Questions Answered Exactly Correctly by Trainees in the Standard and CBT Programs

	Pre-test before Training	Post-test after Training	Gain from Pre-test to Post-test
CBT group (n = 25)	37.0% (13.7)	64.8% (23.9)	27.8% (10.2)
Standard group (n = 22)[1]	36.0% (13.3)	65.5% (24.2)	29.5% (10.9)
Difference (CBT minus standard)	1.0% (0.4)	– 0.7% (–0.3)	– 1.7% (–0.7)

Notes: The number in parentheses in the top two rows is the number of questions (out of 37) answered correctly. Numbers in parentheses in the bottom row are the difference in the number answered correctly between the CBT and standard groups.
[1] One clinician in the standard group did not take the post-test, reducing the sample size to 22.

By mistake, the standard group took the pre-test after the training course, scoring on average 63.8% (23.6 exactly correct answers). They took the post-test the next day, scoring on average 65.5% (24.4 correct answers), 1.0 percentage points less than the CBT group. They may have gained knowledge by taking the pre-test after the course, improving their scores slightly.

B. Observed Performance Scores

Over the four IMCI functions, the average performance in the management of the two simulated cases was a little over 70%, but the performance differed markedly by function. Classification and treatment were done correctly well over 80% of the time; assessment was correct about 65% of the time; and counseling (for the diarrhea simulation) had the lowest performance, less than 45%. There was very little difference in average performance for the combined function scores between the standard (71.5%) and CBT (69.0%) groups (Table 2).

Table 2: Observed IMCI Performance in Two Standardized Simulated Cases

	Mean Score by Function				
	Assessment	**Classification**	**Treatment**	**Counseling**	**All Functions**
Case 1: Simple diarrhea					
Standard group (n = 23)	73.5	91.3	82.6	45.3	73.2
CBT group (n = 25)	74.2	89.6	83.3	39.7	71.7
Case 2: Very severe febrile					
Standard group (n = 23)	60.3	82.6	91.3	---	78.1
CBT group (n = 25)	52.4	75.0	97.9	---	75.1
Both cases combined					
Standard group (n = 23)	66.9	87.0	87.0	45.3	71.5
CBT group (n = 25)	63.3	82.3	90.6	39.7	69.0

Notes: Individual scores are the percentage correct of all required tasks for that function and case, and the values in the table are the mean group scores, except the "All Functions" column. That column is the mean of the four function means for the group (three functions for Case 2).

C. Equivalence Analysis

To determine whether the CBT course is at least as effective as the standard course, an equivalence analysis was performed using the Hwang and Morikawa (1999) method. Although this equivalence test is related to traditional superiority testing, such as is done with t-tests, the equivalence test is more appropriate to our situation where we wish only to test for non-inferiority, not superiority. Since the CBT method proved to be equivalent to the standard method but to cost less, we conclude that it is more cost-effective. Equivalence testing is discussed in Rogers, Howard, and Vessey (1993).

Table 3 presents results of the equivalence analysis of the knowledge test and observed performance scores. We compared the groups' post-test scores and their gains in score from pre-test to post-test (disregarding the pre-test taken after the training). Both of these indicators were found to be equivalent in both groups, assuming an equivalence interval of 5%. (A 5% equivalence interval in this case is less than two questions.) In addition, the equivalence analysis of the observed performance found that the CBT method was not inferior to the standard method.

Table 3: Non-inferiority of CBT to Standard Training Group in Knowledge and Performance

	Post-test Knowledge Mean Score	Gain in Pre-test to Post-test Mean Score	Observed Performance
Standard training group	65.5	29.5	71.5
CBT training group	64.8	27.8	69.0
Difference in group means	0.7	1.7	2.5
CBT passes non-inferiority test	YES	YES	YES

Notes: Individual scores are the percentage correct of total possible, and the values in the table are the mean group scores. The non-inferiority analysis uses the Hwang and Morikawa (1999) method, with an equivalence interval of 5%.

D. Cost

The budgeted cost of the CBT course is less than that of the standard course. Assuming 24 trainees per course, the standard course costs $19,043 ($793 per trainee) while the CBT course costs $13,560 ($565 per trainee), a reduction of about 29%. (All costs are in United States dollars.) Most of the difference was because of the difference in the number of person-days committed to travel and training. The 11-day standard course used six faculty for four days of preparation plus six faculty and 24 clinicians for 13 days of training and travel. The CBT course used four faculty for four days and four clinical coaches for two days for preparation and four faculty, four clinical coaches, a computer expert, and 24 trainees for eight days for training and travel. These costs do not account for the value of work time missed by clinicians.

The amount budgeted for the preceptorship for each training was $25,880, or $1,078 per trainee. The budgeted cost of the entire training program (both course and the preceptorship) would be $1,872 per trainee for the standard training program compared to $1,643 per trainee for the CBT training program, a reduction of about 12% (Table 4).

Table 4: Resources and Budgets for the Standard and CBT Training Programs in Kenya

	Standard	CBT
Budget: Preparation for course	$ 2,178	$ 2,608
Budget: Implementation of course	16, 875	10,952
Subtotal	19,043	13,560
Budget: Follow-up preceptorship	25,880	25,880
Total budget	$ 44,923	$ 39,440

Notes: Costs are budgeted, not actual. Budgets for both courses assume 24 trainees. The budgeted cost per trainee without the preceptorship is $793 for the standard course and $565 for the CBT course; with the preceptorship, the standard course is $1,872 and the CBT course is $1,644, a difference of $228 per trainee.

(1) Budgeted costs for standard training include 6 faculty for 4 days for preparation, plus 6 faculty and 24 trainees for 13 paid days for the 11-day course, plus 3 preceptor visits per trainee. Costs include travel, per diems, venue, and miscellaneous.

(2) Budgeted costs for CBT training include 4 faculty for 4 days and 4 clinical coaches for 2 days for preparation; plus 4 faculty, 4 clinical coaches, a computer expert and 24 trainees for 8 paid days for the 6-day course; plus 3 preceptor visits per trainee. Costs include travel, per diems, venue, and miscellaneous.

IV. DISCUSSION

Practicing Kenyan clinicians who had not been trained in IMCI but wanted to be were randomly assigned to take either an 11-day standard IMCI training course or a six-day IMCI CBT course. Both groups took a written knowledge test before the course. After the course, they took a similar test and demonstrated

their IMCI case management skills with two standardized, simulated cases where their compliance with IMCI standards was observed and recorded by two expert observers.

The knowledge and observed performance of the two groups was nearly the same. A statistical equivalence test concluded that the CBT group's knowledge and performance were equivalent to the standard group's. This finding confirms a previous study in Uganda that compared a group trained with an early version of the CBT program to a group trained with the standard method; that study found no difference in IMCI knowledge or performance after the training (Tavrow et al. 2002).

We compared the budgeted cost of the two programs: The per-trainee cost of the standard course was $793 versus $565 for the CBT course, a difference of $228 or 29%. The budgeted cost per trainee of the preceptorship was the same for both methods: $1,078, yielding a budgeted per trainee cost for the total program (course plus preceptorship) of $1,872 for the standard course and $1,643 for the CBT program, a drop of 12%. This finding confirms the earlier Uganda study finding of lower CBT program costs. Thus, we conclude that the cost-effectiveness is better for the CBT training.

This study measured the effectiveness of the course immediately following the training course, not of the preceptorship in the year following the course. The preceptorship may improve trainee performance or prevent its decay. Even though the planned preceptorships are identical for the two programs, the two different courses may have different impact on the effectiveness of the preceptorship. For example, some trainees who took the CBT course may have retained the CD-ROM and may refer to it over the following year, including after preceptor visits, and as a result perform better. This study did not address that issue.

Despite the study's methodological shortcomings, we do not feel they significantly affected the findings just summarized. The sample size was small, but similarity of this study's findings to those of the Uganda study provide confidence in the results. The unfortunate use of the pre-test *after* the training in the standard group would tend to increase the performance of that group relative to the CBT group. However, there was very little difference in the mean scores on the pre-test and post-test given after the training, and the statistical analysis concluded that the two groups were equivalent despite the small advantage the standard group may have gained from repeating the pre-test one day before the post-test.

Although the budgeted costs are not actual costs, we believe they are approximately correct. This belief is reinforced by the similarity of our findings on cost to the earlier Uganda study.

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ANNEX A

INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS (IMCI)

KNOWLEDGE POST-TEST
With Answer Key

Trainee Name: _____ **Code:** _____

Date: _____ **Training:** ☐ Traditional ☐ CBT

IMCI KNOWLEDGE POST-TEST

Instructions: ***Check the correct answer(s). REMEMBER that for some questions there may be more than one correct answer.***

1) What is the dose and schedule of amoxycillin for a 5-week-old infant who weighs 3.5 kilograms and has local bacterial infection:
   - ☐ a) 1/2 adult tablet – 2 times a day – for 5 days
   - ☐ b) 1/2 pediatric tablet – 3 times a day – for 5 days
   - ☐ c) 1 teaspoon of syrup – 5 times a day – for 2 days
   - ☐ d) 1/4 pediatric tablet – 3 times a day – for 5 days

2) What is a child's classification if he is 10 months old, has had a cough that lasted two days, has a breathing rate of 46 breaths per minute and chest indrawing?
   - ☐ a) no pneumonia: cough or cold
   - ☐ b) pneumonia
   - ☐ c) severe pneumonia or very severe disease
   - ☐ e) very severe febrile disease

3) What are the four main symptoms for which every sick child should be checked?:
   - ☐ a) malnutrition, cough, vitamin A status, ear problem
   - ☐ b) anemia, fever, diarrhea, ear problem
   - ☐ c) cough, diarrhea, malnutrition, ear problem
   - ☐ d) cough, diarrhea, fever, ear problem

4) Approximately 70% of all childhood deaths are associated with one or more of 5 conditions. Three of these conditions are diarrhea, measles and malnutrition. The other two are:
   - ☐ a) acute respiratory infections, primarily pneumonia
   - ☐ b) malaria
   - ☐ c) tuberculosis
   - ☐ d) HIV/AIDS
   - ☐ e) diabetes

5) A 3-year-old child has fever and diarrhea. He has no danger signs and no cough. The child has had diarrhea for 2 weeks. The child is restless and irritable, but is not drinking eagerly. His eyes are not sunken. A skin pinch goes back slowly. He does not have a cough or difficult breathing. He does not have an ear problem. The child should be classified as:
   - ☐ a) no dehydration
   - ☐ b) some dehydration
   - ☐ c) severe dehydration
   - ☐ d) severe persistent diarrhea
   - ☐ e) persistent diarrhea
   - ☐ f) dysentery

6) The IMCI clinical guidelines are designed for use with certain age groups. One group is 2 months up to 5 yeas. What is the other age group?
   - ☐ a) birth up to 5 years
   - ☐ b) 1 week up to 2 months
   - ☐ c) 2 months up to 1 year
   - ☐ d) 2 months up to 9 years
   - ☐ e) 6 months up to 10 years

7) A 2-year-old child has had diarrhea for several days. He is not dehydrated, but the mother is alarmed because she saw blood in his stool this morning. Your treatment includes:
   - ☐ a) start antibiotic for dysentery and ORS in the clinic, re-assess in 4 hours, give the mother ORS to continue at home, advise on feeding and fluids, and tell her to return in 5 days
   - ☐ b) start antibiotic for cholera , advise on feeding and fluids and send home
   - ☐ c) start antibiotic for dysentery, give antibiotic to take home, advise on feeding and fluids and tell her to return in 2 days
   - ☐ d) start antibiotic for cholera, give vitamin A, give antibiotic to take home, advise on feeding and fluids and tell her to return in 3 days

8) Feeding should be assessed in a child who:
   - ☐ a) need urgent referral
   - ☐ b) is less than 2 years old and does not need urgent referral
   - ☐ c) is classified as having anemia or very low weight
   - ☐ d) is classified as having persistent diarrhea

9) When a mother is advised ot give home care for the young infant, it is necessary to tell her when to return for a follow-up visit and when to return immediately. When to return for a follow-up visit depends on the young infant's classification; for example, in case of acute ear infection child needs to return in 5 days. The mother needs to return to the clinic immediately if her young infant:

- ☐ a) is drinking eagerly
- ☐ b) is breastfeeding or drinking poorly
- ☐ c) develops fever
- ☐ d) is coughing often
- ☐ e) has blood in stool
- ☐ f) becomes sicker

10) For each of the following cases, select **Yes** if urgent referral is needed or select **No** if urgent referral is not needed.

a) a 6-month-old boy does not have general danger signs. He is classified with:
MASTOIDITIS
NO ANEMIA AND NOT VERY LOW WEIGHT

Does he need an urgent referral? ☐ Yes ☐ No

b) a 7-month-old girl does not have general danger signs. She is classified with:
NO PNEUMONIA: COUGH OR COLD
DIARRHEA WITH NO DEHYDRATION
PERSISTENT DIARRHEA
NO ANEMIA AND NOT VERY LOW WEIGHT

Does she need an urgent referral? ☐ Yes ☐ No

c) a 9-month-old boy is lethargic. He is classified with:
DIARRHEA WITH SEVERE DEHYDRATION
NO ANEMIA AND NOT VERY LOW WEIGHT
Your clinic can give IV fluids.

Does he need an urgent referral? ☐ Yes ☐ No

d) a 2-year-old girl does not have general danger signs. She is classified with:
DIARRHEA WITH SEVERE DEHYDRATION
SEVERE MALNUTRITION OR SEVERE ANEMIA
Your clinic can give IV fluids.

Does she need an urgent referral? ☐ Yes ☐ No

11) If a child has had ear pain and pus draining from the ear for 10 days, you will classify this child as having:

- ☐ a) acute ear infection
- ☐ b) chronic ear infection
- ☐ c) mastoiditis
- ☐ d) not enough signs to classify this child

12) If a child has any of the four general danger signs, you should urgently refer him to hospital for treatment, These signs are:

- ☐ a) unable to drink or breast-feed
- ☐ b) severe cough
- ☐ c) convulsions during this illness
- ☐ e) vomiting everything
- ☐ f) lethargy or unconsciousness
- ☐ f) bloody stools

13) If a child did not receive immunization for DPT at the recommended age, it is necessary to:

- ☐ a) increase the dose of the vaccine prescribed for that age
- ☐ b) not immunize at all – because it is too late
- ☐ c) immunize the child any time after reaching recommended age, and give the remaining doses 4 weeks apart

14) A follow-up visit in 5 days should take place if a child is classified as having which of the following condition(s):

- ☐ a) persistent diarrhea
- ☐ b) pallor
- ☐ c) pneumonia
- ☐ d) feeding problem
- ☐ d) low weight-for-age
- ☐ e) acute ear infection
- ☐ f) measles

15) To be classified as having mastoiditis a child must have the following signs:

- ☐ a) severe ear pain
- ☐ b) redness behind the ear
- ☐ c) pus draining from one of the ears
- ☐ d) pus draining from both ears
- ☐ e) tender swelling behind the ear

16) To be classified as having mastoiditis a child must have the following signs:

- ☐ a) severe ear pain
- ☐ b) redness behind the ear
- ☐ c) pus draining from one of the ears
- ☐ d) pus draining from both ears
- ☐ e) tender swelling behind the ear

17) What is the cut-off rate for fast breathing in a child who is 11 months old?

- ☐ a) 60 breaths per minute or more
- ☐ b) 50 breaths per minute or more
- ☐ c) 40 breaths per minute or more
- ☐ d) 30 breaths per minute or more

18) A 14-month-old child with cough is brought to an outpatient clinic. You will assess this child for:

- ☐ a) general danger signs
- ☐ b) common serious symptoms such as diarrhea, cough or difficult breathing, fever and ear problems
- ☐ c) trauma
- ☐ d) malnutrition and anemia
- ☐ e) immunization status
- ☐ f) developmental milestones
- ☐ g) feeding problems

19) Choose the three best questions for checking the mother's understanding about how to give an antibiotic:

- ☐ a) How will you give the antibiotic?
- ☐ b) Will you give the antibiotic three times per day?
- ☐ c) For how many days will you give antibiotic?
- ☐ d) Do you understand how to give the antibiotic?

20) According to IMCI, a mother of a sick child should be counseled about what topics:

- ☐ a) importance of the fluids and feeding
- ☐ b) why she needs to come to clinic
- ☐ c) when to immediately return to clinic
- ☐ d) food and feeding problems
- ☐ e) her own health
- ☐ f) immunization
- ☐ g) when to return for a follow-up visit

21) Complimentary foods should be started if the child:

- ☐ a) shows interest in semisolid foods
- ☐ b) does not show interest in semisolid foods
- ☐ c) appears hungry after breastfeeding
- ☐ d) does not appear hungry after breastfeeding
- ☐ e) is not gaining weight adequately

22) If a child has measles now or has had it within the last three months, and has fever and any general danger sign, he or she will be classified as having:

- ☐ a) malaria
- ☐ b) severe complicated measles
- ☐ c) very severe febrile disease
- ☐ d) measles with eye or mouth complication

23) What are two signs that are used to classify severe malnutrition?

- ☐ a) small arm circumference
- ☐ b) visible severe wasting
- ☐ c) oedema of both feet
- ☐ d) severe dehydration
- ☐ e) severe dehydration

24) To classify the dehydration status of a child with diarrhea you will look:

- ☐ a) at the general condition of the child (lethargic or unconscious, restless and irritable)
- ☐ b) for sunken eyes
- ☐ c) for oedema of both feet
- ☐ d) if the child is drinking eagerly or poorly
- ☐ e) for palmar pallor
- ☐ f) for a swollen abdomen

25) A boy is 11 months old. He weighs 8 kg. His temperature is 37ºC. His mother says he has had a dry cough for the last 3 weeks. He does not have any general danger signs. The breathing rate is 41 breaths per minute. There is no chest indrawing. You can hear wheezing noise when the child breathes out. There is no stridor when he is calm. There is no diarrhea, fever or ear problem. He does not have visible severe wasting. His palms are very pale and appear almost white. There is no oedema of both feet. The child should be classified as having:

- ☐ a) pneumonia
- ☐ b) severe anemia
- ☐ c) no pneumonia: cough or cold
- ☐ d) severe pneumonia or very severe disease
- ☐ e) anemia or very low weight

26) Where can the IMCI guidelines be used?

- ☐ a) in the inpatient ward of a hospital
- ☐ b) in a neonatal ward
- ☐ c) in the outpatient ward of a hospital
- ☐ d) at first-level health facilities
- ☐ e) at a community clinic

27) Which should be checked for malnutrition and anemia?

- ☐ a) only children with feeding problems
- ☐ b) only children who are younger than 12 months old
- ☐ c) all children brought to the clinic
- ☐ d) only children who are not breastfed
- ☐ e) only children with diarrhea
- ☐ f) only children with malaria

28) What is the dose and schedule of cotrimoxazole for a 2-year-old child who weighs 12 kilograms and is classified as having pneumonia

- ☐ a) 1 adult tablet – 2 times a day – for 5 days
- ☐ b) 1 pediatric tablet – 3 times a day – for 5 days
- ☐ c) 3 pediatric tablets – 2 times a day – for 3 days
- ☐ d) 1 teaspoon of syrup – 5 times a day – for 2 days

29) A child with fever plus any general danger sign should be classified as:

- ☐ a) malaria
- ☐ b) acute ear infection
- ☐ c) measles
- ☐ d) very severe febrile disease
- ☐ e) mastoiditis

30) If a caretaker brings an 18-month-old child with a cough to a health facility, what do you need to do?

- ☐ a) ask the duration of the cough
- ☐ b) count the number of breaths in one minute
- ☐ c) look for chest indrawing
- ☐ d) check for sore throat
- ☐ e) look and listen for stridor
- ☐ f) take the child's pulse rate
- ☐ g) check for other main symptoms (e.g. fever, diarrhea, ear problem)
- ☐ h) check for malnutrition and anemia
- ☐ i) check the child's immunization status
- ☐ j) check for other problems

31) A boy is 20 months old. He has had fever for 5 days, cough for 3 days; he is able to drink, does not have convulsions, and is not lethargic or unconscious. His breathing rate is 51 per minute, there is no chest indrawing or stridor. The boy does not have diarrhea, but has generalized rash and a runny nose. There is no clouding of the cornea or mouth ulcers. The boy should be classified as having:

- ☐ a) no pneumonia: cough or cold
- ☐ b) pneumonia
- ☐ c) severe pneumonia or very severe disease
- ☐ d) very severe febrile disease
- ☐ e) malaria
- ☐ f) measles
- ☐ g) measles with eye or mouth complications

32) A mother brought her 16-month-old child back to clinic after 2 days of ORS treatment for diarrhea with no dehydration. The mother says that the child still has diarrhea and now is coughing and has fever. What is the proper course of action?

- ☐ a) immediately refer the child to hospital
- ☐ b) reassess the child for diarrhea
- ☐ c) continue current treatment and ask mother to return later
- ☐ d) disregard diarrhea, treat cough
- ☐ e) assess and classify child's cough
- ☐ f) treat diarrhea, it's more important than cough
- ☐ g) assess and classify diarrhea as if it is initial visit

33) The IMCI clinical guidelines describe how to manage a child:

- ☐ a) with a chronic problem
- ☐ b) with acute illnesses
- ☐ c) with an injury
- ☐ d) with malnutrition
- ☐ d) with malnutrition

34) Which of the following statements are true?

- ☐ a) a 3-month-old child should be exclusively breastfed
- ☐ b) a 5-month-old child should be breastfed as often as s/he wants, day and night
- ☐ c) children should be given fewer feedings during illness

35) A girl is 18 months old. She weighs 9 kilograms. Her temperature is 37ºC. She had ear discharge for 3 days. The girl does not have any general danger signs. She does not have cough or difficult breathing, does not have diarrhea or fever. There is no ear pain and you do not feel any tender swelling behind ears. The girl should be classified as having:

- ☐ a) acute ear infection
- ☐ b) chronic ear infection
- ☐ c) no ear infection
- ☐ d) mastoiditis

Answer Key to Post-test

1) d
2) c
3) d
4) a, b
5) b, e
6) b
7) c
8) b, c
9) b, c, e, f
10) a)=Yes; b)=No; c)=No; d)=Yes
11) a
12) a, c, e, f
13) c
14) a, d, f
15) e
16) b
17) a, b, d, f, g
18) a, c
19) a, c, d, e, g
20) a, c, e
21) b
22) b, c
23) a, b, d
24) a, c
25) c, d, e
26) c
27) a
28) d
29) a, b, c, e, g, h, i, j
30) b, f
31) b, e
32) b, d
33) a, b
34) a

ANNEX B

INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS (IMCI)

SKILL OBSERVATION CHECKLIST
With Correct Practice Key

Trainee Name: _____ **Code:** _____

Date: _____ **Training:** ☐ Traditional ☐ CBT

SKILLS OBSERVATION CHECKLIST

Indicate beginning time of observation: _____

1.	Does the health worker ask the caretaker why the child was brought to the facility?	Y	N
2.	Does the health worker ask the age of the child?	Y	N
3.	Is the child's weight checked against a growth chart?	Y	N
4.	If NO, was the child weighed on the day of the visit?	Y	N
5.	Is the child's temperature checked?	Y	N

Does the health worker **ASK** about (or does the caretaker **REPORT**)---	Does the health worker perform these **EXAMINATION** tasks---
6a.Danger signs: b. Not able to drink or breastfeed? Y N c. Vomits everything? Y N d. Convulsions? Y N	12. Look for lethargy or Unconsciousness? Y N DK
7a. Cough or difficult breathing? Y N b. For how long? Y N	13. Raise the shirt? Y N 14. Cough breaths/minute? Y N 15. Look for chest indrawing? Y N 16. Look and listen for stridor? Y N
8a. Diarrhea? Y N b. For how long? Y N c. Is there blood in the stool? Y N	17. Observe drinking or breastfeeding? Y N 18. Pinch the skin on the abdomen? Y N 19. Look for sunken eyes? Y N
9a. Fever? Y N b. For how long? Y N c. Measles now or in the last 3 months? Y N	20. Look or feel for stiff neck? Y N 21. Look for generalized rash? Y N 22. Look for runny nose or red eyes? Y N
10a.Ear problem? Y N b. Ear pain? Y N c. Ear discharge? Y N d. **If YES**, for how long? Y N	23. Look for pus in the ear? Y N 24. Feel for swelling behind the ear? Y N
11a. Malnutrition/anemia b. Ask about breastfeeding? Y N c. Ask about other food/fluids Y N d. Ask if feeding changed with illness? Y N	25. Undress and look for wasting? Y N 26. Look for palmar pallor? Y N 27. Look for oedema of both feet? Y N

IMMUNIZATION AND SCREENING

28a. Does the health worker ask for the child's immunization card? Y N
If NO, go to question 29.

b. **If YES**, does the caretaker have the child's card? Y N

c. Is the child referred for vaccination
____Immediately ____Another day _____Not referred

How does the health worker **CLASSIFY** the child?	What does the health worker **ADMINISTER or PRESCRIBE** for the child?
29. Severe pneumonia/very severe disease Y N 30. Pneumonia Y N 31. No pneumonia/cough/cold Y N 32. ARI, other (specify)_____ 33. ARI, other (specify)_____	55. Immediate referral Y N 56. Antimalarial injection Y N 57. Antibiotic injection Y N 58. ORS/RHF Y N 59. Antidiarrheal/antimotility Y N 60. Metronidazole tablet/syrup Y N
34. Simple diarrhoea Y N a. Severe dehydration Y N b. Some dehydration Y N c. No dehydration Y N 35. Dysentery Y N 36. Severe persistent diarrhoea Y N 37. Persistent diarrhoea Y N	61. Antimalarial tablets/syrup Y N 62. Paracetamol/aspirin Y N 63. Tepid bath Y N 64. Antibiotic tablets/syrup Y N
38. Very severe febrile disease Y N 39. Malaria Y N 40. Severe complicated measles Y N 41. Complicated measles Y N 42. Measles Y N 43. Fever, other (specify)_____ 44. Fever, other (specify)_____	65. Vitamin A Y N 66. Other vitamins Y N 67. Mebendazole Y N 68. Iron tablets/syrup Y N
45. Mastoiditis Y N 46. Acute ear infection Y N 47. Chronic ear infection Y N	69. None Y N 70. Other (specify)_____
48. Severe malnutrition/anemia Y N 49. Anemia/very low weight Y N	
50. Other (specify)_____ Y N 51. Other (specify)_____ Y N	
52. No classification Y N	

Doses of ORAL AGENTS given or prescribed

Name of Drug	Formulation	Amount each time	Doses per day	Total Days	Correct?
71. Antimicrobial 1 _____					**Y N**
72. Antimicrobial 2 _____					**Y N**
73. Antimalarial 1 _____		DAY 1_____ DAY 2_____ DAY 3_____			**Y N**
74. Antimalarial 2 _____		DAY 1_____ DAY 2_____ DAY 3_____			**Y N**
75. ORS					**Y N**

76. Does the health worker explain how to administer oral treatment?
    a. antibiotic N/A Y N
    b. antimalarial N/A Y N
    c. ORS N/A Y N

77. Does the health worker demonstrate how to administer the oral treatment?
    a. antibiotic N/A Y N
    b. antimalarial N/A Y N
    c. ORS N/A Y N

78. Does the health worker ask an open-ended question to verify the caretakers' comprehension of how to administer the oral treatment?
    a. antibiotic N/A Y N
    b. antimalarial N/A Y N
    c. ORS N/A Y N

79. Does the health worker give or ask the mother to give the first dose of the oral drug at the facility?

a.	antibiotic	N/A	Y	N
b.	antimalarial	N/A	Y	N
c.	ORS	N/A	Y	N

80. Does the health worker explain to give more fluid or breastmilk at home? Y N

81. Does the health worker explain to continue feeding or BF at home? Y N

82. Does the health worker give advice on the frequency of feeding/BF? Y N
If NO, skip to question 83.

82a. ***If YES,*** how many times/24 hours did the health worker advise to feed/breastfeed?
_____times in 24 hours

83. Does the health worker explain when to return for follow-up? Y N

83a. ***If YES***, when does the health worker advise the caretaker to return? _____Days.

84. Does the health worker tell the caretaker to bring the child back immediately for the following signs? ***Tick all that apply***.

a.	Child is not able to drink or breastfeed	Y	N
b.	Child becomes sicker	Y	N
c.	Child develops a fever	Y	N
d.	Child develops fast breathing	Y	N
e.	Child develops difficult breathing	Y	N
f.	Child develops blood in the stool	Y	N
g.	Child drinking poorly	Y	N
h.	Other, specify _____	Y	N

85. Did the health worker ask at least one question about the mother's health (ask about her own health, access to family planning or vaccination status)? Y N

86. Did the health worker use the IMCI chart booklet at any time during the management of the child? Y N

Indicate ending time of observation: _____

Key to Correct Practices on Skills Observation Checklist

This is the key to the correct practices as recorded on data collection form "SKILLS OBSERVATION CHECKLIST" (Annex B) for simulated case #1 (20 month old with simple diarrhea, some dehydration) and simulated case #2 (24 month old with very severe febrile disease). The Observation Checklist contains items (practices) numbered 1 through 86 with some sub-parts (and some numbers missing). Each item is a practice that is required under IMCI guidelines for at least one of the classifications. The practices can be categorized into four functions – assessment, classification, treatment, counseling – although the items are not so categorized on the Observation Checklist.

The items that must be checked "Y" on the Observation Checklist for either of the two cases are listed in the table below. One point is credited for each listed item checked "Y". It does not matter whether or not other items on the "Observation Checklist" are checked "Y" or "N". They do not affect the score. Each completed Observation Checklist is the evaluation by one observer of one trainee managing one case. Each trainee managed two cases and there were two observers evaluating each case. Thus each trainee received four evaluations.

Item from 1d. Skills Observation Checklist	Case#1: Diarrhea, Some Dehydration	Case #2: Very Severe Febrile Illness	Comments
ASSESSMENT			
1. Ask why child brought to facility?	X	X	
2. Ask age of child?	X	X	
3. Is wt checked to chart? OR 4. Was child weighed?	X	X	Either 3 or 4 or both
5. Is child temperature checked?	X	X	
6b. Ask danger signs: Not able to drink or BF?	X	X	
6c. " : Vomits everything?	X	X	
6d. " : Convulsions?	X	X	
7a. Ask if cough: Cough or difficult breathing?	X	X	
7b. " : How long?	X	X	
8a. Ask if diarrhea: Diarrhea?	X	X	
8b. " : How long?	X	X	
8c. " : Blood in stool?	X	X	
9a. Ask if fever: Fever?	X	X	
9b. " : How long?	X	X	
9c. " : Measles now or last 3 months?	X	X	
10a. Ask if ear problem: Ear problem?	X	X	
10b. " : Ear pain?	X	X	
10c. " : Ear discharge?	X	X	
11b. Ask if malnutrition: Breastfeeding?	X	X	
11c. " : Other foods/fluids?	X	X	
11d. " : Feeding changed with illness?	X	X	
12. EXAM for: Lethargy or unconsciousness.	X	X	
17. " : Drinking or breastfeeding.	X		
18. " : Pinch skin on abdomen.	X		
19. " : Sunken eyes.	X		
20. " : Stiff neck.		X	
21. " : Generalized rash.		X	
22. " : Runny nose or red eyes.		X	
CLASSIFICATION			
34b. Simple diarrhea – Some dehydration	X		
38. Very severe febrile disease		X	

-- Continued --

Item from Skills Observation Checklist	Case#1: Diarrhea, Some Dehydration	Case #2: Very Severe Febrile Illness	Comments
TREATMENT			
55. Immediate referral		X	
58. ORS/RHF	X		
COUNSELING			
76c. EXPLAIN how to administer oral ORS	X		No counseling required for case #2 because immediate referral.
77c. DEMONSTRATE to administer oral ORS	X		
78c. Verify COMPREHENSION to administer ORS	X		
79c. Give or ask mother to give first dose of ORS	X		
80. EXPLAIN to give fluid/breastmilk at home	X		
81. EXPLAIN to continue feeding/BF at home	X		
82. ADVISE on frequency of feeding/BF	X		
83. EXPLAIN when to return	X		
84a. Return immediately if: Not able to drink or BF	X		
84b. " : Child becomes sicker	X		
84c. " : Child develops fever	X		
84f. " : Blood in stool	X		
84g. " : Drinking poorly	X		
85. Inquire about mother's health	X		

QUALITY ASSURANCE PROJECT
University Research Co., LLC
7200 Wisconsin Avenue, Suite 600
Bethesda, MD 20814

Tel: (301) 654-8338
Fax: (301) 941-8427
www.qaproject.org