

# Improving facility-based care for sick children in Uganda: training is not enough

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This study assessed the effects of scaling-up Integrated Management of Childhood Illness (IMCI) on the quality of care received by sick children in 10 districts in Uganda. Health workers trained in IMCI were found to deliver significantly better care than health workers who had not yet been trained, but absolute levels of service quality remained low. Achieving training coverage alone is not sufficient as a strategy to improve and sustain care quality. Other factors including training quality, effective supervision, availability of essential drugs, vaccines and equipment, and the policy context are also important and must be included in child survival policies and plans.

**Key words:** IMCI, child health, quality care, health facility, Uganda

## Introduction

Over 10 million children die each year in low-income countries, most from causes that can be addressed through effective and affordable child survival interventions (Black et al. 2003; Jones et al. 2003). In Uganda, almost 70% of these deaths are due to a small number of diseases – pneumonia, diarrhoea, malaria and measles – in combination with malnutrition (Uganda Ministry of Health 2001). Integrated Management of Childhood Illness (IMCI) is a strategy for delivering essential child survival interventions at health facilities and in communities. The IMCI strategy includes three components: improving the case management skills of health workers; improving the health system support needed for effective management of childhood illness; and promoting key family and community practices through education of caretakers and other members of the community (Tulloch 1999).

The Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact (MCE) aims to evaluate the impact of IMCI on child mortality, health and nutrition, as well as on intermediate outcomes such as quality of care in health facilities and family practices that support child health (Bryce et al. 2004). MCE studies are under way in Bangladesh, Brazil, Peru, Tanzania and Uganda.

Several recent reports demonstrate that training health workers in IMCI case management can lead to important improvements in the quality of care of sick children visiting first-level health facilities (Rowe et al. 2000; Armstrong Schellenberg et al. 2004; el Arifeen et al. 2004; Gouws et al. 2004; Amaral et al. 2005). The challenge,

however, is to maintain the demonstrated effectiveness of training while expanding the intervention to achieve coverage levels sufficient to result in a meaningful impact on population health (Victora et al. 2004a). The current study assesses the effect of IMCI on the quality of care provided to children under 5 years in health facilities in 10 districts in Uganda. We examine factors that mediated this effect under routine programme conditions during a period of rapid scale-up.

## IMCI implementation in Uganda

Uganda has a population of 24.7 million (Uganda Bureau of Statistics 2002) and an under-five mortality rate of 156.5/1000 per year (Uganda Bureau of Statistics and Macro International Inc. 2000). IMCI was adopted by the Ministry of Health (MoH) as a part of their child health policy in 1995 (Uganda Ministry of Health 1995). The first IMCI training of health workers began in three ‘early implementation’ districts in 1996 (Nsungwa-Sabiiti et al. 2004) and, after an initial 2-year period of trial implementation, was established as a priority for nationwide expansion. By 2000, IMCI had been introduced to 55 of 56 districts in Uganda as a MoH priority and incorporated into the Uganda health sector strategy.

Most health care in Uganda is delivered through government and private not-for-profit (NGO) health facilities. In the 10 districts participating in this study, there were a total of 420 first-level facilities (excluding hospitals), among which 288 were government facilities. Outpatient child health care is provided through dispensaries (some with maternity services) and health centres. The health

workers who manage children in these facilities include 'qualified' staff with at least 18 months' of training (nurses/midwives, clinical officers, and in a few higher-level facilities, a medical doctor) and 'auxiliary' staff with on-the-job training in basic health care (nursing aides), or on-the-job training plus 3 months of intensive training (nursing assistants). The MoH recommended that district health management teams provide IMCI case management training to qualified staff first, followed by auxiliary staff.

The IMCI training of qualified staff in Uganda between 2000 and 2002 had a duration of 11 days, including at least 33% clinical practice and with a trainer to trainee ratio of at least 1:4 (Jesca Nsungwa-Sabiiti, personal communication). Until 2001, central MoH IMCI staff monitored all training to ensure that quality standards were met, and visited trained health workers within 2 weeks after training to support them in the implementation of IMCI and to address facility-level barriers to the applications of case management guidelines.

In 2000, the MoH incorporated a 14-day module on IMCI case management into the 3-month government curriculum for auxiliary staff (nurse assistants). Over 4000 auxiliary health workers participated in this training module between 2001 and 2002 (Nsungwa-Sabiiti et al. 2004). This training included less clinical instruction than the original 11-day course, and did not include post-training follow-up visits. Trainer to trainee ratios were low, although quantitative documentation is not available (Nsungwa-Sabiiti, personal communication).

Until 1993, government health providers offered services to children and mothers without official fees, although various kinds of unofficial fees were often reported. With the decentralization of health services in 1993/94, many local government authorities introduced user fees with the tacit approval of the central government, but no formal legal provision for it. Informal MoH guidelines stipulated that health facilities could retain 100% of fees collected. Up to 50% of these funds could be used to supplement staff salaries, with the balance for drugs and basic facility maintenance. The President of Uganda abolished user fees in March 2001 because of concerns about access to facility care among the poor and reports of inappropriate application of the guidelines at local level. The circumstances and effects of the abolition of user fees have been described elsewhere (Burnham et al. 2004).

### The Uganda IMCI impact study

As part of a larger IMCI impact study, health facility surveys were carried out between July and December in 2000, 2001 and 2002 in random samples of eight government and non-government health facilities drawn from each of the 10 study districts (Figure 1), stratified by type of facility. Replacements were included in the original sample for facilities found to be closed on the day of the survey visit. Sample sizes were increased in 2002

through the addition of a second stratified random sample of eight facilities per district.

Data were collected by two teams of four surveyors, all of whom had extensive previous experience in IMCI case management and participated in a 5-day training course for surveyors. Case management, from child registration and assessment through the dispensing of medicines and provision of advice to the caretaker, was observed by a trained surveyor using a standard checklist. Each child was reassessed and the caretaker interviewed by another trained surveyor, resulting in a 'gold standard classification of the child's illness. An inventory was conducted of facility drugs, equipment and supplies needed to implement the IMCI case management guidelines.

All sick children aged 2 months to 5 years presenting on the day of the survey to the health facility for care for the first time during an illness episode were enrolled. Surveyors remained at the facility throughout the opening hours, and were trained to follow the child and caretaker throughout the process of case management in ways that minimized interference with routine facility procedures. Facilities where no health worker was available, or where fewer than three patients under age 5 were present, were re-visited by the study team within 1 week.

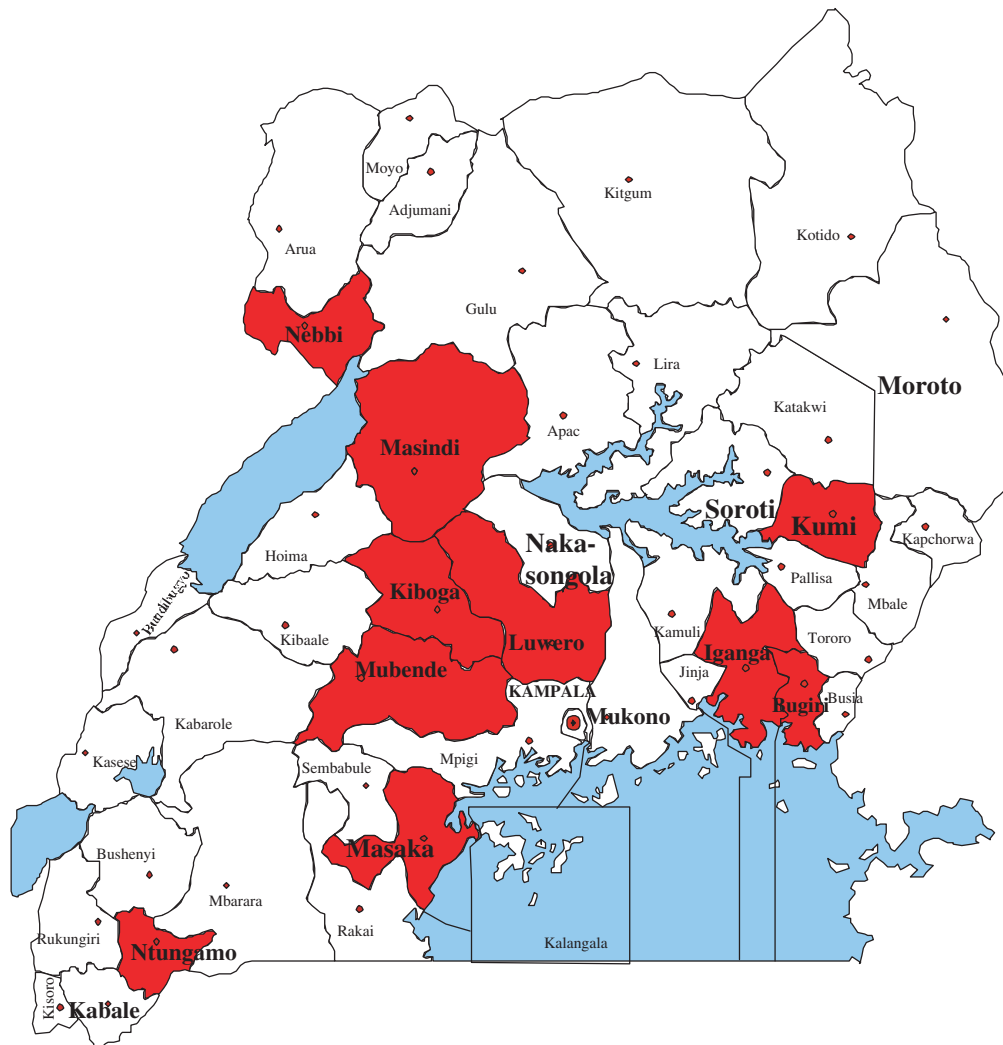
Further detail on the study methods is available from website [<http://www.who.int/imci-mce>]. Ethical approval for the study was obtained from the Uganda National Council for Science and Technology and from the Committee on Human Research, Johns Hopkins University Bloomberg School of Public Health, USA.

### Indicators

The performance of the health worker was assessed using standard MCE quality of care indicators (see website [<http://www.who.int/imci-mce>]) covering assessment tasks, correct classification, correct treatment and correct counselling and communication. The index of integrated child assessment measures the completeness of the assessment received by sick children in terms of 14 routine tasks to be performed on all sick children (Gouws et al. 2005). The reliability of this index was high for each of the three annual health facility surveys in Uganda, with Cronbach alpha coefficients of at least 0.80.

IMCI training coverage was measured as the proportion of children presenting for care on the day of the survey visit who were managed by a health worker trained in IMCI, and the proportion of health facilities in which at least 60% of health workers managing children were trained in IMCI. Data for these indicators were obtained through interviews with facility staff during the facility visit.

Health facility support indicators included an assessment of the frequency of routine supervision, with or without the observation of case management. IMCI training follow-up visits were not considered as supervision.



**Figure 1.** Map of Uganda showing the 10 Multi-Country Evaluation study districts

Other indices used in the analysis include the proportion of essential oral medications (out of eight essential drugs) available in the facility on the day of the survey, the proportion of essential pre-referral injectable medications (out of four), the proportion of essential vaccines (out of four), and the percentage of health facilities that had all items of a predefined list of essential equipment. Data on the availability of drugs, supplies and equipment were collected through a visual assessment at the health facility. The composition of these indices is described in Box 1.

#### Data management and analysis

Data were double-entered in EpiInfo Version 6.04b<sup>1</sup> using standard templates developed by the World Health Organization and adapted for use in the IMCI impact study. Inconsistencies were identified and resolved through reference to the original survey forms. Preliminary descriptive statistics were checked for internal consistency.

STATA version 7 (StataCorp 2001) was used for data analysis. Analyses of case management indicators were adjusted for clustering at the health facility level.

Differences in training coverage recorded for the 3 years were tested for statistical significance using the chi-square test for trend. Associations between training coverage and health worker performance in the 10 districts, as reflected in the index of integrated assessment, were investigated by year using linear regression analysis, and slopes of this association for the three study years were compared using analysis of co-variance.

Analyses comparing performance of health workers by IMCI training status (trained, untrained) and cadre (qualified, auxiliary) included data from all three surveys (2000, 2001, 2002) in all 10 districts. Chi-square tests were used to assess the statistical significance of differences in percentages, and t-tests or analysis of variance for comparison of mean values. Clustering at the health facility level was taken into account using STATA commands for adjusting the Pearson chi-square test, using a Rao and Scott correction, and performing t-tests on linear combinations of mean values (StataCorp 2001). The statistical significance of trends in the performance of IMCI-trained health care workers over time (2000,

**Box 1.** Description of summary indices**Index of Integrated Child Assessment**

Completeness of assessment received by sick children in terms of the following tasks:

- Check for ability to drink or breastfeed
- Check whether child vomits everything
- Check whether child has convulsions
- Check for cough or difficult breathing
- Check for diarrhoea
- Check for fever
- Child weighed on the same day
- Child's weight checked against growth chart
- Check for palmar pallor
- Check for visible severe wasting
- Check for oedema of both feet
- Check vaccination status
- Check temperature
- Check for other problems.

**Correct treatment**

Correct treatment was defined as the child being prescribed the correct drug in the correct formulation and dosage based on the Uganda adaptation of the IMCI case management guidelines.

**Index of availability of essential oral treatments**

Availability of first-line oral drugs for home treatment of sick children present in the facility on the day of the visit, including:

- Oral rehydration solution (ORS)
- Recommended antibiotics for pneumonia
- Recommended antibiotics for dysentery
- Recommended anti-malarial
- Vitamin A
- Iron
- Mebendazole
- Paracetamol/aspirin.

**Index of availability of injectable drugs for pre-referral treatment**

Availability of injectable antibiotics and antimalarials for pre-referral treatment of severely ill children and young infants present at the facility on the day of the visit, including a recommended intramuscular antibiotic, quinine, gentamycin and benzylpenicillin.

**Index of availability of four vaccines**

Estimated as the mean of four recommended vaccines available in the facility on the day of the visit, including BCG, polio, DPT, measles.

**Index of essential equipment and materials**

The proportion of health facilities that have all essential equipment and materials available on the day of the survey, including:

- Accessible and working weighing scale for adults
- Accessible and working weighing scale for children
- A timing device
- Child health cards
- A source of clean water
- Spoons, cups and jugs to mix and administer ORS.

2001 and 2002) was assessed using the Cochran-Armitage test for trend (Armitage et al. 2002). A chi-square test for trend or analysis of variance was used to compare the differences in the availability of drugs and equipment across study years.

## Results

Characteristics of the study health facilities, health workers and children are summarized in Table 1 for the three surveys.

### IMCI training coverage

IMCI training had started in nine of the 10 study districts by the time of the first survey in 2000, and in all districts by 2001. The percentage of observed children in all districts managed by IMCI-trained health workers on the day of the survey visit increased from 42% in 2000 (median of 10 districts = 47, range 0–79) to 65% in 2001 (median 70, range 14–100) to 79% in 2002 (median 83, range 50–96);  $p < 0.001$ . The percentage of health facilities with at least 60% of health workers managing children trained in IMCI showed similar rapid and significant increases between 2000 (7.7%), 2001 (36.3%) and 2002 (74.1%);  $p < 0.001$ .

**Table 1.** Characteristics of study samples of facilities, health workers and children in 10 districts in Uganda, July–December, 2000, 2001 and 2002

	2000 %	2001 %	2002 %
<i>Health facility</i>	<i>n = 78</i>	<i>n = 80</i>	<i>n = 158</i>
Facility type			
Dispensary	35.9	40.0	38.6
Dispensary with Maternity Services	37.2	40.0	43.0
Health Centre	26.9	20.0	18.4
Facility ownership			
Government	83.3	83.8	79.1
Non-government	16.7	16.2	20.9
<i>Health workers (all)</i>	<i>n = 123</i>	<i>n = 93</i>	<i>n = 211</i>
Sex			
Female	50.3	52.8	50.4
Cadre			
Qualified	69.8	70.5	65.2
Auxiliary	26.2	28.2	31.4
Other	4.1	1.3	3.4
IMCI training status			
Trained	42.4	64.9	79.0
Year of IMCI training	<i>n = 51</i>	<i>n = 60</i>	<i>n = 167</i>
2000	100.0	70.0	45.2
2001	–	30.0	27.2
2002	–	–	27.6
<i>Children</i>	<i>n = 516</i>	<i>n = 332</i>	<i>n = 686</i>
Age			
< 24 months	71.9	66.9	71.8
24 months to 59 months	28.1	33.1	28.2
Sex			
Female	50.3	41.3	46.9
Brought to facility by			
Mother	86.4	84.5	89.7
Other	13.6	15.5	10.3

### Association between health worker performance and IMCI training coverage

The association between levels of training coverage and performance (as measured by the index of integrated assessment) was assessed for the 10 districts by study year. Although the results of regression analysis show a consistent trend toward improved quality of care with higher levels of training coverage, the association was statistically significant only in 2002 (2000:  $R^2 = 0.25$ ,  $p = 0.137$ ; 2001:  $R^2 = 0.20$ ,  $p = 0.192$ ; 2002:  $R^2 = 0.51$ ,  $p = 0.020$ ). Analysis of co-variance using an interaction term between training coverage and study year revealed no significant difference in slopes between the three study years ( $p = 0.669$ ).

### Performance of health workers by IMCI training status

The proportions of children and their caretakers for whom specific case management tasks (assessment, classification, treatment, counselling of caretakers) were performed by the health worker, by survey year and among health workers with and without IMCI training, are shown in Table 2. Health workers trained in IMCI performed significantly better in assessment and correct classification of the child's illness than health workers without IMCI training.

Data on correct treatment show considerable variation, both by illness classification and by survey year (Table 2). In years 2000 and 2002, children with either a 'gold standard' classification of malaria (fever) or noted to need an antibiotic or antimalarial were significantly more likely to receive correct treatment from a health worker trained in IMCI than from a health worker not yet trained in IMCI. No significant differences were found by training status in the correct treatment of pneumonia, or in identifying and filling gaps in the child's schedule of essential vaccinations.

IMCI training was strongly and consistently associated with improved efforts by health workers to advise child caretakers, and with caretakers' ability to report correctly how they would administer medicines to the child at home (Table 2).

When data for the three study years were combined, the average differences in performance by IMCI training status were statistically significant for all reported indicators ( $p < 0.05$ ; data not shown). Health workers trained in IMCI consistently performed better than those who were not trained in IMCI.

Despite these strong and statistically significant improvements in performance associated with IMCI, the absolute levels of performance remained low (Table 2). For example, even after IMCI training only about half of children classified as having malaria or needing an antibiotic or antimalarial drug received complete and correct treatment. In 2002, 68% of caretakers whose children received an oral medicine were told how to

**Table 2.** Indicators of correct performance by IMCI training status of the health worker, 10 districts in Uganda, 2000–2002

Indicators	2000			2001			2002		
	IMCI trained n (%)	No training n (%)	All	IMCI trained n (%)	No training n (%)	All	IMCI trained n (%)	No training n (%)	All
Assessment									
Integrated assessment of child (mean)	181 (60.0)***	277 (35.7)	45.6	192 (51.2)**	104 (28.5)	43.9	562 (56.8)**	158 (35.0)	52.1
Classification									
Child correctly classified	181 (45.3)***	252 (21.0)	31.2	160 (39.4)	81 (24.7)	34.4	532 (37.8)***	151 (16.6)	33.1
Child correctly classified omitting coughs and colds and no dehydration <sup>††</sup>	181 (60.8)**	252 (43.3)	50.6	160 (62.5)*	81 (45.7)	56.9	532 (49.8)**	151 (37.1)	46.9
Treatment									
Pneumonia treated correctly	62 (40.3)	81 (24.7)	31.5	53 (35.8)	24 (25.0)	32.5	181 (51.4)	48 (47.9)	50.7
Malaria treated correctly	142 (47.9)***	224 (23.7)	33.1	138 (48.6)	73 (38.4)	45.0	378 (52.4)*	105 (30.5)	47.6
Child needing oral antibiotic and/or oral antimalarial is prescribed correctly	155 (54.2)*	233 (37.3)	44.1	151 (70.2)	76 (68.4)	69.6	414 (54.1)*	108 (39.8)	51.2
Child leaves facility with all needed vaccines <sup>†††</sup>	83 (0)	147 (3.4)	2.2	75 (9.3)	42 (2.4)	6.8	205 (17.1)*	46 (4.4)	14.7
Caretaker counselling/knowledge indicators									
Caretaker of sick child is advised to give extra fluids and continue feeding <sup>†</sup>	167 (43.1)*	261 (24.5)	31.8	162 (40.1)***	92 (9.4)	28.7	500 (33.2)**	147 (13.6)	28.7
Caretaker of child prescribed oral medicine advised on how to administer the treatment <sup>†††</sup>	164 (41.5)	230 (27.4)	33.3	159 (33.3)*	81 (16.1)	27.5	476 (67.9)***	134 (30.6)	59.7
Sick child whose caretaker is advised on when to return immediately <sup>†††</sup>	176 (20.5)***	267 (1.1)	8.8	175 (12.6)***	100 (2.0)	8.7	533 (30.2)***	151 (0.7)	23.7
Child leaving the facility whose caretaker was given or shown a mother's card	160 (37.5)***	259 (3.5)	16.5	159 (23.3)*	97 (8.3)	17.6	504 (31.8)***	146 (2.1)	25.1
Caretaker of child prescribed ORS/oral antibiotic/antimalarial knows how to give treatment <sup>†††</sup>	159 (27.0)	231 (18.2)	21.8	157 (47.7)	81 (49.4)	48.3	500 (47.0)***	137 (29.9)	43.3

p values are for comparison between IMCI trained and non-trained health workers in each round: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001.

p values are for comparison of performance among IMCI trained health workers over the three study years: †p<0.05; ††p<0.01; †††p<0.001.

administer it at home, but fewer than 35% of caretakers were advised on each of three other important home care messages (Table 2).

Analyses of performance in correct case management among IMCI-trained workers by survey year and the cadre of the health worker providing care (qualified or auxiliary staff) showed that auxiliary staff performed significantly better than qualified staff ( $p < 0.05$ ) only for the correct treatment of pneumonia in the 2000 survey and in the provision of correct advice to the caretaker in the 2000 and 2001 surveys.

Table 2 also shows changes in performance over time among health workers trained in IMCI. Performance levels varied widely by management task (i.e. assessment, classification, treatment, caretaker counselling). There were significant trends in six of the 12 indicators presented. For four of the indicators, these trends showed improvements in performance over time, and in two, performance levels decreased. For six of the twelve indicators, performance remained the same or decreased between 2000 and 2001, and then improved sharply in 2002.

To assess the possible effects of training quality, the performance of IMCI-trained auxiliary workers in 2002 was analyzed by the year they reported receiving IMCI case management training (before 2001, during 2001 and during 2002), adjusting for potential effect of gender. Performance by auxiliary workers was significantly better among those who were trained in IMCI in 2000 or before, compared with those who received IMCI training in 2001 and 2002, in four of nine indicators assessed.

### Facility support for IMCI

The percentage of health facilities that received at least one routine supervisory visit that included observation of case management during the previous 6 months was 38.9% in 2000, 36.6% in 2001 and 48.6% in 2002. Facilities with at least one IMCI-trained worker in 2000 received significantly more supervisory visits ( $n = 40$ , 50%) than facilities without an IMCI worker ( $n = 32$ , 25%;  $p = 0.031$ ), but differences in 2001 and 2002 were

not statistically significant as there were few facilities without an IMCI-trained worker in 2001 ( $n = 6$ ) and 2002 ( $n = 2$ ).

Using 2002 performance data for health workers with and without IMCI training, the results show that health workers in facilities that received at least one supervisory visit that included observation of case management during the previous 6 months performed significantly better (mean for index of integrated assessment = 56.7) than health workers in facilities who did not report such a visit during this period (mean for index of integrated assessment = 48.8;  $p = 0.001$ ).

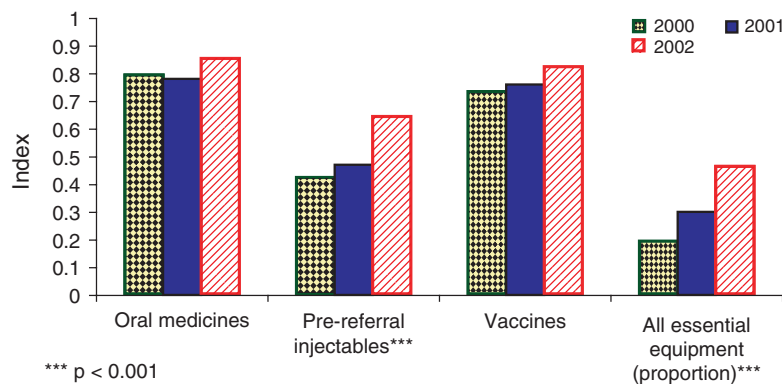
### Essential drugs, equipment and supplies

The availability of essential drugs, vaccines and equipment needed to provide correct IMCI case management is shown in Figure 2. In 2000, about 80% of health facilities had the oral medicines needed for IMCI case management, 40% had the pre-referral injectable drugs, and 70% had the essential vaccines. Only 20%, however, had all of the six items of equipment essential for IMCI implementation. There were significant increases over time in facility-based scores on the index of availability of pre-referral injectables ( $p = 0.0001$ ) and six essential items of equipment ( $p = 0.001$ ). The presence of one or more health workers trained in IMCI was not associated with differences in the availability of this health system support (data not shown).

Although data from 2002 showed no association between availability of drugs or vaccines and health worker performance (index of integrated assessment), there was better health worker performance in facilities where all essential equipment was present (mean for index of integrated assessment was 56.7 among health workers in facilities with all essential equipment, and 46.7 among health workers in facilities without all essential equipment;  $p = 0.001$ ).

### Discussion

This study shows that while efforts by the Ugandan Ministry of Health to scale-up IMCI resulted in



**Figure 2.** Availability of essential drugs, vaccines and equipment for IMCI case management in 10 districts in Uganda, July–December, 2000–2002

significant improvements in the quality of facility-based child health care, overall service quality remained low and did not improve with increases in training coverage. The findings reported here are at odds with previous reports of improved quality of care after the introduction of IMCI case management training. These other studies, however, were conducted using selected subsets of indicators (e.g. Gouws et al. 2004) or under more controlled circumstances in smaller geographic areas (Rowe et al. 2000; Rowe et al. 2001; Armstrong Schellenberg et al. 2004; el Arifeen et al. 2004). We believe that this inconsistency reflects the challenges of rapidly scaling-up an effective intervention from a small demonstration project setting to a national programme (Victora et al. 2004a). This analysis is instructive for policymakers seeking increases in IMCI coverage sufficient to achieve the Millennium Development Goal of reducing child mortality by one-third by 2015 (United Nations 2001).

The 10 study districts represent 23% of the estimated 4.5 million children aged under five in Uganda (Uganda Bureau of Statistics 2002). The intervention – IMCI – was implemented entirely by the Ministry of Health and its development partners, with no participation from the evaluation team. The results presented here are a rare example of a true effectiveness evaluation, assessing the outcomes of national efforts to scale-up IMCI to nationwide coverage within a 3-year period.

As in most effectiveness studies, there are important limitations that must be taken into account (Victora et al. 2004b). Changes in health worker performance may have been affected by a ‘spillover’ effect from other health workers, or the presence in a single facility of both health workers with and without IMCI training. Among facilities with two or more health workers managing sick children on the day of the survey visit, the proportion of facilities in which some health workers were trained in IMCI while others were not was 34% (14/41) in 2000, 11% (3/27) in 2001, and 23% (13/56) in 2002. In addition, the high retention rates for IMCI health workers in Uganda (Uganda IMCI Implementation Documentation Team 2002) could have meant that the repeated annual surveys of the same health workers may have introduced a positive bias.

Despite these limitations, this study provides new quantitative data on the factors associated with health worker performance and the quality of care. These factors include:

- *The quality of initial training.* The general pattern of results indicates that performance levels did not improve between 2000 and 2001, and in some cases deteriorated, and then in 2002 returned to 2000 levels or higher. Using year of initial training as a proxy, we found that auxiliary health workers trained before 2000 performed better than those who participated in the special training sessions in 2001 and 2002, which included less clinical practice, higher trainee to trainer ratios and no systematic follow up.

- *Adequate support for correct case management.* The findings indicate that *most* of the study facilities had *most* of the essential drugs, supplies and equipment needed to provide integrated case management, *most* of the time. Results for the composite summary indicator, however, show that fewer than 40% of facilities had *all* essential materials to care for sick children on any given day, even after 3 years of implementation.
- *Effective supervision.* Our findings demonstrate that high-quality routine supervision, as reflected in the supervisor’s observation of case management, is associated with the provision of better child health care. Even after 3 years of IMCI implementation, however, fewer than half of the health facilities in these 10 districts had received effective supervision at least twice per year.
- *Policies that support health worker motivation and independence.* The abolition of cost-sharing had negative effects on health worker morale, resulted in reduced availability of some essential drugs (e.g. antibiotics), and decreased support for auxiliary staff (Burnham et al. 2004). Not surprisingly, health worker performance declined under these conditions. The return to higher levels of performance in 2002 may be explained in part by the passage of time as well as by the positive steps taken by the Ministry of Health to respond to staff complaints and strengthen the supply of essential drugs.
- *Inconsistent or inadequately communicated vaccination policies.* The Uganda IMCI guidelines state clearly that missing immunizations found during a sick child visit should be remedied, even if this means opening a vial of vaccine for a single child. In addition, one of the assumptions underlying the expected impact of IMCI on child mortality is that training of health workers in the integrated case management guidelines would minimize missed opportunities for vaccination (Tulloch 1999).

Although health workers checked the vaccination status of almost half of the sick children observed and the index of availability of four essential vaccines was higher than 70% across the three survey years, fewer than one in five children needing immunizations were vaccinated during their visit to the facility. This figure was significantly higher in 2002 than in 2000, but even then only 17% of needed vaccinations were provided to children seen by IMCI-trained staff.

Discussion of these findings with Ministry of Health personnel revealed that in the late 1990s, in part as a result of changes in global policies on immunization, there was a *de facto* understanding among government health workers and District Health Management Teams that the ‘open a vial, even for only one child’ policy was not cost-effective. Reports from districts and health workers indicated that in practice, children needing vaccination were asked to return to the facility for scheduled vaccination sessions. This inconsistency between *de facto* and *de jure* policies may have contributed to the lower than targeted immunization coverage rates in Uganda.



Our findings demonstrate that although high-quality training can lead to improved performance and quality of care under the relatively well-controlled conditions of small-scale demonstration projects, this may be hard to maintain during periods of rapid scale-up.

Improving and sustaining facility-based service quality requires the confluence of a number of factors that must be addressed together and over time (Rowe, personal communication). Existing conceptual frameworks for the determinants of health worker performance (e.g. Tanser et al. 2001; Marquez 2001; Franco et al. 2002) are not incompatible (Grol and Grimshaw 2003) and must be synthesized and used as the basis for further longitudinal studies of health worker performance and the quality of child health care in routine service settings. The results of such studies are needed urgently as a basis for strengthened child survival policies and programmes.

## Conclusions

IMCI case management training was associated with significant improvements in the quality of care received by children in 10 study districts representing 23% of all children aged under five in Uganda. But IMCI training alone was not sufficient to attain and sustain adequate levels of service quality. There are multiple factors that must work together in order to strengthen health worker performance and to sustain improvements achieved. These factors include adequate training quality, effective reinforcement of skills, and policies that are supportive, consistent across and communicated to all levels of the health system.

Our findings are consistent with other assessments in Benin (Rowe et al. 2001), Tanzania (Armstrong Schellenberg et al. 2004) and Bangladesh (el Arifeen et al. 2004) in documenting performance improvements after IMCI training, but go beyond earlier findings in geographic scope and in documenting the important trade-offs that occur between coverage and quality during the scaling-up process.

These findings have important implications for governments seeking to scale up child survival programmes and reduce child mortality. They indicate that achieving high training coverage is a necessary but not sufficient input to the provision of adequate facility-based child health care. More comprehensive (and therefore perhaps more carefully sequenced) steps must be taken concurrently to ensure adequate training quality, effective supervision, continuous supplies of all essential drugs, vaccines and equipment, and the development and communication of supportive policies.

Our experience also underlines the importance of having study time lines that are sufficiently long to take into account those contextual factors that may modify intervention effects. In this study, preliminary results showing decreases in health worker performance after

IMCI training in 2001 led both the Ministry of Health and donors to question the effectiveness of IMCI and reduce their support for the strategy. The critical role of other factors in determining the effectiveness of IMCI was only understood once the 2002 results showing renewed performance improvements became available, stimulating a broader analysis of the determinants and contextual factors associated with the quality of child health care.

## Endnote

<sup>1</sup> Website: [<http://www.cdc.gov/epiinfo/Epi6/EI6dwni.htm>].

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