Integrated Infectious Disease Capacity Building Evaluation (IDCAP)

Accepted Abstracts

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Eastern, Central and Southern Africa (ECSA) Health Ministers' Conference 2009

Results from IDCAP Learning Needs Assessment in Uganda: Mid-level Practitioners' Role in Managing Infectious Diseases and Site Leadership

Background/Significance: As the demand for health care services continues to grow, health care facilities struggle to provide clinic services. One highly-recognized approach to managing this demand has been task-shifting, moving less-complex tasks from higher cadres to lower cadres of staff. Despite controversy in public forums, task-shifting often takes place informally, as health workers strive to meet patients' needs. In many community-level clinics, Nurses and Clinical Officers deliver infectious disease services that are officially assigned to Medical Officers and Doctors. Because these cadres perform the work informally, the needed training to perform these tasks is not provided.

Research: With the Ugandan Ministry of Health, Accordia Global Health foundation and its partners designed IDCAP: an intervention to evaluate the cost-effectiveness of a capacity building program for the care and prevention of infectious diseases among mid-level practitioners.

Program: Intervention combines classroom training, distance learning and on-site support to improve the diagnosis and treatment of infectious diseases. The evaluation will measure the impact of combined on-site support, classroom training and distance learning, compared to classroom training and distance learning alone.

Methodology: A learning needs assessment was conducted with 408 staff at 45 health facilities classified as hospitals, Health Centre IV or III . The sample includes Doctors, Clinical Officers, Nurses, Midwives and Nursing Assistants. Forty-eight key tasks were identified based on infectious disease competencies in eight areas: HIV Education, HIV Prevention, Initial Assessment of HIV, Prescribing ART, Clinical Management of Fever, Clinical Management of Respiratory Illness, Pediatrics, Care and Management of the Clinical Team.

For each task, respondents were asked:

- Do you perform this task?
- How competent do you feel performing this task (can perform independently/ can perform with support/ not able to perform) ?
- Did you attend pre-service training on this task?
- Have you participated in in-service training on this task?

Data: Four analyses were performed. 1) Cross-tabulation of the percentage of health professionals who performed each of the 48 tasks by profession. 2) Among professionals who performed a task, the percentage who self-reported they were competent to perform it independently was listed. 3) Among professionals who performed a task, the percentages who attended pre-service training, in-service training, and both was calculated. 4) The percentage of professionals who self-reported they were competent to perform a task independently who attended training was compared to those who did not attend training using a chi-square test.

Findings: First, a large percentage of mid-level practitioners already perform most tasks related to the management of infectious diseases. In some cases, midwives performed complex ART tasks more frequently than nurses.

Task	Clinical Officers	Nurses	Midwives
Perform WHO Staging	96%	58%	64%
Determine patient eligibility for ART	76%	39%	45%
Prescribe 1st line ART for a tx naïve patient	63%	28%	43%
Switching ART regimen	46%	14%	19%
Diagnosis of Malaria based on lab test	95%	88%	71%
Diagnosis of severe malaria	100%	96%	90%
Diagnosis of extrapulmonary TB	74%	42%	19%
Clinical management of TB/HIV Co-Infection	85%	70%	49%
Developmental milestones for children	84%	61%	62%

Second, the relationship between competence and training varied across tasks. For several HIV tasks there was no relationship between competence and pre-service training. For example, 44% of health professionals who prescribe first line ART and attended pre-service training on it were competent, compared 56% who did not attend pre-service training (p=0.270). The relationship between competence and in-service training was significant for almost all HIV tasks, indicating a need for continued updates in these areas. Two exceptions where switching ART regimens (1st line to 2nd line) and performing the dried blood spot test HIV test of HIV exposed infants.

Third, more than 60% of the sample were engaged in the six "care and management of the clinical team" tasks: : team building, adult learning, time management, leadership, quality improvement, and sharing of best practices. Two other leadership tasks were infrequently performed: 28% mentored colleagues on prescribing ART, and 47% mentored them on respiratory infections. Competence in seven leadership tasks was significantly related to both pre-service and in-service training. The exception was mentoring health care workers who are prescribing ART, which was significantly related to in-service but not pre-service training.

Program: As the discussion of task shifting continues, it is important to understand the extent to which mid-level practitioners are already performing complex infectious diseases tasks, officially or unofficially, often with little or no training. Precious training resources should be targeting those who most frequently treat patients, and this assessment indicates that more training is needed for mid-level practitioners.

Further, mid-level practitioners may be the key to achieving significant improvements in quality of care. Though higher-cadres are able, and trained, to manage infectious diseases they may not be available to lead the clinical team. Our assessment suggests that mid-level practitioners are currently practicing leadership and see themselves as competent leaders when trained.

ASTMH 2010

The Effect of IDCAP Implementation on Improvement of Health Management Information Systems in Rural Uganda

Background: Integrated Infectious Diseases Capacity Building Evaluation (IDCAP) is providing classroom and on-site training and continuous quality improvement of mid-level practitioners in 36 rural health centers in Uganda. IDCAP seeks to measure incremental impact and cost-effectiveness of integrated infectious diseases management. In order to measure the impact of site-level performance, IDCAP has had to strengthen the Ministry of Health (MOH) Management Information System (HMIS). This paper discusses the HMIS improvements that have been achieved due to IDCAP efforts.

Design: A Data surveillance system was set up to collect data on management of infectious diseases in Outpatients, Maternity, TB, HIV, Antenatal and Postnatal clinics. For Outpatients, the MOH Medical Form (MF5) was modified to capture in a coded format patients' demographics, history, examinations, diagnosis, treatment, referral and dispensed drugs. Health centers received a computer, printer, power supply and/or backup systems and modems for electronic reporting. Records personnel were trained in electronic data entry, analysis, reporting, quality assurance, facilitation and receive technical support.

Results: The rate of data completeness has improved to over 95%. Over 90% of clinicians using the new MF5 have found it timesaving and easy-to-use. Data losses and reporting timeliness have improved. Over 300,000 records have been collected during the four months of baseline. Using a computer, data entry, analysis and reporting is timely reducing from over seven days to less than two days.

Conclusion: Efforts to collect quality data to measure IDCAP site performance and impact has had a profound effect on improvement and strengthening of the HMIS in the rural health centers implementing IDCAP. The new MF5 and data surveillance system have improved quality of collected data, timely electronic entry, data analysis and reporting. It is also strengthening treatment and drug supply systems.

ASTMH 2010

Addressing health workforce crisis in rural health facilities through integrated infectious disease capacity building of mid and lower level health practitioners in Uganda

Background: The Integrated Infectious Disease Capacity Building Evaluation Program (IDCAP) is providing On-Site Support (OSS) to 36 rural health facilities spread out in all regions of the country. IDCAP conducted a training needs assessment (TNA) in the rural facilities of Uganda and noted that the already constrained workforce mainly comprising of mid level health Practitioners (Clinical officers and Registered Nurses) is challenged with inadequate and insufficient skills. They feel incompetent in offering care and management of infectious diseases among others.

Design: The package for OSS consists of Multi Disciplinary Training (MDT) of all the health workers involved in the patient care pathway (Medical officers to nursing assistants), Continuous Quality Improvement training and one on one coaching and mentoring of key staff who are involved in making daily clinical decisions on site.

Results: In the first IDCAP OSS field work conducted in April 2010 in 18 study sites, on average 8 clinical staff were mapped out for one on coaching and mentoring. Of these, 2 were Medical Clinical Officers, 2 Nursing Officers and 4 enrolled Nurses per site. On average, 30 health staff participated in the MDT training per site. This number appears to be big because most of the staff involved in patients' care are of lower cadre which often times can be attracted and retained in these rural health facilities i.e Enrolled Nurses, Nursing assistants, Health Educators and Inspectors, Records officers and counselors. The scope of work for non-professional personnel is tailored operationally to enable them perform less technical tasks such as counseling, adherence monitoring, home visiting, patient registration and maintaining flow client. All these aspects are addressed in the MDT sessions.

Conclusion: Participation of health facility staff in on-site activities i.e. mentoring, coaching, multi-disciplinary and Continuous Quality Improvement training could be one of the strategies towards improving individual and site performance given the staff shortages in rural health settings in delivering health services.

Consortium of Universities in Global Health (CUGH) 2010

Infectious Disease Capacity Building Evaluation (IDCAP) – the Intersection between Research and Professional Training Evaluation

Objective: To develop a cutting edge evaluation framework to measure the impact of a novel package of classroom training, distance learning, and on-site support services (OSS)

Background: Evidence to support the improved skill and knowledge base of trained healthcare providers is a necessary, but is not sufficient. Demonstration that those improved skills and knowledge lead to improved clinical decisions and better healthcare service delivery is a step closer, but still not enough. Building a knowledgeable and skilled health workforce is only valuable if it translates to improved healthcare service delivery - which only really makes a difference if it translates to better health outcomes for the general population.

Method: While the primary emphasis of IDCAP is to advance a field of science and introduce scientific tools to enable the evaluation of training more broadly, we needed a candidate to test and develop that capacity. For this candidate intervention, we elected to develop a new approach to training that responded to widely-acknowledged needs in the field of human resources for health. With our expertise and that of our partners, we developed IDCAP, which incorporates three much-needed innovations in training: focus on mid-level practitioners, integration across infectious disease, and on-site follow-up and support.

The relative impact of IDCAP's capacity-building program elements is being assessed through a randomized control trial with staggered introduction of its training components. To our knowledge, the simple and robust tool of a randomized facility-based trial has not been used previously in large-scale training evaluations in resource-limited settings.

Results: The developed framework includes three chain linked components: Individual Knowledge & Competency, Facility Performance & Quality of Care, and Patient Outcomes & Population Health.

Individual Knowledge & Competency - IDCAP's innovation in evaluating the impact of the training course on individual skills and clinical practice is focused on two primary new evaluation tools: Classroom Case Scenarios and Clinical Assessment Tools.

Facility-level Performance and Quality of Care - IDCAP's evaluation of facility-level performance is enabled by a comprehensive surveillance system at all thirty-six health facilities in the study. The surveillance system collects data in support of *key performance indicators* that have been identified for purpose of the evaluation.

Patient Outcomes & Population Health -Two ambitious efforts designed to produce scientifically valid observations about IDCAP's impact on the health of the population are 1) its patient cohorts and 2) a large-scale mortality survey.

Conclusions:
With the developed evaluation framework, IDCAP hopes to set a new standard for the evidence required in support of key policy decisions involving human resources for health.

Eastern, Central and Southern Africa (ECSA) Health Ministers' Conference 2010

Improving Human Resource Capacity through Evidence-based Training

Background/Significance: As the demand for health care services continues to grow, health care facilities struggle to provide clinical services. One highly-recognized approach to managing this demand has been task-shifting, moving less-complex tasks from higher cadres to lower cadres of staff. Task-shifting often takes place informally as health workers strive to meet patients' needs. In many community-level clinics in sub-Saharan Africa, Nurses and Clinical Officers deliver infectious disease services that are officially assigned to Medical Officers and Doctors. Because these mid-level practitioners perform the work informally, the needed training to perform these tasks is not provided.

Research: Evidence to support the improved skill and knowledge base of mid-level practitioners trained is a necessary first step in establishing cause and effect, but is not sufficient. Demonstration that those improved skills and knowledge lead to improved clinical decisions and better healthcare service delivery is a step closer, but still not enough.

Building a knowledgeable and skilled health workforce is only valuable if it translates to improved healthcare service delivery - which only really makes a difference if it translates to better health outcomes for the general population. Creating that chain of evidence is the greatest challenge to proving the value of training healthcare workers.

With the Ugandan Ministry of Health, Accordia Global Health foundation and its partners designed the Integrated Infectious Disease Capacity-Building Evaluation (IDCAP): a 3-year program with the goal of evaluating a cost-effective method to build capacity among mid-level health practitioners in sub-Saharan Africa for the treatment and prevention of infectious diseases.

Program: The intervention combines classroom training, distance learning and on-site support to improve the diagnosis and treatment of infectious diseases. The IDCAP training program serves as a model for teaching adaptive expertise in places with severe human resource shortages.

Methodology: Building on IMCI and IMAI, IDCAP offers an integrated approach to training and treatment for infectious diseases. IDCAP training is based on clinical decision guides and builds capacity in clinical decision-making. Although the focus is on HIV, TB and Malaria, the Integrated Management of Infectious Disease (IMID) core course addresses more than 50 disease entities to build clinical decision-making skills.

Two clinicians from each of the rural health facilities begin with a three-week classroom training. Trainees then return to their sites during which time distance learning modules are completed. Also during this time, IDCAP mobile teams provide monthly on-site support to multidisciplinary teams at each of the health facilities. After 12 weeks, the two clinicians return to the classroom for a 1-week booster training, then return to their sites to complete another 12 week distance learning module with simultaneous onsite support before returning after 24 weeks for the final 1-week booster training. The remaining 12 weeks are followed by distance learning modules and the final monthly visits for onsite support.

To measure the performance of these health facilities, a data surveillance system was implemented at each site by IDCAP. The data surveillance system is a comprehensive system for collecting routine information about the daily performance of a health facility's clinical and laboratory staff. The system incorporates tools that had already been in place as a result of Ministry of Health systems (patient registers for Tuberculosis and ART, for example), improved tools to replace others that already existed (patient-specific clinical forms requiring more detail about patient history, symptoms and test results), and some new reporting tools (laboratory and other inventory records).

In addition the facility level performance measurement, the impact of the intervention is also measuring Individual knowledge & Competency through classroom case scenarios and clinical assessment tools; and Patient Outcomes & Population Health through TB & HIV Cohorts and a mortality survey focused upon children under five.

Data: The baseline data has been collected for the individual and facility levels, but is not yet available. Population health outcomes baseline data is currently being collected for the HIV and TB cohorts while the mortality survey is scheduled to begin in early 2011. Comparative results will be available in 2011.

Findings and Knowledge Contribution: IDCAP expects to show that an integrated IMID course can prepare mid-level practitioners to perform key clinical tasks at acceptable standards of care. Secondly, IDCAP anticipates evidence to support that onsite support services will significantly improve clinic performance and health outcomes. Finally, the results are forecasted to show that onsite support services can be conducted cost effectively.

Program (State lessons learned): With IDCAP, Accordia Global Health Foundation hopes to set a new standard for the evidence required in support of key policy decisions involving human resources for health. By communicating to others the proven cost effectiveness of the IDCAP onsite support services, the innovative, integrated approach will be integrated into national healthcare systems.

First Symposium on Health Systems Research 2010

Improving Outpatient Health Information Systems for Integrated Infectious Diseases Management in Rural Uganda

Objectives: Integrated Infectious Diseases Capacity Building Evaluation (IDCAP) provides on-site training to mid-level practitioners and continuous quality improvement in 36 rural health centers in Uganda. Ministry of Health's (MOH) information system was strengthened to measure its impact on site-level performance.

Design: Data surveillance system collects integrated data on management of infectious diseases. MOH Medical Form (MF5) was modified to capture patient's demographics, history, examinations, diagnosis, treatment, referral and dispensed drugs. Sites received computer, printer, power supply and/or backup systems and modems for reporting over internet. Records personnel were trained in electronic data entry, analysis, and reporting, and receive technical support.

Results: Four months of baseline data were collected comprising more than 300,000 records. Over 90% of clinicians using new MF5 have found it time-saving and easy-to-use. Data losses reduced and timeliness improved. Baseline data on the following site performance indicators are reported:

Malaria indicators by two age groups

- Microscopy among suspected malaria cases
- Patients treated for malaria among those with negative blood smear
- Patients who received artemisinen-based combination (ACT) treatment among patients treated for malaria

Pneumonia: Proportion of children less than 5 years diagnosed with pneumonia treated with appropriate antibiotic

HIV screening by three age groups

- Proportion of outpatients with known HIV status
- Proportion of TB suspects with known HIV status

Management of respiratory infections by two age groups

- Proportion of TB suspects >12 years sent for first acid fast bacilli (AFB) smear
- Proportion people with AFB smear positive tests who start initial TB treatment phase.
- Proportion of people with AFB smear negative results who are started on empiric treatment for acute respiratory infection

Emergency Triage and Treatment: Proportion of patients triaged

Conclusions: New MF5 and data surveillance system improved reporting. MOH now considers adopting it to strengthen treatment and supply systems.

International Forum on Quality and Safety in Healthcare 2011

Improving Emergency Care in Resource Constrained Health Facilities in Uganda: Experience of the Integrated Infectious Disease Capacity Building Evaluation Project

Context: The improvement occurred among multidisciplinary staff at 36 mid-sized health facilities in Uganda participating in the Integrated Infectious Disease Capacity Building Evaluation (IDCAP).

Problem: Baseline assessment revealed that an inadequate portion of outpatients were triaged at study sites, contributing to avoidable death in the first 48 hours of admission, particularly among children under five.

Assessment of problem and analysis of its causes: At baseline, medical records in all 36 IDCAP sites revealed that less than 50% of outpatients were triaged into three categories: emergency, priority or normal. Among the priority patients, less than 14% were managed well. We planned to train multidisciplinary clinic staff in ETAT, and introduce an ETAT system.

Intervention: Two midlevel practitioners from each of 36 sites participated in an Integrated Management of Infectious Disease (IMID) training course including ETAT content. Multidisciplinary teams at half the sites also received IDCAP's primary intervention: targeted on-site support (OSS) including training in ETAT, and visits from Continuous Quality Improvement advisors to set up functional ETAT systems, indentify appropriate triage staff, reorganize patient flow, and establish emergency care stations.

Study design: A comprehensive surveillance system deployed at all 36 study sites included key ETAT indicators, and baseline data was collected over a period of 5 months before the intervention. Sites were randomized to two study arms. Both study arms received IMID for two midlevel members of their staff, and Study Arm A received monthly OSS from a specialized team of experts; the first visit focused exclusively on ETAT. Data for ETAT indicators will be compared between Study Arms over a period of 6 months to evaluate the incremental impact of OSS on ETAT indicators.

Strategy for change: The OSS was delivered by multidisciplinary mobile teams consisting of a Medical Officer trained in CQI techniques, a Clinical Officer, a nurse and a laboratory professional. The first OSS session focused exclusively on ETAT. Monthly mentoring and continuous quality improvement coaching was provided to multidisciplinary teams at each site: providers at these facilities were supported in team building and to systematically analyze and improve their processes of care.

Measurement of improvement: Site teams documented quality gaps for ETAT, and captured the changes tested and their impact. The proportion of patients triaged was measured on a monthly basis and plotted in a run chart.

Effects of changes: Initially there was some resistance by the health workers who viewed the ETAT system as additional work. There was also a lack of basic emergency equipment at some sites. However, observations collected from Study Arm A site journals show notable improvement in the rate of patients triaged in the months following introduction of ETAT

training and system implementation. An increasing number of referrals and admissions of very sick patients was also observed, which should lead to better outcomes of care.

Data collected through the IDCAP surveillance system will be analyzed to show whether the OSS intervention produced an improvement in ETAT indicators in Study Arm A sites, as compared to the control sites in Study Arm B.

Lessons learnt: OSS including CQI improves the adoption of new processes and contributes to improved healthcare service delivery. When staff see the positive impact of improvement changes they accept them more readily, and incorporate them in their daily routines. With appropriate training and onsite support, health facilities can rapidly improve emergency triage, assessment and treatment.

Message for others: Successful introduction of effective ETAT systems requires on-site and multidisciplinary training on the clinical management of emergency cases, and CQI to improve all associated processes. It is possible to establish effective ETAT system even in facilities with limited resources. With this kind of intervention, deaths among seriously ill children presenting in such facilities can be averted.

Global Health Conference (Montreal) 2011

Advances in Medical Education: A Model for Infectious Disease Training for Non-Physician Clinicians in Uganda

Background: Recent calls for reform in global medical education have stressed the need for approaches that strengthen clinical reasoning skills. The Integrated Infectious Disease Capacity Building Evaluation (IDCAP) created a training program using current best practices in clinical education among clinicians in rural Uganda.

Method: The process that expert clinicians use to make decisions has been a source of debate in the medical education literature—particularly, the use of adaptive thinking (i.e. analytic, conscious) versus routine thinking (i.e. non-analytic, automatic) to solve clinical problems. Progressive strategies for clinical teachers enable students to practice thinking about medicine in both routine and adaptive ways. IDCAP focused on 3 key practices for building both routine and adaptive reasoning skills:

- Articulating the reasoning process
- Practice-embedded learning
- Collective learning in the clinic

Thirty-six health facilities across Uganda were selected to participate in IDCAP. Each site nominated two individuals—a Clinical Officer (CO), and/or Nursing Officer (NO)—to be trained.

Results: IDCAP designed a sustained intervention while minimizing out-of-clinic time, combining classroom training, distance learning and on-site support, spanning a 9-month period.

Integrated Management of Infectious Diseases - the 3-week core course features detailed case studies and discussion in integrating infectious diseases and mirroring the clinical reasoning process as the primary means of instruction. It was followed by two 1-week booster courses- 12 weeks apart with case presentations from the trainees' clinical practice. During 5 weeks of courses, trainees had 12 half-day clinical rotations.

Distance Learning – Between courses, trainees used a clinical practice logbook that supported three practices: 1) recognizing interesting and complex cases in their day-to-day practice, 2) identifying sources for consultation; and 3) articulating case details for another clinician.

On-site Support - Trainees were visited monthly by a four-member mobile team: Medical Officer, CO, NO and Laboratory Technologist. The two-day visit included team-based training to include a broader cross-section of staff, and mentoring for the clinical and laboratory professionals.

Conclusion: The IDCAP model provides longer-term support to translate clinical experiences into learning, and support the development of complex reasoning skills in understaffed, rural settings.

Global Health Conference (Montreal) 2011

Capacity-Building and Clinical Competence in Infectious Diseases in Uganda: A Mixed-Design Study with Randomized Trial Components.

Background: Best practices for training non-physician clinicians (NPCs) to support global health-services scale-up are not well-characterized. In Uganda, the Integrated Infectious Disease Capacity-Building Evaluation (IDCAP; www.clinicaltrials.gov #NCT01190540) is measuring the impact of two interventions: Integrated Management of Infectious Disease (IMID) training and on-site support (OSS). We hypothesized that both interventions would improve clinician competence.

Methods: Thirty-six health facilities (randomized 1:1 to OSS and control arms) enrolled two NPCs each. All NPCs participated in IMID (3-week core course, two 1-week boost sessions, distance learning). After the 3-week course, OSS-arm trainees arm participated in monthly OSS.

Twelve written case scenarios tested clinical competencies in HIV/AIDS, tuberculosis, malaria, and other infectious diseases. Each participant completed different randomly-assigned blocks of 4 scenarios before IMID (t0), after the 3-week course (t1), and after the 2nd boost course (t2, 6 months after t1). Scenario scoring guides were harmonized with IMID content and Ugandan national policy. Score analyses used a linear mixed-effects model. The primary outcome measure was longitudinal change in scenario scores.

Results: Scores were available for 856 scenarios. Mean scores at t0, t1, and t2 were 39.3%, 49.1%, and 49.6% correct, respectively. Mean score increases (95% CI) for t0-t1, t1-t2, and t0-t2 were 12.1 (9.6, 14.6), -0.6 (-3.1, +1.9), and 11.5 (9.0, 14.1) percentage points for OSS arm and 7.5 (5.0, 10.0), 1.6 (-1.0, +1.4), and 9.1 (6.5, 11.6) for control arm. For the period (t1–t2), in which interventions differed across arms, the mean change was 2.2 (-5.8, +1.4) points lower for the OSS arm. Mean scores increased for all 12 scenarios.

Conclusions: Mean aggregate scenario scores increased significantly after a 3-week core course; improvement persisted for six months. No additional impact of OSS was observed, according to this measure. Data on clinical performance and health outcomes will complete assessment of overall impact of IMID and OSS.

Global Health Conference (Montreal) 2011

Clinical performance of non-physician clinician (NPC) in Uganda: Baseline Assessment

Background: The Integrated Infectious Disease Capacity-Building Evaluation (IDCAP) sought to measure the effect of Integrated Management of Infectious Disease (IMID) training on clinical practice for HIV, tuberculosis, malaria and related infectious diseases. Two NPC from 36 facilities participated in a three-week core course, two one-week boost courses, and distance learning over seven months. Eighteen of 36 facilities were randomly assigned to arm A, and participated in on-site support (OSS) from April to December 2010.

The primary hypothesis was that clinical performance improved after IMID. Two secondary hypotheses were 1) no difference in performance between arms A and B at baseline and 2) performance would increase more among trainees at sites with OSS. Performance was tested with a mixed design with pre/post and cluster randomized control elements.

Methods: From January to March 2010, clinical faculty conducted 337 baseline assessments of care for children less than 14 years. From December 2010 to February 2011, they conducted 350 endline assessments. Sixty percent of trainees were clinical officers. Majority of children were less than five years; 84% at baseline and 97% at endline. Observers noted trainee performance on five sets of tasks: history taking, physical examination, laboratory investigations ordered, diagnoses, and treatment prescribed. Observers collected information omitted by trainees, so accurate patient information was available.

Results: Characteristics of patients on whom the trainees were assessed were not significantly different across arms at baseline and endline. Ninety percent of patients were new attendances, 80-88% presented with fever, 60-70% with cough, and 25-30% with complaints of diarrhea. Final diagnoses were comparable across arms at baseline and endline, respectively, for uncomplicated (45% A vs 47 B) and (34% A vs 36% B) severe malaria (12% A vs 19% B) vs (8% A vs 11% B) pneumonia (18% A and 21% B) vs (13% A vs 18% B) and acute diarrhea (14% A vs 17% B) vs (10% A vs 14% B).

Conclusions: Randomization of health facilities was successful; patient samples across arms at baseline and endline were comparable. Evaluation of the effectiveness of IMID and OSS in improving clinic performance is on-going.

Global Health Council Conference 2011

Impact of On-Site Support on the Management of Malaria: a Randomized Controlled Trial

Objective: To evaluate the impact of on-site training (OSS) of non-physician clinicians (NPC) on management of infectious diseases in Uganda.

Background: Over 60% of patients visiting health facilities in Sub-Saharan Africa, present with infectious diseases including malaria, TB, HIV and pneumonia. The Integrated Infectious Disease Capacity Building Evaluation (IDCAP) seeks to evalaute the impact of OSS in addition to integrated infectious disease classroom training (IDT) for NPCs on patient care in Uganda.

Methods: Two NPC from 36 facilities attended a core IDT course and two booster sessions. Half of the facilities were randomly assigned to PhaseA and received OSS once a month for 9 months.

Data on every outpatient were collected from Nov 2009 using a revised Ministry of Health medical form 5 and are used to track performance of facilities against malaria management indicators.

Analysis compared percentage changes after 7 months of OSS implementation in the performance of PhaseA and PhaseB sites.

Results: Preliminary results showed that the percentage of malaria suspects aged less than 5 years with a diagnostic test for malaria was significantly higher (11.2%, p=.031) for PhaseA (15.7%) than Phase B (4.5%) . It was also significantly higher (13.3%, p=0.014) for suspects aged above five years for PhaseA (16%) than PhaseB (2.7%). The results also showed a significant difference(10.6%, p=0.015) in the percentage reduction of smear negative patients aged less than 5 years treated for malaria for PhaseA (14%) than PhaseB (3.4%). The percentage decrease was also significantly higher (15.1%, p=0.023) for patients aged five or more years for PhaseA (22.3%) than PhaseB (7.2%).

Conclusions: OSS significantly impacted on malaria management practices in terms improving diagnostic based treatment. However it did not significantly impact on prescription practices.

Implications: Investing in OSS in addition to IDT can be effective in building the capacity of NPC to improve on patient care practices.

Global Health Council Conference 2011

Using a computerized outpatient visit form to evaluate the effect of onsite support on rural health facility performance

Objectives: Improve the quality of outpatient records and measure effectiveness of onsite team (OSS) training and quality improvement on the management of malaria, TB and HIV/AIDs and other related infectious diseases.

Background: Use of existing health facility records in rural settings to measure the effect of interventions is constrained by incompleteness; inconsistency in detail and difficulties in manipulating manually stored records. An outpatient visit form was standardized and computerized to improve the quality of data for evaluation of facility performance for the Integrated Infectious Disease Capacity Building Evaluation (IDCAP).

Methods: 36 rural health-sub district facilities in Uganda were randomly assigned to either receive the intervention of OSS training and classroom training or classroom training alone in the control arm. A patient visit form was modified and computerized to collect and enter basic patient information and care received during outpatient visits, in a standardized manner. Individual patient data were aggregated for each facility to measure performance in terms of proportion of patients who received appropriate care as defined by a set of indicators for management of infectious diseases.

Results: Use of the standardized and computerized form led to a reduction in outpatient data losses (21.7% to 8 % over a six months period); improvement in data accuracy; timeliness of reporting; and a reduction in the time spent on compiling reports.

Conclusions: Using a standardized and computerized outpatient visit form led to improvements in the completeness of patient data; and enabled monitoring of performance at each facility. Buy in by clinicians and adequate back systems to support information and communication technology were critical for success.

Implications: Standardizing and computerizing the outpatient visit form provides a promising approach for monitoring outpatient care in rural settings in Africa. Investment in facility records provides ongoing data on facility performance that has advantages over one-off surveys.

Eastern, Central and Southern Africa (ECSA) Health Ministers' Conference 2011

Impact of Emergency, Triage Assessment and Treatment (ETAT) on processes of care for seriously ill children in Uganda: a randomized controlled trial

Objectives: To evaluate the impact of introducing and sustaining ETAT on the type and outcome of care given to seriously ill children under five years in primary care facilities in Uganda.

Background: The Uganda Child Verbal Autopsy Study, 2007 reported that 75% of children who died sought care at a government or private hospital or health facility. About 20% of all children in most sub-Saharan African countries present at first level referral facilities with severe illnesses requiring ETAT. The Integrated Infectious Disease Capacity Building Evaluation (IDCAP) sought to reduce mortality among children under five years by focusing on ETAT and infectious diseases that are major causes of mortality, including malaria, respiratory infections, and HIV/AIDS.

Methods: Two non-physician clinicians from 36 facilities attended a core Integrated Management of Infectious Disease (IMID) course and two booster sessions. Eighteen of 36 facilities were randomly assigned to Phase A, and participated in on-site support (OSS) from April to December 2010. OSS was monthly team trainings, clinical coaching, and continuous quality improvement (CQI).

OSS included training in ETAT, and improvements in the processes of care through CQI, such as streamlining ETAT care, allocating specific staff to triage, duty rosters, allocation of space for emergency care, provision of essential emergency care commodities and supplies, provision and posting of clinical decision guides in emergency service areas, and weekly review of performance.

Data were collected on every outpatient beginning in Nov 2009 using a revised version of the Ministry of Health medical form 5 (MF5) building on work by the Uganda Malaria Surveillance Project. ETAT data on the MF5 included: 1) whether or not outpatients were triaged to priority 1 (emergency), priority 2 (seriously ill) or queue, 2) action taken in the management of priority 1 and 2 patients, and 3) information on whether priority 1 and 2 patients were retained or admitted. Data on the outcome of care in terms of whether the patient survived or died may also be extracted from the in-patient register.

Binomial linear regression compared longitudinal improvements at Phase A facilities who received OSS to Phase B facilities without OSS, controlling for facility level (hospital or health center IV), facility type (government or private/not for profit), previous CQI experience, and the placement of a data entry assistant.

Results: Preliminary regression results show steadily increasing percentages of patients triaged from 30% before the IMID course to 87% ($p<0.001$) after OSS at phase A and from 42% to 77% ($p<0.001$) at phase B sites. The percentage of priority 1 and 2 patients who were retained, admitted, or referred increased from 10% pre-IMID to 34% ($p<0.001$) at phase A sites and from 15% to 23% ($p=0.005$)at phase B sites. The increase was statistically significantly larger at phase A sites than phase B sites for priority 1 and 2 patients who were detained (14% vs. 7%, $p=0.005$), whereas for triage there was no significant difference (22% vs. 34%, $p=0.058$).

Improved triage, early identification of emergencies, and initiation of treatment have been demonstrated. The service providers are encouraged by the improvement in the processes of care and

are eager to see the overall impact on the outcomes of care such as reduction in hospital or health center mortality.

Implications: ETAT in Uganda and the region can be strengthened through a combination of IMID, data entry assistants to support outpatient data collection, and on-site training, coaching to ensure compliance with standards for emergency care, CQI, and provision of essential commodities and supplies for ETAT.

World Healthcare Congress 2011

The Integrated Surveillance System of the Integrated Infectious Disease Capacity-Building Evaluation (IDCAP)

Background/introduction: The Joint Uganda Malaria Training Program (JUMP) used Uganda Malaria Surveillance Program (UMSP) data to test the effect of team-based training on clinical performance (Ssekabira, et. al. 2009). IDCAP extends the JUMP evaluation with an integrated outpatient record form that builds on work by UMSP and the Ministry of Health's vision for patient-centered as opposed to a project-centered health information system. The form integrates across diseases and three departments within the health facility: clinical, laboratory, and pharmacy.

Objective: Test the effect of on-site support (OSS) on clinical performance in a randomized controlled trial. Indicators focus on four areas: HIV screening, case management of respiratory infection, case management of fever, and emergency triage and treatment.

Methodology: Two trainees from 36 facilities attended a core Integrated Management of Infectious Disease course and two booster sessions. Eighteen of 36 facilities were assigned to Phase A, and participated in OSS from April to December 2010. OSS was monthly team trainings, clinical coaching, and continuous quality improvement.
Data were collected on every outpatient beginning in Nov 2009 and entered on-site by data entry assistants. Data technicians visited each month for quality control. Supplemental electrical supply was tailored to the facility.

Difference in difference analysis compared longitudinal improvements at Phase A facilities with OSS, core trainees, and surveillance data to Phase B facilities without OSS.

Results: Preliminary analysis after seven of nine months showed significant improvements in more than one-half of indictors for Phase A and one-quarter for Phase B facilities. Difference in difference analysis showed OSS significantly improved malaria case management and emergency triage and treatment.

Conclusions/recommendations: OSS caused significantly improved clinical performance. Core training and data surveillance were also associated with improvements. Beyond IDCAP, the integrated surveillance system has applications to burden of disease and clinical research.

Consortium of Universities in Global Health (CUGH) 2012

Case scenarios that measure clinical competence: preliminary results from the Integrated Infectious Disease Capacity Building Evaluation (IDCAP)

Objective: The objectives of IDCAP are to develop an integrated training program for mid-level practitioners on clinical management of infectious diseases in Uganda, and to evaluate the program's cost-effectiveness.

Background: IDCAP will test two hypotheses: 1) Does the Integrated Management of Infectious Diseases course (IMID) significantly improve the competence and practice of individual clinicians? 2) Does post-course on-site support (OSS), which includes multidisciplinary team training and Continuous Quality Improvement, significantly improve clinical performance and health outcomes? Preliminary analyses of the effect of a three week IMID course on trainee competence are reported below.

Methods: Two clinicians from each of 36 health centers attended a three-week course at the Infectious Diseases Institute in Kampala. Trainee performance was measured by case scenarios in which trainees write answers to open-ended questions about the diagnosis and management of hypothetical clinical cases. Case scenarios, also called "vignettes," have been used to evaluate quality of care in the U.S. and globally. The method can measure competence in diagnosis of uncommon conditions and longitudinal management of patients, which are difficult to evaluate through cross-sectional observation of actual patient care. The IDCAP project is the first to use case scenarios to describe evolution of clinical competence after exposure to a specific training curriculum. One block of 4 case scenarios was randomly assigned to each clinician before the three-week course and second block afterward. Though topics varied, each block covered curriculum content on tuberculosis (TB), malaria, and HIV, and included pediatric, adult, and obstetrical cases.

Results: Preliminary scenario results are available for all 72 course participants. The mean score at baseline was 34.3% (95% CI 32.7, 35.8), increasing to 41.8% (40.3, 43.3) post-course. With adjustment for correlation of pretest and posttest results for individual participants, the absolute score increase was 7.5% (5.5, 9.7). Both absolute scores and score changes were heterogeneous among scenarios. The lowest mean baseline and post-test scores (27.8%, 31.2%) were for a scenario on pediatric antiretroviral therapy; the highest (50.4%, 53.7%) were for a scenario on pulmonary TB. The greatest score improvement (30.4%, 42.3%) was for a scenario on clinical deterioration after initiation of antiretroviral therapy.

Conclusion: The case scenarios are a sensitive measure of clinical reasoning. A third set of scenarios will be administered after two, one-week IMID booster courses and distance learning sessions six months after baseline. Subsequent analyses will compare scenario performance between trainees whose health centers were randomly assigned to two groups (OSS vs. control).

GH Innovate 2012

Capacity-Building and Clinical Competence in Infectious Diseases in Uganda: A Mixed-Design Study with Randomized Trial Components.

Background: Best practices for training non-physician clinicians (NPCs) to support global health-services scale-up are not well-characterized. The Integrated Infectious Disease Capacity-Building Evaluation is measuring impact of two interventions: Integrated Management of Infectious Disease (IMID) training and on-site support (OSS). We hypothesized that both interventions would improve clinician competence.
Methods: Thirty-six health facilities (randomized 1:1 - OSS and control arms) enrolled two NPCs each. All NPCs participated in IMID (3-week core course, two 1-week boost sessions, distance learning). After the 3-week course, OSS-arm trainees participated in monthly OSS.

Twelve written vignettes tested clinical competencies in infectious diseases. Trainees completed different randomly-assigned blocks of 4 scenarios before IMID (t0), after core course (t1), and after 2nd boost course (t2, 6 months after t1). Score analyses used linear mixed-effects model. The primary outcome measure was longitudinal change in scenario scores.

Results: Scores were available for 856 scenarios. Mean scores at t0, t1, and t2 were 39.3%, 49.1%, and 49.6% correct, respectively. Mean score increases for t0-t1, t1-t2, and t0-t2 were 12.1, -0.6, and 11.5 percentage points for OSS arm and 7.5, 1.6, and 9.1 for control arm. For period (t1–t2), in which interventions differed across arms, mean change was 2.2pts. lower for the OSS arm. Mean scores increased for all 12 scenarios.

Conclusions: Mean aggregate scenario scores increased significantly after the core course; improvement persisted for six months. No additional impact of OSS was observed, according to this measure. Data on clinical performance and health outcomes will complete assessment of overall impact of IMID and OSS.

Eastern, Central and Southern Africa (ECSA) Health Ministers' Conference 2012

Improvement in diagnostic based malaria treatment after Integrated Capacity Building Interventions implementation in Uganda; a before-after and cluster randomized controlled study

Background/Significance: The Integrated Infectious Diseases Capacity Building Evaluation (IDCAP) developed two interventions to improve infectious disease management: a classroom-based Integrated Management of Infectious Disease (IMID) course and an On-Site Support (OSS) educational outreach program. We evaluated the effect of IMID and OSS on case management of malaria in Uganda.

Research Hypothesis: IMID and OSS significantly improves clinic performance in case management of malaria.

Methodology: IDCAP was implemented in 36 health center IV or comparable facilities (HF) in Uganda. Two mid-Level practitioners (MLP) – clinical officer and/or registered nurse/midwife from each HF received IMID – a 3 week core course followed by two 1-week boost courses 3 and 6 months after the core course. Half of the HF were randomly assigned to Arm A and received OSS – one two-day session per month for 9 months following the IMID core course in 2010; the other HF were randomly assigned to Arm B and received OSS as a delayed intervention in 2011. Baseline data was collected for 5 months and 7 months in Arm A and Arm B respectively before IMID implementation.

Data: Data collected between Nov 2009 - Dec 2010 was used in the analysis. Data on every outpatient was collected at baseline and during the implementation of IMID and OSS using a Ugandan Ministry of Health revised Medical Form to track malaria case management indicators. Analysis compared changes before and after IMID and OSS within and between arms. The impact of IMID was analyzed by comparing changes in performance before and after IMID in Arm B. Analysis of the impact of OSS compared before and after changes changes in Arm A to Arm B. Analysis of the impact of IMID compared changes before and after IMID in Arm B.

Findings: At baseline, no significant differences were observed between the two arms in indicators for case management of malaria. The effect of OSS was measured with the ratio of the relative risk (RRR) in Arm A to Arm B of the following variables: malaria suspects for whom a test was ordered (RRR = 1.26; CI: 1.00, 1.59), malaria suspects for whom test was received (RRR = 1.25; CI: 0.98, 1.59), smear positive suspects prescribed an appropriate anti-malarial (RRR = 1.13; CI: 1.04, 1.26), smear positive suspects prescribed an appropriate anti-malaria for whom drug was in stock and received it (RRR = 1.34; CI: 1.10, 1.79), and smear negative suspects prescribed an antimalarial (RRR = .75; 0.58, 0.96). Using a conservative standard of $p < 0.01$ to adjust for multiple comparisons, the increase in the smear positive suspects prescribed an appropriate anti-malarial was statistically significant. OSS was not associated with improvement in antibiotic prescription practices for confirmed malaria cases (RRR =.97, CI: .084, 1.12).

Conclusion: Generally, OSS implementation improved clinic performance in case management of malaria as evidenced by increased use of laboratory diagnosis for malaria suspects; reduced antimalarial prescription among laboratory confirmed negative malaria cases; and increased prescription of appropriate antimalarial drugs among confirmed malaria cases. IMID did not impact indicators for case management of malaria but was associated with improvements in other indicators for infectious disease management.

European Congress on Tropical Medicine and International Health 2013

Trusting Malaria Test Results:
Fever and young age predicts in appropriate malaria treatment in Uganda

Introduction: Health care workers (HCW) continue to presumptively treat fever cases as malaria. This results in over-prescription of malaria treatment, leaving other causes of fever untreated. We conducted a secondary analysis of data from the Integrated Infectious Disease Capacity Building Evaluation (IDCAP), focusing on a subgroup of patients with a history of fever.

Material and Methods: We analyzed data collected from 36 health centers from November 2009 - December 2010 using a revised Uganda Ministry of Health Outpatient Medical Form and compared pediatric (under 5 years of age) and older fever cases. Given the data were originally collected for evaluation of training interventions, we controlled for the impact of the interventions.

Results: Data from 753,074 (27.5% pediatric) outpatient visits was analyzed. Fever was reported in 333,371 (44%) visits of which 128,205 (38%) received a malaria blood test and 68,277 (42%) tested negative. After controlling for the effects of the intervention, pediatric fever cases were more likely than older cases to receive a malaria test (43% vs. 35%, RR= 1.20, 99%CI: 1.06, 1.36; p<0.001). Pediatric fever cases with negative test results were also more likely to be diagnosed with malaria (46% vs. 34%, RR= 1.32, 99%CI: 1.18, 1.48; p<0.001) and prescribed antimalarial treatment (55% vs. 40%, RR= 1.35, 99%CI: 1.19, 1.53; p<0.001).

Conclusions: While inappropriate treatment of smear negative fever cases was high among both age groups, pediatric fever cases were more likely than older cases to be inappropriately treated for malaria. HCW may be less likely trust results of malaria tests among pediatric fever cases due to the higher risk of mortality from malaria among children. More research is needed to better understand the HCW decision-making process for diagnosis and treatment of fever cases that test negative for malaria among both pediatric and older cases.

Consortium of Universities in Global Health (CUGH) 2013

Improvement in facility-based quality of care after an integrated infectious diseases capacity building intervention in Uganda; a before-after and cluster randomized controlled study

Background: The Integrated Infectious Diseases Capacity Building Evaluation (IDCAP) was designed to test the effect of the Integrated Management of Infectious Disease (IMID) training program and On-Site Support (OSS) on improving facility performance quality of care indicators for emergency triage assessment and treatment (ETAT), malaria, pneumonia, TB and HIV.

Methods: IDCAP was implemented in 36 health centers IV or comparable facilities in Uganda. Two mid-level practitioners (MLP) from each site participated in the 3 week IMID course at the Infectious Diseases Institute beginning in April 2010 followed by two 1-week boost courses 12 and 24 weeks. Eighteen sites were then randomly assigned to Arm A and received OSS, one two-day session per month (9 sessions) in 2010, while the 18 Arm B sites received OSS in 2011.
Data were collected using a Ugandan Ministry of Health revised Outpatient Medical Form and MOH registers from Nov 2009 - Dec 2010. We analyzed the impact of IMID alone by comparing changes in performance before and after IMID in Arm B, the combined impact of IMID and OSS by comparing changes in performance before and after in Arm A and incremental OSS effect by comparing before and after changes in Arm A to Arm B.

Results: Data were analyzed for 22 out of 24 intended indicators. IMID was associated with statistically significant improvement in three indicators: outpatient triage (RR=1.29; 99%CI: 1.01,1.64), admission or referral of emergency/priority patients (RR=1.59; 99%CI: 1.04,2.44), and assessment of pneumonia suspects (RR=2.31; 99%CI: 1.50, 3.55). IMID and OSS combined was associated with improvements in six indicators: three ETAT indicators (outpatient triage: RR=2.03; 99%CI: 1.13,3.64; admission or referral of emergency/priority patients: RR=3.03; 99%CI: 1.40,6.56; emergency patients receiving appropriate treatment: RR=1.89; 99%CI: 1.21,3.21), two malaria indicators (malaria cases receiving appropriate antimalarial: RR=1.49; 99%CI: 1.05,2.10; patients with negative malaria test prescribed antimalarial: RR=0.67; 99%CI: 0.46,0.97), and enrollment in HIV care (RR=1.24; 99%CI: 1.08,1.43). OSS was associated with receiving appropriate ETAT treatment (RR=2.08; 99%CI: 1.16,3.72).

Conclusions: IMID and OSS combined were associated with more improvement than IMID or OSS alone. Further analysis will be conducted to determine whether this integrated intervention was cost-effective.