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Using Team Problem Solving To Improve Adherence with Malaria Treatment Guidelines in Malawi

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Dedication

This case study is dedicated to **Mellina Mchombo, BSN, RN,** a Quality Assurance Project staff member who died in 2002, not long after the work in this case study was completed. As a Quality Assurance Specialist, Mellina helped ensure that the quality improvement effort described in these pages bore fruit. A hard-working and dedicated professional, she faced very challenging circumstances but never gave up trying. She was wonderful at motivating and coaching health worker teams, helping them learn how powerful they could be in improving the quality of healthcare. We miss her, but her commitment and spirit still inspire us.

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TEL (301) 654-8338
FAX (301) 941-8427
www.qaproject.org

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About this series

The *Case Study Series* presents real applications of quality assurance (QA) methods in developing countries at various health system levels, from national to community. The series focuses on QA applications in child survival, maternal and reproductive health, and infectious diseases. Each case study focuses on one or more major QA activity areas: quality design, quality improvement, the communication and development of standards, or quality assessment.

This case study focuses on **quality improvement (QI),** an effective and systematic process of addressing the gaps between current practices and desired standards. Approaches to QI include individual problem solving, rapid team problem solving, systematic team problem solving, and process improvement. These methods vary in the time and resources required and the number of people who participate. Regardless of the method's intensity, QI approaches share four basic steps: identification of opportunity for quality improvement, analysis of improvement area, development of possible interventions to provide improvement, and the testing of promising interventions and their implementation if successful. Sometimes, when the potential solutions to a problem are already clearly defined, a shorter QI activity focused on field-testing the alternatives is used.

This case study illustrates systematic team problem solving. A five-member team at a rural health center in Malawi used this QI approach to reduce the number of patients returning with malaria symptoms, reducing case load, drug costs, and the risk of accelerating drug resistance.

Abbreviations

CHAPS	Community Health Partnerships
DOT	Directly observed treatment
QA	Quality assurance
QAP	Quality Assurance Project
QI	Quality improvement
QIT	Quality improvement team
SP	Sulfadoxine-pyrimethamine
STI	Sexually transmitted infection

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Lifuwu Health Center Team
K. M. Machangwa, Medical Assistant – *Team Leader*
T. S. Phiri, Assistant Environmental Health Officer – *Team Recorder*
L. M. Mulusa, Health Surveillance Assistant – *Time Keeper*
C. Kachule, Health Surveillance Assistant – *Member*
F. K. Sapangwa, Health Surveillance Assistant – *Member*

Salima District QA Coaches
Mr. Gabriel Banda, Microscopist, Save the Children Fund (UK)
Mr. Steve Mfune, Clinical Officer, Salima District Hospital
Mrs. Dorothy Kamanga, Registered Nurse, Salima District Hospital
Mrs. Twambilire Phiri, Registered Nurse, Salima District Hospital

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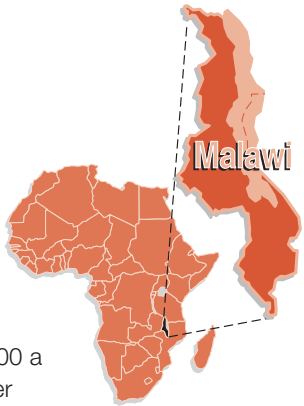
Using Team Problem Solving To Improve Adherence with Malaria Treatment Guidelines in Malawi

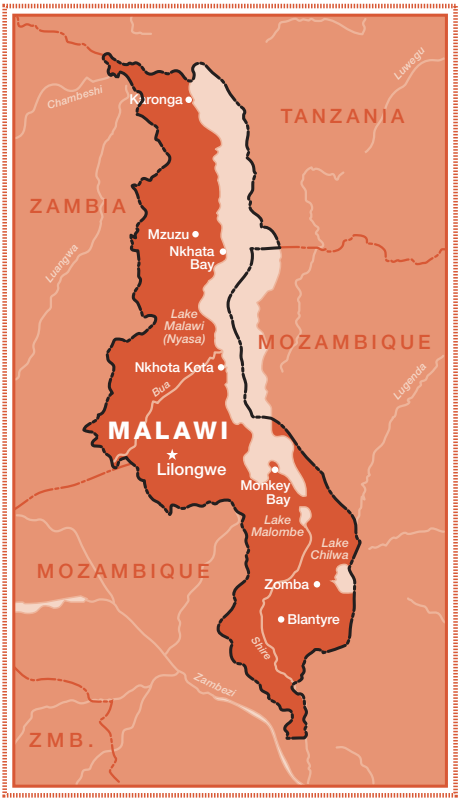


Background

Malaria is one of the most serious public health issues worldwide, particularly in sub-Saharan Africa. It kills at least a million people each year: about 3,000 a day. Almost 300 million people suffer from acute malaria each year, resulting not only in death and morbidity but also severe economic loses.[1] Moreover, incomplete treatment of malaria is a serious problem that can lead to anemia, cerebral malaria, and even death. Perhaps worst of all, misuse of anti-malarials can contribute to the malaria parasite's drug resistance. Malawi, a small country in southeastern Africa, averaged 372 cases of malaria per 1,000 people per year from 1996 to 2000, about 3.7 million cases.[2] Government health centers there provide free consultations and medicine for malaria.

Funded by the US Agency for International Development (USAID), the Quality Assurance Project (QAP) provides technical expertise, particularly in the area of quality improvement, to healthcare personnel in developing countries to help them improve healthcare services. QAP has teamed with the Community Health Partnerships (CHAPS) Project in Malawi since 1998 to develop better management systems and ultimately improve the quality of healthcare.

This case study describes the experience of a quality improvement team in Malawi's Salima district. The team works at Lifuwu Health Center, a small outpatient center serving a largely rural population. Significant health problems presenting at the clinic include diarrhea, upper respiratory tract infections, STIs, HIV/AIDS, and malaria. The last transmits year round due to the warm climate and proximity to Lake Malawi. As this case study reports, the team recognized the severe impact that malaria had on the community and decided to investigate and change the system of treating malaria patients as a step toward improving overall quality of care at the health center.



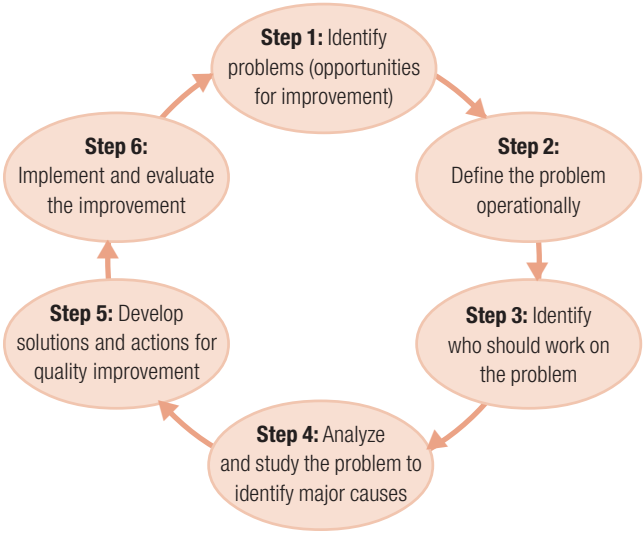
Quality Improvement Methodology

Quality improvement, using the team problem-solving approach, was initiated in six CHAPS districts in 1999 and a seventh in 2000. The approach used in Malawi is a six-step methodology (or "cycle") that guides teams to identify and analyze problems ("opportunities for improvement") and then develop and implement solutions (see Figure 1). This approach preceded the current four-step process described in the *About this series* section above and advocated by the QA Project at this writing. Different analysis tools and activities are used in each step, and the process also incorporates the principles of teamwork, using data for decision making, focusing on the customer, and taking a systems view (inputs, processes, and outcomes) of healthcare.

Malawi quality improvement team members

District staff learned to be QA coaches in a three-week QAP training of trainers, studying quality improvement (QI) in both classroom and practical settings. These coaches then trained health facility staff and mentored them as they worked through

Figure 1. Problem-Solving Steps for Quality Improvement Used in Malawi



their first problem-solving cycle. The Lifuwu Health Center QI team formed in October 1999 and included all health center technical staff: the medical assistant, the assistant environmental health officer, and three health surveillance assistants. Two coaches visited the team monthly or whenever a team meeting was planned, listening to and observing the team (not facilitating meetings) and stepping in to help when the team was stuck or did not fully understand a concept covered in the training.

Step 1. Identify the Opportunity for Improvement

Brainstorming opportunities for improvement. The Lifuwu team's first problem-solving cycle began with the assistance of the QA coaches during the team's training. The team "brainstormed" (developed a list in a way that encouraged all to participate) 21 problems that adversely affected the quality of care at the health center. The coaches helped the team members think about and discuss the problems and how to select the problem they could most likely solve. With this guidance, the team decided that 14 of the 21 problems were beyond their scope of influence: that is, these problems would require more resources or authority than they had (e.g., hiring more staff or arranging transportation for clients). Two problems were considered simple enough to be resolved by a single person, and two were too complicated for a team's first problem solving. This process of elimination led to three problems the team might address: 1) lack of patient adherence to malaria treatment; 2) family planning and antenatal clients' refusal to be seen by a male health provider; and 3) maternity clients' refusal of referral to the district hospital. Table 1 displays all of the opportunities for improvement the team considered.

Prioritizing the opportunity for improvement. The team used a decision (or criteria) matrix (Table 2) to choose from these three opportunities for improvement. This matrix is a tool to evaluate several options based on explicit criteria that the team had deemed important. The criteria were:

Table 1. Opportunities for Improvement Considered by the Lifuwu Team

Beyond the Team's Scope of Influence	
Shortage of drugs	Refrigerator not working
Long distance to travel to health center	Delays in paying electricity bills resulting in vaccine wastage
Shortage of syringes for immunization	Lack of chairs in the laboratory
Shortage of staff houses	Facility too small for the activities done
Shortage of staff	Lack of uniforms for staff
Delays in receiving medical supplies	Lack of supplies for traditional birth attendants
Integrated services done in one room	
Lack of maternity services	
Simple Problems That Do Not Require Team Problem Solving	
Lack of spare parts for bicycles	Lack of privacy
Too Complicated to Pursue as First Problem Solving	
Patients with anemic children refuse referral because of HIV test	Cultural barriers to utilization of health center and its activities (e.g., campaigns, surveys)
Short List	
Lack of patient adherence to malaria treatment	Maternity clients refuse referral to district hospital
Clients for family planning and antenatal care refuse to be seen by male health provider	

1) Risk: there are risks to patients if the problem is not addressed.
2) Importance or magnitude: The problem has existed for some time and is widespread.
3) Problem prone: Other problems will probably be caused if this issue is not eliminated.

Each team member assigned a score from one to three to each criterion for each problem. The points were totaled, as shown in the right-hand column of Table 2, to reveal that "Lack of patient adherence to malaria treatment" scored the highest. Satisfied with this outcome, the team agreed to address lack of patient adherence to malaria treatment as their opportunity for improvement.

Table 2. Decision Matrix to Choose Opportunity for Improvement

Problem	Criteria			Total
	Risk	Importance	Problem Prone	
Lack of patient adherence to malaria treatment	8	7	8	**23**
Clients for family planning and maternity cases refuse to be seen by male providers	5	6	6	**17**
Maternity clients refuse referral to hospital	6	4	5	**15**

Step 2. Define the Problem Operationally

An operational definition of a problem or opportunity for improvement expresses the difference between the current and desired state of affairs. The team suspected that patient adherence to malaria treatment was a problem because they were seeing clients who had received malaria treatment return with the same symptoms soon after treatment. Such clients are referred to as "reattendants," officially defined as clients who return with malaria symptoms within a week of receiving malaria treatment. Returning within a week signals the same bout of malaria, not a new infection, since the chances of a new case of malaria manifesting itself within a week are low. An initial survey of the health center's records indicated that since October 1996, when the clinic opened, about 29 percent of malaria clients were reattendants. The team agreed to target an improvement resulting in having less than 5 percent of malaria patients per month return with the same symptoms.

In Malawi, sulfadoxine-pyrimethamine (SP) is the recommended drug for treatment of malaria. It is usually given with an antipyretic medicine (such as Acetaminophen) to reduce fever because, unlike chloroquine, SP itself does not reduce fever. The adult dose of SP is three tablets (equivalent of 1500mg sulfa/75mg pyrimethamine) taken once; the pediatric dose is determined by weight or age.

Tablets for treating malaria.

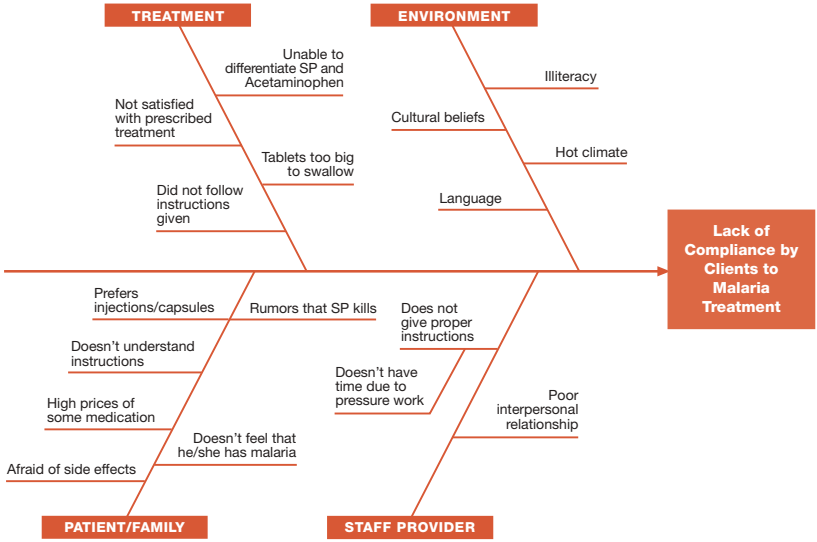
Step 3. Identify Who Should Work on the Problem

QI efforts work best when those who are involved in the process participate in the analysis and development of solutions. The staff created a high-level flowchart to illustrate the process that malaria patients encountered at the health center. This exercise helped the team identify which health workers come into contact with a malaria client or affect the quality of services related to the reattendants problem. While the composition of the team is typically revised at this point to include health workers involved in the process, the Lifuwu team already comprised all the technical staff, so its membership was not changed.

Step 4. Analyze the Problem to Identify Major Causes

Constructing a fishbone diagram. Thorough problem analysis is important to help the team avoid jumping to solutions that may not address the true source of the problem. To begin their analysis, the team brainstormed on the question "What are general categories of issues that could affect patient adherence to malaria treatment?" The result was used to construct a fishbone (or cause-and-effect) diagram. This diagram presents a fish-like image, with a problem statement for the fish's head, which is attached to a main bone that

Figure 2. Fishbone Diagram of Reasons for Lack of Adherence to Malaria Treatment



branches into ribs that present the problem's proposed causes. The ribs are arranged in categories.

As Figure 2 shows, the categories of causes generated by the team—the "ribs"—were: environment, treatment, patient/family, and staff/provider. Using these categories, the team then asked questions to explain *how* and *why* each category could affect patient adherence to malaria treatment. For instance the team asked, "How or why could treatment type influence adherence?" The answers to the question formed the fish's bones:

1. Patient or caretaker unable to differentiate Acetaminophen and SP
2. Patient or caretaker did not follow instructions given
3. Tablets are too big to swallow
4. Patient not satisfied with prescribed treatment

The fishbone diagram helped the team identify the major factors that could affect adherence to treatment.

Verifying hypothesized causes. The team then discussed what information they needed to find out which causes they had hypothesized during the fishbone exercise actually reflected reality. To do this, they decided to quantify the number of reattendants; to ask reattendants if they followed the health worker's instructions on taking the drug; and if they did not follow instructions, to ask why. During February 1999, the team collected these data by reviewing patient records and interviewing patients.

During the 20-day data collection, 761 malaria clients were seen. Of these, 77 percent (588) were new cases, and 23 percent (173) were reattendants. Interviews were conducted with 160 reattendants: 73 percent (117) of them said they had followed the treatment instructions, and 27 percent (43) said they did not. These 43 were asked why they did not follow the instructions: 36 said they forgot; 4 said they did not understand; and 3 said they confused the treatment with other drugs (Table 3). The team was aware that although 73 percent of reattendants said they followed the instructions, this could be an overestimate, as respondents may not have wanted to admit noncompliance.

Table 3. Data Collected on Malaria Reattendants, February 2000

	Number	Percent
Total number of malaria patients	**761**	**100%**
Number of new cases	588/761	77%
Malaria reattendants	173/761	23%
Reattendants interviewed who said they did not follow instructions	43/160	27%
Reasons why reattendants did not follow instructions	**43**	**100%**
Forgot	36/43	84%
Did not understand	4/43	9%
Confused treatment with other drugs	3/43	7%

Additionally, the team noticed that malaria pills had been thrown on the health center grounds. During the data collection, discarded pills were seen on five days. Although staff could not quantify how many clients were discarding their medications, it was another indication of noncompliance.

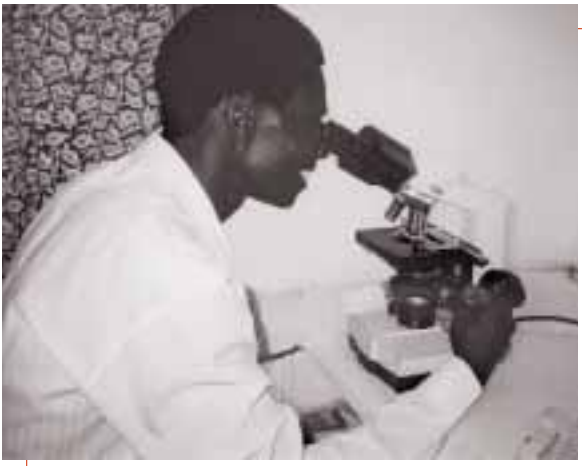
Step 5. Develop Solutions for Quality Improvement

The data collection exercise helped the team quantify the number of reattendants. In addition, it confirmed the problem causes the team had discovered in the fishbone exercise and suggested additional issues: not understanding instructions, forgetting the instructions, confusing the malaria treatment with other drugs, and possible distrust of the treatment.

Equipped with this information, the team brainstormed potential solutions to the problem:

- Provide health education to the community on the importance of taking SP as recommended by the treatment guideline,
- Assign two dispensers to give the SP dose at the health center as directly observed treatment (DOT),
- Check all reattendants with a malaria blood slide to confirm that they really have malaria,
- Assign a health worker to look for discarded drugs along the paths to the villages,
- Assign a health worker to follow up door-to-door with patients who receive SP to make sure they take the medicine.

Prioritizing solutions. A decision matrix was used to decide which solution(s) to implement. The criteria were feasibility in terms of resources, acceptability to the community, and efficiency in terms of time needed for implementation. Looking for discarded drugs and door-to-door follow up were eliminated due to insufficient staff to perform these tasks; the team also agreed that these ideas were not really solutions but rather ways to monitor whether clients were adhering to the treatment. The highest score went to health education,



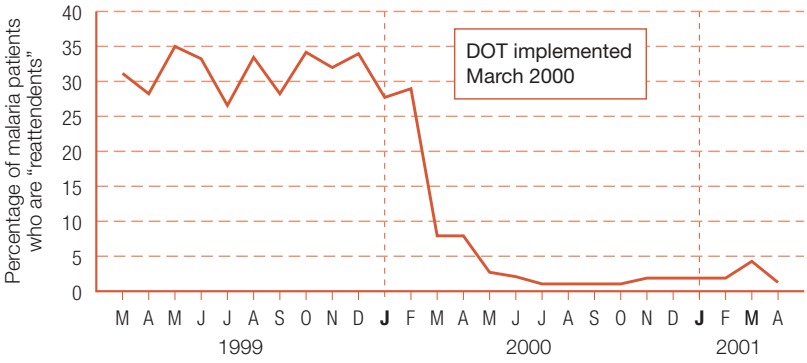
A clinic staff member examines a blood smear to determine the presence of malaria.

followed by DOT at the health center, and then using a blood slide to confirm malaria. The team felt that for their intervention to have the most impact, all three solutions should be implemented at once; DOT would be the main component, as the team believed it would have the most effect on the problem while the other two solutions would help.

Step 6. Implement and Evaluate the Improvement

The solution. A system was devised for patients to take their malaria pills under supervision. The grounds laborer and hospital attendant were assigned to administer the medication as directed by the clinician, providing a clean cup and water. In addition, health education on malaria was intensified both at the health center and in the community. All health workers, including support staff, participated in giving daily health education talks at the health center. These talks covered the importance of taking SP on time and fully, and the signs, symptoms, and prevention of malaria. Health surveillance assistants discussed the importance of proper SP dosing with the village health committee and at outreach clinics. Malaria blood slides were routinely examined for all reattendants to confirm that they indeed had malaria.

Figure 3. Decrease in Malaria Reattendants after Implementation of DOT



The DOT system for administering malaria treatment was instituted in March 2000. The health education on SP and malaria lasted several months, until clients had become familiar with the new procedure for SP administration at the clinic.

Evaluation and results. After the interventions were implemented, the team continued monitoring the percentage of malaria patients who were reattendants. There was an immediate and sustained decrease in the percentage of reattendants (Figure 3): prior to SP's being given under observation, the 12-month average percentage of reattendants was 31 percent. In the first month the intervention was implemented, the percentage of reattendants fell to 7 percent; the next month it dropped below 5 percent where it stayed for the 12-month monitoring period.

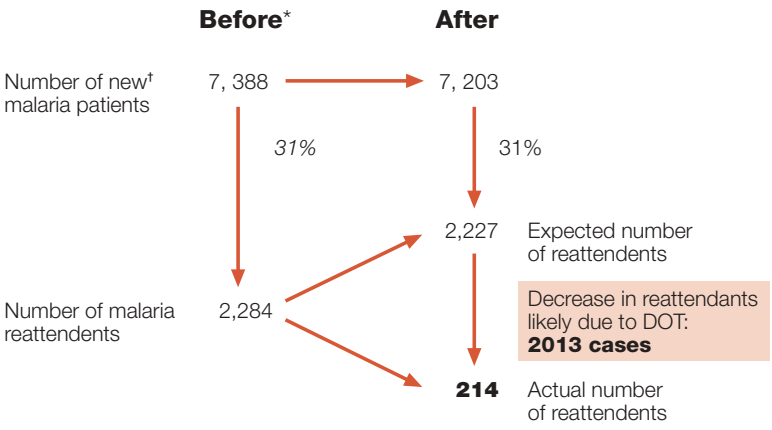
Cost Analysis

Drug savings. A cost analysis was conducted to demonstrate the savings, in terms of financial and human resources, brought about by the DOT intervention. As displayed in Figure 4, in the 12-month period after the intervention, 2,227

reattendants would have been expected, based on the average percentage of reattendants before the intervention, 31 percent. However, the actual number of reattendants was 214, a reduction of 2,013 cases or 90 percent. Assuming that the 9-cent cost of a dose of SP is saved for every reattendant that is prevented by the DOT, the DOT intervention resulted in savings up to $181 in SP doses (or $2,255 at the retail value of SP).[3] The $181 could be used to treat 2,013 new malaria patients or to purchase other supplies or equipment.

Staff time savings. The DOT intervention also led to savings in health worker time and other benefits related to fewer complications from malaria. With regard to health worker time, staff estimate that the average consultation with a malaria patient (either new or reattendant) is about seven minutes. Seeing 2,013 fewer reattendants in the 12-month period following the introduction of DOT saved 235 hours or 29 person-days. This time was used to attend to other patients and perform other tasks.

Figure 4. Decrease in Reattendants Most Likely Attributable to DOT Program



* To control for seasonality, equivalent 12-month periods before and after the implementation of DOT were compared.

† Patients who were not treated for malaria within the past week

Table 4. Savings Due to DOT over a 12-Month Period

Change	Savings
Number of fewer reattendants due to DOT	$2013
Total savings due to SP doses saved (health center wholesale price)	$181
Total savings due to SP doses saved (retail price)	$2255
Savings in health worker time	235 hours or 29 person-days

Table 4 summarizes the financial and human resource savings to the health center that might be attributed to the DOT intervention.

Benefit to the patient and the community. With regard to other benefits, it is expected that the DOT intervention would have a positive effect on patient outcome. A patient who takes his/her SP dose according to the DOT procedure is more likely to recover from malaria and not suffer complications that can result from failing to take the drug or taking it incompletely. Fewer complications from malaria mean reduced patient suffering and increased productivity.

In addition, ensuring completion of the prescribed SP regimen retards drug resistance. Drug resistance carries a high cost to the community in the form of extra visits to the doctor, hospitalization or extended hospital stays, a need for more expensive antibiotics to replace the ineffective ones, lost workdays and, sometimes, death.

Quality Improvement Insights

The Lifuwu team significantly decreased the number of malaria reattendants seen at the health center. The following are insights about using team problem solving:

The first problem a team tackles should be chosen with extra care. Since the team is learning the methodology when it tackles its first problem, coaches should guide teams in selecting problems that are within their scope of influence and that do not require resources that the team may not be able to obtain. Success with the first problem will inspire the team to move on to others. Since problem solving works only to the extent that the team is motivated, it is imperative to use the selection of the problem as part of the motivational strategy.

On the other hand, some of the problems listed in Table 1 that were deemed to be beyond the scope of the team's influence may not have been. For instance, the problem "facility too small for the activities done" might have been a problem that could have been addressed with creative solutions for improved patient flow or better use of existing space. In choosing the problem, teams should think "outside the box."

Community education stressed the importance of taking SP regularly.

Teams should adapt and use existing approaches, when possible. The Lifuwu team thought creatively and adapted the concept of directly observed treatment (DOT), which had been used successfully in treating tuberculosis. It is important for teams to know that they can use interventions that have been successful elsewhere, instead of having to invent new ones. Other health centers could replicate this intervention to prevent malaria reattendants.

Use education to prevent resistance to change. When the DOT administration of anti-malarials was initiated, it was combined with an education campaign on the importance of taking SP correctly and the new DOT procedure. The information eased clients concerns about the new system and reduced resistance to the change.

At the health center level, successful interventions are those that health workers control. This intervention was successful partly because the team changed something that was under its control: how anti-malarials are administered at the health center. Changing human behavior (in this case, the behavior of clients) would have been much more difficult. If the team had only instituted health education on taking SP properly, they probably would not have been as successful, since they have no control over client behavior outside the health center. However, the team could control how anti-malarials were administered at the health center, and the DOT procedure ensured that the drugs were taken correctly.

Quality improvement can lead to the better use of existing resources. By significantly decreasing the number of reattendants, the health center realized a savings, enabling its scarce resources to be used for other services. With far fewer reattendants, SP was not wasted and health workers had more time for other patients or other tasks. The cost analysis demonstrated that QI can improve the use of resources in addition to improving the quality of health services.

The cost savings of QA described in this case study should be considered along with the cost of doing QA. The latter would include such costs as staff time to meet and complete the problem-solving steps and coaching travel and time. However, now that the team is

Children and adults were observed taking their medications.

familiar with the methodology of systematic team problem solving, the cost of doing QA decreases for future problem-solving cycles.

The team problem-solving process empowers health workers. Before understanding the QA approach, the health center staff would not have tackled the problem of malaria reattendants. Although they knew the problem existed, they did not have the skills to analyze it and implement and monitor solutions. Several team members indicated that before using QA, they would just pass problems along to their district supervisors. Now they have the ability and experience to solve problems within their scope of influence. They are more likely to initiate change and call for district-level assistance only when necessary. The team members are proud to have implemented one of the definitions of QA in their own health center: "Doing the right thing, right, the first time."

Endnotes

[1] Roll Back Malaria website: www.mosquito.who.int. May 2001. "Malaria: a global crisis."

[2] Community Health Sciences Unit, Malaria Control Programme, Malawi Ministry of Health and Population, June 2001.

[3] The health center pays $.09 per dose of SP from Central Medical Stores and gives it to patients free. The retail price for a dose of SP is $1.12.

Using Team Problem Solving to Improve Adherence with Malaria Treatment Guidelines in Malawi: Summary

In October 1999, as part of the Malawi Community Health Partnerships Project, the Lifuwu Health Center initiated team problem solving to improve the quality of healthcare. A five-member team, with assistance from district-level coaches, followed a six-step methodology to improve patient adherence to malaria treatment. The team had noted that many patients were returning with malaria symptoms within a week of being treated. Simple tools were used to analyze the problem, collect data, and make decisions. In March 2000, a new system for administering drugs to patients was implemented: instead of simply going home with their malaria drugs as before, patients took their drugs at the health center in the presence of a health worker. Health education, at the health center and in the community, fostered the change by explaining the new system and its rationale. Comparing the 12 months before and after the intervention, the average percentage of malaria reattendants fell from 31 to 3 percent. This decrease resulted in health center savings of up to $181 for the wholesale price of drugs ($2255 retail price) and human resource savings of 235 hours or 29 person-days. The solution the team used to resolve the problem of treatment adherence—the use of directly observed treatment (DOT)—is a best practice that could be applied at other health centers.