CASE STUDY

Improving Quantification of Parasitaemia on Confirmed Malaria Blood Smears at Matungu Sub County in Kakamega County

Summary
The USAID Applying Science to Strengthen and Improve Systems project (ASSIST) has been supporting quality improvement (QI) with a focus on improving malaria case management in Kakamega County since June 2014. In February 2016, Matungu Sub County Hospital (MSCH) formed a work improvement team with the goal of improving malaria testing of suspected malaria cases through quality improvement. Rapid improvement was achieved with this initial work that they began looking for new areas to work on. In August 2016, laboratory personnel were trained in expert microscopic examination of blood slides for malaria parasites. MSCH laboratory team was required to report blood slides of confirmed cases in terms of the number of parasites observed. Two months passed by without the team having begun quantifying malaria parasites on confirmed blood smears. The coach working with the ASSIST’s Project Officer picked this as an improvement theme, and at the end of September 2016 conducted process mapping for malaria testing, and root cause analysis for failure to quantify parasitaemia. Countermeasures were identified and small tests of change initiated in October 2016 to help the team improve. In the preceding four months, quantification of malaria parasites on blood smears confirmed to have malaria increased tremendously from zero to greater than 90%, and the team has since sustained this performance.

Background
Matungu Sub County Hospital (MSCH) is one of 12 malaria case management centers of excellence in quality improvement in Kakamega County. It serves a catchment population of about 50,000 people. The facility offers both curative and preventive services. Malaria is the leading cause of morbidity and mortality in this facility. Approximately 2,800 clients are tested for malaria and its positivity rate is about 25%. In August 2016, laboratory personnel in MSCH were trained in expert microscopic examination of blood slides for malaria parasites by Malaria Care in conjunction with the Ministry of Health (MoH). The MSCH laboratory team was required to report blood slides of confirmed cases in terms of the number of parasites observed. Two months passed by without the team having begun quantifying malaria parasites on confirmed blood smears.

The USAID Applying Science to Strengthen and Improve Systems project (ASSIST), with funding from the President's Malaria Initiative (PMI), began supporting quality improvement (QI) with a focus on improving malaria case management in Kakamega County in June 2014. MSCH is a high malaria case load facility and was selected among 11 other facilities, for initial implementation of malaria QI within the county. ASSIST is currently implementing malaria QI activities (both case management and malaria in pregnancy) in 45 facilities across five counties in Kenya.

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Implementation

County Background

ASSIST, in collaboration with Kakamega County Department for Health selected facilities with high malaria case load in each of the 12 sub counties in June 2014. A laboratory, clinical officer, pharmacist, and sub county malaria personnel from the selected facilities were then trained in Kenya Quality Model for Health in August 2014. The trainees formed sub county quality improvement teams (QITs) in September 2014. The QITs then conducted a baseline assessment on malaria case management and pinpointed large disparities in reporting, and adherence to national malaria guidelines. As a priority, the QITs settled on quarterly sub county continuous medical education (CME) sessions and data reviews to help address the gaps in malaria case management. In the same period, the county malaria coordinator formed a malaria technical working group (TWG). The TWG brought together all sub county malaria coordinators, as well as the county pharmacist, county medical laboratory technologist, county health records officer, and the county director for health on a quarterly basis. The TWG monitored the progress of the QITs, reviewed their reports, and gave recommendations on areas for improvement.

Quarterly CMEs and TWGs continued for a year. A re-evaluation was done in August 2015, and it was established that only three out of the 12 QITs were active. Some members of the QITs had dropped out, and most of them did not have improvement charters to help them focus better. Sensitization training in QI was done for the sub county malaria coordinators, who were then serving as coaches in October and November 2015. The teams went back to their sub counties and reconstituted their QITs and selected improvement areas. The malaria case management theme for this team was on improving the Test-Treat-Track (3T) cascade. The first learning session was done in December 2016. In this first learning session, members of the QITs and those proposed to be part of the work improvement teams (WIT) in the selected facilities participated.

Matungu Sub County Hospital (MSCH)

Matungu was one of the three active QITs. It was found that this was because all the QIT members were from MSCH whereas the inactive QITs were comprised of sub-county level officials who did not have enough contact with the facilities in order to drive improvement activities. In February 2016, a WIT for malaria case management was formed at the out-patient department in the hospital. The team conducted their first root cause analysis and put in place change ideas to further improve the 3T model in March 2016, after a coaching meeting done regionally. By forming an improvement team comprising front-line personnel phenomenally improved results of the 3T cascade, so much that by June 2016 the facility was considering new improvement areas. This improvement was shared at the second learning session for malaria case management held in August 2016.

In August 2016, laboratory personnel were offered a chance to train in expert microscopic examination of blood slides for malaria parasites. Nonetheless, two months passed by without the laboratory having begun quantifying malaria parasites on confirmed blood smears. The coach working with ASSIST’s Project Officer picked this as an improvement theme, and at the end of September 2016 the WIT with the support of their coach conducted process mapping.

Figure 1: The WIT’s process map
(Figure 1) for malaria testing, and root cause analysis using the fish bone diagram (Figure 2) was done for failure to quantify parasitaemia.

**Figure 2: The WIT’s fish bone diagram**

![Fish Bone Diagram]

A simplified tree and matrix table (Table 1) was used to establish countermeasures. The small tests of change were initiated by the WIT in October 2016 to help the team improve.

**Table 1. Simplified Tree and Matrix Table used by the team**

<table>
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<tr>
<th>Problem / Issue</th>
<th>Root Cause</th>
<th>Counter-measure</th>
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| Use of plus system instead of quantification in reporting positive malaria cases. | Knowledge gap on quantification and interpretation of results. | • Training of laboratory staff on quantification.  
• OJT for those not trained.  
• CME on interpretation of results. |
|                  | Old Microscope | • Procure a better microscope. |
|                  | Sorting and setting | • CME on 5s (Work Environment Improvement)  
• Lab to do sorting and setting of their work environment. |
|                  | WHO Guidelines on Malaria parasite reporting | • Provide the malaria guidelines in laboratory |
|                  | Workload and staff shortage | • Forward to hospital QI team and management for action. |

Sorting and setting was done in October 2016 to improve the work environment in the laboratory. Copies of the WHO guidelines on malaria parasite reporting were downloaded online by the coach who shared the soft copy with the laboratory staff in November 2016. During their departmental meeting in the same month, the unit in-charge agreed to harmonize work schedules for the department to ensure balanced allocation of duties at peak and off-peak hours and days in the calendar.

This work was shared in the third case management learning session in March 2017.
Results
Since the team in the laboratory began testing the changes, the proportion of slides confirmed with malaria have increased astronomically and remained above 90% (see Figure 3).

Figure 2. Percentage of malaria slides with positive results return with parasitaemia quantified

Lesson Learned
The team at MSCH attribute their improvement to a functional team and their commitment to tackle countermeasures within their capacities. They acknowledge the value of working on areas with easily achievable gains. The WIT strived to address root-causes and factors within their scope, other than wait for the health managers and county government to address strategic level issues such as staff posting.

Next Steps
Laboratory personnel at MSCH are looking at engaging more with the QIT to help address strategic level countermeasures such staff shortages and postings, even as they continue working on simpler improvements. Utilizing the QIT should then enable them achieve 100% quantification of malaria parasites for all confirmed blood smears.