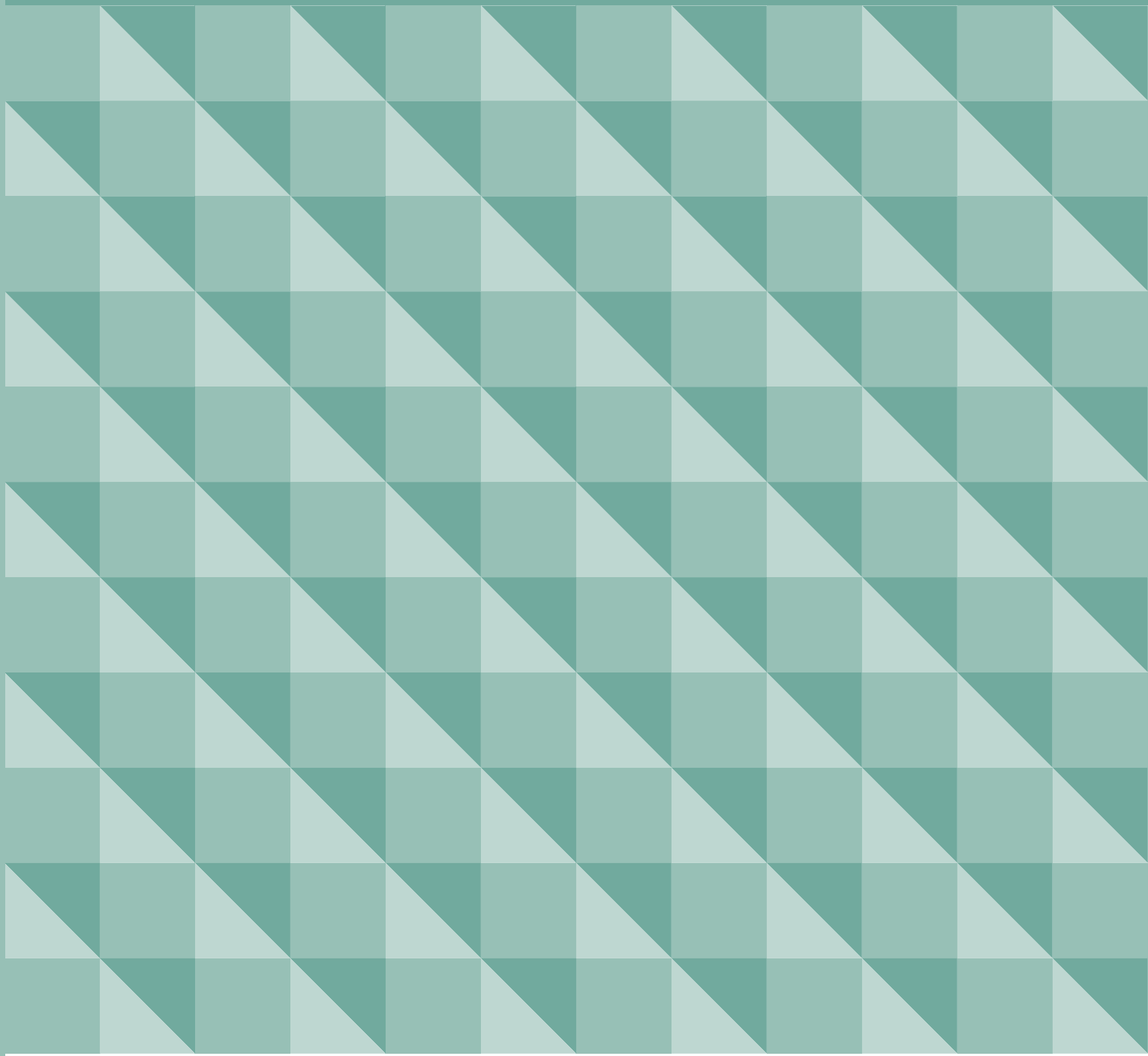
Guide for Malaria Commodities Logistic Management System

Applying the Monitoring-Training-Planning Approach for Improving Performance



CDC
Centers for Disease Control and Prevention

USAID
FROM THE AMERICAN PEOPLE

President's Malaria Initiative

SPS
Strengthening Pharmaceutical Systems

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About SPS

SIAPS and its predecessor SPS works in more than 30 countries to provide technical assistance to strengthen medicine and health commodity management systems. The program offers technical guidance and assists in strategy development and program implementation both in improving the availability of health commodities—pharmaceuticals, vaccines, supplies, and basic medical equipment—of assured quality for maternal and child health, HIV and AIDS, infectious diseases, and family planning and in promoting the appropriate use of health commodities in the public and private sectors.

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Contents

Acronyms

ACT	artemisinin-based combination therapy
ADR	adverse drug reaction
AL	artemether-lumefantrine
AMC	average monthly consumption
ARV	antiretroviral drug
CRMS	Continuous Results Monitoring System
DTC	Drug and Therapeutic Committee
FEFO	first expiry, first out
FIFO	first in, first out
HC	health center
HF	health facility
HIV	human immunodeficiency virus
IPLS	integrated pharmaceutical logistics system
ITN	insecticide-treated (mosquito) net
LLIN	long-lasting insecticide-treated net
LMS	Logistics Management System
LMIS	Logistics Management Information System
M&E	monitoring and evaluation
MIS	Management Information System
MOH	Ministry of Health
MSH	Management Sciences for Health
MTP	monitoring, training, and planning
PMI	President's Malaria Initiative
PMIS	Pharmaceutical Management Information System
PP	procurement period
QO	quantity to order
RBM	Roll Back Malaria
RDT	rapid diagnostic test
RMU	rational medicine use
RPM	Rational Pharmaceutical Management Program
SB	stock on back order
SI	stock now in inventory
SIAPS	Systems for Improved Access to Pharmaceutical Services
S_{max}	maximum stock level
SO	stock on order
SOP	standard operating procedure
SPS	Strengthening Pharmaceutical Systems
SS	safety stock
STG	standard treatment guideline
TORs	terms of reference
USAID	US Agency for International Development
WHO	World Health Organization

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Purpose of this Guide

This guide is intended to assist managers, planners, technical advisors, and health care workers to improve logistic management system (LMS) skills for their malaria programs at district, health center (HC), dispensary, and community levels. This document complements existing materials produced by the Strengthening Pharmaceutical Systems Program, such as Quantimed, the *Manual for Quantification of Malaria Commodities*, and other US Government-funded projects, such as USAID | DELIVER, in applying logistics management approaches that enhance LMS.

Potential users of this guide will generally fall into three categories—

- National and program managers and technical advisors interested in designing and planning an LMS training program that incorporates the monitoring, training, and planning (MTP) approach
- Facility-level teams and supervisors seeking a hands-on practical approach to improve logistics management practices, to resolve constraints to health program implementation, and to scale up where they work
- Organizations and individuals responsible for planning and implementing other types of training programs that may find this guide useful

The guide's objectives are to —

- Provide users with guidance on how to identify problems in LMS, discuss the underlying factors, and set priorities for improvement using the MTP approach
- Provide guidance to analyze the current logistics situation, prioritize interventions, and monitoring and evaluation (M&E), including indicators
- Discuss current practices and the underlying factors for identified problems and develop options for strengthening different components of the LMS
- Outline implementation considerations and how to apply the MTP strategy to address LMS challenges
- Provide skills and guidance on the use of various tools/forms used in MTP/LMS
- Describe selected tools, approaches, and mechanism related to MTP and LMS

Chapter 1. Introduction

In response to a request from the US Agency for International Development (USAID)/President's Malaria Initiative (PMI) team, USAID-funded SPS Program conducted a review of LMS status in all SPS-supported PMI countries. The findings revealed that some do not have proper LMS, and those that do are at varied levels of LMS implementation and functioning. The review also confirmed that accurate information to support policy and planning decisions is weak at all levels of the supply chain. In addition, there is no formal system to effectively utilize available data and information, resulting in poor tracking of stock status and consumption of malaria commodities, such as artemisinin-based combination therapies (ACTs), rapid diagnostic tests (RDTs) and insecticide-treated mosquito nets (ITNs). It was these observations that prompted SPS to develop this guide to provide practical, feasible guidance and a uniform approach to strengthen LMS for malaria commodities.

Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and function. Access to reliable and consistent information about malaria prevention and treatment in most endemic countries is poor. Effective case management for malaria requires that quality products be available and used appropriately in the correct formulations, amounts, and appropriate regimens (dose, frequency, duration). Ineffective treatment can lead to recrudescent infections requiring additional treatment, which can lead to increased cost, loss of productivity, complications, or death. In addition, lack of careful selection, incorrect quantification, high prices, poor quality, theft, improper storage, expired medicines, irrational prescribing, and incorrect use of medicines by providers and patients can result in significant economic losses.

Many developing countries are beneficiaries of donations for implementing their malaria programs. Global initiatives and donors, including USAID/PMI; Global Fund to Fight AIDS, Tuberculosis and Malaria; Roll Back Malaria (RBM); Bill & Melinda Gates Foundation; etc., expect that the resources they provide reach the affected population and are managed prudently and that reports are submitted regularly. The success of the PMI in reducing malaria deaths by half in 15 target countries in Africa by reaching 85% of the most vulnerable groups depends on the continuous availability of malaria medicines and related commodities. A comprehensive and integrated LMS for malaria commodities and other essential medicines is necessary to ensure better access and improve quantification, procurement, and distribution.

Logistics is the practice of making sure resources are available when and where they are needed. It consists of order processing, warehousing, and transportation. It is necessary because the time, place, and quantity of production do not always agree with the time, place, and quantity of consumption.

The three steps—monitoring, training, and planning—are interdependent and cyclical. This guide promotes the use of MTP to sustain performance monitoring and improve LMS. The guide also describes a mechanism of ownership and oversight for the implementation of MTP through Drug and Therapeutic Committees (DTCs). DTCs make use of a Continuous Results Monitoring System (CRMS) to track implementation progress and trends in performance and use.

The guide is developed to provide users with practical steps and guidance on how to strengthen LMS of malaria products. This guide differs from other manuals in that it focuses on health facilities (HFs), uses an approach that informs participation and sustainability, and demonstrates appropriate technologies and approaches that are used in different settings. The guide shows users how to complete and manage different forms and provides instructions for selected elements of the pharmaceutical supply framework that relate to LMS.

The guide is organized into eight chapters so that the user can choose the area to focus on. The overview chapter defines LMS, describes the drug management cycle, and describes the use of LMS in malaria products management. The third chapter describes the MTP approach and its use in LMS; the

cause and effect pathway; and DTCs as a mechanism for oversight and ownership of the MTP process. The chapter on LMS of malaria products describes each element of the pharmaceutical management framework in detail. The fifth chapter describes M&E with generic checklists for tracking performance and provides selected LMS indicators, including ways of calculating values. Chapter six is devoted to key LMS and other relevant forms. The last two chapters describe several case studies intended to demonstrate the use of different, innovative tools and approaches to improve LMS. The case studies are selected from different countries and projects supported by SPS, SIAPS, USAID | Deliver, and others. mHealth is described as a technology to strengthen LMS through the use of mobile phones and personal digital assistants. One case study describes how mobile technology is used to monitor malaria stock in remote areas. An ACT tracking system and logistics management information system (LMIS) in Benin, Ethiopia, and Kenya demonstrate the benefit of strengthened LMS. A CRMS from Ethiopia is described as a continuous performance tracking system that helps in evidence-based decision making. Establishment of a DTC is described as an oversight and ownership mechanism that gives institutions a basis for implementing MTP. An experience from a hospital setting in Malawi describes how MTP improved performance.

A resources section at the end of the manual lists additional references.

Chapter 2. Overview of LMS

Logistic Management System Defined

According to a speaker at the Council of Supply Chain Management Professionals 2011 Conference, logistics management is that part of supply chain management that controls the flow (both forward and in reverse) and storage of goods, services, and related information between the point of origin and the point of consumption to meet customers' needs. Logistics management integrates, coordinates, and optimizes all logistics activities; it also integrates logistics activities with other functions, such as marketing, sales, manufacturing, finance, and information technology.

Logistics activities are the operational component of supply chain management, including quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting. Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and functions. Supply chain includes global manufacturers and supply and demand dynamics, but logistics tends to focus more on specific tasks within a particular program health system. Logistics management includes a number of activities that support the eight rights. Key in logistics management and use is having the right item, in the right quantity, at the right time, at the right place, for the right price, in the right condition, to the right customer, and in the right way.

The main aim of LMS is to ensure uninterrupted supply of malaria products for the prevention and management of malaria. LMS is about operations, resources, and functions of the pharmaceutical supply framework. It includes knowing what and how much is purchased or ordered, how much is received, when it is received, how it is stored, how much is distributed, how much is left in the store, how it is transported, how it is handled/organized, how it is controlled, and how it is used. Responses to these questions are either incomplete or not available at all. In many instances, operations are not conducted efficiently. Not having these issues addressed results in erratic stock availability, loss, stock-out, overstock, etc. The reason for lack of positive response to the issues is mainly poor management practice, corruption, and lack of accountability, motivation, leadership, and commitment. Hence, the solution is more systemic. More training, more resources, more of the same failed approach may not be the answer. The solution lies in an integrated approach that includes identifying the problems, planning strategically, setting targets, meeting expectations and deadlines, accountability, leadership, active M&E, and a systematic management approach based on performance monitoring and transparency.

LMS of Malaria Products

LMS for malaria products is broader in scope as it has to deal with the logistics of bulky commodities like ITNs, special storage considerations such as RDTs and suppositories, short-shelf life medicines such as ACTs, and bulky, at times hazardous products like insecticides for mass application. The management of these products becomes a challenge also as a large proportion is expected to be used at lower levels by modestly trained persons.

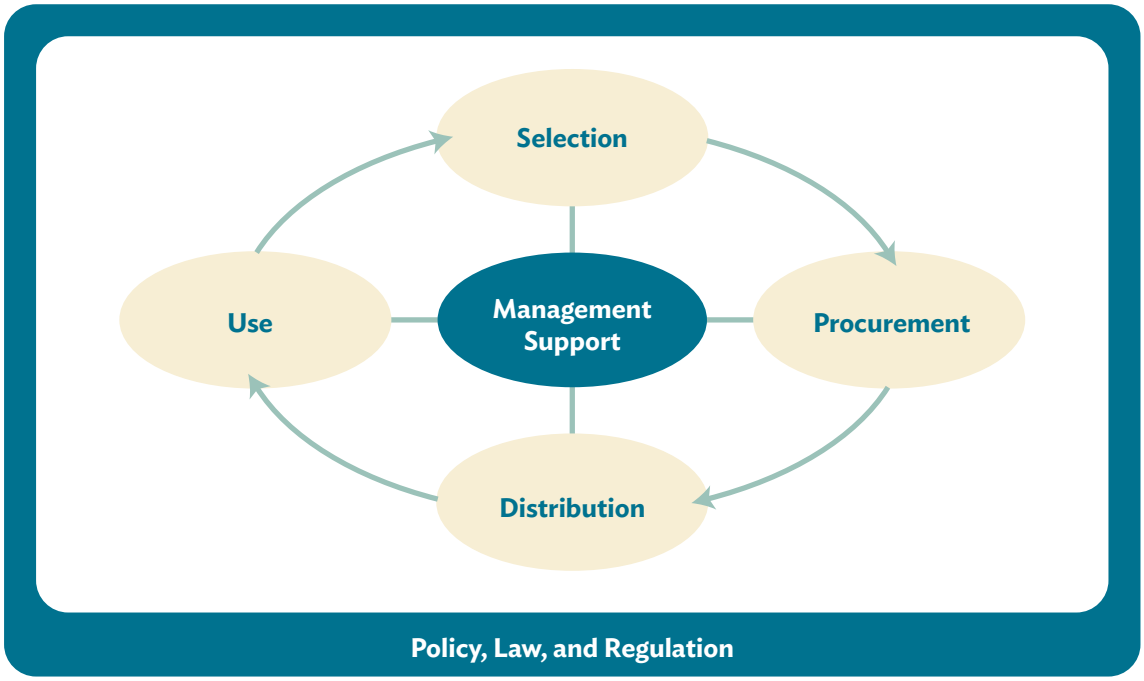
The following are WHO 2011 estimates of the volume of malaria products provided by suppliers and need by countries. Such large-volume products require robust logistics management.

ACT treatment courses delivered = 278 million doses
Number of ITNs delivered = 92 million
Number of ITNs needed every year = 150 million
Number of RDTs supplied by manufacturers = 155 million

Source: WHO World Malaria Report 2012; http://www.who.int/malaria/publications/world_malaria_report_2012/en/

Pharmaceutical Management Framework

To better understand LMS, it is important to understand the pharmaceutical management framework (figure 1) and to visualize the steps and relationships of the different elements of the drug supply system. This framework is applicable for understanding and implementing the different aspects of pharmaceutical management at the different levels where pharmaceutical products are managed and used.



Source: Center for Pharmaceutical Management. 2011. *Center for Pharmaceutical Management: Technical Frameworks, Approaches, and Results.* Arlington, VA: Management Sciences for Health

Figure 1. Pharmaceutical Management System Framework

Pharmaceutical management involves several basic functions including selection, quantification, procurement, warehousing, distribution, and use. The cycle begins with **selection** where decisions are made about which drugs and supplies to purchase and use at the national and user levels. Key considerations for rational selection include prevalent health problems (morbidity profile), identifying treatments of choice based on treatment guidelines, choosing individual medicines and dosage forms, and deciding which medicines will be available at each level of the health care system. The process of selection involves formation of a committee or similar structure, participation of experts, and use of current reference sources.

The next step in the cycle is quantification. It is the process used to estimate how much of a product is required for the purpose of procurement. Key considerations for rational quantification are past use or historical consumption, available budget, number of cases to be treated, etc. The process is preferably conducted by a committee. Various electronic tools (such as Quantimed, ProQ) or manual systems (using simple spread sheets) can be used to conduct the exercise.

Quantification involves forecasting, which is estimating the quantity of malaria products required to meet customer demand for a future period beyond the next purchase order; estimating the quantities of product that will actually be used during a particular time frame; and supply planning, which is detailing the quantities, costs, orders, and arrival dates of shipments and is the final output of the quantification.

Once selection and quantification are made, the following step is ordering the needed products, also known as **procurement,** purchasing, or acquisition. Procurement generally involves prequalifying

and selecting suppliers in a transparent process, defining packaging and delivery requirements, selecting procurement methods, managing tenders, establishing contract terms, assuring quality of medicines, and ensuring adherence to contract terms. If the procurement involves an overseas order, it is important to ensure timely clearance, waiver of applicable duties and taxes, security, and transport to deliver to the destination.

Distribution includes warehousing or storage, stores management, inventory management and control, and distribution or direct delivery to the appropriate level. The information management system may also be considered part of distribution. Logistics presupposes an efficient transportation system. Transport management includes the selection of various forms of transport, the acquisition of vehicles, and the optimization of available transport methods through a prudent system of travel routes, supply periods, security, and inventory control.

There can be different modes of procurement and distribution, depending on the nature of procurement and ordering, if it is purchasing from a higher level or from a private supplier, or getting donated medicines for serving special need patients, etc. Distribution may follow a push system where the products are sent to lower levels based on a determination made by the central level or a pull system where the lower levels request what they need using requisition forms.

At the facility level, selection follows the same approach as at higher levels. Procurement at lower levels, including the health-facility level, involves determining quantity needed (if the approach follows a pull system) based on past consumption, morbidity data, and financial resources.

Although **use** is not strictly defined as a logistics management activity, it is a key component of the pharmaceutical management framework, as the ultimate goal of the supply system is to ensure access to adequate and quality products for promoting good health and preventing and treating diseases for improved health outcomes. Prescribing (ordering of a patient treatment by the clinician), dispensing of the prescribed product, which includes proper packaging and counseling, and use of the medicine by the patient according to the instructions are key for an effective outcome.

At the center of the pharmaceutical management framework is a core of **management support** systems: organization, financing and sustainability, information, and human resources management. These management support systems hold the pharmaceutical management cycle together. Finally, the entire cycle rests on a policy and legal framework that establishes and supports the public commitment to essential medicine supply.

The following four management support areas are key for improving LMS for malaria and other pharmaceutical products—

- Basic LMIS that focuses on stock status, consumption, expiry, etc.
- Infrastructure such as adequate space and proper and organized storage for ensuring safety, security, and accountability
- Standard operating procedures (SOPs) for guiding the process and practice of LMS
- Trained and adequate manpower for effective implementation of the different components of the supply chain system

By appreciating the challenges and understanding the principles, good practices, and methods to address the challenges, sustainable improvement of the LMS can be attained.

Different strategies or approaches and mechanisms that are applicable to different levels can be used for improving LMS for malaria commodities. For the purpose of this guide, the MTP approach is highlighted as a performance quality improvement approach and the DTC as one mechanism at the facility level for effecting the improvement.

Chapter 3. MTP Application To LMS

MTP as an Innovative Approach for Strengthening the Logistic System

Traditional approaches for improving LMS have included workshops and having staff go to training venues. However, HFs in many developing countries are faced with human resource challenges including inadequate numbers, low skills, low motivation, high turnover, and high attrition. It is simply not feasible for the facility to keep releasing employees for lengthy, didactic trainings.

Some of the commonly used performance and quality monitoring and improvement approaches include the continuous quality improvement (CQI) and MTP approaches. CQI, sometimes referred to as performance and quality improvement, is a process of creating an environment in which management and workers strive to create constantly improving quality by following several sequential steps.

- Identifying a need, issue, or problem and developing a problem statement
- Defining the current situation–breaking down the problem into component parts, identifying major problem areas, and developing a target improvement goal
- Analyzing the problem–identifying the root causes of the problem and using charts and diagrams as needed
- Developing an action plan–outlining ways to correct the root causes of the problem and specific actions to be taken and identifying who, what, when, and where
- Looking at the results–confirming that the problem and its root causes have decreased, identifying if the target has been met and displaying results in graphic format before and after the change and
- Starting over–going back to the first step and using the same process for the next problem

MTP is another participatory performance improvement approach, more or less using the same approach as CQI, but focusing on skills-building that places training, tools, and responsibility for implementing the pharmaceutical management practices in the hands of local staff. Key for successful monitoring is identifying and defining indicators that will be used to measure or track progress toward accomplishing set targets or objectives.

In the mid-1980s, recognizing the limitations of traditional training and that the skills and knowledge acquired are not necessarily applied back in the workplace, Management Sciences for Health (MSH) developed the MTP approach to assist the Ecuadorian Ministry of Health (MOH) to implement its Child Survival Program.

Since 2006, RPM Plus and the follow-on SPS Program have worked with MOHs and institutions in Afghanistan, Ethiopia, Kenya, Liberia, Malawi, Rwanda, South Africa, Southern Sudan, Tanzania, and Uganda to develop plans for training health care workers on the application of MTP to pharmaceutical management to support HIV, malaria, and other health care programs.

Experiences in using MTP for pharmaceutical management in several countries since 1997 indicate consistent improvements in all areas of pharmaceutical management after implementation of MTP. Details can be found in the MTP manual.[1] From these experiences, MTP appears to be a cost-effective

[1] Nelson, D. P., and I. C. Adams. 2000. *A Guide to Improving Drug Management in Decentralized Health Systems: The Monitoring-Training-Planning Guide for Program Implementation.* Published for the US Agency for International Development by the Rational Pharmaceutical Management Project. Arlington, VA: Management Sciences for Health.

and sustainable intervention to build local human resources capacity. In addition, the MTP approach provided public facility staff the technique and motivation to prioritize problems and improve their health commodity management practices. In 1999, the World Health Organization (WHO) Collaborating Center for Research and Training on Rational Drug Use in Yogyakarta, Indonesia, began investigating the effectiveness of using the MTP approach to implement interventions on medicine use. The methodology was field-tested by WHO in Cambodia, Indonesia, and the Lao People's Democratic Republic (PDR). Evaluations demonstrated that MTP was effective in improving medicine practices and led to significantly reduced overuse and misuse of antibiotics and injections.[2]

MTP can be—

- Highly useful to program managers and facility staff
- Complementary to subject-specific trainings
- Used to build the overall problem-solving skills of the health care team to support the scale-up of public health initiatives in the long term

MTP Framework

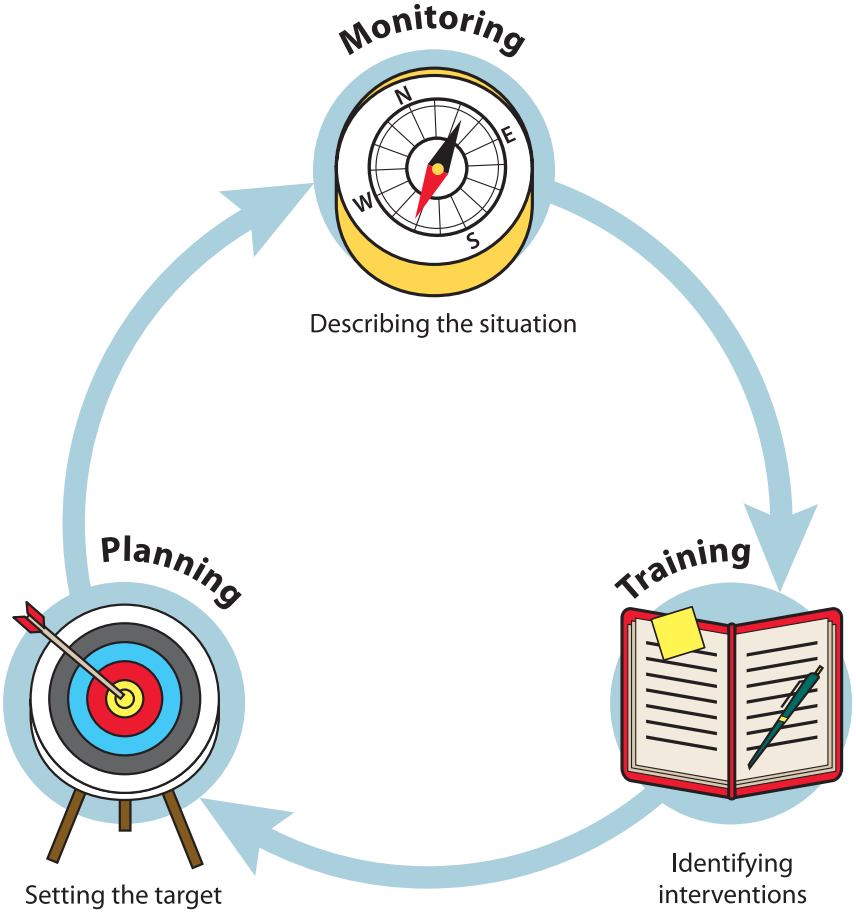


Figure 2. The MTP approach applied to each individual monthly or periodic session can help achieve real results (RPM Plus 2009).

[2] Suryawati, S., and B. Santoso. 2004. *MTP Approach Is Effective in Reducing Inappropriate Medicines Use in Hospitals.* Poster and PowerPoint presentation at the Second International Conference on Improving Use of Medicines, March 30–April 2, Chiang Mai, Thailand. Available at http://archives.who.int/icium/icium2004/poster5a7b.html.

Table 1. What Should Be Covered in the MTP Sessions

		
Problem identification and measurement	**Problem solving**	**Setting the target for improvement**
▪ Follow up from the last session ▪ Discuss the current situation and/or identify and present specific problems for solving ▪ Select a priority problem ▪ Determine how important the problem is ▪ Determine whether the problem has a feasible solution	▪ Train and problem solve on the topic of the day's session ▪ Discuss the specific problem or implementation of the new initiative ▪ Collect supporting information ▪ Obtain information and build skills to implement the new initiative or solve the problem ▪ Decide how to implement the new initiative or solve the problem	▪ Develop action plan and assign responsibilities ▪ Select indicators and set targets for the improvement ▪ Identify information to collect for the next MTP session ▪ Evaluate the session ▪ Develop a plan to introduce the new initiative or solve the problem ▪ Set a measurable target for improvement ▪ Assign responsibilities for executing the plan ▪ Set the date for the next MTP session

Framework for MTP Application in the Performance Improvement of LMS

Without building advocacy for management support and commitment of resources at the different levels, MTP for improving LMS for malaria commodities cannot be achieved. Strategic planning, participatory activity planning, and implementation follow-up are critical for results-oriented programming (figure 3).

Figure 3. The three phases of the MTP approach (RPM Plus 2009)

There are no universal targets of "acceptable" performance for strengthening pharmaceutical management system. Each country is unique, and setting performance targets will depend on many factors, such as the time frame of the intervention, the human and economic resources available, national policies, and the level of decentralization. Most important, however, is that targets should be established on the basis of previously agreed upon standards of performance and according to the local situation. By comparing indicator values among districts and among HFs, it should be possible to measure the impact of an intervention over time and better identify areas of concern that warrant further action.

Interventions should be evaluated by looking for both intended and unintended changes in specific outcomes. Establishing general standards of practice for LMS is an important element to bench mark

performance against a set of accepted generic or universal approaches. One way of describing such a standard is developing an SOP for each element of the pharmaceutical management cycle. Such an SOP will define the element and the way it should be practiced or operated. This also includes assigning responsibilities for holding staff accountable in ensuring SOPs are adhered to. The measure of performance is tracked by defining key indicators which are usually tracked against set targets. A check list is also a complementary approach for monitoring the performance level of the activity under the element. All these are contributing pieces for MTP implementation.

Generally, MTP implementation constitutes—

- Situational analysis to assess the current LMS situation and quantify gaps and challenges (measure the magnitude of the problem)
- Discussing underlying factors for identified problems
- Analyzing options to improve the situation or implement a new initiative
- Obtaining stakeholders' consensus on options
- System design (if nothing exists) or existing system optimization and improvement
- Defining the scope; initially limited to malaria commodities and gradually expand to include other essential medicines
- Developing indicators to be used for a CRMS
- Using a checklist for monthly or quarterly tracking indicators that directly relate to the common challenges of the system
- Producing a report on the findings and trends in the indicators
- Reviewing the findings and trends and setting targets

MTP Process

The MTP process (figure 4) is a series of activities that begins with a situation analysis and discussing problems. Following this diagnostic step, the process moves into capacity building of the MTP participants, identifying interventions and setting measurable targets for improvement. The implementation segment includes assigning executing responsibility, follow-up and evaluation. The diagram below represents the MTP process framework described above.

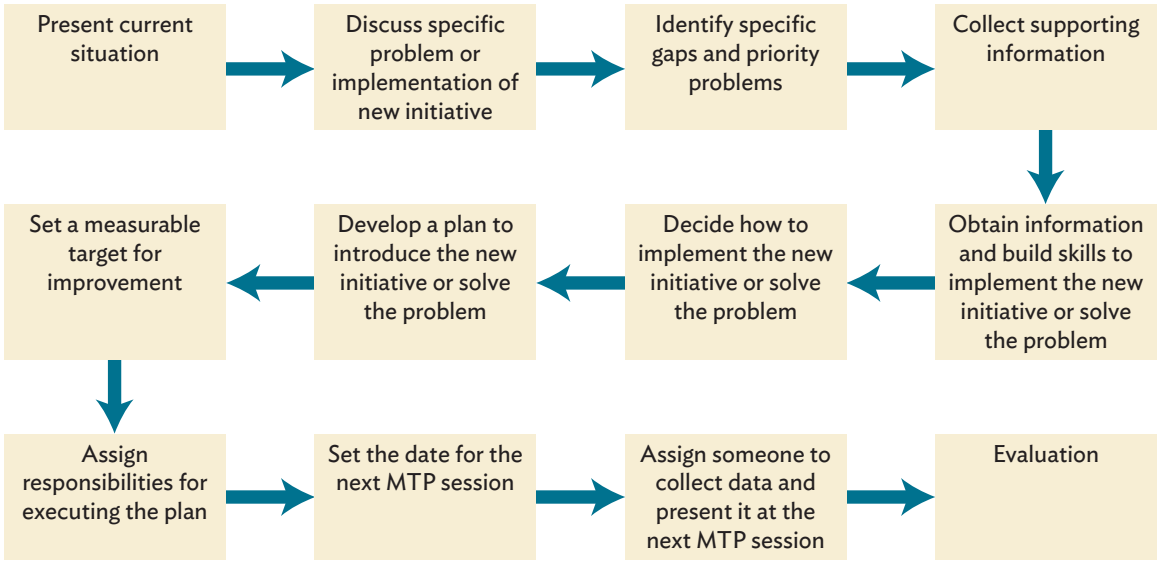


Figure 4. MTP process framework

MTP sessions are the group-work meetings devoted to a single topic or problem in pharmaceutical management. On a monthly or other regular basis, participants first review achievements from the previous session, and then move on to the new topic or problem. The participants analyze information about their own situation, study how to take action, plan short-term activities, and set goals for improvement. Training is limited to providing information and building skills needed to carry out the tasks assigned. The session ends with participants taking on specific tasks or responsibilities that generally will achieve results before the next session. However, some goals may take several sessions to achieve, for example, those that involve changing behavior to address irrational medicine use.

Using the MTP approach, staff members learn to mobilize their own resources and to incrementally improve the management of medicines and other products at their own facility. MTP differs from traditional training approaches in that MTP sessions are held within the participants' place of work or local environment. Because MTP is a self-learning activity involving many providers in HFs, it's more likely to be sustainable. MTP can be highly useful to program managers and facility staff as an approach to complement traditional training courses or as an alternative methodology in situations where chronic staff shortages prevail. An ongoing series of short, periodic MTP sessions (one day in length) delivered at or close to the facility that addresses specific pharmaceutical management issues experienced by facility staff can build their overall problem-solving skills and ultimately allow participants to support the scale-up of public health initiatives in the long term.

As a general rule, at the end of the process, the following sequence is used in MTP—

- Review the topics that were covered
- Review the training plan of each session
- List some activities that can be completed during the next month and others that will take longer than a month
- Note who will complete each activity and the date planned for completion
- Note the result of the activity
- Plan expected dates for supervisory visits; the supervisory team will visit each HF to determine the extent of implementation of the planned activities and provide technical assistance if needed

When choosing the most useful outcomes to track and achieve, consider the following—

- Select outcomes that can be clearly and explicitly defined
- Select outcomes that can be reliably measured by the indicator, preferably using routinely collected data
- Prioritize monitoring to focus on a few important outcomes rather than measuring all possible changes
- Select the key behaviors targeted by the intervention and the most likely behaviors to substitute
- Measure more than one dimension of success, especially if some changes are secondary; for example, changes in prescribing that result from new knowledge about resistance to specific antimalarial medicines

Cause and Effect Pathway

The LMS cause and effect pathway is premised on a logical link between a problem, the cause, and the solution. The cause and effect pathway can be used as a complementary approach to the monitoring aspect of MTP implementation. The process is based on prioritizing key issues of the program and coming up with specific, realistic, and measurable solutions that ensure uninterrupted supply and access to quality products. This process usually takes a cyclical approach in which one or a set of problems and causes are examined; once those problems are solved, the next set of problems and causes is addressed. This approach helps program implementers see the changes and progress in a systematic manner, rather than trying to address a problem head on, which will only produce symptomatic relief in a one-off manner and not result in a sustainable solution.

Identifying the cause of the problem is an important first step. The cause may be internal, external, systemic, procedural, administrative, behavioral, managerial, personal, or global. Each problem must be related to a cause so that a plan and solution can be realized. Problems must be prioritized on the basis of the urgency of the problems. By examining the cause and effect pathway, team members can more easily choose one or more aspects of the problem that they have some control over changing and identify those that they believe will significantly improve the situation.

Table 2. Illustrative Causes and Solutions Pathway

Common LMS problems	Illustrative causes	Illustrative solutions
Stock-out	Weak quantification/forecasting; weak data on which to base accurate forecasting; pilferage; shortage of funding; irrational use of drugs; requested quantity not received	Strengthen quantification, conduct regular stock inventory
Overstock	Weak quantification/forecasting; weak inventory management system	Improve LMIS, transfer to other HFs
Push system used	Lack of inventory management system; lack of capacity to conduct quantification	Introduce pull system; introduce integrated pharmaceutical logistics system (IPLS)
Procurement not done on time	No scheduled procurement; no funding	Set order schedule
Stock card filled incorrectly	Lack of training, supervision; shortage of staff	Monitor correct filling
Stock card/bin card not filled on time	No dedicated data personnel; shortage of staff	Monitor timely filling
Lack of stock status report	No SOP; no accountability	Develop SOPs, terms of reference (TORs)
Lack of expiry report	No regular monitoring of expiry	Report expiry regularly
High volume of expired products	No inventory tracking and reporting on expiry status	Track and dispose
Lack of standardized tools	Lack of funding; no system for standardization	Provide standardized tools
Shortage of staff	No budget; no HR standard	Implement HR strengthening strategy
Weak leadership	No importance given to drug supply; no well- defined statement of work, TORs; no DTC	Strengthen DTC
Weak supportive supervision	No SOP; staff shortage; passive system of supervision; no feed-back and follow up	Strengthen DTC and monitoring team through training and mentoring
Poor storage conditions	Inadequate space; poor conditions; inade-quate cold chain; cold chain not monitored	Improve storage, provide support

Common LMS problems	Illustrative causes	Illustrative solutions
Inadequate shelving, pallets	Shortage of storage and handling equipment	More shelves, pallets
No planned distribution	Shortage of supplies; no SOP	Develop SOP for distribution
Lack of consistent transport	No funding; undependable private sector	Ensure transport
Loss/pilferage	No secured structure; poor inventory management and control	Improve infrastructure and inventory control
No SOPs for LMS	No systematic approach to address supply chain problems	Develop SOPs
Ordered goods not fully recd.	Shortage of supplies	Develop SOPs
Obsolete, expired drugs taking up space	No system to register and dispose; fear of responsibility	Develop SOP for disposal

DTC as MTP Mechanism for Improving LMS

According to WHO, the percentage of total expenditure on pharmaceuticals during 1990-2000 for WHO member states was 39.4%.[3] Wastage caused by irrational use, weak accountability, inefficient procurement and distribution, inappropriate handling, poor inventory control, and inadequate oversight can be alleviated by formal and regular consultation between management and health professionals in a given health service setting. One of the mechanisms for such consultation and oversight is the DTC (also known as the pharmacy and therapeutic committee or medicines and therapeutic committee). A DTC can be established at the facility, district, regional, or national level as appropriate. The purpose of a DTC has expanded beyond the traditional role of overseeing management of a formulary system and evaluating medicine use (drug use studies) to include promoting the effective, safe, and cost-effective use of medicines through development and implementation of relevant policies and procedures. Effective DTCs help improve medicine availability, promote rational use and medicine safety, and contain antimicrobial resistance within the facilities.

For a DTC to function, it should have a multidisciplinary, transparent approach, technical competence, and an official mandate. For the committee to be effective, structured guidance and TORs that are explicit and transparent in objective, scope, duties, and responsibilities must be available. The committee must have the ability to design and implement interventions to improve the management and use of medicines. The HF's administration must give the committee authorization and support to carry out its function, and have made explicitly clear the line of authority to top administration officials. The DTC is responsible for closely following the implementation of its recommendations. If the staff does not implement the recommendations, the committee should discuss the recommendations with the staff again and urge management to take necessary measures.

A DTC can be a key instrument of the MTP for improving LMS by training members, planning and implementing activities, and monitoring and evaluating results and impacts. The DTC can be responsible for guiding the process and ensuring that planned activities are undertaken effectively. It can advocate resource availability to ensure that planned activities are undertaken on time. The DTC can provide the needed ownership and oversight to the MTP process. Because DTCs represent all key stakeholders of the facility (medical director, facility manager, major specialties, pharmacy, nursing, laboratory, radiology, finance, data and M&E unit, logistics), this multidisciplinary representation creates a spirit of ownership, accountability, and team work for planning and implementing effective medicines management and use. Building the capacity of the DTC to play this key role will avoid creating a duplicate mechanism in the HF.

[3] The World Medicines Situation, WHO 2004; http://apps.who.int/medicinedocs/en/d/Js6160e/

Chapter 4. Strengthening LMS Through Implementation of MTP

This chapter describes the key elements of LMS, followed by illustrative practice standards for each element, challenges and indicative steps for addressing the challenges, and how MTP and related approaches can be used for improving LMS.

Procurement of Drugs and Supplies

Procurement involves selecting a supplier through a transparent process, defining the quantity to be procured, and packaging and delivery. If the procurement involves an overseas order, it is important to ensure timely clearance, waiver of applicable duties and taxes, and security and transport to the destination.

Programmed procurement is characterized by periodic inventory review. The stock card is the basis of this periodic review. Managers count the available inventory of each stock item and then place an order to bring stock levels back to the calculated maximum stock level (refer to the practicum on stock card use and calculations in chapter 6).

Procurement standards

- Procurement standards guided by rules, regulations, acts, procedures, and manuals clearly explaining the process
- Competitive bidding
- Conducted by an official procurement committee
- Tracking of procurement and shipment
- Sourced from WHO or other authorities recognized worldwide such as FDA
- Adequate funding

Procurement challenges and problems

- Erratic and inadequate funding
- Poor coordination among donor funds
- Limited funding for pediatric preparations
- Delayed clearance and high demurrage cost
- No SOP for procurement
- No procurement committee
- Long, bureaucratic, and cumbersome procedures
- Procurement integrity
- Transparency
- Poor product specifications

Table 3. Toward Improved Procurement

Good procurement practice	Consequences of not practicing
Estimate type and quantity of products to purchase	Over or under procurement
Estimate and ensure availability of funding	Shortage of funding causes insufficient purchase, leading to stock-out and inadequate supply
Bid for best price based on competitive tender	Compromised procurement practices; kick-backs; overpricing; makes drugs expensive; quality compromised
Establish a procurement committee	Lack of transparency; weak accountability
Develop an SOP	Inconsistent practice; lack of accountability
Track procurement /shipment	Delayed clearance; high demurrage cost; unavailability of products when needed
Ensure all necessary shipping, insurance, etc.; documents on hand to avoid delay in clearance	Delayed clearance; unavailability of products when needed

MTP Implementation in Procurement (Hypothetical)

Review of procurement at the HF shows that unscheduled or emergency ordering is routine

Monitoring

The review at the HF pharmacy department showed that there is no system of scheduled procurement, and several emergency orders have been made in the last six months. The MTP session begins reviewing the stock status situation and finds overstock of some products, shortages of others, and a large quantity of expiring products. Some of the reasons for the problems are inaccurate forecasting; no formal stock inventory; and lack of an SOP to guide the forecasting and ordering process. In addition, procurement is not conducted by a committee. The report was made to the DTC at the MTP's regular monthly meeting.

Training

The MTP session prioritizes the problems to be addressed to resolve this challenge. During the session participants discuss and analyze what good procurement practice means and how it can be operationalized. The session identifies interventions that promote good procurement practices, such as taking inventory regularly, preparing orders based on reliable consumption data, reconciling orders with finance, receiving only donations that are needed by the facility, and limiting emergency ordering for special situations and with the approval of the DTC. The use of an SOP to guide procurement practice was also agreed upon.

Planning

The MTP team develops an action plan and a schedule for addressing priority problems in the course of six months. Targets are set and indicators identified to track the performance of the prioritized interventions. The action plan describes step-by-step implementation of activities, corrective actions, who will be responsible for undertaking the actions, what resources are required, and in what time frame the activities will be completed. The DTC or a similar institutional body supervises the individual(s) or unit that is overseeing the activities. The action plan is reflected in a template that shows the incremental changes toward meeting the target. The findings and accomplishments of this exercise are reported to the DTC at the next MTP meeting, where the MTP cycle begins afresh by reviewing progress, tackling the next challenge or problem, and eventually improving the procurement system.

Quantification of Drugs and Supplies

Quantification is a process that estimates the total quantities and costs of products that will be used during a specific time and needed to fill the supply pipeline to maintain adequate stock levels.

Quantification involves estimating not only the quantities needed of a specific item, but also the funding required for purchasing the item and when the products should be delivered to ensure an uninterrupted supply for the program.

Quantification involves using past consumption, morbidity, funding, and other factors that affect the process. If the assumptions are not correct, there is the danger of under- or overestimating need.

Quantification standards

- Needs estimated on the basis of reliable data on consumption and morbidity
- Comprehensive approach to quantification using a case management model that takes diagnosis with RDTs and treatment with ACTs into account
- Quantification of ACTs requires estimating needs for each pre-package corresponding to a particular age or weight group
- Quantification based on diagnoses confirmed with microscopy or RDTs per WHO recommendation
- Ensure uninterrupted availability of products at all times

Quantification challenges and problems

- Poor quantification of needs
- Data on malaria morbidity by weight and age group limited
- Health workers often break up ACT packages when the required pack size is not available which gives an inaccurate picture of actual consumption by age/weight group
- Uncomplicated malaria is still treated on the basis of clinical symptoms alone, making estimation of demand for diagnostic tests and ACTs difficult
- No recording and reporting on actual malaria drug consumption
- No SOP or guideline to support quantification
- Guidelines are not regularly revised or updated
- Existence of major resource gap

Table 4. Toward Improved Quantification

Good quantification practice	Consequences of not practicing
Estimate quantity needed based on each product received last, what has been used (monthly consumption assuming full supply), number of cases managed, what is on-hand, and what is needed	Stock-out; overstock; expiry; congested storage, making inventory control difficult; irrational demand forecasting, causing interruption and shortage of products
Utilize/revise national drug list and standard treatment guidelines (STGs) in agreement with disease specific guideline	Stock-out; overstock; expiry; congested storage, making inventory control difficult
Follow SOP or guideline for drug quantification	Inconsistent practice, shortages
Strengthen malaria drug consumption and morbidity data recording and reporting	Unreliable data for quantification resulting in over/under estimation of need
Conduct resource gap analysis and resource mobilization	Underfunding; insufficient funds for procurement, causing shortages
Estimate funding and ensure availability of funding	Shortage of funding causes insufficient purchase, leading to stock-out and inadequate supply
Establish quantification planning and quantification committee	Compromised procurement practice; kick-backs; corruption; makes drugs expensive; lack of transparency
Develop an SOP	Inconsistent practice

MTP Implementation in Quantification (Hypothetical)

Review of forecasting/quantification practice at the HF shows that there is no reliable and timely data on which to base the ordering of antimalarial products

Monitoring

The review at the HF pharmacy department showed that there is no system of scheduled quantification, resulting in erratic ordering on the basis of unreliable data. This leads to over- and understock. The MTP session begins reviewing quantification practice, if any. If the quantity purchased last is used as the basis for the new quantity to order, it gives the false impression that this practice is accepted and correct when it is not.

Training

The MTP team identifies the cause of poor estimation of need, which is the lack of data and information on the actual consumption or on morbidity. Through the MTP process, the team makes the staff realize that there are standards for conducting good quantification. The case is made that additional staff are needed to assist in data management for good quantification.

Planning

The MTP team develops an action plan and a schedule for addressing priority problems. Once interventions are prioritized, targets are set and indicators identified to track performance. The action plan describes step-by-step implementation activities, including establishing a quantification committee and validating quantification data every year based on prior practice. The DTC supervises the individual(s) or unit that is overseeing the activities.

Storage of Drugs and Supplies

This section introduces participants to good storage practices and good inventory management. It focuses on how to maintain a good arrangement of stock, proper disposal, good control and rotation of stock, and good record keeping. Further, the section details the different types of inventory control systems and the steps of the inventory management process. Participants will acquire a better understanding of the consequences of poor storage.

Storage involves ensuring safe and secure warehousing of all products. Minimum storage conditions, including storage of heat-sensitive products is key to ensure that the quality and effectiveness is maintained. The warehouse is responsible for the receipt, storage, and order fulfillment activities of health commodities. The effectiveness of the warehousing and inventory management function has a significant impact on the supply chain's ability to deliver quality products to users on time, and to reduce expiry and wastage. Not only is it necessary to protect drugs and supplies from excessive heat, light, humidity, rats, and insects, but also against theft, expiration, damage, and fire.

Incorrect storage of medicines

Storage standards

- Adequate size to handle the volume of products
- Appropriate conditions (ambient temperature, no humidity, appropriate lighting, clean, free of insects and rodents, no leakage, etc.)
- Secure doors and windows
- Limited access to authorized personnel
- Adequate shelving and pallets
- Organized storage following first expiry, first out (FEFO)/first in, first out (FIFO)
- Adequate equipment for handling (ladders, forklift, etc.)
- Temperature monitoring devices
- Fire extinguisher
- Cold storage

Source: Rational Pharmaceutical Management Plus Program. 2006. *HIV/AIDS Pharmaceutical Management Training, Module 2: HIV/AIDS Pharmaceutical Management, Session 3: Store and Facility Management.*

Figure 5. Framework for Good Storage Practice

Storage challenges and problems

- Lack of storage space
- Lack of storage accessories (shelf , pallets)
- Poor organization of products during storage
- Poor inventory management at facilities
- Presence of large volume of expired drugs and obsolete products at HFs' stores
- Expired/obsolete products not stored separate from useable products
- Expired products not disposed on time and lack of disposal guideline

Table 5. Toward Strengthened Storage

Good storage practice	Consequences if not practiced
Adequate space	Congestion and inability to do inventory management
Appropriate condition per manufacturer guideline	Quality not assured, damage, outcome compromised
Clean	
Managed by a professional	Proper storage conditions and inventory management not assured; expiry or damage possible
Proper organization and use of shelving, pallets, and handling equipment	Products stored inappropriately and their quality affected, resulting in poor treatment outcome
Separation of obsolete/expired drugs	Mistaken use; poses risk to public health
Bin card on shelves	Issues and receipts not recorded and inventory control compromised; expiry not tracked; adequate supply not assured
Track expiry	No inventory control; expired drugs affects funding; products not rotated before they expire
Guided by storage and handling SOP	Lack of consistency in practice; no accountability because staff don't know their roles and responsibilities
Stock is rotated (FIFO/FEFO)	Wastage, medicines expire before used
Secure doors, windows, and roofs; limit access to authorized personnel	Ease of breakage by thieves, poor inventory control, and laxity causes loss
Inspect the store regularly	Loss, damage, expiry, mismanagement, etc., not detected and prevented
Rational use of refrigerator (no congestion, not opening the refrigerator too often, no storing food, etc.)	Fridge efficiency decreased; items not kept at correct temperature, causing quality and safety problems

MTP Implementation in Storage (Hypothetical)

Review of storage practice at the HF shows inadequate space and lack of organization

Monitoring

The review at the HF pharmacy department showed that there is storage congestion, lack of organization, shortage of shelves, and lack of cleanliness. Without proper storage, proper inventory control cannot be conducted, and expired drugs are not segregated for disposal. Poor storage can potentially affect drug safety and effectiveness. Many facilities treat pharmaceuticals like non-health commodities.

Training

The MTP team discusses the findings of the review and identifies the causes for poor storage. If it is a lack of space, the team must work with management to expand the physical space. The importance of good storage and the consequences of the lack of it and ways to improve the situation are highlighted. Setting standards of good storage practice is meant to inform proper storage. SOP for good storage practice helps a lot.

Planning

The MTP team identifies the key challenges in storage and handling, develops an action plan for addressing priority problems, and sets a schedule for addressing them. Developing and training in storage SOP will help. Simple organization of the store contributes to rational management of malaria products. Segregating expired and other unusable products creates space for active products. The action plan will define specific activities that will contribute to storage improvement. The action plan describes step-by-step activities to be undertaken, how to conduct corrective actions, who will be responsible for undertaking the actions, and in what time frame the activities will be accomplished.

The DTC supervises the individual(s) or unit that is overseeing the activities. The findings and accomplishments of this exercise are reported to the DTC at the next MTP meeting, where the MTP cycle begins afresh by reviewing progress, tackling the next challenge or problem, and improving the storage system.

Distribution of Drugs and Supplies

This section introduces participants to the elements of distribution. It details the definitions, advantages, and disadvantages of push and pull systems and highlights good distribution practices.

The objectives of a distribution system are to ensure the:

- Availability of drugs and supplies
- Safe, secure, and punctual transport of drugs and supplies in a punctual manner from distribution points to the requisitioning facilities
- Efficient management of inventory (e.g., stock cards and stock registers) to reach an effective level of stock control; staff must be able to ascertain stock availability and to locate any stock item at any moment
- Availability of space to store each stock item
- Prevention of theft and loss during storage and transport

The distribution system, in practice, uses a pull (active ordering) and a push system. In a push system, the central warehouse is responsible for determining how much to order and send to the HF. The preferred system of the two is a pull system, unless special situations (emergencies) dictate otherwise. In a pull system, the HF, which uses the drugs and supplies, is responsible for determining its own needs and how many to order.

Table 6. Pull vs. Push System

Pull (order)	Push (allocation)
Advantages ▪ Order what is needed, when it is needed ▪ Fits its storage capacity ▪ Based on financial capacity	**Advantages** ▪ Based on past consumption or morbidity ▪ Equity, ensures contact ▪ Depending upon the product type could be tied to performance
Disadvantages Need accurate and up-to-date information system (record keeping)	**Disadvantages** ▪ Planning done at higher levels, centralized decisions ▪ Dumping drugs ▪ Drugs expire before use ▪ Ties up budget ▪ Overstock, understock

Managing Transportation

Transportation of products to their destination (moving products from supplier to the target) is a critical element that has a major implication in availability. Poor transport can lead to security, inventory control, and quality concerns. Transportation system management includes the selection of various forms of transport, the acquisition of vehicles, and the optimization of available transport methods through a prudent system of travel routes and supply periods. The transport system is generally the least trustworthy component of the distribution system and a source of great frustration. Even so, a systematic plan for transport can help improve the continuity of drug supply. In planning for transport, the following questions must be considered—

- Which is the best method of transport in terms of speed, security, local availability, costs, road conditions, and special conditions needed for maintaining drugs and supplies?
- Which is the best route, taking into consideration the distance, road capacity, weather conditions, security, and the location of refueling stations, that guarantees availability of drugs and supplies at the lowest operational cost?
- What is the best frequency for making deliveries, taking into consideration normal work hours, road conditions, storage space in the storeroom, and the cost of maintaining inventory?

Distribution standards

- Conserve drugs and supplies so that the integrity of the packaging is maintained and items are easily accessible in the storeroom
- Optimize inventory management to prevent stock-outs or overstocking, yet maintain enough inventory to sustain good service levels at all of the system's distribution points
- Locate storage warehouses to optimize the infrastructure available for storing stock when needed and to facilitate distribution to peripheral HFs
- Maintain a register of need to prevent stock-outs and analyze consumption data

Distribution challenges and problems

- Erratic and inadequate funding
- Poor coordination among donor funds
- Lack of SOPs
- Poor transport system and lack of transport funds
- No scheduled distribution
- Push system of distribution without consulting recipient
- Oversupply or undersupply
- Unneeded products distributed ("dumping")

Table 7. Toward Strengthened Distribution

Good distribution practice	Consequences if not practiced
Distribution plan/scheduled distribution	Unplanned distribution, erratic supply
Delivery to HFs	Lack of transport at HFs causes shortage or loss on transport
Ensure uninterrupted transport system	Interruption of supply, stock-out, discontinuation of treatment by patients causing resistance
Develop an SOP	No consistent practice
Pull system	Overstock, understock; unneeded products by quantity and type, resulting in overstock and expiry
Stock is rotated (FEFO/FIFO)	Wastage, medicines expire before used

MTP Implementation in Distribution (Hypothetical)

Review of inventory management practice at the HF shows a high level of expired antimalarial products

Monitoring

The review at the HF pharmacy department showed a high level of expired drugs. The main reasons are found to be unplanned procurement, weak quantification, poor storage, and weak inventory management, including a non-functional information system.

Training

The MTP session discusses what good distribution means and how it can be practiced. The session identifies interventions that promote good distribution practices, such as taking regular inventory, practicing FEFO, and cleaning and storing products according to recommended conditions.

Planning

The MTP session develops an action plan and a schedule for addressing priority problems in the course of three months. Once interventions are prioritized, targets are set and indicators identified to track performance. The action plan describes step-by-step implementation of activities, corrective actions, who will be responsible for undertaking the actions, and by what time the activity will be accomplished. The DTC supervises the individual(s) or unit that is overseeing the activities. The action plan is reflected in a template that shows the incremental changes toward meeting the target. The findings and accomplishments of this exercise are reported to the DTC at the next MTP meeting, where the MTP cycle begins afresh by reviewing progress, tackling the next challenge or problem, and eventually improving the distribution system.

Logistic Management Information System

LMIS is a component of the broader pharmaceutical management information system (PMIS), which deals with all aspects of pharmaceutical management including governance, finance, HR, supply management, medication information, etc. Information is the engine that drives the logistics cycle; without information the logistics system would not run smoothly. The LMIS is the heart of the logistics system. An LMIS collects data about commodities; this information is often used for activities, such as filling routine supply orders and reorders for HFs.

Stock and transaction records are the core records in the inventory management system. They are the primary source of information used in the various LMS operations. They also constitute the source of data used to compile reports. Stock records can be either manual or computerized.

All the forms and documents necessary for LMIS must be available, and all personnel must be trained on their correct use before beginning distribution activities.

Some staff resists the implementation of inventory control systems. The reasons should not be ignored, but brought out into the open for discussion. Common reasons for resistance are a perceived lack of time for record keeping or a feeling that "this is not my job." Lack of appropriate training may also play a major role in such resistance.

LMIS standards

- Standard and harmonized tools
- Simple and user friendly
- Guidelines and/or manuals
- Dedicated information system personnel (data clerk)
- Training and quality assurance

LMIS challenges and problems

- Erratic and inadequate reporting
- Incomplete data
- Non-standardized forms
- Not timely
- Staff shortage
- No SOPs
- Inconsistent supply of tools

Table 8. Toward Strengthened LMIS

Good LMIS practice	Consequences if not practiced
Standardized tools and forms	Inconsistent, non-standardized data and reports
Adequate supply of forms	Inadequate forms result in not documenting transactions and opens the way for leakage, expiry, etc.
Dedicated staff	Shortage of staff makes availability of data and reporting difficult and affects availability of products when needed
Automation as appropriate	Efficient use of time and accuracy of data may be affected
Quality assurance	Poor data results in unreliable information for decision making
Timely reporting	Delayed reporting results in delayed supply availability
Accurate data	Inaccurate data affects availability and inventory control; reliable quantification and procurement is compromised
SOPs and training	Inconsistent and inefficient practice leading to unavailable supplies

MTP Implementation in LMIS (Hypothetical)

Review of record keeping at the HF shows inaccurate and delays in orders

Monitoring

The review at the HF pharmacy department showed unreliable transaction and consumption data and inaccurate data entry. Timely data entry is not done. This results in the lack of critical information needed to make procurement and distribution decisions. Such data lapses compromise inventory control and create an environment conducive to pilferage, etc.

Training

The MTP team discusses the root cause and the implication, especially its effect on timely ordering and ordering the right quantity. The team is made aware of the importance of good information system practice and data quality management. The team identifies measures that will be followed to address this challenge.

Planning

The MTP team develops a plan to address the challenge by assigning dedicated staff for record keeping, conducting data audits on a regular basis, and ensuring that reports are submitted on a monthly basis.

Rational Medicine Use

Rational medicine use (RMU) requires that patients receive medicines appropriate to their clinical needs, in adequate doses and quantities, and at the least expensive cost to the patient and/or health system. There are five important criteria in the rational use of medicines—

- Correct diagnosis depending on the state of the patient
- Prescribing of the most efficient, safe, and economic drug treatment according to the condition of the patient
- Correct dispensing of the prescribed medicine
- Appropriate packaging and labeling of the prescribed medicine
- Patient compliance in taking the prescribed medicine

The irrational use of medicines can destroy all the benefits of careful, cost-effective selection, procurement, and distribution of medicines. All the resources spent on bringing a medicine to the HF will be lost if the process cannot guarantee that the correct medicine is prescribed and dispensed to the correct patient, in an adequate dosage, with clear instructions, and in packaging that maintains the quality of the medicine. There are various common procedural and practical obstacles to RMU. Some obstacles in the areas of diagnosis, prescribing, dispensing, packaging, and poor compliance are listed below. Compliance is the degree to which the patient carries out the physician's instructions on how to take the prescribed drug and treatment. Many studies about outpatient compliance carried out in developing countries indicate that only about 50% of patients follow the instructions given by the physician. The main cause of poor compliance identified in these studies was poor interpretation of the directions, leading to taking the medication in the wrong dosage or frequency.

RMU standards

- Treatment based on proper diagnosis
- Training of prescribers and dispensers in RMU
- Use of STGs
- Establishment and implementation of DTCs
- Control on judicious prescription of antibiotics, injectables, and polypharmacy
- Compliance by patient
- Use of managerial, educational, and regulatory strategies to improve RMU
- Active management and reporting of adverse drug reactions (ADRs)

RMU challenges and problems

- Prescribers lack appropriate training and skills to give proper diagnosis
- Overworked prescribers
- Lack of basic diagnostic equipment and tests
- Using expensive drugs when equivalent, reasonably priced ones are available in the local market
- Polypharmacy (prescribing several drugs when fewer drugs would provide the same effect)
- Wrong quantity dispensed
- Incorrect or inadequate labeling or instructions
- Unsanitary practices
- Poor quality packaging material

Table 9. Toward Strengthened/Improved RMU

Good RMU practice	Consequences if not practiced
Prescribe drugs and treatment according to STGs	Irrational use promoted, treatment outcome compromised
Discourage polypharmacy	Wastage, high cost of treatment, side effects, poor compliance by patients
Improve dispensing practices	Unhygienic dispensing and poor packing may result in contamination and compromised outcome
Give correct and adequate instructions to the patient	Inadequate counseling affects adherence
Label the prescription container adequately (written or with symbols) before dispensing to the patient	Patient mistakes and poor compliance, compromised treatment outcome and safety concern
Establish a DTC	No leadership role, no accountability
Develop an SOP	Nonstandardized practice, no accountability
Track RMU	Irrational use promoted, treatment outcome compromised

MTP Implementation in Rational Use Antimalarial Products (Hypothetical)

Review of RMU at the HF shows adult dosage forms also being used for children

Monitoring

The review at the HF showed that, because of a shortage of ACTs for children, adult ACT packages of artemether-lumefantrine (AL) 24 tablets are being given to children by reducing the quantity to meet the pediatric dose. This is an irrational practice because it decreases the quantity meant for adults. The practice also leads one to believe that what is given out is the adult form. Correlating dispensed quantity to age groups is difficult. Repeated practice makes the practice normal and has implications on forecasting dosage forms by age groups. Regimen breakdown also becomes difficult.

Training

The MTP session analyzes the malpractice and identifies the causes. The participants understand that such a practice is the result of poor quantification. Lack of supervision and disallowing such a practice by the pharmacy dispensing unit is what is needed. Training is provided on regimen breakdown, and the importance of using the recommended package for the right age group.

Planning

Based on the need to address this challenge, the MTP participants develop an action plan for addressing this malpractice by accurate determination of need by age group. Good record keeping that breaks down the age category treated and the required age-specific dosage form helps as part of the solution.

Chapter 5. Monitoring and Evaluation of LMS

This section deals with M&E and the use of data and indicators for applying MTP in LMS. M&E are key for successful implementation of MTP in LMS for antimalarial drugs. MTP is intimately tied to reviewing the elements of the pharmaceutical management framework—identifying problems and solutions, setting targets, measuring progress toward meeting targets, and evaluating the different aspects of the implementation process. Generic assessments are conducted to identify successes, problems and gaps, and challenges and to benchmark levels of development in one or a combination of components at one or many levels. The M&E approach makes use of survey/assessment questionnaires, focus group discussions, observations, and other similar approaches.

The CPM approach in situation analysis takes several routes, one of which is the options analysis. The outcome of options analysis is a choice among two or more paths to take. This fosters greater ownership, a better chance for making adaptations, and greater chances of success. The process starts from what people have and what they do. Although option analysis/situation analysis is a one-off baseline or stock-taking of the situation, it must be complemented by a more continuous mode of situation analysis to understand the trends.

Evaluation is the observation of changes in selected indicators over time and across populations, plus a comprehensive assessment of program outcomes and impacts using qualitative and quantitative instruments. A program evaluation attempts to establish a causal relationship between effects and program interventions by describing what works, what does not, and why. It is an objective and systematic process for assessing the extent to which goals have been achieved, looking at relevance, effectiveness, efficiency, and impact of activities. Results are usually compared to baseline or midterm measurements. Evaluation is a learning and action-oriented management tool as well as an organizational process for improving current activities and future planning, programming, and decision making.

After an intervention has been identified, performance targets should be established. A performance target is a desirable and, in principle, attainable standard of practice. Indicators can be used to measure the extent to which the targets and objectives of an intervention are being attained. Locally appropriate performance targets should be set for each indicator. Evaluation measures the extent to which these targets have been reached.

Data Collection

Data collection for evaluating programs can take a quantitative or qualitative approach, or a combination of both. The quantitative approach means that the data collected will have numerical values and can be aggregated to give a quantitative indication of the indictors used. The qualitative approach seeks a yes and no answer or observational notations. Qualitative responses can be subjective at times.

Assessments can also take a structured or unstructured approach to collecting data. A structured approach uses well-designed questionnaires, pre-testing of the questionnaires, and proper sampling of the population. There are different tools that can be used or adopted. The key in assessment tools is the need to identify indicators that can be tracked in time to support the principles of an MTP.

Any tool used for the logistic system assessment should—

- Provide stakeholders with a comprehensive view of all aspects of a logistics system
- Be used as a diagnostic tool to identify logistics and commodity security issues and opportunities

- Raise collective awareness and ownership of system performance and goals for improvement
- Be used by country personnel as a monitoring tool (to learn and continually improve performance)
- Provide input for work planning

For example, the Logistics System Assessment Tool developed by USAID | Deliver can be used to complete an annual assessment as an integral part of the work planning process. The information collected using the logistic assessment tool is analyzed to identify issues and opportunities and, from those, used to outline further assessment and/or appropriate interventions. Another malaria specific indicator-based assessment tool, the Pharmaceutical Management for Malaria Manual developed by USAID/RPM Plus is designed to guide the review of availability and patterns of use of medicines for malaria treatment in public HFs, private facilities, pharmacies, and retail pharmaceutical outlets. The manual helps diagnose existing or emergent problems and provide the evidence required for making decisions about antimalarial medicines in the public and private sectors.

Because the assessments are conducted and analyzed in successive years, the results can be used to monitor and improve system performance and to provide critical data that can identify a country's commodity security strengths and weaknesses.

The logistic assessment can be conducted annually, or as agreed upon at different levels; the initial assessment can be followed every three months to track progress in performance against set targets. This a key approach for identifying challenges, gaps, and track trends in progress. This continuous system is beneficial for health-level performance monitoring.

Three methods for data collection can be used—

1. Discussion groups (preferred approach) that involve central- and lower-level participants; plan to conduct, at a minimum, one discussion group of central-level people
2. Interview guide to conduct key informant interviews at both the central and lower levels
3. A checklist to track different indicators

Data analysis and development of recommendations and an action plan should take place immediately following data collection. To develop and prioritize a set of objectives and interventions that will address issues raised during the assessment, this process should include a thorough review of system strengths and weaknesses.

It is highly recommended that the discussion group participants or interviewers and interviewees complete a limited number of field visits. These visits can be made pre-data collection to sample current circumstances or post-data collection to follow-up on issues that arise during data collection.

Data analysis and development of recommendations and a work plan should take place immediately following data collection. To develop and prioritize a set of objectives and interventions that will address issues raised during the assessment, this process should include a thorough review of system strengths and weaknesses.

Table 10. Example Checklist of Generic Standards of Practice

		Yes or no
Selection	Is there a national drug list?	
	Is there a facility-level formulary?	
	Is there an STG?	
	Is there an SOP that guides selection?	
Quantification	Is there a quantification committee?	
	Is there a tool for quantification?	
	Is quantification participatory?	
	Is quantification conducted on the basis of reliable consumption data?	
Procurement	Is there a representative procurement committee?	
	Is procurement competitive and done in a transparent fashion?	
	Is adequate funding available for procurement of all needs?	
	Is procurement guided by official guidelines/SOPs?	
Distribution	Is distribution based on a pull method?	
	Is there an IPLS system?	
	Is there an adequate and functional transport system?	
	Is distribution guided by an SOP?	
Storage	Is the storage space adequate?	
	Are drugs organized on shelves and pallets?	
	Are refrigerators and freezers adequate and optimally functional?	
	Is FIFO/FEFO in practice?	
	Is the store clean and organized?	
Use/Dispensing	Is dispensing done in an environment that ensures privacy?	
	Is standard prescription used for prescribing?	
	Is there a functioning DTC in the HF?	
	Is a medication/treatment register maintained?	
Inventory control PMIS/LMIS	Are stock cards, bin cards, and order supply forms used?	
	Is stock inventory and expiry status tracked every month?	
	Are expired drugs and obsolete products segregated and disposed of on time?	
	Is there a stock status reporting mechanism in place?	

Indicator tracking or monitoring is a key activity in MTP implementation. The MTP team is responsible for identifying pharmaceutical management indicators to track process and results. The table below shows how to calculate illustrative indicators used in LMS.

Sample Malaria LMS Indicator Calculation

Indicator name	Computation
1) Average percentage of a set of unexpired antimalarial medicines being available	$\frac{\text{Number of antimalarial medicines with unexpired stock}}{\text{Total number of antimalarial medicines normally stocked}} \times 100$
2) Percentage of stock items that were out of stock for 3 or more days in the last 3 months	$\frac{\text{Number of items with a stock-out of 3 days or more in the last 3 months}}{\text{Total number of items}} \times 100$
3) Percentage of items supplied out of a total of items requested	$\frac{\text{Total number of supplied items}}{\text{Total number of items requested}} \times 100$
4) Percentage of prescribed antimalarial medicines actually dispensed	$\frac{\text{Number of prescribed medicines actually dispensed}}{\text{Number of prescribed medicines presented for dispensing}} \times 100$
5) Average number of days that elapsed between sending an order to the warehouse and receiving the drugs and supplies	Number of days between ordering and receiving ordered items
6) Average percentage of stock records that correspond with physical counts for a set of antimalarial medicines	$\frac{\text{Number of tracer items where stock records count equals physical stock count}}{\text{Total number of items counted (from the indicator drug list)}} \times 100$
7) Percentage of stock cards up-to-date	$\frac{\text{Total number of up-to-date stock cards}}{\text{Total number of stock cards}} \times 100$
8) Percentage of LMIS reports submitted complete and timely (during the year)	$\frac{\text{Total number of complete and on-time LMIS reports}}{\text{Total number of LMIS reports}} \times 100$
9) Percentage of drugs prescribed according to STGs	$\frac{\text{Total number of drugs prescribed from STG}}{\text{Total number of drugs prescribed}} \times 100$
10) Percentage of malaria patients/caregivers who could correctly describe how to take/give the prescribed antimalarial medication	$\frac{\text{Total number of patients/caregivers who correctly describe how to take/give medication}}{\text{Total number of patients/caregivers interviewed}} \times 100$
11) Percentage of encounters with pregnant women who are prescribed appropriate antimalarial intermittent preventive treatment at antenatal clinics	$\frac{\text{Total number of antenatal encounters prescribed antimalarials}}{\text{Total number of antenatal encounters surveyed}} \times 100$
12) Percentage of facilities that use standardized checklist to monitor storage condition (adequacy of space, availability of shelves, cleanliness, organization etc.)	$\frac{\text{Total number of facilities that use standardized checklist}}{\text{Total number of facilities}} \times 100$

Chapter 6. LMS Forms and Practicum

MTP's monitoring segment cannot be successfully implemented without ensuring uninterrupted supply and proper use of standard PMIS/LMIS tools at all levels. Information for decision making in quantification, procurement, distribution, expiry tracking, and rational use is contingent on availability of accurate and timely data. Having a good understanding of key LMIS tools and developing the skills and abilities to use them is a prerequisite for effective application of the MTP approach in malaria commodities LMS. This section is designed to give users a description and step-by-step guide on key LMS forms and checklists so that they have the necessary tools for evidence-based tracking of performance and documenting improvement. The following tools and guidelines are considered key in LMS.

1. Order and supply form
2. Stock card
3. Bin card
4. Medication/dispensing register
5. Prescription paper
6. Conducting inventory
7. Monitoring storage
8. Monitoring expiry date/Expiry tracking chart
9. Disposing damaged/expired drugs
10. Monitoring data consistency and accuracy

Order-Supply-Receipt Form

The order-supply-receipt form provides key transaction activities in one form. It has elements of reporting, calculating need, and making a request by an HF and is also used by the issuing unit as a supply voucher and confirmation of receipt by the requester. It is prepared in triplicate copies so that each transacting body has its respective documentation.

Placing an Order (Under Requesting Section, Items Ordered)

- At the top of the form, fill out the name of the health institution and the form's serial number
- **Requesting section:** enter the name of the section in the facility making the order
- **Code:** stock number or code of the item used by the health system; may be a national code
- **Description:** the name, strength, and size of the package for the stock item
- **Unit:** unit of measure for making the order, issue, and receipt
- **Stock on hand:** the current quantity of the item in the storeroom that can be distributed or dispensed
- **Quantity ordered:** the quantity of packages being ordering for each stock item
- **Ordered by:** the person placing the order must print his/her name legibly
- **Signature:** the person placing the order must sign his/her name legibly

Order-Supply-Receipt Form

Name of the health institution:	Serial no

Requesting section:					Supplier/date:						
	Items ordered				**Items supplied**					**Items received**	
Code	Description (name, strength, dosage form, and pack size)	Unit	Stock on hand	Quantity ordered	Quantity supplied	Expiry date	Batch no.	Unit cost	Total cost	Quantity received	Remark/discrepancy

Ordered by:	Approved by:	Supplied by:	Received/inspected by:
Signature:	Signature:	Signature:	Signature:
Date:	Date:	Date:	Date:
Delivery mode:	Delivering person:		Signature:
Comments:			

- **Date:** the date that the order form was filled out
- **Approved by:** the person responsible for approving the order must print his/her name legibly
- **Signature:** the person approving the order must sign his/her name legibly
- **Date:** the date that the order form was approved
    - The person who approves the order should make sure the same unit is used consistently for Unit and Quantity ordered. For example, if the stock unit on the paracetamol stock card is bottles of 1000, then indicate the number of bottles in stock and the number of bottles to order, not the number of tablets.

Filling an Order (Under Supplier/Date, Items Supplied)

When the storeroom, warehouse, or hospital receives a filled out order-supply-receipt form, space must be reserved in the storeroom or warehouse to collect the stock items ordered. Using the same document on which the order was placed, fill out the middle column as described below.

- **Supplier/date:** the name of the storeroom, warehouse, or hospital that will send the stock items requested on this form and the date the order was received
- **Quantity supplied:** note the quantity of each item removed from stock to send to the requester
- **Expiry date:** for each item, write the date that the item will expire
- **Batch no.:** specific number assigned to quantity of a manufactured product intended to have uniform character and quality, within specified limits, and produced according to a single manufacturing order during the same cycle of manufacture
- **Unit cost:** write the cost of a single unit for each item
- **Total cost:** calculate the total cost of each item by multiplying the unit cost times the quantity of the item supplied
- **Supplied by:** the person filling the supply order must print his/her name legibly
- **Signature:** the person filling the supply order must sign his/her name legibly
- **Date:** the date that the order was filled

Send the Order Form

- Keep a copy of the order form that has been filled out
- Send the other copy or copies to the storeroom, warehouse, or hospital from which drugs and supplies are normally received

Receiving Drugs and Supplies (Under Items Received and Delivery Mode)

When the supplies are delivered, the HF must be ready to receive them. As with ordering and delivering, receiving should be documented. Using the same document on which the order was placed and filled, document receipt of the items as described below.

- Place the drugs and supplies in a secure area in the storeroom
- Obtain the order-supply form that accompanied the delivery
- Be sure that the driver fills in the line near the bottom of the form with Delivery mode and Delivering person (printed legibly)

- **Quantity received:** count the boxes or containers of each item received and put the number in this column
- **Remark/discrepancy:** after counting all the items, record any discrepancy between the Quantity supplied and the Quantity received columns; notes can also be made in the Comments line at the bottom of the form
- **Received/inspected by:** print your name legibly in this space
- **Signature:** sign your name legibly in this space
- **Date:** the date that the order was received and counted
- Have another responsible person recount the items received
- **Signature:** the second person that counted the items should sign legibly in the space below the date

Stock Cards

A **stock card** is an inventory control card that is maintained for each item. As an inventory control card, it is normally kept outside the store by the facility procurement and distribution unit, as opposed to the **bin card** which is kept next to each product in the store and maintained by the store keeper. These cards show how much of the item is in stock at that time; allows staff to calculate how much of that item has been used within a given period; helps monitor theft and losses; helps staff determine whether an item is overstocked or understocked; records amounts ordered, received, and consumed of each item; and provides information for quantifying future needs.

Basic Components of a Stock Card

- Always have a separate stock card for each inventory item
- **Name and strength** of the drug; for example, AL 20/120 mg
- **Unit:** dispensing or distribution unit of measure. It is important to determine in what unit the item is going to be distributed (i.e., by bottles of 500 tablets or base units such as by tablet, capsule, milliliter, etc.). When supplies don't arrive in predetermined units of measure, the employees in the storeroom become confused when attempting to fill out stock cards.
- **Item code:** unique drug identification code used by the health system
- **Expiry date:** date printed on the container of drugs and supplies that is determined by the manufacturing company. When the item passes this date, the manufacturer does not guarantee the potency, purity, or safety of the product.
- **Average monthly consumption:** average quantity of a stock item expected to be consumed per month, calculated on previous consumption data from a specified number of months
- **Minimum stock level:** when stocks are depleted to the minimum stock level, the item must be reordered
- **Maximum stock level:** total quantity necessary to meet the needs of all HFs in the distribution area

Sample Stock Card

Name of the Health Institution: CMS

Product Name: Paracetmol **Strength:** 500 mg **Dosage Form:** Tab

Unit of Issue and Pack Size: 1000 tablets

Maximum Stock Level:

Reorder Level:

Minimum Stock Level:

Avg. Monthly Consumption:

Date	Voucher no. (receiving or issuing)	Received from or issued to	Quantity			Unit price	Expiry date	Remarks
			Recd.	Issued	Balance			
Jan 1	1997 inventory				50			
Jan 15	Req#11	Kamanga		5	45			
Feb 18	Req#3	Zomba		20	25			
Mar 22	Req#10	Salima		5	20			
Apr 6	Req#43	Lilongwe		8	12			
May 10	LI-3		100		112			
May 15	Req#50	Lilongwe		25	87			
Jun 20	Req#53	Salima		30	57			
Jun 30	Req#59	Zomba		25	32			
Jul 1	Req#62	Kamanga		15	17			
Aug 3	Req#70	Zomba		17	0			
Sep				X	0			
Oct				X	0			
Nov 4	SU-15		200		200			
Nov 6	Req#72	Zomba		30	170			
Nov 8	Req#78	Lilongwe		40	130			
Dec 31				0	130			

Year:	20__	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Received		50 bf				100						200		350
Issued		5	20	5	8	25	30+25	15	17	X	X	30+40	0	220
On-Hand		45	25	20	12	87	57	32	17	0	0	130	0	
Expired														

Stock Cards and Registers

All stock cards and inventory control registers must be maintained in a clean, legible, and up-to-date manner. For more details on how to fill and use stock cards, see the section on stock cards above (page 40).

Definitions of Calculations from the Stock Card

The stock card provides information so the storeroom manager can make better decisions on the distribution of stock items. The stock card can be used to obtain the following calculations and information.

AMC = average monthly consumption; normally, the average number of units expected to be dispensed or distributed per month

SO = stock on order; total quantity ordered of an item that has not been disbursed

PP = procurement period; established time interval until the next order will be placed

SS = safety stock; reserve stock of an item needed to prevent stock-outs due to either late receipt of orders or to an increase in the use of the item

S_{max} = maximum stock level; total quantity necessary to meet the needs of all HFs in the distribution area

QO = quantity to order; total quantity of an item in the current requisition

SB = stock on back order; when an item is back ordered, it means an order is placed for the item, it is at the manufacturers, and shipment/receipt is awaited.

SI = stock now in inventory; quantity of an item available for dispensing or distribution, including safety stock

D_{exp} = expiry date; quantity of a product likely to expire before use

Use data in the stock card above in the exercises that follow. These calculations are used in a system of programmed procurement, which is the system used most by governments.

Average Monthly Consumption (AMC)

AMC can be calculated using the sum of quantities dispensed or distributed over a period of time, normally 12 months. Use the monthly disbursement data from the previous page to review how disbursements were broken up during the year.

Note that in the month of August there was a stock-out and no paracetamol could be distributed during September and October. For those months, mark disbursements as "X." Note also that in December, there was no distribution at all, but there was stock on the shelves. For this month, count disbursements as "0."

Furthermore, for the formula below, only count 10 months because there were 9 months when drugs were distributed plus 1 month when drugs were in stock, but none were requested for distribution. Do not include the months of September and October in the formula because stock-out of paracetamol occurred. Finally, divide the total number of paracetamol units consumed during the year by 10 (9 + 1 months). To review:

X = stock-out, therefore do not count this month in the formula

0 = stock exists but not requested, therefore count this month in the formula

$$AMC = \frac{5 + 20 + 5 + 8 + 25 + 55 + 15 + 17 + 70 + 0}{10}$$

= 220/10

= 22 bottles of 1000 tablets per month, or 22,000 tablets per month

Stock on Order (SO)

SO is calculated by multiplying AMC by the procurement period (PP). If the drugs and supplies are reordered every 6 months (PP), then—

SO = AMC × PP

= 22,000 tablets per month × 6 months

= 132,000 tablets, or 132 bottles of 1000 tablets

Safety Stock (SS)

SS is necessary to protect the storeroom from stock-outs and provide a safety net for variation within the procurement system. There is no single formula for calculating the SS level; however, this number is usually calculated from AMC. For example, if stock is normally distributed every 6 months and the facility intends to have enough SS for 2 months to account for slower than normal delivery, then—

SS = 2 × AMC

= 2 months extra for distribution × 22,000 tablets per month

= 44,000 tablets, or 44 bottles of 1000 tablets

Maximum Stock Level (S_{max})

S_{max} is used to define the total quantity of an item to stock. To obtain this number, add SS and SO. For this example, PP is also 6 months.

S_{max} = SS + SO

= SS + (AMC × PP)

= 44,000 tablets + (22,000 tablets × 6 months)

= 44 bottles + (22 bottles × 6 months)

= 176,000 tablets, or 176 bottles of 1000 tablets

Quantity to Order (QO)

Using the figures for S_{max}, stock on back order (SB), stock now in, inventory (SI), and SO, it is possible to calculate the quantity of each stock item to order at one time.

Use the S_{max} value calculated above for paracetamol (176,000 tablets, or 176 bottles of 1000 tablets). SB can be gathered from past records; for this example, SB is 5000 tablets. From the sample stock card, use the SI for July 1 (1000 tablets × 17 bottles, or 17,000). Use the SO calculated previously (132,000 tablets, or 132 bottles of 1000 tablets).

QO = (Smax + SB) – (SI + SO)

= (176,000 + 5,000) – (17,000 + 132,000)

= 181,000 – 149,000

= 32,000 tablets, or 32 bottles of 1000 tablets

Quantity of Drugs and Supplies Likely to Expire Before Use (D_{exp})

Finally, it is possible to calculate the quantity of a product likely to pass the expiry date. This calculation helps in using the stock before it passes the expiry date, which causes waste of drugs and money. It also helps determine if stock-outs could occur, caused by the loss of stock due to expiry. To calculate the quantity of paracetamol at risk of passing the expiry date (D_{exp}), assume there are 2 months to expiry and today's date is June 20. Using the sample stock card for paracetamol, calculate D_{exp}.

D_{exp} = SI – (number of months until expiry date × AMC)

= (57 bottles × 1000 tablets) – (2 months × AMC)

= 57,000 – (2 × 22,000)

= 57,000 – 44,000

= 13,000 tablets, or 13 bottles

In this example the quantity likely to expire is 13,000, because the current stock exceeds the quantity likely to be consumed over the next 2 months.

Bin Cards

Bin cards help track movement of stock in the pharmacy or drug store. It documents sources of supplies, batch numbers and expiry dates, quantities received or issued from the store, and balances on hand. It also defines safety stock and maximum and minimum stock levels.

The card is filled every time a stock is received and when issues are made. The issue data can be completed every week, every two weeks, or every month after totaling the dispensed quantities from the treatment or medication register.

Different bin cards are to be used for different forms (tablet, liquid ointment, injection, etc.), strengths (e.g., amoxicillin 250 mg and amoxicillin 500 mg), and units of an item (e.g., bottle of 1000 tablets or bottle of 500 tablets). In case of ACTs, such as Coartem, although tablets have the same strength, there are different packages with different units based on body weight. Therefore, when recording the quantities received or issued, the four different packages (AL6, AL12, AL18, and AL24) should be treated as different medicines each with a different stock card. When the card is full, it is filed properly and a new card prepared for continuing the work.

Instructions on How to Fill a Bin Card

1. In the first row, write the name of health institution or facility.
2. In the second row, write the name of the drug, strength, and dosage form (e.g., paracetamol 500 mg tablet).
3. In the third row, write the issue unit of the drug (e.g., tablet, dose, bottle).
4. In the first column, enter the date the transaction was performed (e.g., date the drug was issued from the store).

Bin Card

Name of the health institution										
Name, strength, and dosage form of the product										
Unit of issue										
Date	**Document number (receiving or issuing)**	**Received from or issued to**	**Quantity**				**Batch no.**	**Expiry date**	**Remarks**
			Received	**Issued**	**Loss/Adj**	**Balance**			

5. In the second column, write the reference number of the document used to receive or issue the product.
6. In the third column, write where the product was received from or to whom it was issued.
7. In the fourth column under Quantity Received, write the quantity of drug received from the HC or district by the unit described in row three.
8. In the fifth column under Quantity Issued, write the quantity issued to the patient or the total for the day issued by the unit described in row three.
9. In the sixth column under Quantity Loss/Adj, write the quantity lost or correction made.
10. In the seventh column under Quantity Balance, write the quantity remaining on hand after receiving the drug, issuing the drug, or making any loss or adjustment.
11. In the Batch no. column, write the batch number from the document that came with the transaction or from the original container.
12. In the Expiry date column, write the date on which the item will expire from the document or original container.
13. In the Remarks column, write any comments or information that would be useful to explain certain shipments or issues or that would provide clarification of losses or adjustments. Use it to sign your name when a physical inventory is done.

Drug Dispensing Register

The treatment, medication, or dispensing register is a register with columns and rows used to write the details of the patient, the diagnosis, and the drugs given. This is maintained by the dispenser in place of the so-called prescription register which is available in many facilities. The source of the information is the prescription paper. It is not the same as the consultation register which is a clinical document kept by the prescriber or card room.

Vital information to record include patient names, illnesses being treated, medicines dispensed, and quantities dispensed. Information from the dispensing register is vital for accurate calculation of monthly consumption of each product in the pharmacy or drug store. The register is filled every time a patient is served. The register can be totaled at the end of the day. The monthly summary can be obtained by totaling the daily totals. The register is a user-friendly form that does not involve a lot of writing. Most of the spaces are filled by either ticking or writing quantities.

The advantage of this form is that it allows the staff to get a statistical total of persons treated broken down by age, sex, diseases, and totals of drugs. Therefore, it is an important tool for getting information to complete monthly reports. It also serves as a handy tool for supervisors to check the accuracy and progress in activities related to treatment and supplies.

How to Fill the HF Treatment/Dispensing Register

The medication register is kept at the HF and is completed by the health worker every time a patient consultation is provided.

At the top, write the name of the HF.

1. As each patient is treated and added to the register, in the No. column, number the patients 1, 2, 3, etc., to make it easy to tally the number of patients.
2. In the next column, fill in the date the patient was treated.
3. In the Card number column, fill in the patient's serial or card number.

Page from a Drug Dispensing Register

Name of the health institution: _____

Treatment	Other							
	Albendazole tab							
	Iron/multivitamin							
	Antacid							
	Aspirin/paracetamol							
	ORS							
	Co-trimoxazole 480 mg tab							
	Artesunate suppository							
	Chloroquine syrup							
	Chloroquine tab							
	Coartem 24 tabs pack							
	Coartem 18 tabs pack							
	Coartem 12 tabs pack							
	Coartem 6 tabs pack							
Disease condition	Other							
	Gastritis							
	Skin infection							
	Anemia							
	Eye infection							
	Pneumonia							
	Watery diarrhea							
	Intestinal worm							
	Pain/fever							
	Malaria							
Age	14 years							
	9 < age ≤ 14 years							
	3 < age ≤ 8 years							
	≤ 3 years							
Sex	Female – Not pregnant							
	Female – Pregnant							
	Male							
	Patient's name						Count	Sum
	Card number							
	Date							
	No.						Total	

4. Next write the full name of the patient.
5. Under the column for sex, mark the gender with a tick (✓) or (X).
6. Under the column for age, either tick (✓) or (X) under the respective age category or right the actual age.
7. The Disease condition column lists the approved disease types that can be treated by a health worker and are pre-filled in each column.

   Under each column, indicate the type of diagnosis or disease condition managed by marking with (✓) or (X). If the managed condition is not in the list, use the column marked Other.
8. The Treatment column lists the approved drugs that a health worker can use to treat the diagnosed disease conditions and are pre-filled with the name of the drug in each column.

   Under each Treatment column, indicate the number of tablets or doses. In the case of ACTs, enter the number of doses (not the number of tablets). If the name of the drug is not in the list, use the column marked Other.
9. At the end of the page, enter the totals as soon all the rows are complete.
10. The Count total is the sum of male, female, different age groups, and each disease condition.
11. The Sum total is the sum of the quantities of drugs given to patients.

Depending on the schedule, make a report every week, two weeks, or monthly.

Prescription Paper

The prescription paper is the official form used by a clinician/prescriber to order medicines for the patient. It is also the official form that the dispenser uses to give the medicine to the patient. It is usually serially numbered and kept securely by the prescriber. Once the prescription is filled, the prescription form is kept in the pharmacy as evidence of issuing the medicine and as reference for future use if a problem is reported. Most facilities maintain a register of prescriptions (prescription register/medication register/dispensing register). Prescriptions are kept for a minimum of five years before being disposed. It is mandatory that the prescriber complete fill in all the spaces on the paper. If a prescription is filled partially because some of the prescribed medicines are not available, the pharmacy should make a copy and give it to the patient so the patient may get it from another place or pharmacy.

The following are the key components of a prescription—

- Name of patient
- Date drug was dispensed
- Name of the drug
- Strength of the drug
- Quantity dispensed
- Instructions on how to take the drug during the day (example: 1 tablet 4 times daily)
- Instructions on how long to take the drug (example: for 5 days)
- Comments, instructions, or warnings specific to the drug (example: take with milk, may cause drowsiness)

The following is an example of a standard prescription paper.

[HEALTH FACILITY LOGO GOES HERE]

Prescription Paper

No. _____

Name of the health institution: _____ Date: _____

Patient's name: _____ Sex: _____ Age: _____

Weight: _____ Card no. _____ ☐ Inpatient ☐ Outpatient

☐ Start ☐ Refill

Diagnosis (ICD code no.) _____

Address: Region: _____ District _____ Community _____

House no. _____ Tel. no: _____

Treatment given (Drug name, strength, dosage form, dose, duration, and quantity)	Price of each item (for dispenser's use only)	
RX		
Total cost of drugs		

Refill: _____

	Prescriber's	**Dispenser's**
Full name	_____	_____
Qualification	_____	_____
Registration	_____	_____
Signature	_____	_____

How to Conduct Inventory

The objective of a physical inventory is to reconcile actual physical stock with the stock detailed in the record-keeping system (such as stock cards, bin cards, registers, and computer).

Any discrepancies found either in the physical stock or stock cards (or in the computer) should be resolved during this activity.

Physical inventory is done for accounting purposes as well as to ensure that the stock in the warehouse is traceable (that is, discrepancies can be explained and their origins can be traced).

Schedule for a Complete Physical Inventory

Ideally, a full inventory should be done every six months, but no less than once a year, for a large warehouse. Performing a complete physical inventory may require closing the storage facility for a day or longer. Any pending transactions should be finalized, and any new transactions should be postponed after this activity is finished.

For a smaller pharmacy, a complete physical inventory should be performed once a quarter or once a month.

How to Perform a Complete Physical Inventory

1. On the date of physical inventory, any new transactions should be frozen. A state of the inventory report, which indicates the available stock, should be prepared and printed. In addition, a working document of inventory status that lists the individual products, with a blank space to fill in the quantities and batches found in the warehouse, should be printed out. *Important:* No recorded quantities are mentioned in this paperwork.
2. The storekeepers count the items assigned to them and record the quantities counted for each batch. For each item, the storekeeper also notes, on the inventory form, any difference between the inventory count and the quantities on the stock card. *Note:* If the staff is large enough, two storekeepers perform the count independently for the same list of items.
3. Once the first count is completed, the list is handed to the physical inventory coordinator. The coordinator then cross-checks the results of physical stock-taking with what is listed in the register (or computer system).
4. If a discrepancy in either the quantities or batch numbers is noted, a second count should be carried out by someone other than the person(s) who did the first count.
5. If the second count tallies with the record keeping (register or computer), it is marked correct. If there is still a problem, the warehouse manager then carries out a third count, and if possible, stock movement (recorded in the computer or in a manual register) is checked to help investigate the discrepancy.
6. Once discrepancies are investigated and resolved, changes in the stock record-keeping register or computer system are then made. Attached to the documentation of the movement of the stock should be a report detailing the reasons for the changes.
7. Once the inventory has been completed and all corrections are made, an inventory status report is prepared and printed out. This report should indicate all the changes made and their impact on the total figures in terms of quantities and monetary values.
8. Feedback is an important last step. Depending on the problems encountered, the manager must make recommendations to minimize future mistakes and to identify any procedures that need to be changed.

Cyclic or Random Physical Inventory

This type of inventory is appropriate for facilities that manage larger quantities of medicines.

It helps to trace the causes of discrepancies between physical inventory and the records and to correct them. This action decreases the number of changes that need to be made during the complete physical inventory.

A schedule should be posted to remind the storekeeper to perform this inventory.

The inventory could be organized and scheduled weekly or biweekly in different ways, for example—

- By aisles, shelves, or some other block of space
- By medicine form (such as tablets, injections, liquids)
  - For example, during one week, different storekeepers are responsible for counting some selected shelves or a certain list of medicine forms. Any discrepancies should be verified by a second and, if necessary, a third person.
  - The counting should be performed when the workload is light and the movement of orders and supplies is at a minimum. The group of items counted should be off limits until the count is made.
  - The procedure used for this type of inventory is similar to that used for the complete physical inventory. See the working documents and processes described above.

Stock Card Inventory

The objective of this type of inventory is to check the accuracy of the stock cards and avoid any mistakes that could be carried along for a longer period of time.

Periodically, the manager prepares a list of a certain number of items selected randomly, goes to the warehouse, and checks the stock card and the physical stock. The quantities found are then compared to those in the computer. If any discrepancies are found, corrective action is taken and noted.

Daily Inventory Reconciliation

Each time stock moves, either coming in or being removed for an order, the storekeepers must check the stock cards and the physical stock when feasible. They must notice, for example, whether a batch requested is missing or whether the quantities shown in the records differ from the quantities in the physical inventory.

If changes are needed, the warehouse manager must be notified, and the corrected amount should be entered using a different colored pen (or mark) to indicate that it is a correction.

Monitoring Storage

The following issues need to be considered to adequately address the challenges of storage.

Heat

Very often heat accelerates the deterioration of drugs, and it is an important factor to consider in tropical countries.

- Air conditioning, if available, will resolve the problem
- Other, cheaper alternatives exist, but aren't as effective in reducing temperature in storerooms (window fans, exhaust fans, and high ceilings)
- Always keep vaccines in the refrigerator

Light

Some items deteriorate when exposed to light. Verify that items that are sensitive to light are packaged adequately to protect them. See the guide following this section.

Humidity

Mildew is caused by high humidity and is difficult to combat. When it is not possible to get air conditioners and dehumidifiers, the following measures will minimize destruction caused by humidity—

- Construct the storeroom to promote air circulation
- Make sure there are spaces between shelves and floor pallets to allow air circulation
- Prevent drugs and supplies from being exposed to air by using closed containers

Rats and Insects

To protect against rats and insects—

- Prohibit the consumption of food in areas where stock items are stored
- Clean the storeroom areas regularly

Theft

Minimize theft through the following actions—

- If doors are not properly secure, perform periodic audits to detect any theft
- Allow only authorized persons into the storeroom
- Place strong locks on doors and security bars on windows
- Maintain good control of stock cards and registries to detect theft, should it occur
- During distribution to the HFs, carefully verify quantities delivered

Expiry Dating

Minimize losses due to expired drugs and supplies by using the following methods—

- Calculate stock requirements correctly
- Distribute drugs and supplies using the FEFO method
- Note expiry dates on stock cards
- Return excessive stock items to warehouses for redistribution to other HFs

The following table is a guide to monitor appropriate storage conditions of selected items. This exercise should be conducted at least every six months.

Table 11. Storage Recommendations for Stocking Some Essential Drugs

Drug	Storage temperature	Protect from	Comments
Acetylsalicylic acid	< 30 °C	Light, humidity, heat	Acetic acid smell indicates deterioration; very stable
Chloroquine HCl tab	15–25 °C	Air, light	Very stable < 30 °C
Paracetamol/acetaminophen elixir			
Sulfamethoxazol/trimethoprine tab		Air, humidity, light	
AL tabs		Humidity	
Artemether-amodiaquine tab			
RDTs	≤ 30 °C		

Use the following checklist to monitor and evaluate the storeroom for security, theft, and protection of drugs and supplies.

Table 12. Checklist for Evaluating the Storeroom

Inside		**Yes**	**No**
Easy to move about in the storeroom			
Windows	▪ Sashes in good shape ▪ Security bars intact ▪ Windows clean ▪ Mosquito screen intact		
Doors	▪ Frames in good shape ▪ Doors in good shape ▪ Hinges in good shape ▪ Locks in good shape		
Good air circulation	▪ Shelves and pallets 0.5–1.0 m from wall ▪ Pallets about 10 mm off floor		
Ventilators	▪ Security bars intact		
Ceiling	▪ Smooth with no false ceiling		
Walls	▪ Clean ▪ Painting in good condition ▪ Signs of dampness		
Floor	▪ Clean ▪ Smooth ▪ Intact		
Shelving	▪ Intact ▪ Smooth surfaces ▪ Clear markings or signs		
Cabinets	▪ Intact ▪ Closed ▪ Function well		
Refrigerators and freezers	▪ Function well		
Cold room	▪ Functions well		
Special storage	▪ For narcotics and psychotropics		
Pests	▪ Free of insects ▪ Free of rats		
Utilities	▪ Existence of electric current ▪ Presence of running water		
Outside		**Yes**	**No**
Roof	▪ In good condition		
Walls	▪ In good condition		
Surroundings	▪ Free of trash, litter, tall grass		

Monitoring Expiry

Insufficient monitoring is one of the major reasons that medicines expire without anyone noticing that the product shelf life is nearly up. This oversight might lead to loss of a significant amount of resources (particularly money), especially in resource-limited countries and is by no means acceptable for medicines, such as ACTs, antiretroviral drugs (ARVs), etc., which are expensive. To avoid such unnecessary waste, the expiry dates of drugs must be monitored closely and regularly.

Expiry dates can be monitored using simple techniques that are easy to perform and enable the store manager to track medicines that will expire within a specified period. These techniques include the following—

- Facilities should regularly monitor expiry dates. Note expiry dates on stock cards or specific charts or tables upon receipt.
- Return excess stock items to warehouses for redistribution to other HFs. The district or provincial warehouse will send these items to pharmacies that need them.
- Newly delivered stock that is nearing expiry should not be accepted unless the product can be used before expiry.
- Expired medicines should be removed immediately from stock.
- Calculate stock requirements correctly to help prevent expiration of stock in inventory.
- Periodically, examine the invoices for all medicines and supplies received during the last period (for example, three months or the ordering period).
- If any stock items have only a few months left before expiring, check the average monthly consumption quantity of the item to determine if it will be used during that time.
- If any stock items are likely to expire before being used, quickly return them to the distribution warehouse.

Expiry Date Tracking Chart

The expiry date tracking chart is a single-page form used to easily trace expiry dates of drugs. It uses colored stickers to track products by batch numbers and quantities that have six months of shelf life remaining. By monitoring the expiry date, the facility can either transfer drugs to other facilities or return them to the supplier to avoid loss due to expiry. Colored stickers (usually red and yellow) are used to determine products nearing expiry.

Immediately after receipt of new stock, the pharmacy personnel in charge of the main store and outpatient and inpatient pharmacies should—

1. Record all the items received with their batch numbers in the expiry date tracking chart. Note that the same drug may have different batch numbers. Each product has space to list three different batches. If you have more than three batches, record the three that expire first.
2. Fix the yellow stickers on the appropriate space that corresponds to one month before the expiry date.
3. Fix the red stickers on the appropriate space that corresponds with the actual month of expiry.
4. Hang the chart on a wall for easy reference.
5. At the beginning each week, look at the charts and note those items to which a yellow record has been affixed in that particular month.

Expiry Date Tracking Chart

Drug	Batch no	2013												2014											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Coartem 1	AXIP/202		12	8	5	○						●													
	GSK8/11														○						●				
Coartem 2	AX66/25						40	24	15	○						●									
Coartem 3	FS44356																								
Coartem 4	FD23431																								

6. Report the lists of items that are going to expire within six months (those with yellow stickers) to the head of the pharmacy department.
7. Review past consumption data of these products with the head of the pharmacy department and decide whether to retain them or arrange for transfer to other HFs.
8. For the three months before the yellow warning dot, enter the current stock level of that batch in the relevant grid (e.g., 12, 8, and 5 or 40, 24, and 15 packages on hand as shown in the example in the first and third rows). The stock levels also show the rate of consumption and determine how much, if any, stock to return.
9. Remove the red dot only after the expired stock has been destroyed or removed from the stock.
10. When a batch expires or is used up, erase the entry and replace it with the next batch to expire. When drugs and supplies are received, enter the new batch number and expiry date on the chart.

How to Properly Dispose of Damaged and Expired Drugs

The store manager separates damaged or expired drugs and makes the necessary adjustments to the stock card and bin cards.

1. The pharmacy personnel in charge of dispensing drugs from the inpatient and outpatient pharmacy—
   - Removes damaged or expired drugs and transfers them to the main store
   - Makes the necessary adjustments to the inventory card

   Note: Transfer of damaged or expired items from dispensaries to the main store could be affected by using the internal transfer described in the procedures for drug stock exchange or transfer between HFs.
2. The store manager keeps all stock for destruction separate from other stock in the main store.
3. The head of the pharmacy department will complete the disposal certificate form and submit it to the DTC/region/district as the case may be with a letter of disposal permit attached to it.
4. A site for disposing the drugs is selected by the disposal team (which includes the store manager, a witness from the HF [preferably a pharmacist], and a representative from the DTC, region, or district).
5. The drugs are disposed at the selected site by the disposal team.
6. A disposal certificate is signed, stamped, and given to the HF by the DTC, region, or district. It shows the date on which the item was disposed, a complete description of the item(s) disposed, the quantity of the item disposed, the total cost of the item disposed, the date on which the item expired, the number written on the package by the manufacturer (batch number), and the country where the drug was manufactured.

Because this process can be different in each country, the disposal approach must be in line with the countries' accepted practices.

Monitoring Data Consistency and Accuracy

The manual procedure described here will check for the accuracy of compiling of the reports.

One approach for assessing accuracy is to randomly select reports from the last 5 months. The process involves picking 5 data elements at random from each report. There will be 25 data elements altogether (5 reports × 5 data elements). Complete the following table. Count the number of data elements that deviate less than or equal to 10% and calculate the percentage accuracy; that is, the (number of data elements that deviate less than or equal to 10%)/25*100. This value should be very high, ideally 100%. If it is less than 80%, there is a serious problem and the data needs checking. What it means is, even if we accept 10% data error, less than 80% of the reported data is correct.

Table 13. Illustrative Data Quality Monitoring Table

Data elements	Value in the report (a)	Count/calculate from the registers (b)	Difference (c = a – b)	% deviation (c/b*100)	More than 10% deviation
1					
2					
25					

This process can be used for both commodity and patient-related reports.

It is also suggested to check the data for completeness. Make sure data fields are not left blank unless there is an option. Ensure that important data like sex, type of service, etc., are not left blank.

Data Consistency

It is important to ensure that the reported data is not only accurate, but is consistent as well. It is suggested that all reports are checked for consistency. Some of the data that can be checked for consistency include—

1. In the monthly report, check if the total quantity of drugs consumed (stock at the beginning of the month + quantity received during the month – quantity damaged or expired during the month – stock on hand) is equal to the total quantity of drugs dispensed
2. Stock on hand of the last month is equal to the stock in the beginning of the current month

Chapter 7. mHealth – Role of Technology in Strengthening LMS for Malaria Products

What is mHealth?

There is no precise definition of mHealth, however, there has been an attempt to describe what it is and what it is used for. mHealth is a term most commonly used in reference to using mobile communication devices, such as mobile phones, tablet computers, and PDAs for health services and information and public health. The mHealth field has emerged as a sub-segment of eHealth, the use of information and communication technology, such as computers, mobile phones, communications satellite, patient monitors, etc., for health services and information. mHealth applications include collecting community and clinical health data; delivery of health care information to practitioners, researchers, and patients; real-time monitoring of patient vital signs; and direct provision of care (via mobile telemedicine).

The field has emerged in recent years largely as an application for developing countries, stemming from the rapid rise of mobile phone penetration in low-income nations. The field, then, largely emerges as a means of providing greater access to larger segments of a population in developing countries, as well as improving the capacity of health systems in such countries to provide quality health care.

Within the mHealth space, projects operate with a variety of objectives, including increased access to health care and health-related information (particularly for hard-to-reach populations); improved ability to diagnose and track diseases; timelier, more actionable public health information; and expanded access to ongoing medical education and training for health workers.

Source: http://www.mhealthalliance.org/media-a-resources

Why mHealth?

Across many malaria-endemic areas in rural Africa, the communication gap between managers, health workers, and patients is a significant barrier to efficient malaria control. The rapid expansion of mobile network coverage and the widespread availability of basic handsets have the potential to substantively bridge the communication gap. Text messaging, as the least-expensive mobile phone function found on all handsets, could improve the delivery of health services and health outcomes. Six major areas of malaria control in which deficiencies are apparent and text messaging interventions could be beneficial are—

1. Disease and treatment effectiveness surveillance
2. Monitoring the availability of health commodities
3. Pharmacovigilance and post-marketing surveillance of the safety and quality of antimalarial drugs
4. Health worker adherence to guidelines
5. Patient adherence to medication regimens
6. Post-treatment review

Text messages transmitting information from the periphery of the health systems to malaria control managers are in the first three malaria control areas listed above.

Future projects in these three areas should demonstrate responses to data signals and comparative advantages with routine information systems. Text messages in the second three areas transmit information to health workers and patients to support the management of malaria patients. Future priorities in these areas are cost-effectiveness evaluations, qualitative research, and studies measuring impact on the processes of care and health outcomes.

Integrating mHealth Solutions into LMS

It is beyond the scope of this guideline to cover everything related to mHealth. Resources are available that will be useful; given the rapid changes in technology and mHealth, one must keep abreast of new developments and innovations at the time of developing the strategy and implementation.

This section, however, will identify key questions that need to be considered to define broad needs when planning to adopt mHealth for malaria LMS.

Table 14. Key Questions that Need to be Considered

Key question	Considerations or option(s)	Recommendation
Is there a functioning malaria commodities recording and reporting system in place?	▪ Understand the foundations upon which the new system will be built and determine critical conditions that have to be met before even considering new mHealth system. ▪ Address weaknesses in the existing recording and reporting before embarking on implementing a mHealth system.	▪ Guidelines for malaria commodities LMS should already be in use in the country and should comply with the updated, recommended mHealth system being designed. ▪ Staff involved in malaria commodities supply management should already be familiar with the basic data items that need to be recorded and with established reporting and data monitoring procedures.
Who needs to provide overall oversight and participate in decision making related to the adoption, design, and implementation of an mHealth system for malaria LMS?	▪ Introducing a new mHealth system would likely change the way staff work at all levels beyond those who interact directly with an information system. ▪ The key stakeholders need to understand the objectives of a new mHealth system, know what resources are available, and understand how existing LMS for malaria commodities works within supply and drug management in both public and private sectors.	▪ Establish a body with the appropriate competence, authority and with an adequate representation of all key stakeholders. ▪ Ensure that a designed mHealth system for malaria commodities LMS fits within a national framework for supply chain commodity management. ▪ Engage key stakeholders (as a technical working group or steering committee) within MOH, the NMCP, users, and beneficiaries at different levels of the supply chain; health information technology specialists; supply chain and pharmaceutical management experts; and development partners providing technical or financial support ,etc.
What are the primary objectives of integrating mHealth system in LMS for malaria?	The primary objectives of an mHealth system can range from a national to a regional or facility level. The focus could be on improving the coverage, quality, and timeliness of data; commodity management and accountability; preventing drug stock-outs; etc.	Clearly define the primary objectives of the proposed system.
Who are the users and beneficiaries of the system?	Identify users and intended beneficiaries of the system and link to the objectives of the mHealth system.	Identify points within the LMS system where mHealth will be integrated, staff will enter data, people using the data will interact with the system.
Which level of the LMS should the mHealth system cover?	▪ Many systems are constructed around the LMIS which provides a basis for supply chain and logistic data for decision making. ▪ Initially aim for only a sub-set of LMS and gradually expand at a later stage to cover all elements.	▪ Aim to cover all components of the LMS for malaria commodities. ▪ Ensure that system specifications do not prevent future expansion.

Key question	Considerations or option(s)	Recommendation
Will the system be a stand-alone system or will it be integrated with other electronic systems?	▪ Electronic systems rarely exist in isolation. Understanding the broader information landscape is critical for the system design. ▪ Design the system with mechanisms to send and/or receive data from other systems (interoperability).	▪ Map all existing paper and electronic systems that are relevant to malaria commodities management. ▪ Find out if a national framework (such as an Enterprise Architecture) for building and integrated health information systems exists. ▪ Aim for integrated systems whenever feasible and consistent with the primary objectives.
What elements of paper-based recording and reporting should be maintained?	The mHealth system needs to interact with paper-based records at different stages (creating a hybrid of paper and electronic patient records).	▪ Check legal requirements to identify which documents have to be kept on paper. ▪ Do parallel runs between paper and electronic systems simultaneously during initial system roll out, but plan to go beyond pilot early on.
What data items need to be captured?	mHealth system developers need to know about all data that will be held in the system. This will include a core set of variables needed to satisfy the minimal reporting requirements for supply and malaria commodities management.	Specify all data to be held in the system. A balanced approach to data needed at all levels for program management; regional, national, and facility levels need to be captured.

Chapter 8. Case Studies

Case Study 1. Improving the Performance of Hospital Pharmacies through MTP in Malawi

The Malawi public health system has very few pharmacists and almost all the hospitals operate without a pharmacist. These hospital pharmacies are mostly managed by pharmacy technicians who are entrusted with responsibilities beyond the scope of their basic training. With funding from PMI, the USAID-funded SPS Program introduced a program to improve the performance of hospital pharmacies run by the Government and faith-based organizations. Adapting and applying the MTP approach to the Malawi context, the program involved a series of one-day mentoring sessions for facility-level pharmaceutical technicians. The sessions were held near the facilities, limiting the need to travel far from their work location and were held over a period of one and a half years. At least once every two months, pharmacy technicians from public hospitals throughout the country would meet for a day. During the meeting, SPS staff would introduce and discuss a pharmaceutical management topic. At the end of the training, the pharmacy technicians were asked to plan and write interventions and activities for the topic discussed that they will undertake in their facilities. This provided an opportunity for the pharmacy technicians to assess the performance of their facility in that particular area and to commit to making a change.

The topics were agreed upon and presentations developed by SPS staff in collaboration with MOH. The pharmacy technicians were then given 3-4 weeks to implement their interventions after which SPS would visit each hospital to assess progress made and provide technical assistance. At each of these visits, a standard checklist was used to evaluate the performance of the facility. The data was collected and analyzed over the duration of the program to see how the pharmacies are performing. The program was conducted from February 2009 to July 2010. A total of 74 pharmacy technicians from 44 hospitals attended the program. The topics covered were stores management, roles and responsibilities, inventory management, Supply Chain Manager® and procurement, district implementation plans, and pharmaceutical management supervision.

Inventory management, storage management and Supply Chain Manager consistently scored above 70% and the roles and responsibilities section improved significantly (from 35% to 61%) during the program.

Pharmacy technicians evaluated the program positively, citing many areas in which they had benefitted from the training. Many comments were made regarding how the pharmacy techs were able to organize their pharmacies better, mentor staff better, and were better able to manage procurement. Only one area (district implementations plans) was deemed to not have been very helpful because the plans developed for pharmacy are usually never incorporated into these district implementation plans.

Case Study 2. Use Mobile Technology to Monitor Malaria Stock Availability in Remote Areas

National malaria control programs (NMCP) conduct quarterly supervision visits to HFs to assess the availability of malaria commodities and to determine how facilities are diagnosing and treating malaria. The information helps managers take immediate action on identified problems.

In 2008, PMI/USAID, the USAID | DELIVER Project and SPS developed a process to look at the availability of malaria commodities at the HF level. As a part of this process, PMI developed guidance and the End-Use Verification Tool for data collection in all PMI countries on a quarterly basis.

In July 2009, USAID | DELIVER and SPS, in collaboration with the Ghana NMCP, piloted DataDyne's EpiSurveyor Mobile, a mobile phone-based tool, to collect and analyze data on malaria commodity availability and case management indicators. After the successful pilot in Ghana, PMI directed USAID | DELIVER and SPS to provide technical assistance to all NMCPs in PMI focus countries (Angola, Benin, Burundi, Ghana, Ethiopia, Malawi, Mali, Mozambique, Kenya, Senegal, Tanzania, Rwanda, and Uganda) to use the tool. The use of EpiSurveyor Mobile alleviated the data collection and analysis burden from quarterly visits and is practical in settings with limited technology support.

NMCP supervision teams comprising NMCP, partners, and district health staff have collected data at HFs for a week and a half to two weeks by using data collection tools created in EpiSurveyor. The team used EpiSurveyor to perform a generic analysis of the data, which is displayed automatically on the website. The data can also be exported into Excel; this feature benefits those who prefer to use other software for analysis. All PMI countries have conducted supervision using EpiSurveyor for at least three rounds of supervision. The results highlight facility problems including stock-outs of malaria commodities, health workers not following treatment guidelines, and misuse of antimalarials. However, through this tracking and using data collected to make decisions, most facilities showed improvement in storage and case management. Immediate analysis allowed managers to take quick action. Using EpiSurveyor Mobile was feasible for collecting and analyzing data from remote facilities with little technology support. Based on this experience, many NMCPs have adopted EpiSurveyor Mobile for collecting data during all malaria supervision visits. Using technology can improve efficiency and accuracy for data entry, analysis, and reporting, and lead to quick action by policy and decision makers.

Sources: http://spssms.msh.org/products/Thulani%20mHealth%20Poster%2010-27.pdf
http://deliver.jsi.com/dlvr_content/resources/allpubs/factsheets/MobiPhonSurv_Poster.pdf

Figure 6. Episurveyor home page

Case Study 3. SMS for Life and Prevention of ACT Stock-Outs in HFs

SMS for Life is an innovative public-private partnership led by Novartis and supported by the Tanzanian Ministry of Health and Social Welfare, IBM, Medicines for Malaria Venture (MMV), the Swiss Agency for Development and Cooperation (SDC), Vodacom, and Vodafone. The project comes under the umbrella of the global RBM Partnership.

SMS for Life harnesses everyday technology to improve access to essential malaria medicines in rural areas of developing countries. It uses a combination of mobile phones, SMS messages, and electronic mapping technology to track weekly stock levels at public HFs to eliminate stock-outs, increase access to essential medicines, and contribute to reduction in the number of deaths from malaria. In many African countries, huge supply chain problems make it difficult to get malaria medicines to patients. Barriers include high stock-outs at rural HFs (i.e., the point of care where patients can get free drugs); zero visibility at the district management level on medicine stock levels in their facilities; extreme difficulty in forecasting demand, resulting in emergency orders that require ramped up production and transport of the drug by air; inconsistent reporting of consumption and sporadic, paper-based ordering; and very poor IT and communications infrastructure, particularly in rural areas, although mobile coverage is growing.

Every Thursday, the system sends a stock request message to the mobile phones of all registered HF workers. They then count how much stock they have and send the information back to the system via a free text message. If they have not done this by Friday, the system sends them a reminder. On Monday, the system would send information about stock levels and non-reports to the district management officer, who can then monitor stock levels and order or redistribute medicine between sites accordingly. The six-month pilot program, which was conducted in three districts in Tanzania, covering 229 villages and a population of 1.2 million people, had impressive results—stock-outs were reduced from 79% to less than 26% in the three districts.

SMS for Life has been rolled out across Tanzania, with over 5000 facilities trained and reporting on a weekly basis. Tracking of tuberculosis and leprosy medicines has also been added. In Ghana, SMS for Life is being piloted in six districts, sponsored by the Swiss Tropical and Public Health Institute, where weekly stock levels at public HFs of ACTs, RDTs, and antibiotics are being tracked. In Kenya, in addition to tracking stock levels of ACTs and RDTs, a patient surveillance study on the testing of patients with malaria and the use of ACTs has been added to SMS for Life. Plans are underway to expand SMS for Life into the Democratic Republic of the Congo.

Sources: http://malaria.novartis.com/innovation/sms-for-life/index.shtml; also Barrington, J., et al. 2010. SMS for Life: A Pilot Project to Improve Anti-Malarial Drug Supply Management in Rural Tanzania using Standard Technology. *Malaria Journal* 9:298

Case Study 4. How Ethiopia Developed a Comprehensive Inventory Management System for Malaria Commodities

In Ethiopia, the Pharmaceutical Logistics Master Plan (PLMP) incorporated proposals for the design of a national LMIS capable of supporting the supply of essential health products. Partners providing expertise in the fields of pharmaceutical services and logistics came together and identified specific areas that they were interested in supporting as the Pharm Fund and Supply Agency (PFSA) implemented the logistics master plan. Among the key partners involved were the USAID-funded SPS, Supply Chain Management System, and USAID | DELIVER Programs.

Without proper inventory and patient and commodity management, it is difficult to ensure an uninterrupted supply; control pilferage and loss; monitor expiry and medicine use; report on uptake; and obtain reliable data for forecasting and budgeting. Proper and correct information is key to all aspects of pharmaceutical supply management. Assessments showed that inventory management tools such as stock cards, bin cards, and treatment registers were not uniformly available; where they were available, most were not current or complete. Only about 40% of zone and district stores and

about 65% of hospitals and HCs had stock cards. Less than 40% of zone and district stores and 16% of hospitals and HCs do report on stock status only for ARVs. No active hierarchy reporting flow seems to be operating. The absence of support staff to help in managing routine inventory control was equally found lacking in many facilities assessed.

Starting with ARV management, with support from SPS, a comprehensive inventory management system was designed. This included SOPs that cover the overall management of ARV drugs and the provision of quality dispensing services; the associated training manuals and tools were designed, printed, and distributed to all HFs providing ART services. The system was rolled out throughout the country to ensure that the implementation and scale up is carried out at all HFs in a consistent and uniform fashion. The result of this effort was the establishment of a functional and robust inventory management that provided accurate information to support decision making related to drugs supply management and rational dispensing practices at HFs.

PMI used the lessons learned from ARV management to design and operationalizing the LMIS for malaria commodities management in the Oromia region, a target for PMI support. Basic inventory management tools, such as stock cards and bin cards, were made available at all levels to ensure that the information is accurate and findings are used for informing decisions. A checklist was developed to track availability of malaria commodities, dispensed quantities, number of patients treated, laboratory data on number tested and number positive, quantity received, quantity distributed/dispensed, balance on hand, availability of inventory management tools, accuracy and timeliness of tools, and adequacy and conditions of storage.

Use of the tools and reporting was included in both in-service and pre-service training, a key ingredient for success. The system developed for tracking these key indicators is now known as CRMS. With best practices now in place in the Oromia region, the system captures appropriate data on malaria commodities distribution and use such as stock control, patient and drug dispensing information, CRMS quarterly reports, and CRMS review by stakeholders.

SPS staff has been assigned to catchment areas to provide mentoring, supportive supervision, and data management technical support to staff working in AMDM/PMI.

Case Study 5. Continuous Performance Monitoring System

The CRMS is a comprehensive indicator-based tracking system that measures performance and results on a continuous basis. CRMS data is updated every two months and monthly reports are prepared by HFs. Review of reports is conducted every 3-4 months by regional, district, and HF personnel as part of a mechanism of ownership. Participants celebrate progress, analyze gaps, and develop solutions to problems that can be addressed by the next joint meeting.

The following matrix shows indicators tracked under different LMS elements.

Table 15. Definitions of Indicators

Availability of malaria products	▪ Availability is defined as the presence of tracer products at the time of the visit. This information is collected from stock cards, bin cards, or physical observation. ▪ The products monitored regularly include all forms of Coartem, chloroquine and quinine, artemether inj, RDTs, and LLINs.
Availability of AMDM forms/tools	Inventory control/MIS forms monitored regularly for availability include stock cards, bin cards, stock status reporting forms, treatment/medication registers, and ADR reporting forms. Use and timely completion of these forms is also monitored.
Use of inventory control/MIS tools	▪ Use of PMIS tools refers to the facility updating stock/bin cards and treatment registers accurately and timely. All transactions (receipts, issues, transfers, stock balance) are tracked through stock/bin cards. ▪ Number of persons tested/treated by type of malaria broken down by gender, age, and quantity of drugs dispensed is recorded from prescription papers on dispensing/treatment registers every day and totaled at least at the end of the month to give an aggregated total for reporting. ▪ ADR reporting is done on a form provided by the pharmacy department of MOH to document adverse events encountered after taking a drug. The report is usually mailed in a postage pre-paid envelope. ▪ Concordance between calculated and recorded quantities-on-hand is determined to see if there is any discrepancy between the two.
Pull order system practiced	The pull system is preferred as an active model that ensures stock availability on the basis of actual consumption and need rather than allocation.
Adequate storage available	Proper storage conditions, including shelves, space, cleanliness, and ambient temperature, should be available.
Drug boxes stacked on pallets	Drugs should not be stacked directly on the floor because they may be exposed to water, vermin, etc. To avoid damage, drug cartons should be stacked on pallets, taking the weight and nature of the product into consideration.
Boxes stacked away from wall	Drug cartons should not be stacked directly against the wall for the same reasons they should not be stacked on the floor (water leakage, vermin). The practice of stacking boxes away from the wall helps address such problems.
Loose drugs (containers) shelved	Smaller quantities should be shelved properly following acceptable categorization.
Store organized	Store organization entails that the drugs are kept in order and stacked visibly, with FIFO, bin cards attached, obsolete/expired drugs separated, non-drug supplies separated, and organized so that counting and managing supplies is easy.
Expired drugs segregated for disposal	Expired drugs should be separated from active storage, not only to provide room for active drugs but to also avoid mistaken dispensing.
Expired drugs disposed	Expired drugs have to formally and appropriately be disposed once they are listed, according to the national disposal guideline.
Availability of staff	Availability of staff assesses the presence of a pharmacist, druggist, pharm technician, and data clerk at the pharmacy level. Pharmacists are required to man hospitals, and HCs are required to have druggists or pharm technicians. A pharmacy data clerk maintains the various registers. The availability of data clerks allows the technical staff to focus more on pharmaceutical duties such as counseling and mentoring rather than on routine data entry.
Training received	Training is usually given in drug supply management where topics on procurement, storage, and distribution are covered. Another set of training involved is in PMIS/LMIS data collection, use, and reporting. Because most pharmacy professionals are not trained in the new products used for management of malaria, it is necessary to orient them on the national diagnosis and treatment guideline. The indicator measures the status of training in these three areas.
Technical support/ mentoring received	Technical assistance should be provided to zones to offer support such as SOPs, PMIS tools, etc. These individuals are required to make mentoring visits to their respective catchment facilities to provide on-the-job training and skills transfer and engage in discussions related to pharmacy services.

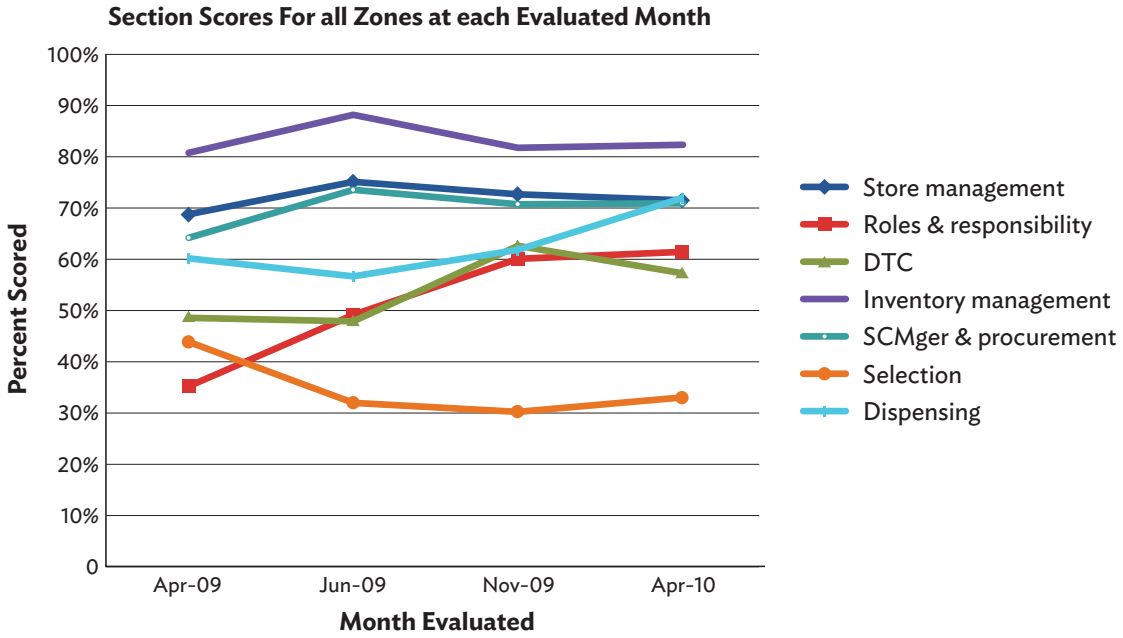


Figure 7. Percent change observed in supply management indicators by quarter

Case Study 6. How an ACT Tracking System Laid the Foundation for a Comprehensive LMIS for Malaria Commodities in Kenya

In May 2006, at the dawn of distributing AL, the new first-line treatment for uncomplicated malaria, the Division of Malaria Control (DOMC) put in place an interim national system for tracking AL consumption at the HF level. The system was established with financial support from USAID through the Rational Pharmaceutical Plus Program implemented by Management Sciences for Health.

The AL consumption tracking system was designed as a short-term solution to provide a transparent record or "paper trail" for the receipt, storage, and issue of AL by all government and mission HFs to ensure stock availability, minimize wastage, reduce leakage, and importantly, to obtain consumption data for reordering and redistributing stocks.

At the time this vertical interim system was instituted, the Ministry of Medical Services (MOMS), Division of Pharmacy did not have a tracking system for all medicines, and the MOMS Health Management Information System Department was finalizing a standard format for tracking the different types of medicines and supplies distributed to public sector HFs.

One-year post-institution of this interim system, a DOMC evaluation noted several system challenges, such as very low reporting rates of consumption from HFs to central (hovering between 10 and 19%), very few facilities reporting consistently, inaccurate and incomplete reports, and some facilities reporting directly to DOMC and in the process bypassing district-level pharmacy staff.

In May 2007, DOMC and its pharmaceutical management stakeholders decided to define a strategy to ensure that the pertinent central-level divisions, namely DOMC, DOP, KEMSA, and the Mission for Essential Drugs and Supplies (MEDS), received ample and appropriate information on ACT consumption from HFs that had been supplied medicines by KEMSA and MEDS. Stakeholders agreed that the KEMSA-housed Logistics Management Information Unit (LMU) and its established LMIS should provide technical support to DOMC. To begin the process of LMIS design for malaria commodities, all components of the malaria commodity logistics system (e.g., commodity flow, inventory management, information flow, and feedback) were mapped out; data collecting and reporting tools were redesigned; and training curricula that embraced the LMIS design were created, printed, and distributed. Broader stakeholders' engagement to build consensus was achieved through

a series of workshops organized by DOMC, followed by a pretest of the revised consumption tracking tools in six selected districts from varied epidemiological malaria zones.

After a successful pilot, the system was rolled out with revised ACT consumption tracking tools, providing dates by which each report should be sent to the next level. HF monthly summaries were sent to the district by the fifth of every month. Districts with Internet access sent aggregated reports to LMU by the twentieth of every month via e-mail. In areas without Internet access, partners supported courier services to transport the summary report to the LMU by the twentieth of every month. Working with partners and LMU teams, DOMC developed data screens that allow aggregated district data to be uploaded into the LMIS and used to generate various reports for DOMC. The LMU indicator set used to generate national reports for DOMC consists of:

- National reporting rate
- Aggregated adjusted AL consumption
- Percentage of facilities stocked out of AL (all weight bands) for more than seven days
- Aggregated losses
- Aggregated expiries
- Aggregated number of patients on AL by weight band

Source: Division of Malaria Control, Ministry of Public Health and Sanitation. 2008. *Strategic Approach and Action Plan Aimed at Improving Health Facility Level Reporting of Malaria Medicine Consumption*. Nairobi: Division of Malaria Control; http://pdf.usaid.gov/pdf_docs/PNADX116.pdf

Case Study 7. Development of a National LMIS for Malaria Commodities in Benin

In early 2007, PMI conducted a needs assessment in Benin to identify opportunities to implement an existing national malaria control plan and assure achievement of RBM goals. Subsequent assessments of the Central Medical Stores (CAME) conducted in 2008 by the USAID-funded SPS Program recommended the establishment of an LMIS to generate data for the CAME to improve efficiency of its operations. In April 2010, the National Malaria Control Program (NMCP) prioritized the establishment of an LMIS for malaria and sought technical assistance from SPS. Some of the key findings from the assessment included:

- Lack of a system to track medicines consumption and distribution from HFs to the health zones (districts), departments (regions), and the national level
- Absence of a mechanism for assessing the stock situation at the various levels of the health system and for triggering actions based on established minimum stock levels
- Difficulties at CAME in procuring appropriate quantities of malaria medicines due to lack of consumption and stock data
- Lack of SOPs at health zone and HF levels to allow appropriate recording and tracking of transfers of medicines from one level to another

The system for compiling data at the lowest level of the health system (HCs) is manual. At the Dépôt Répartiteur de Zone (DRZ) and district-hospital level, software had been installed to facilitate the management of inventory. DRZs use Medistock and Pharmeg, whereas district hospitals use Perfecto. Although these data were collected at each level of the health system, there was no mechanism for transmitting data from lower levels to upper levels, or for aggregating used-to-dispenser data for use in decision making at higher levels of the health system. This was the case, even though there was a mechanism for aggregating and transmitting epidemiological data from lower levels to upper levels of the health system.

The formal approval to develop an LMIS for Benin was obtained in March 2010; this allowed a team (consisting of a pharmacist from the Pharmacy and Pharmacovigilance Department of the NMCP, SPS staff, and the USAID/Benin Mission Logistics and Commodities Advisor) to develop the framework for implementation which was widely shared with stakeholders at all levels of the Benin health system (61 health care providers participated). The team examined the existing health information system (SNIGS) and the Routine Malaria Information System (RMIS) to optimize these two systems for the development of the LMIS for malaria commodities.

In October 2010, 850 registers were printed for use in the new LMIS. Modifications that had been suggested by stakeholders during a briefing in May 2010 were reflected in the registers. Two types of registers were printed – one type for hospitals and HCs and the other for district pharmaceutical depots. The registers destined for use at HCs were delivered to 34 DRZs who in turn distributed them to HCs. Distribution was conducted between November 22 and December 1, 2010.

Integrated supervision visits led by the NMCP was recommended to review completeness and accuracy of data being submitted and facilitate the overall good functioning of the malaria commodity LMIS. Full implementation with data collection began March 2011. Preliminary LMIS monitoring indicated that 73.5% of districts had conducted briefings for HFs on filling in the registers; 91.1% of registers had been distributed, and 14.7% of HFs submitted monthly reports to the DRZs. The results from the April 2011 visits showed that three DRZs had excellent transmission rates for HFs within the zone at 100%, 95.5%, 89.4%; two DRZs had moderate transmission rates at 63.2% and 55.6%; and three DRZs had low transmission rates at 18.8%, 21.4%, and 28.1%.

The question that immediately arises regarding these results is why some HFs demonstrate high rates of data transmission whereas others have very poor performance? What are the factors common to the HFs and personnel at the better performing DRZs and to the poorest performing DRZs? These are questions that will need to be explored as the NMCP continues to monitor the functioning of the LMIS over time to determine how an environment conducive to collection and transmission of high-quality data can be fostered and maintained. A systematic effort to review the quality of the data being collected is also needed.

In conclusion, Benin's experience and early indications demonstrate that it is possible to establish a functional LMIS for malaria commodities. However, the LMIS will require time and close monitoring to ensure that it functions effectively on a large scale.

Overview. Drug and Therapeutic Committees

Inadequate access and irrational use of medicines is a widespread problem at all levels of health care worldwide. The overuse, underuse, or misuse of medicines results in wastage of scarce resources and widespread health hazards.

The DTC, or its equivalent, is an essential component of a health care organization's drug selection and use program. A well-functioning DTC has been shown to be one of the most effective structures that can significantly improve drug use and reduce costs in hospitals and other health care facilities. This committee evaluates the clinical use of drugs, develops policies for managing drug use and administration, and manages the formulary system. The committee has broad responsibilities in determining which drugs will be available, at what cost, and how they will be used.

Why Should HFs Have DTCs?

Many countries spend 30 to 40% of their health care budgets on drugs, much of which are wasted on chemically ineffective, unsafe, or inappropriate drugs, irrational drug use, or inefficiencies in procurement and distribution of drugs. Other serious problems faced by health care organizations include the overuse of antibiotics, thereby increasing antimicrobial resistance and ADRs.

A practical guide on how to establish and operationalize DTCs at HFs and at higher levels is needed. The objectives of such a guide include:

- Helping hospital staff have a better perspective of the DTC and its functions
- Providing appropriate procedures for establishing a DTC and managing its activities to achieve its goals
- Elaborating on the operational aspects of a DTC at the HF level to enhance quality of health care delivery

For a DTC to be effective, certain principles must be adopted and followed throughout the committee's activities and proceedings. These principles can be applied to any committee or any function of the health care system. These principles include:

- Transparent and unbiased decision making
- Objectivity
- Consistency
- Impact orientation

The functions of a DTC are numerous and may vary with the country and the size of the health care facility. The most important functions are—

- Advising medical, administrative, and pharmacy departments on drug-related issues
- Developing drug policies and procedures
- Evaluating and selecting drugs for the formulary and making periodic revisions
- Assessing drug use to identify potential problems
- Promoting and conducting effective interventions to improve drug use
- Managing the system to minimize the impact of ADRs and medication errors

Creating detailed TORs are critical, as they define the:

- Vision, objectives, scope and deliverables (i.e., what is to be achieved)
- DTC members' roles and responsibilities (i.e., who will take part in it)
- Resources and financial and quality plans (i.e., how it will be achieved)
- Breakdown of the work structure and schedule (i.e., when it will be achieved)
- Should include success factors, risks, and restraints

HFs should develop TORs for DTCs. Major sections of the TORs should include:

- **Brief paragraphs that provide background information on the health care facility:**
  - Describe the history of the institution (briefly)
  - Explain the mission and objectives of the institution
  - Describe basic operations of the institution
  - Summarize institutional strengths and/or weaknesses
  - Summarize opportunities and challenges to the institution's performance
- **Organization of the committee and selection of DTC members**

  Opinions vary regarding the optimal size and composition of the committee. The committee should have sufficient members to represent all stakeholders, including major clinical departments, the administration, and pharmacy. Members should be selected based on their positions and responsibilities and they should have a defined scope of responsibility. A dedicated and committed chair and secretary are critical for the success and efficiency of a DTC. The chair and secretary should be allotted sufficient time for their DTC functions and this should be included in the TORs.

- **Determine the objectives and functions of the committee**

  The TORs should specify the DTC's place in the organizational structure of the hospital, its goals and objectives, scope of authority, functions, and responsibilities. To achieve its goals, a DTC must have the following objectives:

  - Develop and implement an efficient and cost-effective formulary system that includes consistent standard treatment protocols, a formulary list, and formulary manual
  - Ensure that only efficacious, safe, cost-effective, and good quality medicines are used
  - Ensure the best possible drug safety through M&E, thereby preventing, as much as possible, ADRs and medication errors
  - Develop and implement interventions to improve medicine use by prescribers, dispensers, and patients; this will require the investigation and monitoring of medicine use

Roles

For any drug system to run smoothly, the drug management process needs managerial and technical support with appropriate drug policies and guidelines. The DTC will often play a key role in LMS, including procurement and distribution of medicines. The DTCs' role would be to ensure that the formulary system and other drug policies developed by the DTC are implemented.

Table 16. Sample List of Key Malaria Products

Product (generic name)	Strength	Dosage form	Uses
Artesunate + amodiaquine (AS/AQ)	100 mg + 270 mg	Tablet	*Plasmodium falciparum*
AL (Coartem)	20 mg + 100 mg		
Artesunate	100 mg or 400 mg	Suppository	
Artemether	80 mg	Injection	*P. falciparum* (pre-referal)
Artesunate	60 mg		Severe malaria
Chloroquine (CQ)	150 mg	Tablet	*P. vivax*
	40 mg/mL 30 mL	Injection	
	40 mg/mL 5 mL		
	50 mg/5 mL	Syrup	
Sulfadoxine/pyrimethamine (Fansidar)	500 mg/25 mg	Tablet	Intermittent preventive treatment
Quinine	300 mg tablet	Tablet	Severe malaria
Quinine	300 mg/mL	Injection	
Mefloquine	250 mg	Tablet	Preventive
RDT	NA	Strip	Rapid test
LLINs	NA	Bed net	Long-lasting mosquito net

Additional Resources

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