Managing TB Medicines at the Primary Level

April 2008

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About RPM Plus

RPM Plus works in more than 20 developing and transitional countries to provide technical assistance to strengthen pharmaceutical 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/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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INTRODUCTION

Until now, guides and training materials have primarily focused on health professionals involved in pharmaceutical management of tuberculosis (TB) at the national and regional levels. Realizing this gap, Management Sciences for Health (MSH) prepared this capacity-building tool to target TB pharmaceutical management issues commonly faced at the primary health care level where there has been little formal training in many country programs.

Who Should Use This Guide?

This guide is intended for district supervisors to train and monitor health workers involved in ordering, stocking, and administering TB medicines at the primary health care level. National TB program staff and technical partners will also find the guide useful when working at the district level. Once trained on the method, health workers can then use this guide in the workplace as a reference while they implement improvements in their TB pharmaceutical management skills.

Main Purpose

This guide is designed to improve treatment center personnel skills in managing TB commodities; this will ensure an uninterrupted supply of quality medicines when patients need them.

How to Use It

A variety of methods are used to communicate information, such as reading, presentations, practical exercises, and open discussions where participants can exchange ideas; also provided are many job aids to help health workers improve their TB medicine ordering, receiving, stock management, storage practices, documentation, and reporting. Suitable indicators are suggested for self- and supervisory monitoring so health workers and their supervisors can see actual

improvements in how they manage TB pharmaceuticals and supplies, and allow supervisors to guide them during the process.

The guide can be used exactly as presented, but it is best used by adapting the job aids, checklists, and indicators to local context, using local terminology, then choosing the approach that is best for the national TB program from the following options—

- Training of trainers (TOT) allows quicker dissemination and use within the health system
- In-service trainings or on-the-job training by supervisors
- Individual or self-training where the individual is motivated enough to work alone

If a formal training setting is chosen, the materials may be used in any of the following ways—

- Cover all six modules in a one-day training with follow-up by supervisors for on-the-job training[1]
- Cover modules one by one over an extended period of time when intermittent training is preferred
- Cover only one or two modules in a single setting based on skill needs of the health workers at that time, using the other modules in the future as needed

In a formal setting, it is often good to have PowerPoint slides to demonstrate key points of each module. You will find information later in this module on how to develop appropriate slides and how to prepare for the training session.

If you are a district supervisor and decide to use these materials for on-the-job training see instructions in the section of this module entitled, "How to Use these Modules for On-the-Job Capacity Building," which discusses how to use each module with respective checklists and job aids for that purpose.

[1] If a one-day training is chosen, see suggested training schedule in Annex 1 of this module.

Content of Modules

Each of the six modules contains a little discussion about the topic, a practical exercise, and numerous job aids in the form of checklists and calculation guides. Following are the module topics—

Module One—How to Receive Medicines and Supplies

- Verifying and documenting quantities received including damaged items

Module Two—How to Keep Good Medicine Records

- Which stock records are required for good management
- Importance of good documentation when stocks move into and out of the treatment center

Module Three—How to Store Medicines Appropriately

- Paying attention to air circulation, heat, and humidity
- How to rotate stock to prevent expiry of medicines
- How to organize medicines on storage shelves
- How to organize medicines into patient kits
- Disposing of medicines if past expiry, damaged, or excess stock

Module Four—How to Calculate TB Medicine Orders

- Stepwise method for calculating orders
- Using numbers of expected patients
- Using complete-patient-treatment method
- Including safety (buffer) stock in calculations

Module Five—How to Prepare and Administer TB Medicines

- Importance of DOT in the treatment center
- Importance of DOT when community DOTS is practiced
- How to prepare doses for children
- How to adjust patient kits according to patient's weight

Module Six—Supervision and Self-Monitoring

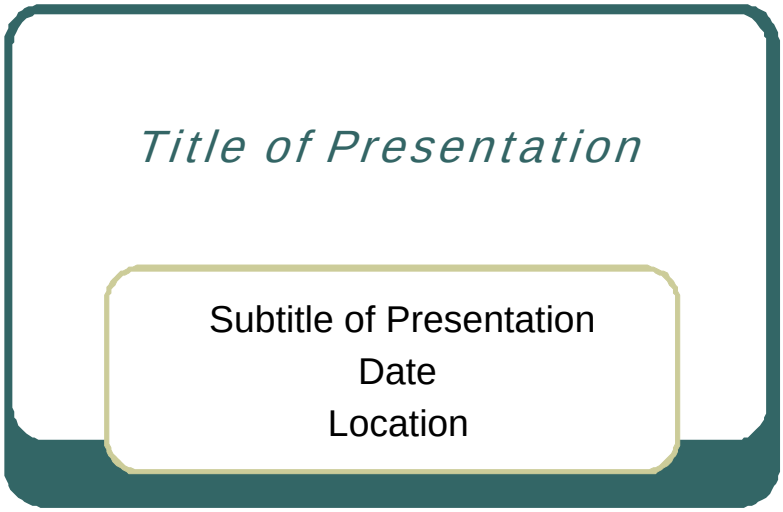
- Why supervise and monitor TB pharmaceutical management?
- Steps on how to supervise and monitor
- Checklists for supervising and monitoring pharmaceutical activities
- Using indicators to monitor pharmaceutical activities

How to Develop a Presentation and Materials for Each Module

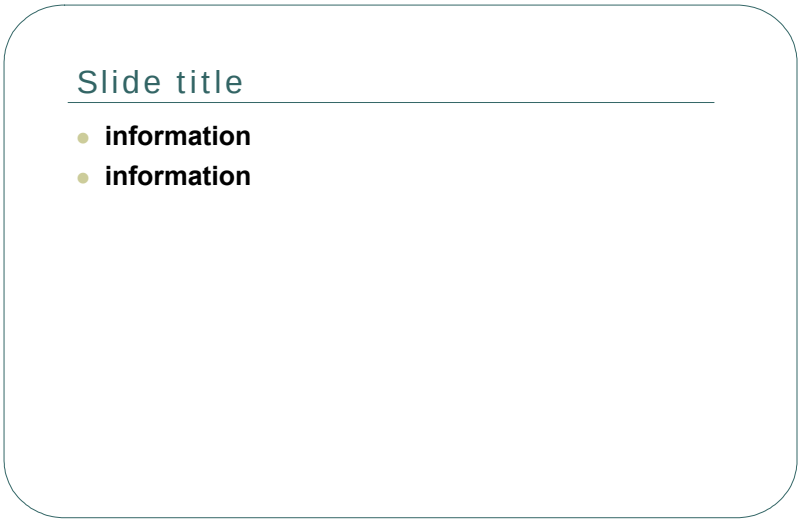
The following information is a guide for preparing slides to present the module contents and for preparing and using the other materials in the module for training sessions. The information provided below assumes that you are already familiar with PowerPoint or other computer software used for slide preparation.

These instructions use *Module Three: How to Store Medicines Appropriately* to demonstrate how you could develop session materials. You would need to do this for each of the modules in advance of training day.

1. Select an appropriate slide design from the templates



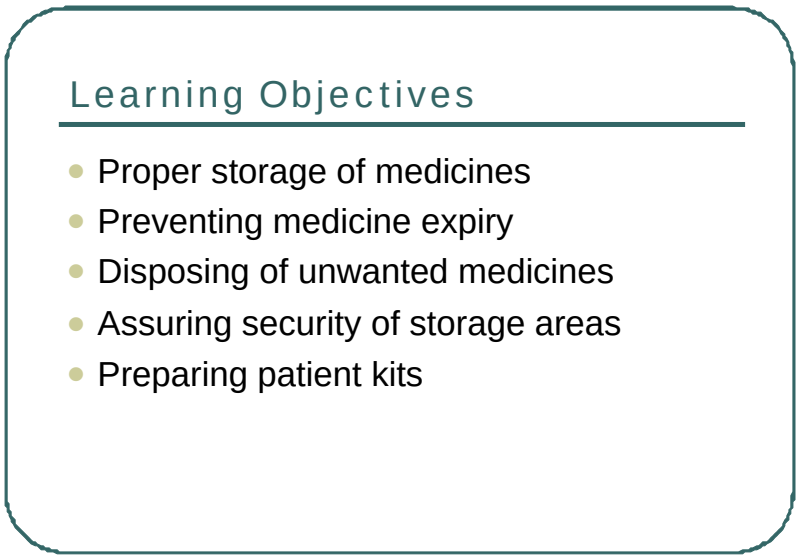
Sample template for title slide



Sample template for other slides

2. Prepare a title slide for the presentation

3. Prepare a slide showing the learning objectives



4. Prepare enough slides to cover each main topic of the module

Factors affecting quality of medicines

- Temperature and humidity
- Direct sunlight
- Poor air circulation
- Security of storage area

What to do for quality

- Evaluate your storage area using checklist from the Guide: Module 3 given to you
- Improve weak areas such as:
  - **more space to allow air circulation**
  - **covering windows**
  - **locking storage area**
  - **obtain an air ventilator**

Reduce medicine expiry

- Practice FEFO
  - Place medicines that will expire first in front of others
  - When treating patients use the medicines that will expire first
  - Remove medicines already expired from shelves and put in a separate place for later disposal

What causes unwanted medicines?

- They reach expiry date before use
- Poor quantification of drug needs
- Patients abandon treatment
- Patients move away while under treatment
- Medicines fade or become crushed due to poor handling

What to do with unwanted medicines

- Put them in a separate place never use them for patient treatment
- Record the value of the lost products on the checklist provided in the Guide: Module 3 given to you
- Return the unwanted medicines to the district supervisor during the next monitoring visit

What are patient kits

- A kit contains all medicines one patient will need to be fully treated for 6-8 months
- Patient kit must be adjusted to fit the patient's weight
- Kits contain only blister tablets (not loose ones)
- Kits allow the patient to be sure their medicines are always present when they come to the treatment center

How to prepare patient kits

- Prepare a kit for a Category I patient, weighing 40-54 kg
- Calculate number of tablets of each medicine to put into the kit
- Use charts and checklists provided to you to carryout the calculations
- Label outside of kit
- Follow steps in the Guide: Module 3 given to you for this exercise
- Remember to add or remove tablets based on patient's actual weight at time of treatment

5. Find the checklist in Annex 1 of Module Six: *Evaluate the Treatment Center Storage Area,* and make photocopies to hand out. Give a copy to participants and review each item on the checklist. Discuss how the person responsible for medicines management will use this checklist and how they can improve storage conditions based on which "No's" they checked.

6. Photocopy the pictures from Module Three: *Exercise 1: Evaluating Good Storage Practices*. Give a copy to small groups of participants and ask them to list what is right and wrong with the storage conditions they see. Follow the directions in that exercise.

7. Go to Annex 2 of Module Six and make photocopies of the spreadsheet, *Calculation One: Cost of Expired Medicines and Supplies during Last Period.* Then go to Exercise 2 of Module Three and photocopy the table, *Sample Data from a Typical Treatment Center.* Have participants complete the Calculation spreadsheet using the sample data you provide. Once they have finished the calculations, show them the correct figures and discuss the information provided in the paragraph *Interpretation* in that part of Module Three.

8. Modify the stepwise instructions in Module Three for preparing patient kits based on information from your national program treatment guidelines for tuberculosis—for example, number of doses a month patient is treated, patient weight categories, and number of tablets for each weight category used in your national TB program. Make photocopies of the steps for kit preparation that you modified including each of the tables and hand them out to participants. Review each step and each calculation for the number of tablets and blister cards needed for a patient kit. As an additional exercise you might organize enough medicines and patient kit containers for participants to work in small groups and practice assembling a typical patient kit.

How to Use These Modules for On-the-Job Capacity Building

If the district supervisor decides to use this guide for on-the-job capacity building, it will require a lot more supervisory attention and should be carried out over a longer period of time. For example, if you normally conduct monthly supervisory visits you may want to cover the information in one module over two monthly supervisory visits—the first one to review the appropriate materials and the second visit to check on how the health worker understands the material by reviewing orders placed and received, and documentation of stock movement. Depending on the weaknesses of individual health workers in TB medicine management, it may be good to spend more time on each module.

Module One: How to Receive Medicines and Supplies illustrates how to use this guide for on-the-job training.

Preparation for the field visit—

- If necessary, modify the three forms in Annex 3 of Module Six (Supply-Order Receipt Form, Delivery Receipt Form and Stock Register Form) to show those used in your TB program for ordering, receiving, and documenting delivery of medicines and supplies
- Make photocopies of the forms to give to the health workers in charge of medicines and supplies management in TB treatment centers
- Make a photocopy of the checklist found in the *Exercise* paragraph of Module One
- Arrange to have about 30–45 minutes to spend with the health worker at the workplace, preferably uninterrupted time. Extend this time as necessary if health worker must stop to attend to patients

During the supervisory visit—

1. Give the complete guide, *Managing TB Medicines at the Primary Level,* to the health worker at the beginning of the first session
2. Tell the primary level TB health worker about the five modules you will be covering over the next months—
    - Module One—How to Receive Medicines and Supplies

- Module Two—How to Keep Good Medicine Records
- Module Three—How to Store Medicines Appropriately
- Module Four—How to Calculate TB Medicine Orders
- Module Five—How to Prepare and Administer TB Medicines

3. Have the health worker open the guide to Module One

4. Review the information with the health worker targeting the most important points in Module One. For example—

   - Know when medicines will be delivered
   - Verify quantities of each item as soon as you receive them
   - Verify if they are the items you ordered
   - Inspect items for damage such as crushed boxes, blister cards, or tablets

5. Review the ordering, receiving, or delivery forms in the Annex of Module One, or the forms you have modified if more appropriate for your health setting. Tell the health worker the importance of using the forms; proper documentation means better medicine control so medicines are available when the patient needs them. For each form, show which information the health worker must fill in including—

   - Quantities received
   - Expiry dates
   - Discrepancies
     - Quantities of missing items ordered but not received
     - Quantities of expired items received
     - Quantities of damaged items received
   - Signature of receipt and discrepancy observations

6. Now give health worker the checklist you photocopied from the *Exercise* paragraph of Module One to answer the questions in the checklist. Calculate the health workers performance in this area by using the formula in Module One:

$$\frac{\text{Total number of check marks (✓)}}{\text{Total number of questions}} \times 100$$

For those items marked with an "X" meaning "not practiced," discuss the importance of carrying out each of those steps when receiving medicines and supplies

7. If medicine registers are used at the treatment center in your TB program for documenting movement of each individual medicine, review what information should be recorded by the health worker when receiving and dispensing medicines and supplies

8. Introduce the information mentioned in Module One that will be covered in detail in subsequent modules. For example—
   - First expiring, first out (FEFO) method to prevent medicine expiry
   - Patient kits—what they are, how they are beneficial to patient and health worker, and how additional space may be needed

9. Review with the health worker the *Procedures for Receiving Medicines and Supplies* found in Module One

10. Until the next supervisory visit, ask the health worker to re-read the information in Module One and continue to practice the procedures you've covered

<u>During later supervisory visits—</u>

- The monitoring visits that follow should be used to review one or more receiving and delivery forms and the medicine register (if used) to see if the heath worker is following procedures correctly

- Review any materials you previously presented as necessary to convey the importance of good documentation, which is: to assure proper receipt, dispensing, and accounting of medicines and supplies so they will be available at the treatment center when the patients need them

- When it appears that the health worker is following appropriate procedures on Module One, you can then set up a session for Module Two and continue this process until the materials in all the modules are being practiced by TB health workers at the primary level

How to Test Knowledge Gained by Health Workers

It is good to check how much the health worker has learned during training to better manage TB medicines. The test found in Annex 2 of this module can be used whether training takes place in a formal setting or at the workplace.

The test is designed as a pre- and post-test, that is, the facilitator should give the test before any training or practical exercises begin and repeat the same test again once training has finished. Comparing scores from the pre- and the post-test for each person will indicate how much the health worker has learned.

Note that the answers to the test are listed at the end of test question 25 in Annex 2. As facilitator, you would *not* want to photocopy that part when preparing the training documents.

Annex 1. Suggested Training Schedule for a One-Day Training Session

	Topic
08:30 – 08:45	Introduction
08:45 – 09:00	Pre-test
09:00 – 09:15	Module 1: How to Receive Medicines and Supplies
09:15 – 9:45	*Module 1: Practical exercise*
9:45 – 10:00	Module 2: How to Keep Good Medicine Records
10:00 – 10:15	*Coffee Break*
10:15 – 10:45	*Module 2: Practical exercise*
10:45 – 11:00	Module 3: How to Store Medicines Appropriately
11:00 – 11:45	*Module 3: Practical exercise*
11:45 – 12:00	Module 4: How to Calculate TB Medicine Orders
12:00 – 13:00	*Lunch*
13:00 – 14:30	*Module 4: Practical exercise*
14:30 – 14:45	Module 5: How to Prepare and Administer TB Medicines
14:45 – 15:15	*Module 5: Practical exercise*
15:15 – 15:30	Module 6: Supervision and Self-Monitoring
15:30 -15:45	Post-test
15:45 – 16:00	Review correct answers to post-test
16:00 – 16:30	Participants' evaluations of materials and methodology

The time suggested for each module is estimated from previous experience. Depending on the current level of understanding by participants and how long they have been on the job, the amount of time for an individual module may need to be increased.

After the one-day training, the supervisor will need to follow up during regular monitoring visits to determine if participants have understood the materials and if they are using the checklists and other job aids as suggested. That way, the monitoring visits become an opportunity for subsequent on-the-job training.

Annex 2. Pre/Post-Test—Managing TB Medicines at the Primary Level

This test is intended to be given before and after participants receive training on the guide, *Managing TB Medicines at the Primary Level*. The training workshop is designed to improve knowledge and skills of health center personnel in managing TB commodities, thus ensuring an uninterrupted supply of quality medicines when patients need them. It is useful for the district supervisor also to fully understand the tasks for managing TB medicines relegated to health center personnel. The test covers basic skills—it does not intend to cover all of the tasks required for good TB medicines management.

In marking the test, you should choose the **best** answer of those given for each question, unless otherwise instructed.

Module One: How to Receive Medicines and Supplies

1. When medicines arrive at my health center, I must do the following—
    a. Sign the delivery form
    b. Have a second person sign the delivery form
    c. Verify that all medicines are correct and sign the delivery form
2. Why would you need to know the day medicines will arrive at your health center?
    a. To make sure I am working that day
    b. To organize the storage area to accommodate the arriving medicines
    c. To hire a second person to help me when the medicines arrive
3. What should I inspect about the medicines and supplies when they arrive?
    a. No need to inspect as this was done at the warehouse
    b. Verify the number of packages received
    c. Verify the quantity of each item received, the label information on a sample of medicine to see if the medicines are the correct ones, and if any items are broken or damaged

4. What is the *Discrepancy* column used for on the delivery form?
    a. Not used at health center level
    b. To record the difference in quantities sent to me with the quantities I actually received
    c. To record the expiration date of the medicines
5. What should I do after signing the delivery form?
    a. Put the medicines on the shelves in an organized way
    b. Discard the delivery form once medicines are verified as correct
    c. Put the medicines in the corner and out of my way until I have time to put them away

Module Two: How to Keep Good Medicine Records

6. What types of stock records should I use in my health center?
    a. Informal papers to show what medicines arrived
    b. Stock register with space to record quantities entering and leaving the health center for each item in stock
    c. Stock forms to show which medicines were dispensed
7. Daily administration records should be kept because—
    a. I might forget what medicine the patient is supposed to receive next time
    b. It is a requirement of my health system
    c. According to good TB control program practices each dose of medicine a TB patient receives should be recorded and initialed
8. If community DOTS is practiced at your health center, what should you do?
    a. Give the patient or caregiver a TB control record to record and initial each dose given
    b. Tell them to make sure each dose is taken
    c. Tell them to keep a record of the medicines taken but that it is not necessary to bring it to the health center

9. What information should be recorded on stock records?
    a. The amount received from the warehouse
    b. The amount dispensed to patients
    c. Date of transaction, where items were issued to and received, quantity issued and received, available stock balance
10. I should conduct an inventory of items before placing my next order as follows—
    a. Look at items on the shelf to see if they look right according to the records
    b. Compare quantity on shelves with the quantity on the stock record, recount if different, record difference on stock record
    c. Look at the quantities received and subtract quantities on the stock records

Module Three: How to Store Medicines Appropriately

11. You should conduct an inspection of your medicine storage areas for the following reasons—
    a. Is it clean?
    b. Is it orderly?
    c. Medicines are organized so that labels can be easily read and stored out of direct sunlight, away from walls and off the floor
12. Rotating stock means that—
    a. Medicines with the closest expiry date are stored in front of medicines with later expiry dates
    b. Medicines with an expiry date way into the future are stored in front of items with an expiry date that is very soon
    c. Medicine expiry dates shouldn't be considered but store latest stock to arrive behind stock already in the health center

13. Why should I worry about having too many items of a medicine in stock?

    a. I shouldn't worry at all because medicines run out sometimes
    b. Too many medicines mean that some will pass the expiry date and patients cannot use them
    c. The warehouse sent too many items so it is not my problem

14. Patient kits are useful because—

    a. A patient kit contains enough medicines for the continuation phase and medicines won't run out
    b. A patient kit has expiration dates on the labels and they can be monitored
    c. A patient kit contains enough medicines for a complete patient treatment and medicines won't ever run out for the patient

15. What should I do with a medicine that expired last week?

    a. Remove it from regular stock and dispose of it according to procedures
    b. Keep it on the shelf and use it for patients since it is still good for one month
    c. Keep it and only use it if I run out of the medicine later on

16. What can I do in my health center to improve medicine storage?

    a. Order fewer medicines
    b. Change environment so that air will circulate around the items, items are stored away from direct sunlight, and the storeroom is secure from unauthorized persons entering and taking medicines
    c. Keep the medicines in the coolest place in the health center

<u>Module Four: How to Calculate TB Medicine Orders</u>

17. What does *order period* mean?

    a. The day of the week that you must place an order
    b. The period of time it takes to count your stock
    c. The period of time between when you last ordered and must order again

18. What is *safety stock*?

    a. An extra amount of stock I order each order period in case normal quantities are not enough

    b. An extra amount of stock that must be kept locked away for emergencies

    c. An extra amount of stock that is kept at the district warehouse for me to use in emergencies

19. What is *stock on hand*?

    a. Emergency stock I can use when I run out of normal stock

    b. Quantity of an unexpired item available in my health center at any point in time which I can verify by counting

    c. Quantity I need for treating all my patients for one week

20. What is a medicine's *shelf life*?

    a. The period of time the medicine sits on the shelf before I use it

    b. The date by which I expect to use a certain medicine

    c. The date that a medicine reaches its expiry date

21. What information must I have before I can calculate quantities to order for the next order period? *Please choose all answers that are correct.*

    a. Number of patients I expect to receive TB treatment during next order period

    b. Percentage of safety stock to keep

    c. Amount of stock on hand

    d. Amount of stock already ordered but not yet received

22. The following are steps in calculating quantities to order for the next order period. Arrange them in proper order by assigning the first activity number 1, second activity number 2, etc.

    ___Calculate the cost of the entire order

    ___Calculate number of tablets to treat all expected patients during next order period

    ___Calculate the number of tablets to treat one patient for the entire treatment period

___Calculate the number of containers to order for each medicine

___Calculate safety stock quantities of each medicine

___Estimate number of patients to treat next period

___List the medicines to order (including formulation and dosing)

___Adjust amount to order by adding the quantity of safety stock

Module Five: How to Prepare and Administer TB Medicines

23.Which of the following statements is true about DOT?

a. DOT means to tell patients how to take their medicines
b. DOT means to record all medicine usage as soon as it is dispensed
c. DOT means to watch the patient take every dose of each TB medicine and then record it

24.How can you be sure to give the correct medicine to the patient

a. Look at the color of the tablets and choose the one that looks like the medicine you administered last visit
b. Look at the patient record to find out which medications were given last time, choose the medicines and dosages by reading the medicine labels, don't remove the medicine from blister card or container until you are ready to administer to the patient
c. Look at the patient record to find out which medications were given last time, but remove them from the blister card or container because you have many patients to treat and won't have time to do so one by one

25.Once the patient has taken the medicine you should:

a. Register the dose in the patient record right away
b. Wait until end of day to register all patients since you have many patients to treat
c. Not necessary to register the dose because you are counting the quantity of medicines on hand once a month

Scoring Key to Pre- and Post-Test: Managing TB Medicines at the Primary Level

Module One—How to Receive Medicines and Supplies

1. When medicines arrive at my health center I must do the following:

   c. Verify that all medicines are correct and sign the delivery form

2. Why would you need to know the day medicines will arrive at your health center?

   b. To organize the storage area to accommodate the arriving medicines

3. What should I inspect about the medicines and supplies when they arrive?

   c. Verify the quantity of each item received, the label information on a sample of medicine to see if the medicines are the correct ones, and if any items are broken or damaged

4. What is the *Discrepancy* column used for on the delivery form?

   b. To record the difference in quantities sent to me with the quantities I actually received

5. What should I do after signing the delivery form?

   a. Put the medicines on the shelves in an organized way

Module Two—How to Keep Good Medicine Records

6. What types of stock records should I use in my health center?

   b. Stock register with space to record quantities entering and leaving the health center for each item in stock

7. Daily administration records should be kept because—

   c. According to good TB control program practices, each dose of medicine a TB patient receives should be recorded and initialed

8. If community DOTS is practiced at your health center, what should you do?

   a. Give the patient or caregiver a TB control record to record and initial each dose given

9. What information should be recorded on stock records?

   c. Date of transaction, to where items were issued and received, quantity issued and received, available stock balance

10. I should conduct an inventory of items before placing my next order as follows—

    b. Compare quantity on shelves with the quantity on the stock record, recount if different, record difference on stock record

Module Three—How to Store Medicines Appropriately

11. You should conduct an inspection of your medicine storage areas for the following—

    c. Medicines are organized so that labels can be easily read and stored out of direct sunlight, away from walls and off the floor

12. Rotating stock means that—

    a. Medicines with the closest expiry date are stored in front of medicines with later expiry dates

13. Why should I worry about having too many items of a medicine in stock?

    b. Too many medicines mean that some will pass the expiry date and patients cannot use them

14. Patient kits are useful because—

    c. A patient kit contains enough medicines for a complete patient treatment and medicines won't ever run out for the patient

15. What should I do with a medicine that expired last week?

    a. Remove it from regular stock and dispose of it according to procedures

16. What can I do in my health center to improve medicine storage?

    b. Change environment so that air will circulate around the items, items are stored away from direct sunlight, and the storeroom is secure from unauthorized persons entering and taking medicines

Module Four—How to Calculate TB Medicine Orders

17. What does *order period* mean?

    c. The period of time between when you last ordered and must order again

18. What is *safety stock*?

a. An extra amount of stock I order each order period in case normal quantities are not enough

19. What is *stock on hand*?

b. Quantity of an unexpired item available in my health center at any point in time which I can verify by counting

20. What is a medicine's *shelf life*?

c. The date that a medicine reaches its expiry date

21. What information must I have before I can calculate quantities to order for the next order period? *Please choose all answers that are correct.*

Note: All answers are correct and all must be chosen to count this question as correct.

22. The following are steps in calculating quantities to order for the next order period. Arrange them in proper order by giving the first activity number 1, second activity number 2, etc.

All answers must be in the correct order to count this question as correct

__8__ Calculate the cost of the entire order

__4__ Calculate number of tablets to treat all expected patients during next order period

__3__ Calculate the number of tablets needed to treat one patient for the entire treatment period

__7__ Calculate the number of containers to order for each medicine

__5__ Calculate safety stock quantities of each medicine

__2__ Estimate number of patients to treat next period

__1__ List the medicines to order (including formulation and dosing)

__6__ Adjust the amount to order by adding the quantity of safety stock

Module Five—How to Prepare and Administer TB Medicines

23. Which of the following statements is true about DOT?

    c. DOT means to watch the patient take every dose of each TB medicine and then record it

24. How can you be sure to give the correct medicine to the patient

    b. Look at the patient record to find out which medications were given last time, choose the medicines and dosages by reading the medicine labels, don't remove the medicine from blister card or container until you are ready to administer to the patient

25. Once the patient has taken the medicine you should—

    a. Register the dose in the patient record right away

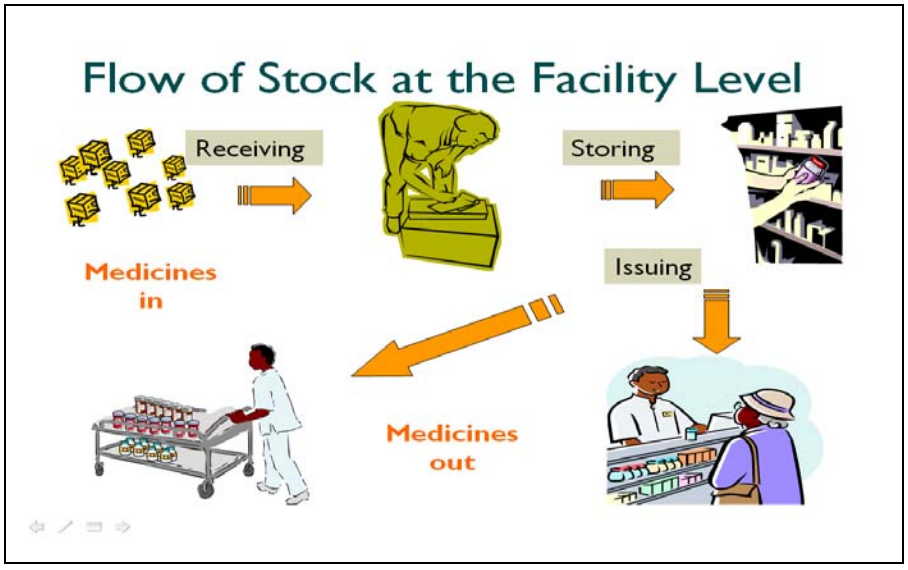
MODULE ONE—HOW TO RECEIVE MEDICINES AND SUPPLIES

Good practices require that you store medicines and supplies properly so they will be easily accessible to the health worker, available when the patient needs them and medicine quality maintained. Along with this is the requirement to document quantities received and quantities administered on a daily basis. Without good medicine practices, treatment outcomes will not be reached and patients will not be cured.

At the end of this module you should be able to describe—

- How to properly receive medicines
- Which forms are useful for tracking receipts and issues
- How to record quantities received and quantities issued

In a typical situation, the picture below shows the flow of medicines and supplies from the time of delivery to the treatment center to storage, and finally, for use for patient treatment.



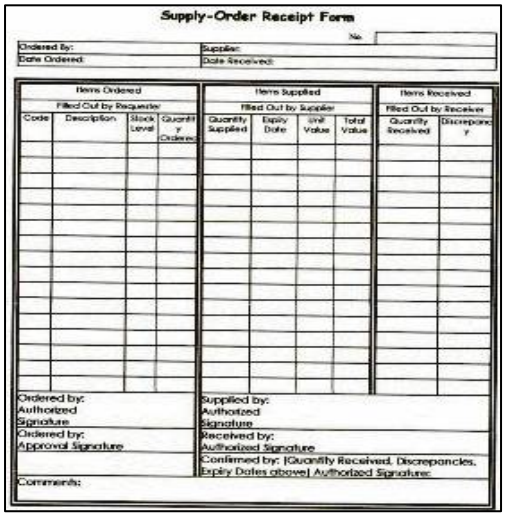
As the person in charge of receiving TB medicines and supplies that were ordered from the district stores, you must find out the day and time the items will be

delivered to your center so you can create adequate space to store the incoming items.

Once the TB medicines and supplies are delivered to your center, you have to verify quantities received and document this on the receipt forms sent with the order.

The following should be checked and cross-checked by another TB health worker before signing the delivery receipt forms—

- If all quantities for each item listed on the delivery receipt form were delivered
- If some items delivered were not ordered for your facility
- If the items delivered are correct (inspect medicine label for name, strength, and dosage form)
- If the correct quantity of each item was delivered
- If all containers and medicines are in good condition—no broken bottles, damaged tablets, or blister cards; discolored medicines, past expiry dates



Supply-Order Receipt Form

No.

Ordered by:
Date Ordered:
Supplier:
Date Received:

Items Ordered (Filled Out by Requester)				Items Supplied (Filled Out by Supplier)				Items Received (Filled Out by Receiver)	
Code	Description	Stock Level	Quantity Ordered	Quantity Supplied	Expiry Date	Unit Value	Total Value	Quantity Received	Discrepancy

Ordered by:
Authorized Signature
Ordered by:
Approval Signature

Supplied by:
Authorized Signature
Received by:
Authorized Signature
Confirmed by: (Quantity Received, Discrepancies, Expiry Dates above) Authorized Signature:

Comments:

If there are any missing or damaged items, document the quantity of good items and the quantity that are missing or damaged on the receipt forms sent with the order before signing for the delivered items. Once you've signed, keep one copy of the signed form for your records. It is a good idea to have another stores person sign to verify quantities received.

After receiving and signing for the delivered items, arrange them in your storage area or place on shelves following the first expiring, first out (FEFO) method. FEFO means you should store medicines with the

shortest expiry dates at the front of the shelf. FEFO policy and proper storage procedures will be discussed in more detail in Module Three—How to Store TB Medicines Appropriately.

In some health systems, a medicine register is kept for tracking movement of each item. Don't forget to document total quantity of each item received in the medicine register if one is used in your center.

If your TB program supplies TB medicines as patient kits or packs, remember that the kits contain a complete set of medicines for the entire duration of treatment for one patient and so more storage space on shelves or in cabinets will be needed.

These pictures show different ways of organizing medicines into patient kits. Kits are recommended at the treatment center level for optimum TB control since they allow the patient to know medicines are available when they need them.

Use the actual size of your patient kit when planning for space requirements. In case you do not know your kit size, you can estimate using the Global TB Drug Facility's patient kit for Category I as a guide. For each patient kit, you would need a space 12 cm wide, 14 cm high, and 23 cm deep. If you work in a large treatment center and treat many patients, you need to have safety or buffer stock which means you could receive boxes with 10 kits to store. In that case, your storeroom would need to be able to accommodate one or more boxes with the following dimensions: 60 cm wide, 30 cm high, and 23 cm deep.

Procedures for Receiving Medicines and Supplies

Place delivered items in a secure area in the treatment center

- Obtain supply order receipt forms that accompanied the delivery
- Inspect each container for damages and expiry date
- Count all containers of each medicine and record quantity received
- Record any discrepancies between quantity supplied and quantity received in the "Discrepancy" column
- Sign authorized signature in the "Received by" space
- Have another store officer recount and sign in the "Confirmed by" space
- Keep a copy for your records

Annex 1 provides an illustration of a typical supply order receipt form, which may be used by any type of health facility to track quantities ordered, issued, and received. You will also find an example of a typical delivery receipt form, which is an additional form that would be used when the delivery driver needs a document showing that the delivery actually took place (Annex 2).

Exercise

Now that you understand how you should receive medicines and supplies, use the checklist below to assess your current practice in your treatment center for receiving ordered items. Put a ✓ mark beside each question that you answer yes (you practice in your store) and an X mark for each question that you answer no (you do not practice).

Once completing the checklist, evaluate your performance by counting the total of all checked (✓) questions and dividing by the total number of questions multiplied by 100.

$$\text{Performance} = \frac{\text{Total number of check marks (✓)}}{\text{Total number of questions}} \times 100$$

$$\text{Example of calculation: Performance} = \frac{5}{9} \times 100 = 56\ \%$$

	Do you:	**✓ or X**
1	Check for broken, cracked, or leaking bottles?	**X**
2	Check for broken or crushed tablets; damaged blister cards?	✓
3	Check for expiry dates of each item?	✓
4	Check labels on each box to confirm medicine name and strength?	**X**
5	Check whether refrigerated or cold chain items arrive within acceptable temperature ranges (e.g., BCG vaccine)? Omit if you do not stock refrigerated items.	—
6	Check if all items listed on invoice were delivered (missing items)?	✓
7	Check items that were delivered but not ordered (wrong items)?	**X**
8	Document discrepancies in quantities delivered when they occur?	**X**
9	Document received items in stock registers the same day you receive deliveries? Omit this question if stock registers are not required in your health system.	✓
10	Have a second person verify quantities that are received, missing, or damaged?	✓

Group Discussion

What to do when you receive items that are near to expiring or expired already?

What remaining shelf life would you still accept?

How can a low performance rate (56 percent) be improved with the idea of reaching a goal of 100 percent?

Why was the number of check marks divided by 9 instead of by 10?

Annex 1. Sample Supply Order Receipt Form

Use this form to document a supply order and delivery between any type of facility such as warehouse to treatment center or from one treatment center to another.

Facility: ***Bengal Three***				District: ***Lilongwe***				No. ***2-2006***	
Ordered By: ***Louis Stevens***				Supplier: ***District Warehouse , Lilongwe***					
Date Ordered: ***20 Aug 2007***				Date Received: ***24 Aug 2007***					
Items Ordered				Items Supplied				Items Received	
Filled Out by Requester				Filled Out by Supplier				Filled Out by Receiver	
Code	Description/units	Stock Level	Quantity Ordered	Quantity Supplied	Expiry Date	Unit Value	Total Value	Quantity Received	Discrepancy
--	RH 150/75 mg, tablets in blisters	78	220	220	1-1-08	0.01	2.20	220	0
--	RHZE Cat. I patient kit	3	12	12	6-6-08	17.54	210.48	10	2
Ordered by: Authorized Signature **Louis Stevens**				Supplied by: Authorized Signature **Marta Raya**					
Ordered by: Approval Signature **Mary Fortuna**				Received by: Authorized Signature **Louis Stevens**					
				Confirmed by: (Quantity Received, Discrepancies, Expiry Dates above) Authorized Signature: **Mary Fortuna**					
Comments: ***2 kits missing; also 3 blister cards of RH were crushed but not open and tablets were not crushed so they will be given to patients***									

Annex 2. Sample Delivery Receipt Form

Use this form to record delivery and receipt of medicine orders. This form should be used to track the number of boxes or containers delivered; it cannot be used to track the total quantity of medicines in the storage area.

This form may not be necessary if the Supply Order Receipt Form previously shown is used for that purpose.

Delivery Note Facility Making Delivery: ***District Warehouse*** Health Facility Receiving Delivery: ***Bengal 3*** District: ***Lilongwe***		
Description drug name, strength, form, package	Qty sent	Qty received
RH 150/75 mg, tablets, box	***1***	***1***
RHZE Cat. I patient kit, box	***2***	***2***
Observations		
Upon opening the boxes Mr. Louis Stevens found 2 patient kits missing; 3 blister cards of RH were crushed but tablets are useable		
Received by (Date) **Louis Stevens 24-8-07**	Delivered by (Date) **Andre Milange 24-8-07**	Received by (Date) **Mary Fortuna 24-8-07**

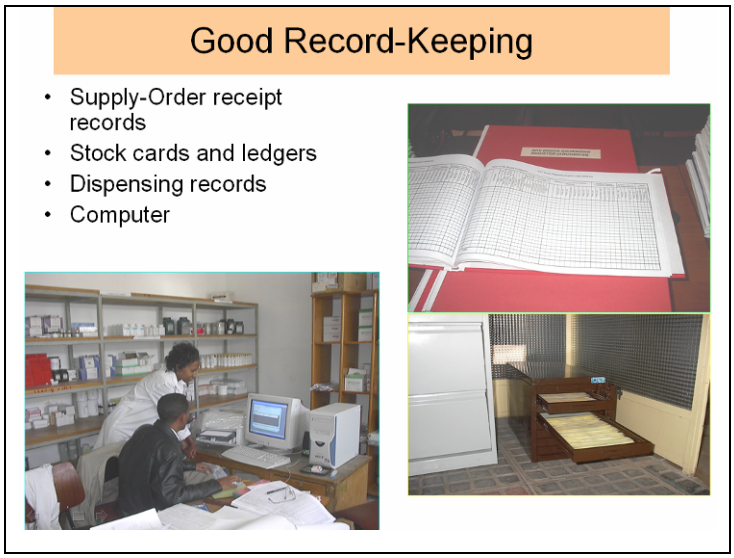
MODULE TWO—HOW TO KEEP GOOD MEDICINE RECORDS

Good record keeping is one of the most important aspects of good medicine management. This is because good records can help prevent stock-outs, overstocking, or understocking; wastage from expired medicines and theft; and maintain the health worker's integrity.

At the end of this module, you should be able to describe—

- How and why to keep patient administration records
- From where to get the information to write on stock records
- What information is needed to maintain stock records in larger treatment centers

There are three types of records that could be kept in treatment centers—(1) supply order receipt and delivery records that were discussed in Module One;
(2) individual inventory medicine records such as stock registers, cards, or ledgers; and
(3) administration records such as the TB patient treatment register. These records are usually kept manually (written by hand).



In many treatment centers, the TB patient register also serves as the medicine inventory record since the centers are too small to require more complicated methods of record keeping. For that reason, this module will focus more on using the patient administration record and the supply order receipts as the inventory method of choice.

How and Why to Keep Patient Administration Records

In good TB control programs, each dose given to a patient must be recorded. Most national TB programs have standard forms for recording these doses. If this is not the practice in your country, you should begin it right away.

Daily administration records not only document patient use but also may be used as a duplicate stock record to crosscheck any discrepancies in medicines stored in the treatment center. Patient administration records will also help you take a quick look to see if any prescription errors or irrational prescribing are happening at the center. Irrational medicine use occurs when the correct medicine or strength, dosage form, or right quantity are *not* given to the patient.

Why have daily administration records?

- **Follows DOTS scheme**
- **Records if directly observed therapy took place**
- **Identifies if—**
  - **Wrong medicines were given**
  - **Wrong quantities were given**
  - **Wrong duration of therapy was given**
- **Monitors patient compliance to treatment**
- **For inventory control**
  - **Shows quantity actually consumed by patient**
  - **Can be used to calculate order quantities**

Daily administration records are necessary for directly observed therapy which is a part of the DOTS scheme followed by many TB programs around the world. They are important to verify if the patient comes to the clinic to collect his/her medicine daily (or intermittently, if that is the practice) during the intensive treatment phase.

For a patient who does not come to collect medicines, you can follow up to find out the reasons why not and get him or her back on track.

If your health system practices community DOTS, don't forget to give a copy of the daily administration form of each patient to the caregiver (e.g., family member or community health worker). Each dose must be recorded and signed by the caregiver and the record brought by the responsible person to the treatment

center when collecting the next set of TB medicines. Then the health worker will record the taken doses on the master record kept at the treatment center.

An example of a daily administration form is provided in Annexes 2 and 3 of Module Five for intensive and continuation phases of treatment, respectively. This form can be changed to suit your country's needs.

Stock Records Importance and Use

Stock records are a good reference when ordering TB medicines. They provide the following information:

- Quantities of medicines and supplies consumed by patients during the last order period
- Quantities ordered but not yet received
- Quantities received from previous orders
- Quantities loaned to another health facility that will need to be replaced during the order period
- Expiry dates of medicines in stock

In some health systems, treatment centers are so small they do not require stock records. In this case, quantities to order are calculated from both the TB patient treatment register and records of medicine deliveries to the treatment center.

Stock records (or forms) for documenting TB medicines and supplies inventories are usually provided by the Ministry of Health's Central Medical Stores (CMS) or through the TB program. The TB health worker-in-charge or store officer usually keeps custody of the supply of stock records received from CMS and is responsible for keeping them in stock.

Regardless of the method used in your health system, it is important to keep good records to help with the following—

- Track the quantity of each item received, administered to patients, or issued to another facility
- Calculate the quantity to order and safety stock levels to keep
- Monitor expiry dates

Important points to remember about stock records

- Update stock records at the time medicines are received, administered, or issued
- Records should be filled out clearly so they are easy to read
- Always fill out required information such as
  - Transaction date
  - Location from where items were received or issued
  - Quantity received or issued
  - Available stock balance
- Remove damaged or expired items from regular stock and subtract from stock records

In unplanned situations such as stock-outs, a treatment center can borrow from or loan TB medicines to another center. The borrowing center should always submit a written request similar to what it does for its normal orders from district stores listing each item separately. Once loaned or borrowed, the quantities should be entered into stock records at both treatment centers. The stock records should indicate the source of the medicines and supplies. Depending on the procedures in your health system, if you are required to pay back medicines you borrowed from another treatment center, make sure to indicate this in the stock record.

Physical inventory (counting of current stock items) should be carried out regularly to monitor stock levels, for example, during supervisory visits by district TB coordinator. Physical counts should be compared with the quantity written on

individual stock records to find out if there are differences. If patient kits are used in your health system, it is recommended not to count each drug individually since a kit is considered the unit of measure.

In health systems where individual stock records are not used, cross-check your supply order receipt records and patient treatment registers with physical counts of existing stocks to determine if—

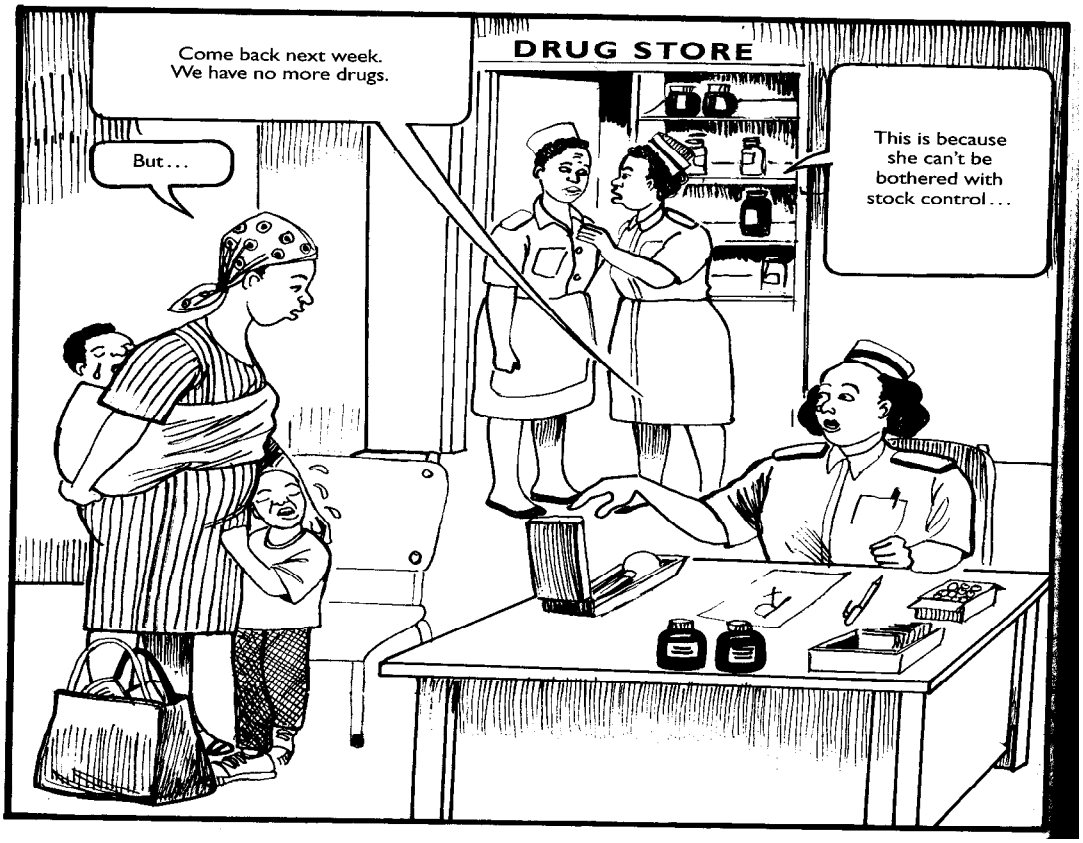
- All issued items were entered into stock records
- All received items were verified as correct
- All items administered to TB patients were registered
- There are any calculation errors

If you cannot find reasons for any errors discovered during comparison of records with physical counts, record the discrepancy and write the date and your initials of the physical inventory count on the stock record. Notify the district officer as soon as possible. There could be theft of stocks from your treatment center.

In the Annex of this module, find the form "Sample Information to Keep If Using Individual Stock Register." It is an example of the information you would keep in an individual stock record if your treatment center is large enough to require use of a separate medicine record.

Exercise

Carefully examine the picture below.



A. Has this incident ever occurred in your treatment center?

B. Why were medicines not available?

C. How can this situation be prevented from occurring next time?

D. Do you think the patient will want to return to this clinic?

Using the examples in the Annex of this module, practice how to fill out those stock records you plan to use with your own treatment center data.

Annex 1. Sample Information to Keep If Using Individual Stock Register

Facility:_____ Medicine: RH 150/75 tablets Code:_____				
Date	**Stock on hand (balance)**	**Received/Issued**	**Exp. date**	**Signature**
1–2	12,000	300 to patients	6/2007	Chinwe Owunna
3–2	11,700	200 to patients	6/2007	Adam Smith
4–2	11,500	600 patients	6/2007	Mohammad Obu
30–2	11,400	Inventory – 100 not accounted for		Adam Smith
2–3	16,400	5,000 from district warehouse	8/2009	Mohammad Obu

To this you may add columns with information on prices, invoice number, or other information required by your health system.

The following two forms can be found in the Annex section of Module 5—
Sample Daily Administration Form: Intensive Phase (Annex 2)
Sample Daily Administration Form: Continuation Phase (Annex 3)

MODULE THREE—HOW TO STORE MEDICINES APPROPRIATELY

Your treatment center may not be very big and maybe you treat only a few patients each month, but regardless of size, a good storage environment is required where TB medicines and supplies are kept. Once you have completed this module, you should be able to describe—

- How TB medicines must be stored to maintain medicine quality
- How you should rotate stock and monitor medicines expiry
- What to do with expired, damaged, or excess TB medicines
- How to keep your storage area secure
- How to organize medicines as TB patient kits

Storage areas should be tidy, clean, free of pests such as rodents and insects, and well organized according to good storage practices. Also, for TB it is good to organize medicines as patient kits. In some health systems, this means that the patients' kits are purchased from the supplier ready to use, and in others it means organizing the kits at the treatment center. The important thing to remember is that a patient kit for TB contains all medicines for the entire treatment period for each patient.

Ensure that your storeroom is always kept clean

- Draw up a schedule and instructions for cleaning floor and shelves
- Prohibit food consumption in areas where stock items are kept
- Remove any spilled products immediately and clean affected areas
- Dispose of garbage often, at least daily
- Keep the area outside the treatment center clean
- Schedule regular inspections (done by senior staff) to check for signs of theft, pests, or water damage, and for deterioration due to humid conditions

Other factors besides basic cleanliness—temperature, humidity and direct sunlight—can affect the quality of TB medicines and supplies in your storeroom. For example, high heat, humidity, and exposure to direct sunlight may cause package labeling and medicines to change color or fade, tablets to crumble, and medicines to give off unusual odors. You can maintain the quality of TB medicines in your treatment center by taking some basic precautions as follows.

Promote Quality and Good Use of Medicines

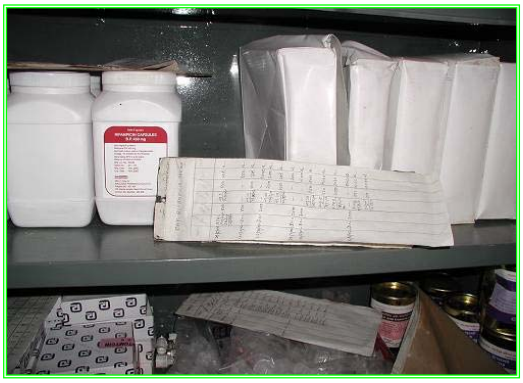
- Organize medicines into patient kits (assures patient and nurse that all medicines are available for six to eight months' treatment)
- Organize medicines so medicine labels can be easily read while on shelves (product name, expiry date, patient name)
- Promote air circulation by doing as many of the following as possible—
  - Prepare storage room so it will have high ceilings with vent openings
  - Install air conditioner, window, or exhaust fans
  - If no equipment available, at least open windows or air vents
  - Allow more space between shelves
- Keep medicine containers closed; avoids exposing medicine to humid air which causes tablets to crumble
- Place protective bars on windows
- Follow manufacturer's storage recommendations; check with supervisor if you can't find these on the medicine containers
- Keep light-sensitive products in their original packaging in a closed cupboard or shady corner
- Use refrigerators and freezers to store PPD, BCG, other diagnostics
  - Keep in shady, ventilated areas
  - Monitor and maintain temperatures (refrigerator 2-8°C and less than 0°C for freezers)
  - Keep daily record of temperatures
  - Minimize how many times you open refrigerators and freezers
  - Keep them well organized
  - Use exclusively for medical products (not food)

- Never store medicines on the floor; only on pallets or shelves
- Never store medicines near the ceiling where temperatures are higher
- Do not stack containers too high to avoid crushing lower ones
- Leave a space of 10-15 cm between walls, shelves, and stacks of medicines to allow better air circulation

Q. What is your impression about the pictures below? Which one looks like your treatment center?

Treatment Center A

Treatment Center B



A) Could you easily find the products you need?

B) Are medicines stored in an orderly manner?

C) Is the storeroom clean?

D) Would pests (insects, rats) like this area?

E) Would it be easy to select the wrong product?

You will have a chance later on to review these pictures in detail and decide what the problems are and how to solve them (see Exercise 1 at the end of this module).

How to Rotate Stock and Monitor Medicine Expiry

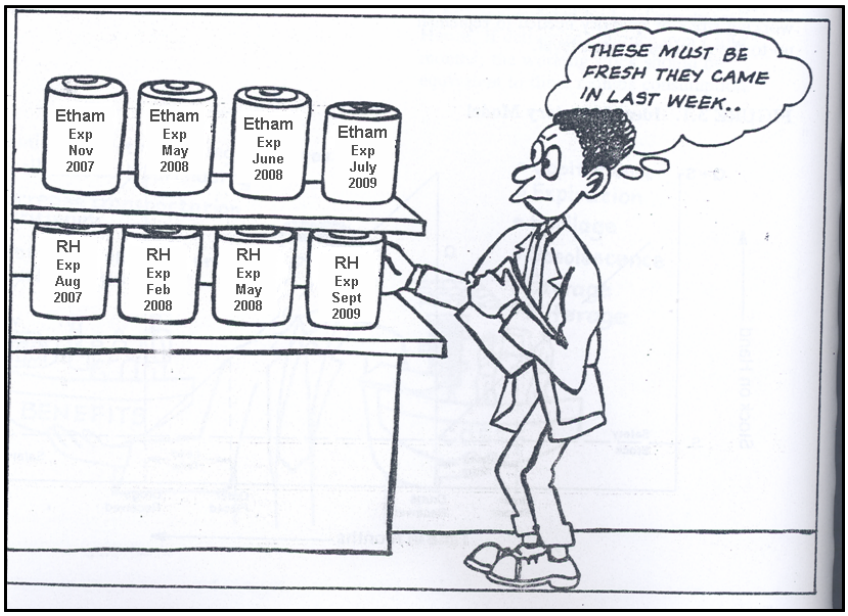
In the first module, you saw the term first expiring, first out (FEFO). FEFO is the preferred method to rotate your TB medicine stock to avoid going beyond the expiry date of the product before it is used by the patient.

FEFO means that all products with shorter expiry dates should be stored on the shelves in front of medicines with a longer expiry.

Why FEFO?

- Minimizes wastage of products
- Saves money
- Helps ensure medicines are available when patients need them

Carefully examine the picture below, describe what you see.



A) Did the storekeeper practice FEFO when arranging medicines in the store?

B) Is he practicing FEFO as he collects medicine to dispense?

C) What is likely to happen with this type of practice?

You can monitor expiry dates using a variety of tools, for example—

- Check expiry dates printed on labels on each product container monthly
- Record expiry dates on stock registers when the medicines are received in your health center and then check these on a monthly basis

For TB patient kits that contain a patient's complete treatment (e.g., category I treatment box with two months intensive phase and four to six months continuation phase), the medicines for intensive phase might have a different expiry date from those for the continuation phase. Store the medicines so the shortest expiry date is always visible. This may involve writing the shortest expiration data on the front of the kit.

A patient kit containing medicines that have an expiry date before the six to eight months treatment duration should not be started. See sample expiry date calculations in the following table.

Expiry date Intensive Phase medicines	Expiry date Continuation Phase medicines	Latest date the kit should be put into use
31 October 2008	01 August 2008	01 February 2008
01 August 2008	31 October 2008	30 April 2008
01 May 2008	31 October 2008	01 March 2008
31 October 2008	31 October 2008	……..*
01 May 2008	01 May 2008	…….. *

* Please try to calculate the correct date in these two places…….

This doesn't necessarily mean that the medicines in the kit cannot be used any more, but only that the kit has to be started to be used before the dates calculated above; it is worthwhile to mark on the kit's outside the date a kit has to be put into use and the shortest expiry date of the medicines inside!

Q. What should you do if a patient who is using TB patient kits defaults or transfers to another health center?

A. Depends on the TB program's policy and could consist of any of these—

- **You may send the medicines to the transfer treatment center (best not to send with patient to assure appropriate DOT is followed)**
- **Keep the patient kit at your center and place it in a supply box for use to adjust kits of heavy weight patients**
- **Send back to the district store for repacking**

What to Do with Expired or Damaged Medicines and Excess Stock

Expired and damaged medicines: Good storage practices require that you handle expired and damaged medicines with care. You might have expired or damaged products in your treatment center because—

- Not practicing FEFO method
- Irregular monitoring of monthly needs
- Poor storage practices
- Poor handling during delivery

Remove all expired items immediately from the normal usable stock and store in a separate area clearly marked for that purpose. Maintain a written record of all stock that has expired or is damaged, and calculate the indicator value of the lost products (see Exercise 2 at the end of this module).

Never dispense expired or damaged medicines to patients. Follow your country's guidelines, which often means returning expired and damaged products to the district warehouse for disposal.

Excess stocks: The direct cause of this situation is simply poor management, but more specifically due to the following practices—

- Overestimating drug requirements

- Failing to monitor existing stocks on a regular basis
- Ordering more than required because of fear of future stock-outs

Return excess medicines to the district warehouse for redistribution. Remember to keep good records of medicine quantities returned and received.

Where patient kits are used, there may be an excess of loose medicines created because patients stop coming for treatment (defaulters) or move from the region, or you must adjust the kit for the patient's weight. This is not bad as long as you follow the procedures outlined above for either re-using the excess stocks at your center or sending them back to district stores for repacking depending on health system policy.

How to Keep Your Storage Area Safe and Secure

Security problems such as theft, bribery, and fraud can affect the way your storage area functions. A strong security system can help minimize medicine shortages and misuse; a strong system can also promote accurate record keeping ensuring that correct medicines are available to treat patients when needed.

What can you do to ensure that your storage area is well secured?

- Restrict access to storage areas
- Hold all staff who are authorized to handle supplies accountable for their actions
- Entrust the store keys to one or two reliable persons; one person should always be present during working hours
- Install bars on all store room windows to prevent burglaries
- Fit all doors with security locks
- Maintain good inventory records for accountability

Another security concern includes fire outbreaks. Keeping the storage area clean will help prevent fires from occurring.

How to Organize Medicines into TB Patient Kits

TB treatment should never be stopped once it has started, but in many health systems it is very difficult to assure a steady medicine supply all of the time. Common problems associated with not being able to have medicines available at all times are—

- Poor estimation of medicine needs because of—
  - Responsible person not adequately trained in medicine calculations
  - Incomplete data on patient attendance
  - Not calculating buffer or safety stocks to cover unexpected increases in patients needing treatment (recommendation is to keep 3 months safety stock at local level, 6 months at national level but in a poorly managed supply system 12 months is best)
- Lack of funds to purchase all the medicines and supplies needed
- Irregular medicine deliveries because—
  - Health system doesn't have enough vehicles
  - Responsible person doesn't understand monthly or quarterly medicine needs and orders too few
  - Medicine supplier has business problems

In a system using loose medicines, there may be unexpected stock-outs consequently interrupting the full treatment of some patients. The best solution to these problems is to have all medicines organized as patient kits and marked with patients' names sitting on the shelves at the treatment center.

Individual patient kits in treatment centers promote good TB control. That is because all 4-5 medicines for the full 6-8 months of treatment are present at the center when the patient arrives.

It is important to note that you will need more shelves or storage space since patient kits contain enough medicines for 6-8 months instead of the 1-3 month quantities of single drugs usually ordered by many TB treatment centers. In the last module you saw an example of the space requirement for a Global Drug Facility patient kit for category I where a single kit is 12 cm wide, 14 cm high, and 23 cm long. Of course you should use the size of your own patient kit when planning space requirements.

To organize medicines into kits the following steps should be followed—

1. List which medicines are needed for each category of TB patient from the standard treatment guidelines (STGs) of the national TB program; only fixed-dose combinations (FDCs) packaged as blister cards is recommended for kits

2. Determine how many tablets of each medicine must be given per dose depending on patient's weight, how often they must go to the treatment center to receive their doses (daily, three times week, etc.), and the duration of treatment (number of doses treatment over how many months)

3. For Intensive phase and Continuation phase, calculate how many tablets of each medicine you will need for a complete patient treatment of 6-8 months depending on the TB patient category; include syringes and other supplies such as water for injection for a Category II patient

4. Determine how medicines are supplied to you (number of tablets per blister card or strip) and on a clean surface assemble all the medicines and supplies needed for the patient kit

5. Place all medicines and supplies needed for one patient in suitable containers and label them as Category I, II, III, or other commonly used terms in your TB program, and write on the outside of the kit the shortest expiry date of all the medicines you placed inside; suitable containers usually consist of specially ordered boxes of cardboard or plastic. *Caution: you should prepare*

all kits of just one category and then set them aside before assembling kits of another category to avoid putting the wrong medicines in a patient kit.

6. Arrange a suitable place to store new, unopened patient kits in a separate area away from kits already in use. Don't forget to check expiry dates and "use before" dates of unused patient kits at least monthly.

7. As soon as you have a newly diagnosed patient, pick the appropriate kit according to the treatment category and write the patient's name, weight, and age on the label; if patient weighs more or less than 40-54 kg (middle weight band) adjust the kit for the patient's weight as instructed in the section How to Adjust a TB Patient Kit Based on Patient's Weight of Module Five of this guide. Then move the kit to the shelves where kits for current patients under treatment are stored.

For illustration purposes, let's organize patient kits for a Category I patient. The above steps would be carried out as follows—

1. List all TB medicines needed. The TB program's STGs state that for a Category I patient the medicines rifampicin, isoniazid, pyrazinamide, ethambutol (RHZE—150/75/400/275 mg) in FDC is used for Intensive phase and RH (150/75 mg) in FDC is used for Continuation phase treatments.

2. Determine number of tablets in one dose, number of doses to be taken each month, and number of month's treatment. If prepared beforehand, it is always best to set up kits for the patient who weighs between 40–54 kg, since in most countries more TB patients weigh within this range when they begin treatment. Once a TB patient is diagnosed and weighed, you will then adjust the patient kit should the patient's weight be more or less than 40–54 kg.

   For our illustration, the TB program requires that patients go to the treatment center daily and treatment is for two months—Intensive phase

and four months—Continuation phase. The following table is found in the STGs and the information you need is listed under the **Daily** column highlighted in yellow. If your health system uses different patient weight bands or treatment frequencies, you can adapt the table with those numbers.

Patient Body Weight (kg)	Intensive Phase			Continuation Phase		
	Two Months			Four Months		Or Six Months
	Daily	Or Daily	Or 3 Times Per Week	Daily	Or 3 times per week	Daily
	RHZE 150 mg + 75 mg + 400 mg + 275 mg	RHZ 150 mg + 75 mg + 400 mg	RHZ 150 mg + 150 mg + 500 mg	RH 150 mg + 75mg	RH 150 mg + 150 mg	EH 400 mg + 150 mg
40–54	3	3	3	3	3	2

Rifampicin (R), isonoiazid (H), pyrazinamide (Z), ethambutol (E), streptomycin (S), rifampicin/isoniazid (RH)

3. Calculate number of tablets of each medicine for a complete patient treatment. Using the information from Step 2 we can see that 3 tablets of RHZE and 3 tablets of RH are given in a daily dose to a Category I patient for both the two months-Intensive phase and the 4 months-Continuation phase. In this TB system, medicines are given in 28 doses for each month. Therefore, the calculation would be done as shown in the following table.

Product Name	Treatment Category	Treatment Phase	(A) Basic Units per Dose (e.g., tablet, vial)	(B) Doses per Month	(C) Months Treatment	Basic Units per Patient (A × B × C)
RHZE 150/75/400/275 mg	Cat. I	Intensive	3	28	2	168
RH 150/75 mg	Cat. I	Continuation	3	28	4	336

4. In a separate calculation determine the number of blister cards needed for one Category I patient kit as follows—

   For illustration purposes both the RHZE and the RH FDCs are supplied in blister cards containing 28 tablets.

Number of Blister Cards Required for One, Category I, Patient Kit			
	Total number tablets for 1 patient kit	Number of tablets in one blister card	Total number of blister cards for 1 patient kit
RHZE	168	28	6
RH	336	28	12

Note that for patients receiving streptomycin (e.g., Category II or children with HIV), you simply add those items to the table above, determine how many units come in one package (e.g., 100 vials water for injection or 50 syringes) and carry out the same calculations.

5. Place medicines needed for one patient in suitable containers and label appropriately. Assemble the tablet blisters on a clean surface and place enough blister cards in the box to be used for one patient kit (RHZE—6 blister cards and RH—12 blister cards). The box should be of sturdy cardboard or plastic and will likely have to be specially ordered for this purpose. Once all drugs are placed inside the box, label the container on the outside with a label similar to the one below:

Patient Name:
Date Started Treatment:
First medicine to expire date:
Use before date:
Category I TB treatment
RHZE (150/75/400/275 mg) 168 tablets

You can use a variety of containers for preparing patient kits. Here are a couple of examples.

For example, if you decide to prepare kits in advance for all new patients coming to the clinic next month, simply multiply the number of expected patients for the month by the number of blister cards calculated above for one patient kit. Then follow the same procedures for assembly, labeling, and storage of the kits. For example, let's assume you expect 22 new Category I patients to present at the treatment center next month. You would determine the number of blister cards needed to assemble the patient kits as follows—

Number of Blister Cards Required to Prepare 22 Category I Patient Kits			
	Number blister cards required for one patient kit	**Number of expected patients during the month**	**Total number of blister cards required for 22 patient kits**
RHZE	6	22	132
RH	12	22	264

6. Store the newly prepared patient kits in a special area away from kits already in use by patients. Place the kits on shelves with the labels visible so you can easily pick the appropriate kit when needed and to check expiry dates on a monthly basis.

7. For a new patient, pick the appropriate kit, label, and adjust medications. For the next patient who is diagnosed as Category I, pull one of the patient kits from the storage shelves and write on it the patient's name and date treatment is started. If the patient weighs 48 kg, no adjustment is necessary and the kit should be then placed on the shelves where kits for other current patients under treatment are stored. Don't forget to pick the patient kit for that category of treatment with the shortest expiry date and use before date to avoid wasting medicines.

Exercise 1. Evaluating Good Storage Practices

The pictures below show medicine storage in two treatment centers. Examine the pictures carefully and write down what you observe to be the problems.

Picture A. A larger treatment center

Picture B. A treatment center using patient kits

Compare your list of problems with those listed as follows.

Picture A. Larger treatment center

- Medicines are not grouped as patient kits for storage
- Health worker cannot easily tell if there are enough medicines to treat the expected number of patients
- Not clear if good security is in place

but…

- Storage area is very orderly and uncluttered
- Even if room is not ventilated, space on shelves allows air movement
- No medicines are stored on the floor
- Can easily select the correct medicine for dispensing
- Easy to practice FEFO

Picture B. Treatment center using patient kits

- Not clear if good security is in place

but…

- Storage area is very orderly and uncluttered
- Medicines are grouped as patient kits for storage
- Health worker can easily tell if there are enough medicines to treat the expected number of patients
- Even if room is not ventilated space on shelves allows air movement
- No medicines are stored on the floor
- Can easily select the correct medicine for dispensing
- Easy to practice FEFO

1. Use the comparison experience above to think about the storage conditions in your treatment center.
2. Review and complete the "Checklist for Evaluating the Treatment Center Storage Area" located in the Annex of this module.
3. Document which problems you may have.
4. Write down ways you can avoid or improve the problems you identified in your storage areas.
5. When you return to your workplace, review your answers on the checklist and the ways you can improve on the problem areas
6. Take the needed action to improve your storage practices. Some improvements can be made right away and others may take some time. Ask your supervisor for help if you need anything (materials or funds) that is not available.

Exercise 2. Using Data Indicators to Monitor Storage Practices

Calculating indicators such as the one illustrated in this section shows how to monitor your own work. You and your supervisor may think of other important indicators that will help you evaluate and improve your treatment center. Module Six—Supervision and Self-Monitoring discusses use of indicators in more detail.

1. Review the steps that follow for calculating the indicator, *Cost of Expired Medicines and Supplies during Last Period*.

- Make a list of all expired drugs and supplies during the last month
- For each item past the expiry date, count the quantity of tablets, vials or other measuring unit and record in column (A)
- Obtain the cost of one tablet, vial, or unit for each expired product and record in column (B)
- Multiply the unit cost times the quantity expired (B × A) for each item and record in column (C)
- Add up the total cost of all expired items
- Send the results to your supervisor who can use this indicator on a regular basis to help you improve your storage practices

Summary of calculation:

Total cost per expired item = Units expired × Unit cost

(column C) (column A) × (column B)

Total cost of all expired items = Add together the cost of expired items

2. Use the sample data below to calculate the indicator

Sample Data from a Typical Treatment Center

	Quantity in stock	Price per unit	Quantity expired	Date expired
Rifampicin-isoniazid 150 mg/75 mg tablets	2,034	0.05	115	3/05
Pyrazinamide 500 mg tablets	1,552	0.03	0	12/05
Ethambutol 400 mg tablets	1,899	0.04	535	6/05
Streptomycin 1 gm	867	0.51	345	8/05
Water for injection 5 ml	989	0.10	0	9/05

3. Take sample data just above and place into the following worksheet

Cost of Expired Medicines and Supplies during Last Period

Date	Item Name and Strength, Dosage Form, Pack Size	Date Expired	(A) Quantity Expired	(B) Tablet, Vial, Unit Cost	(C) Total Cost (A × B = C)	Comments
	Rifampicin-Isoniazid 150 mg/75 mg tablets	3/05	115	.05	5.75	
	Pyrazinamide 400 mg tablets	12/05	0	.03	0.0	
	Ethambutol 400 mg tablets	6/05	535	.04	21.4	
	Streptomycin 1 gm	8/05	345	.51	175.95	
	Water for injection 5 ml	9/05	0	.10	0.0	
				TOTAL	203.10	

Interpretation

In this example you have lost medicines worth $203.10 because of poor inventory practices. Imagine if you were to do this throughout the year; it could amount to lots of money!

Now imagine if you and your colleagues in other treatment centers were to follow poor inventory practices such as these. The national TB program would be wasting lots of money and would not meet its objectives to have medicines available to treat TB patients when they need them.

Remember to track expiry dates and if you have more medicines and supplies than you can use before expiry, send them back to district stores well in advance of expiry so they can be redistributed to other treatment centers that need them. That way you will be providing the best service to your patients and to the health system in your country.

When you return to your workplace you can use this same form, "Cost of Expired Medicines and Supplies during Last Period," to collect data for calculating the indicator (a blank form that can be photocopied is in the Module Six Annex). In treatment centers where expired products happen all the time, you may want to calculate this indicator monthly or quarterly. If expired medicines are not a constant problem in your facility, you may want to calculate this indicator every 6 to 12 months.

Annex 1. Checklist for Evaluating the Treatment Center Storage Area

		Yes	No
Is there easy movement about the area?	- Organized space for walking - No items blocking access to medicines	√	
Are windows in good condition?	- Sashes in good shape - Windows clean	√	
Are doors, walls, and ceilings in good condition?	- No leaking ceilings - No signs of dampness on walls	√	
Is there good air circulation	- Vented openings allow movement of air - Shelves are spaced apart	√	
Are any products stored in direct sunlight?	- Not too near windows or doors	√	
Is the storage area secure?	- Doors in good shape - Hinges in good shape - Window bars in good shape - Locks in good shape		√
Is the storage area clean?	- Free of insects and rats upon inspection - No trash on floors or counters	√	
Are products organized in a systematic way?	- Medicines grouped as a patient kit - Patient kits in use contain patient's name - Medicines not grouped as patient kits are identified with product names		√
Are there sufficient storage cabinets for TB medicines?	- Are intact and functioning well - Are closed and have locks if door is not locked		√
Are large quantities of medicines kept on pallets?	- Are stacked so as to keep medicines on the bottom from getting crushed - No products are stored on the floor		√
Do refrigerators, freezers, and cold room work well?	- Temperature is maintained - Electricity is constant	√	
Are products available on day of inspection?	- FEFO is used; no products are passed expiry dates - All products are available	√	
Are there damaged or expired products?	- Such products are returned to district stores on a regular schedule - Such products are not mixed with useable stock	√	
Are excess medicines from patient defaults, transfers, or weight adjustments repackaged for use?	- Are returned to district stores on a regular schedule - Are repacked at the health center for new patients - Are returned to district stores for repacking		√

MODULE FOUR—HOW TO CALCULATE TB MEDICINE ORDERS

Treatment centers are at the lowest level of the supply chain in a health system. Stocks are kept in much smaller quantities than in district or regional storerooms. This means the nurse or health care worker must know how to order stocks as well as manage patients.

At the end of this module, you will know about—

- Factors that influence TB order quantities
- Data requirements for calculating orders
- How to calculate order quantities using number of expected patients

When ordering medicines and supplies for TB, it is best to think in terms of complete patient treatments. Before learning how to calculate medicine orders, let's first discuss the consequences of poor order calculations.

Carefully examine this picture.

A. Does this look like what happens in your facility?

B. Why do you think this store is overstocked?

C. What can you do to prevent overstocking from occurring?

D. What can you do with excess TB stock not required for your center?

Overstocking or understocking occurs when order quantities are calculated inaccurately. Or the number of patients to be treated during the order period was poorly estimated. Understocking can cause stock-outs which means that patients' treatments will be irregular causing one or more of the following—

- Can make the patient sicker
- Takes longer for patient to recover
- Treatment might not work when all medicines become available later

- Patient might need different medicines because TB infection is resisting current medicines (are more costly and must be taken for a longer period of time usually 24 months instead of 6-8 months for first-line treatment)
- Patients may die because of developing resistance to the medicine
- Tuberculosis might spread from the patient to family members

As you can see irregular treatment has a negative impact on many people either directly or indirectly. Therefore, remember that any interruption in treatment should never happen with TB patients.

Overstocking has its own problems as well, such as—

- Your center has stock that could be used at another facility where stock-outs are occurring
- Medicines might expire and be given to patients by mistake
- Expired medicines—
  - Can take up space in your center and will cost time and money to dispose of
  - Cost money to the health system and donors
  - Could have saved lives

To prevent overstocking or understocking, we should therefore pay close attention and learn to calculate order quantities as accurately as possible.

Good order calculation

- Ensures availability of medicines and supplies at all times
- Minimizes wastage
- Avoids overstocking
- Saves money
- Saves lives
- Makes your patients believe in the health system

Factors Influencing Order Quantities

When estimating your medicine and supply needs, you should take into account the following factors—

- Has there been a steady increase in the number of TB patients coming to your treatment center over the last few months?
- Is there a migrant population in your service area?
- Has safety (buffer) stock been used up?

Another consideration is available storage space. If adequate storage space is not available at your treatment center, you would not want to order and receive medicines only to have to store them in unfavorable conditions. You should look for alternate ways to ensure you have enough medicines for all TB patients coming for treatment.

For alternate storage

- Reorganize existing space (add cabinets or shelving)
- Expand the building (costly and takes a long time)
- Reduce amount of buffer stock and schedule more frequent deliveries (increased cost of transportation)
- Find suitable space in another nearby area

Regardless of which option you choose, you could set up procedures to borrow required medicines from another treatment center or district store nearby to cover unexpected situations in which there are a large number of extra patients to treat.

When calculating medicine orders, you should seek any relevant information available to make the best decisions that will help your center function well with adequate quantities of TB medicines available when the patient needs them.

Terms You Should Know for Order Calculation

Order period—The time period between when you placed the last order to the time you are due to place the next order. In treatment centers this varies from one month to three months depending on the way the health system is organized.

Safety stock—The stock quantity that should be kept in reserve at all times to protect against stock-outs due to a sudden increase in demand or unplanned event. The safety stock quantity for TB is always calculated based on a full patient treatment. (Note: safety stock is sometimes called buffer stock.)

Stock on hand—The quantity of stock present in your facility that is not already assigned to a patient at the time you begin to calculate quantities to order. Stock on hand is counted in basic units, such as tablets, vials, or patient kits. Only count stock as present if it is not expired and will not expire in the next order period. Be sure to mark, separate, and use up any stock that is about to expire first!

Stock on order—The stock quantity you already ordered but have not yet received at your facility; it also includes quantities owed to your facility by other facilities that may have borrowed from you. Stock on order is counted in basic units, such as tablets, vials, or patient kits.

Change in treatment guidelines—If the national TB program decides to change the treatment regimen; this change should be considered when calculating order quantities. You should find a way of using up old stock before you start using the new products to reduce wastage (for example: placing new patients on the new treatment regimens only when all the old stocks have been allocated to patients).

Shelf life—The period of time the medicine is considered safe and effective to consume. Medicines which have passed their expiry dates should never be given to patients. This factor affects order quantity; expired stocks should be excluded when counting existing stocks. Expired stocks must be removed from your shelves immediately and disposed of according to your health system guidelines.

Available budget—Treatment centers in most countries get their TB medicines free of charge either from the national TB program or through donors such as Stop TB's Global TB Drug Facility (GDF). Treatment centers in other countries may have to buy their own medicines using budgeted funds. Obviously, the amount of funds you have available will affect the quantity of medicines you can buy so do not order more than you can afford.

How to Calculate Order Quantities

To calculate order quantities you need data on population or patient clinic attendance, or simply the known number of patients that are sick. For TB, the total number of patients currently on treatment at the treatment facility during the order period may be used to estimate number of patients that will be on treatment during the next order period, taking the factors mentioned above into consideration.

Before you start calculating order quantities, make sure you have all the information you need. The table below lists the data and where you can find them.

Data	Where to get it
Number of patients expected to receive TB treatment during order period	TB treatment registers or treatment cards Quarterly reports to NTP
TB standard treatment guidelines (STGs)	National TB treatment manual, NTP district office
Safety stock	Calculated by you, based on past experience, equal to percentage of expected and unexpected new patients during the order period
Stock on hand	Physical count and from stock ledgers
Stock on order	Stock records and order records
Generic name, strength or concentration, dosage form, package size	NTP district office, district store List of medicines

The following steps show how to calculate quantities to order.

1. List all the medicines you need to order, stating for each medicine the generic name, medicine strength, dosage form, and pack size all on forms similar to the ones in Annex 4 of this module. Note that if your health system uses patient kits, there should always be a number of loose drugs available to you for those patients who are allergic to one of the medicines

in the combination products. A referral treatment center may be the one to stock loose drugs—you would refer these patients there.

2. For each medicine, determine the quantity required for treating one patient for the entire treatment period and for each category of TB patient. As mentioned above, treatment information is normally provided in national TB program guidelines. To carry out this step you must use the following information—
    - Basic units per dose (e.g., patient must take three tablets for each dose)
    - Number of doses per month patient will take TB medicines (e.g., 28 doses each month)
    - Number of months patient will continue treatment (e.g., two months for Intensive phase and four months for Continuation phase)

For TB, the number of tablets that a patient takes for each dose will depend on the patient's weight. In most cases, you should use the number of tablets for a middle-weight patient 40–54 kg (e.g., 3 tablets of RH). We call these *basic units* for ordering purposes, since some are in tablet form, others in vials, and yet others in liquid or syringe units.

See Annex 1: "Treatment Look Up" tables of this module for detailed information on weight bands, number of tablets required for one dose for both intensive and continuation phases of treatment, and number of doses per month.

Example of calculation:

For a Category I TB patient, the national TB program recommends that we use the following treatment regimen—2 RHZE/4 RH. This means the patient must take two months of RHZE and four months of RH.

List of medicines used—

R = rifampicin tablets
H = isoniazid tablets
Z = pyrazinamide tablets
E = ethambutol tablets

- RHZE 150 mg/75 mg/400 mg/275 mg–four drug FDC tablets in blister cards of 672 tablets per pack
- RH 150 mg/75 mg-two drug FDC tablets as blister cards in 672 tablets per pack

Therefore using the Look up Table in Annex 1 a middle-weight patient would need 3 tablets of RHZE (FDC) for the intensive phase and 3 tablets of RH (FDC) for the continuation phase.

The following examples are taken one part at a time from the table in Annex 2 of this module.

This first part shows how to calculate the number of basic units needed to treat one patient:

Product Name	Treatment Category	Treatment phase	(A) Basic units per dose (e.g., tablet, vial)	(B) Doses per month	(C) Months treatment	(D) Basic units per treatment phase (A × B × C)	(E) Basic units per patient (e.g., tablet, vial)
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	Cat. I	Intensive	3	28	2	168	168
		Continuation	0				
RH 150/75 mg Blisters of 672 tablets per pack	Cat. I	Intensive	0				336
		Continuation	3	28	4	336	

3. Estimate the number of patients you expect to treat during the order period.

For TB, some countries use the total number of patients reported in the last quarterly report to estimate needs. Another way of determining the number of patients expected for treatment would be to look at the pattern during the same quarter of the past year; this is because the pattern might be quite different from one quarter to the next of the same year.

To determine the most accurate estimate, it is best to compare numbers using different methods such as the two examples given in the paragraph above.

Also, don't overlook exceptional activities going on in the health system such as an expansion of TB services to additional centers where more patients will be expected. In those cases, the expected patient numbers can be adjusted using a factor or percentage increase. If needed, this calculation would be carried out much like the illustration in Step 4 below.

For illustration purposes in the following steps, we will assume the numbers of patients expected for treatment in your treatment center next order period are—

Category I. 22 patients

Category II. 6 patients

Category III. 5 patients

4. Calculate safety stock quantities

The quantity of safety stock held at each treatment center is the decision of the health system and based on the local situation. One factor to consider when deciding how much safety stock to keep is storage space. If medicines are not properly stored, they will go bad and will not be available to treat sick patients. In addition to adequate storage space, other factors to consider are—

- Normal frequency of delivery orders
- Reliability of normal deliveries

- Availability of additional stock from the main district stores
- Distance of the treatment center to the district stores
- Ease of transportation and road network to district stores

The above factors are also important in cases where emergencies arise and additional medicines are urgently needed.

For TB medicines, always order enough medicines for a complete treatment of six-eight months for each new patient (according to the national STG). This way, there are medicines at your center to continue to treat current patients at all times.

Keep safety stock on hand in case unexpected patients show up and your order delivery is delayed for some reason.

Example of Safety Stock for a Poor Delivery System

- Order period is 3 months
- Expected number of new patients for 3 months = 22
- 22 patients + 22 for safety stock = 44 patient treatments to order

Note that if order delays are very common in your health system, you must double your order, keeping enough safety stock equal to the order period for expected and unexpected number of new TB patients.

For illustration of safety stock in a health system where deliveries are usually made on time, we will assume that safety stock is an additional 50 percent of your order. Another way to say this is that safety stock will be enough to treat an additional 50 percent of patients with sufficient quantities for full-course patient treatments. If deliveries in your health system are problematic, you may need to increase the amount of buffer stock needed to avoid stock-outs as much as 100 percent (same as doubling your order as shown in the text box above).

The previous example was the number of expected new patients for TB treatment during this order period is 22 for Category I, 6 for Category II, and 5 for Category III.

You would calculate the quantity of safety stock as shown in the following table for the medicine RHZE which is taken in part from Annex 3 of this module.

Then add the quantity of safety stock to the original number of expected new patients next order period to get the Adjusted Number of Patients per Order Period.

Product Name	Treatment Category	Estimated Patients for Order Period	50% Adjustment for Safety Stock	Round Number of Patients to Adjust	Adjusted Number of Patients per Order Period
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	Cat. I	22	22 × .50 = 11	11	33 (22 + 11)
	Cat. II	6	6 × .50 = 3	3	9 (6 + 3)
	Cat. III	5	5 × .50 = 2.5	3	8 (5 + 3)

5. Calculate the quantity of each medicine needed for complete treatment of the adjusted number of new patients.

Now we need to calculate how many basic units we will need for all expected patients after adjusting for safety stock. The following example, taken in part from Annex 4 of this module, shows how to calculate the total basic units needed for the medicine, RHZE.

Product Name	Treatment Category	(F) Adjusted Number of Patients for Order Period	(G) Basic Units per Patient (e.g., tab, vial)	(H) Basic Units Needed (each category) (F × G)	(I) Total Basic Units per Product (sum of [H] per product)
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	Cat. I	33	168	5,544	
	Cat. II	9	252	2,268	
	Cat. III	8	168	1,344	9156

6. Adjust the quantity of medicines to order by the amount of stock on hand and amount of stock on order

Stock on hand is the stock you currently have in your facility including any items that—

- Will not expire in the coming order period
- Are not already assigned to a patient for treatment
- Are left over when a patient stops treatment as a defaulter or transfer

You should physically count and check the remaining shelf life of the existing stock on the shelves and in storage areas to be as accurate as possible. If using patient kits in your treatment center, estimating stock on hand is easy since you already know the quantity of each medicine in the kit. Simply add the quantity of loose tablets to kit quantities to get a total quantity on hand.

Stock on order is any full order or part of an order that was previously placed but medicines have not yet been delivered to your facility. Stock on order also includes any medicines you have loaned to another treatment center that you expect to get back during the order period.

For example, when part of the medicines for the last order were not available in the district store, the store sent a partial order and plans to deliver the remaining quantities to you later on. Also, if you are sending medicines to another treatment center, it is recommended to do so in complete patient treatments to make sure your stock remains as full patient treatments as much as possible.

To carry out this calculation, do the following—

Sum the quantities *on hand* and *on order* for each medicine, placing the sum in the appropriate space.

Subtract these quantities from the Total Basic Units per Product needed for the adjusted number of expected patients you estimated above.

For illustration let's assume your stock on hand for RHZE (FDC) is 840 tablets, which will not expire soon (i.e., in the next 3 months). This quantity is enough of RHZE for 5 patient treatments. There is no stock on order and you have not loaned any RHZE to another TB facility. Therefore your calculation would be the following:

Product Name	(I) Total Basic Units per Product (sum of [H] per product)	(J) Total basic Units on hand or *on order*	(K) Quantity to Order in Basic Units (I – J)
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	9156	840	8316

7. Calculate the number of containers to order for each medicine

To calculate the total number of containers you would divide the quantities to order of each medicine needed by the number of tablets in each container. Using Annex 4 of this module, the calculation would be carried out as follows:

Product Name	(K) Quantity to Order in Basic Units (I – J)	(L) Basic Units per Pack	(M) Number Packs to Order (K ÷ L)
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	8316	672	12.4 = 13 rounded

8. Calculate cost of the quantities to order

This is important in those health systems where treatment centers have their own budgets for ordering TB medicines and supplies. If that is the case in your center, simply take the cost for each pack and multiply by the *Number of Packs to Order*. Finally add the costs of all medicines together get a sum total.

Product Name	(M) Number Packs to Order	(N) Cost per Pack	(O) Total Cost of Order (M × N)
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	13	35.93	467.09
		Total for All Products	—

You must be thinking now that the steps are too complex. However, they are explained in great detail above so you can understand the process and the thinking that should be done when calculating order quantities for each medicine. This is very important as incomplete or inaccurate order quantities may result in stock-outs and patients not receiving their treatments when they need them.

Simplifying the Steps for Order Calculation

Understanding that your workload may be high, the information in the steps above has been simplified and organized into three tables (Annexes 2–4) that can be used systematically to calculate your drug order. Find the three tables in the following Annexes of this module.

- First determine the number of tablets to treat one patient (Annex 2. Calculation of Doses)
- Then add safety stock (Annex 3. Calculation of Safety Stock)

- Finally, calculate the total number of packs to order for this period (Annex 4. Calculation of Quantities to Order)

The annexes contain sample information so you can better understand how to use them. However, you could re-create the tables in these annexes and use them over and over with information from your treatment center. You could either re-create the tables in the annexes by hand, or if you have a computer, you could create a spreadsheet for data entry which will do the calculations for you.

Exercise 1

1. It's time again to estimate the quantity of each TB medicine that will be needed in your treatment center over the next order period.

- What method will you use to calculate your order quantities?
- What information do you need for the calculation and from where can you get it?

2. Your health facility projects that 25 middle weight patients will be placed on category I TB treatment, 5 on category II, and 4 on category III during the next order period. Medicines are available in the strengths, dosage forms, and package sizes shown in Table 1 on the next page. The duration of treatment for each treatment category is also listed in the table.

From the day you place an order, it takes one month before you receive the items for issuing to patients. You are required by the national TB program to keep a reserve stock of 50 percent of expected patients and to make orders every three months.

- Use the "Treatment Look-Up" tables in Annex 1 of this module
- Calculate the total quantity of each medicine that your health facility will need during this order period.
- The national program uses the following standard treatment scheme for TB patients—

Category I and Category III:	2RHZE, 4RH
Category II:	2SRHZE, 1RHZE, 5 RH + E

3. Discuss how it would affect order calculations if your TB program were to order FDC tablets containing RHE instead of RH + E separately for Category II treatment.

Exercise 2

Repeat the same calculations as in Exercise 1, except that your health facility is ordering by patient kits instead of loose tablets. NTP uses the same kit for Category I and III patients.

Table 1. To Order by Patient Kits

Medicines	Categories I and III treatment duration (months)	Categories II treatment duration (months)	Pack size	Stock on hand (basic units)	Stock on order (basic units)
RHZE in FDC 150 mg + 75 mg + 400 mg + 275 mg tablets	2 months intensive phase	3 months int. phase	672 tablets in blister cards	840 tablets	0
RH in FDC 150 mg + 75 mg tablets	4 months continuation phase	5 months cont. phase	672 tablets in blister cards	1,680 tablets	0
E 400 mg tablets		5 months cont. phase	672 tablets in blister cards	23 tablets	0
Streptomycin 1 g vial		2 months int. phase	50 vials	112 vials	0
Water for injection 5 ml vial		2 months int. phase	100 vials	108 vials	0
Cat. I and III Patient Kit				6	0
Cat. II Patient Kit				2	

Answer

Examples of similar calculations are provided in the following Annexes of this module—

Annex 2. Calculation of Doses

Annex 3. Calculation of Safety Stock

Annex 4. Calculation of Quantities to Order

Annex 1. Treatment Look-up Tables

Number of Tablets Required for Adult TB Patients

Patient body weight (Kg)	Intensive Phase			Continuation Phase		
	2 months			4 months		Or 6 months
	Daily	Or Daily	Or 3 times per week	Daily	Or 3 times per week	Daily
	RHZE 150 mg +75 mg+400 mg+275 mg	RHZ 150 mg + 75 mg + 400 mg	RHZ 150 mg + 150 mg + 500 mg	RH 150 mg+ 75 mg	RH 150 mg+ 150 mg	EH 400 mg+150 mg
30–39	2	2	2	2	2	1.5
40–54	3	3	3	3	3	2
55–70	4	4	4	4	4	3
71 and more	5	5	5	5	5	3

	Daily	Daily	Daily	Daily	Daily	Daily	3 times per week	3 times per week
	R 150 mg	H 150 mg	Z 400 mg	E 400 mg	H 100 mg	E 400 mg	H 300 mg	R 150 mg
30–39	2	1.5	2	1.5	1.5	1.5	1	2
40–54	3	2.5	3	2	2.5	2	1.5	3
55–70	4	3	4	3	3	3	2	4
71 and more	5	3.5	5	3.5	3.5	3.5	2.5	5

Dose Table

Daily Regimen (one month = 28 doses)	3 times per week regimen (one month = 12 doses)
2 months = 56 doses	2 months = 24 doses
3 months = 84 doses	3 months = 72 doses
4 months = 112 doses	4 months = 48 doses
5 months = 140 doses	5 months = 60 doses
6 months = 168 doses	6 months = 72 doses

Annex 2. Calculation of Doses

Product Name	Treatment Category	Treatment Phase	(A) Basic Units Per Dose (e.g., tab, vial)	(B) Doses Per Month	(C) Months Treatment	(D) Basic Units Per Treatment Phase (A × B × C)	(E) Basic Units Per Patient (e.g., tab, vial)
RH 150/75 mg Blisters of 672 tablets per pack	Cat. I	Intensive	0				336
		Continuation	3	28	4	336	
	Cat. II	Intensive	0				420
		Continuation	3	28	5	420	
	Cat. III	Intensive	0				336
		Continuation	3	28	4	336	
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	Cat. I	Intensive	3	28	2	168	168
		Continuation	0				
	Cat. II	Intensive	3	28	3	252	252
		Continuation	0				
	Cat. III	Intensive	3	28	2	168	168
		Continuation	0				
Ethambutol 400 mg Blisters of 672 tablets per pack	Cat. I	Intensive	0				
		Continuation	0				
	Cat. II	Intensive	0				280
		Continuation	2	28	5	280	
	Cat. III	Intensive	0				
		Continuation	0				
Streptomycin powder for injection, 1 gm vial 50 vials per pack	Cat. I	Intensive	0				
		Continuation	0				
	Cat. II	Intensive	1	28	2	56	56
		Continuation	0				
	Cat. III	Intensive	0				
		Continuation	0				
Water for injection, 5 ml vial for streptomycin 100 vials per pack	Cat. I	Intensive	0				
		Continuation	0				
	Cat. II	Intensive	1	28	2	56	56
		Continuation	0				
	Cat. III	Intensive	0				
		Continuation	0				

Annex 3. Calculation of Safety Stock

Product Name	Treatment Category	Estimated Patients for Order Period	50% Adjustment for Safety Stock (SS)	Round Number of Patients to Adjust	Adjusted Number of Patients per Order Period
RH 150/75 mg Blisters of 672 tablets per pack	Cat. I	22	22 x .50 = 11	11	(22 + 11)
	Cat. II	6	6 x .50 = 3	3	(6 + 3)
	Cat. III	5	5 x .50 = 2.5	3	(5 + 3)
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	Cat. I	22	22 x .50 = 11	11	(22 + 11)
	Cat. II	6	6 x .50 = 3	3	(6 + 3)
	Cat. III	5	5 x .50 = 2.5	3	(5 + 3)
Ethambutol 400 mg Blisters of 672 tablets per pack	Cat. I	0			
	Cat. II	6	6 x .50 = 3	3	(6 + 3)
	Cat. III	0			
Streptomycin powder for injection, 1 gm vial 50 vials per pack	Cat. I	0			
	Cat. II	6	6 x .50 = 3	3	(6 + 3)
	Cat. III	0			
Water for injection, 5ml vial for streptomycin 100 vials per pack	Cat. I	0			
	Cat. II	6	6 x .50 = 3	3	(6 + 3)
	Cat. III	0			

Annex 4. Calculation of Quantities to Order

Product Name	Treatment Category	* (F) Adjusted Number of Patients per Order Period	(G) Basic Units per Patient (e.g., tablet, vial)	(H) Basic Units Needed (each category) (F × G)	(I) Total Basic Units per Product (sum of [H] per product)	(J) Total basic Units on hand or on order	(K) Quantity to Order in Basic Units (I – J)	(L) Basic Units per Pack	(M) Number Packs to Order** (K ÷ L)
RH 150/75 mg Blisters of 672 tablets per pack	Cat. I	33	336	11,088					
	Cat. II	9	420	3,780					
	Cat. III	8	336	2,688	17,556	1,680	15,876	672	24
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	Cat. I	33	168	5,544					
	Cat. II	9	252	2,268					
	Cat. III	8	168	1,344	9,156	840	8,316	672	13
Ethambutol 400 mg Blisters of 672 tablets per pack	Cat. I	0							
	Cat. II	9	280	2,520					
	Cat. III	0			2,520	23	2,497	672	4
Streptomycin powder for injection, 1 gm vial 50 vials per pack	Cat. I	0							
	Cat. II	9	56	504					
	Cat. III	0			504	112	392	50	8
Water for injection, 5 ml vial (for streptomycin) 100 vials per pack	Cat. I	0							
	Cat. II	9	56	504					
	Cat. III	0			504	108	396	100	4

*Adjusted with safety stock factor equal to an additional 50 percent of expected patients

**Rounded to the nearest whole number

MODULE FIVE—HOW TO PREPARE AND ADMINISTER TB MEDICINES

Patients should be the focus of all health worker activities at the treatment center. In Modules One to Four, you learned various procedures to ensure that TB medicines are available in your treatment center in the right quantities every time the patient needs them.

In addition a good TB control program should provide medicines in dosage forms and packages that are easy to administer and that promote adherence to treatment. For example, medicines should be available in fixed-dose combination (FDCs), in blister cards or strips, and in patient kits.

Results of Clever Packaging

- **FDCs—fewer tablets to swallow**
- **Blister cards or strips—sanitary; easier to count; protect from light, moisture, and humidity**
- **Patient kits—correct medicines already assembled for patient**

To use these dosage forms the right way this module will show you how to—

- Prepare and administer doses correctly to children and adult TB patients
- Promote adherence to treatment by counseling TB patients
- Adjust adult patient kits based on weight of the newly diagnosed patient

Directly Observed Treatment

Requiring directly observed treatment (DOT) during both intensive and continuation phases of treatment promotes excellent treatment outcomes. DOT means that every dose the patient takes is observed by the health worker or a caregiver at home or in the community who must then document that the patient has actually swallowed the pills.

If, for some reason, it is not possible to practice DOT throughout the full course of treatment, DOT should always be done during the intensive phase when rifampicin is used. This will keep resistance from developing to this strongest TB

medicine known today. Rifampicin should never be part of the treatment regimen for continuation phase if DOT is not practiced.

Shortly after TB patient kits were introduced as a good way to promote patient adherence, some TB programs thought they would not need to practice DOT. Kits do *not* replace the need for DOT. Patient kits promote adherence by assuring that medicines are available in the correct doses and quantities throughout treatment, packaged in a way that makes it easier for the health worker to prepare the doses.

Patient kits also make educating the patient easier since the health worker can use the kit to illustrate (1) the length of treatment, (2) importance of completing the treatment, and (3) the fact that medicines are reserved for the patient and will not run out.

Preparing Doses for Children

When treating children, it is best to receive TB medicines in smaller dosage strengths, such as RH 60 mg/30 mg and Z 150 mg (or three-medicine product RHZ 60 mg/30 mg/150 mg FDC tablets) to avoid having to break or cut tablets. For example, the dose/weight chart provided by the World Health Organization (WHO) would require that tablets need to be broken in half for children weighing between 8-9 kg where 1.5 tablets should be administered. For the other children's weights, whole tablets would be given. See Annex 1 of this module for the WHO children's treatment chart.

However, if children's dosage strengths are not available, the only remedy is to break tablets intended for adult patients such as the RH 150/75 mg and Z400 mg and crush them before giving to the patient. Breaking tablets evenly is a challenging task, making it difficult to be sure you have the exact dose you need for the child. Encourage your managers to purchase children's doses in the next procurement.

Administering Medicines to Patients

Whether administering medicines to children or adults, the procedures are the same as follows:

1. First make sure you have recorded the correct medicines and doses on the patient's treatment card; this can be found in the patient's diagnosis record and if your program has standard treatment guidelines you would follow those.

2. Collect the correct medicines from the storage shelves. If loose tablets are used, take the bottles with multiple tablets. If patient kits are used, verify the patient's name and take the whole kit.

3. Move the medicine bottles or patient kits to the administration table.

4. For each medicine remove the number of tablets needed for one dose.

If using blister cards you should cut the blister so as to separate the correct number of tablets for one dose and return the blister card to the correct patient's kit so as not to mix up medicines; never remove tablets from the blister until you are ready to administer to the patient. Do not remove tablets for more than one patient at a time.

- Inspect for tablets that are broken, chipped, or odd smelling, and set these aside; select only good tablets for the patients.

5. Make sure you give the correct medicines in the correct number of tablets to the right patient.

6. For Category II patients receiving streptomycin injections, take an unused syringe and needle and dissolve the streptomycin powder in the vial with the amount of sterile water for injection indicated on the label of the vial. Once the powder is completely dissolved, draw up the correct dosage based on patient weight, swab the area where the injection enters the skin, and inject the required dosage. Be sure to follow safe injection practices which require immediately discarding used syringes and needles in specially marked containers for later destruction by burning or burying. Never reuse syringes and needles. Smaller treatment centers in some health systems may not provide streptomycin injections; in those situations, send patients to the referral treatment center for your district to receive their injections.

7. Supply drinking water and observe the patient actually swallowing all tablets of the dose for all medicines.

8. Record in the patient treatment register for all doses and medicines that you saw the patient take. See Annex of this module for an example of a patient administration register.

9. Completely close all medicine bottles and patient kits and return them to the storage shelves.

Administering Medicines to Patients—When DOT Is Not Practiced for the Continuation Phase

As previously mentioned, some TB programs have trouble supporting DOT during the *continuation phase* of treatment. When that occurs, the following important dispensing procedures should be followed when preparing the doses for the patient

or caregiver to take home with them. Some steps are the same as those mentioned previously when administering doses to the patient at the treatment center.

1. First make sure you have recorded the correct medicines and doses on the patient's treatment card kept at the treatment center.

2. Prepare a duplicate treatment card for use at the patient's home containing medicine names, doses, and space to document DOT.

3. Collect the correct medicines from the storage shelves.
   - If loose tablets are used, take the bottles with multiple tablets.
   - If patient kits are used, verify the patient's name and take the whole kit.

4. Move the medicine bottles or patient kits to the preparation table.

5. Calculate for each medicine the number of tablets needed for each dose and for the number of days the patient will be treated at home before returning to the treatment center for additional supplies. In some systems a week's supply, two week's supply, or month's supply is given. See example in the following table for continuation phase where the patient should return to the treatment center every 14 days to collect their medicines—

Product Name	Treatment Category	Tablets per dose	Days treatment	Quantity tablets to take home
EH 400/150 mg	Cat. I	2	14	28

6. Count the total number of tablets you calculated for the treatment period (1 week, 2 weeks, 1 month).

If using blister cards, you should cut the blister to separate the correct number of tablets and return unneeded blister cards to the correct patient's kit; do not mix up patients' medicines from one kit to another.

- Do not remove tablets for more than one patient at a time whether using loose tablets or patient kits.
- Inspect for damaged blister cards and broken, chipped, discolored, or odd smelling tablets; if found, set them aside and do not use these for the dose.

7. Organize a container that can be firmly closed for each medicine and for each patient; examples are small bottles or plastic bags of suitable size.

8. Place the correct medicine and the correct number of tablets into the container and label the container as follows—
   - Patient's name
   - Full name and strength of the medicine in the container
   - Number of tablets to take in one dose
   - How many days a week patient must take a dose of each medicine
   - Expiry date

   Note: When using blister cards, you may find that the medicine name and strength are already printed on the blister card by the manufacturer.

9. Repeat this procedure for each medicine for each patient making sure to label the take-home containers correctly.

10. Mark the treatment register to show number of doses given.

11. Give the take-home medicine containers to the patient or caregiver.

12. Advise patient or caregiver how to take the medicines and to store them properly; see more information in the section below on how to counsel patients to promote adherence to treatment.

13. Completely close all medicine bottles and patient kits and return them to the storage shelves.

14. For every return visit to collect medicines, remind the patient or caregiver to bring the home treatment card with them. With the home treatment card in hand—

- Observe if all doses were documented appropriately; if not, discuss the importance of always doing this with the patient and caregiver.
- On the patient treatment register kept at the treatment center, record all doses taken by the patient.

Counsel Patients and Promote Adherence to Treatment

TB treatment involves taking many medicines over a long period, usually six to eight months for new patients, making it difficult to always comply. Sometimes patients honestly forget a dose or two, especially in the beginning of treatment, while others stop taking their medicines later on because they feel better.

Whether administering the doses to patients in the treatment center or dispensing medicines to patients and caregivers for home treatment the message is the same. Reassure the patient or caregiver that TB can be cured, but that the patient has to accept responsibility for taking the medicines as instructed. Explain the two phases of treatment and length of each one (intensive phase—2 months; continuation phase—4–6 months). Tell the patient or caregiver how to take the medicines—

- Number of tablets in one dose
- Number of days per week to take each dose
- When to return to collect next doses

Ask patient or caregiver to repeat instructions for taking their medicines to you to see if they understood your instructions. Inform the patient or caregiver that even if they start to feel better, they must continue to take their medicines until treatment is completed. Tell patients that if they default their treatments and do

not take all medicines as directed or do not return to the treatment clinic daily (or when medicines run out if home treatment is taking place during continuation phase), there may be the following consequences—

- Patient will get sicker
- Family members could get the disease from them
- Treatment will need to be extended requiring patient to take more medicines for a longer period of time
- Patient may need to go to the hospital for a long period of time
- In some cases, the patient may die

Advise patient to tell you of any discomfort or ill effects they experience while taking the medicines; it is important not to confuse complaints during early treatment with the actual symptoms of TB such as coughing, aching in the chest, night sweats, etc.

Inform patient and caregiver how to prevent TB infection in others, e.g., sleeping in another room, if possible, always cover mouth when coughing to avoid spread of germs. Ask patient and caregiver to encourage others suspected of having TB (e.g., coughing, night sweats, aching chest) to go to the clinic to see if they are also infected with the TB germ. Ask patient and caregiver to bring empty blister cards when they return for more medicines to monitor proper usage.

For new cases, it is important to educate the patient about their disease during the first visit and repeat these messages as necessary during all clinic visits that follow. Many national TB programs have printed posters and brochures you can use when counseling the patient about adherence to treatment.

Educational materials with lots of pictures are better because the TB patient may not be able to read, and visual messages will help them to better understand what you are saying to them.

When checking on patients who have stopped coming to your treatment center, do your best to prevent them from becoming true defaulters. Check and discuss the following—

- Do patients understand the consequences of not taking their medicines?
- Are the medicines causing bothersome reactions in the patient?
- Does the patient need food to help him or her fight the disease during treatment?
- Does the patient need financial support for traveling to the treatment center?
- If your program cannot provide food and transportation vouchers to needy patients, discuss with the TB program manager how to get donor support.

When patient kits are used in TB programs, they serve as a convenient tool to convey the above messages, especially in a newly diagnosed patient. The kits—

- Graphically show the total number of tablets the patient must take to get well
- By seeing their name and personal data on the kit, help patients know that it is their kit and that medicines will be there when they come for treatment
- Promote patients as co-owners of their treatment, making them more aware and responsible

How to Adjust a TB Patient Kit Based on Patient's Weight

How to adjust the patient kit should be taken into account right when the TB program first discusses purchasing patient kits. This is because the number of tablets placed in a blister will make kit adjustment based on patient's weight much easier and will eliminate having loose tablets sitting around.

Programs that do not order medicines in blister cards will have a very difficult time packaging medicines into patient kits because of the possibility of mix-ups and the need for additional packing containers at each treatment center. It is best to promote use of patient kits only when medicines are available in blisters.

Example of Adjustment Using the GDF's Stop TB Patient Kit

The following list of requirements for kit adjustment is based on a national TB program that uses the WHO recommended treatment regimens and the Global TB Drug Facility patient kit as a model, which were also used for showing how to calculate quantities to order in Module Four of this guide.

- Requires 28 doses to be given in a month instead of 30 or 31 doses
- Blister cards for all medicines contain 28 tablets
- Patient kits are prepared for the middle weight patient, one who weighs between 40–54 kg, since most TB patients weigh within this range when they begin treatment
- TB program requires that patients go to the treatment center daily
- TB program requires that Category I and Category III patients are treated with the same regimen
- TB program requires that Category I and Category III treatment is for two months intensive phase
  - Patient kit contains 6 blister cards of RHZE in FDC
- TB program requires that Category I and Category III treatment is for four months continuation phase
  - Patient kit contains 12 blister cards of RH in FDC

Adjusting Kits for Category I and III Treatment

Patient weighs	RHZE blisters	RH blisters
30–39 kg	remove 2 blister cards	remove 4 blister cards
40–54 kg	no changes	no changes
55–70 kg	add 2 blister cards	add 4 blister cards

- TB program requires that Category II treatment is for 3 months intensive phase (for tablets)
  - Patient kit contains 9 blister cards of RHZE in FDC

- TB program requires that Category II treatment is for 5 months–continuation phase (for tablets)
  - Patient kit contains 15 blister cards of RHE in FDC
- No adjustment is needed for streptomycin since 56 doses are given to all Category II patients

Adjusting Kits for Category II Treatment

Patient weighs	RHZE blisters	RHE blisters
30–39 kg	remove 3 blister cards	remove 5 blister cards
40–54 kg	no changes	no changes
55–70 kg	add 3 blister cards	add 5 blister cards

In separate containers that you have labeled "Supply Box RHZE," "Supply Box RH," and "Supply Box RHE," place the blister cards removed from a patient kit for a lighter weight patient. You will use these same supply boxes to get the additional blister cards you need for the heavier weight patient. When a supply box is empty and you need additional tablets for a new patient, transfer contents of a new patient kit to the supply box and pull additional tablets from it. Discard the now empty patient kit unless required to keep it for accountability purposes to be checked by the district supervisor.

Note. When using medicines from the supply box, always check the expiry dates and *never* give expired medicines to patients; if expired, remove the medicines and store away from the good medicines for later disposal.

If your TB program uses different patient weight bands or different treatment frequencies than those used above you can adapt the tables above with those numbers.

Note: In some cases, the treatment of a Category I patient may need to be extended in the Intensive phase by an additional one month for a total of three months rather than the normal two months. In our example, it is only necessary to extend the RHZE. For these patients, do the following—

Additional one-month treatment for Category I

Patient weighs	RHZE blisters
30–39 kg	Add 2 blister cards
40–54 kg	Add 3 blister cards
55–70 kg	Add 4 blister cards

Note: If a patient defaults, dies, or transfers from your treatment center and the patient kit does not go with the patient, place the remaining blister cards in the appropriate supply box and use to adjust kits for new patients. However, it may be the procedure in your health system not to use leftover kits in which case you should store these abandoned kits and wait for the advice of your supervisor.

Exercise 1

Let's practice adjusting a patient kit under the following conditions—

- You receive patient kits ready to use through your national TB program
- All patient kits are prepared for the middle weight patient weighing between 40–54 kg
- Medicines are given on a daily basis
- Kits contain medicines in blister cards of 28 tablets each

Medicines and Number of Blister Cards in the Patient Kits

Medicines	Cat. I and III treatment duration (months)	Cat II treatment duration (months)	Cat. I and III patient kit—number of blister cards	Cat. II patient kit—number of blister cards or units
RHZE in FDC 150 mg + 75 mg + 400 mg + 275 mg tablets	2 months intensive phase	3 months int. phase *	6	9
RH in FDC ** 150 mg + 75 mg tablets	4 months continuation phase	5 months cont. phase *	12	15
Ethambutol ** 400 mg tablets	-	5 months cont. phase	-	10
RHE in FDC ** 150 mg + 75 mg + 125 mg tablets		5 months cont. phase		15
Streptomycin 1 g vial	-	2 months int. phase	-	60
Water for injection 5 ml vial	-	2 months int. phase	-	60
Syringes with needles	-	2 months int. phase	-	60

* Int. phase = intensive phase, Cont. phase = continuation phase

** Cat. II patient kits can come either with RH and E tablets or with RHE combined tablets for the continuation phase. Please keep in mind which type of kit your program is using

Calculations to make: Using the data above, determine how to adjust a patient kit for the following two patients—

- For a Category I patient weighing 57 kg
- For a Category II patient weighing 32 kg

Discussion: Here are directions on how to make the calculations required for these two patients.

Category I Patient

1. Always work on one patient kit adjustment at the time to avoid mix-ups.
2. Get a Category I patient kit as you received it at your treatment center.
3. For the intensive phase, determine the number of tablets needed to treat the 57 kg patient from the dose table as follows—

Number of Tablets Required for Adult TB Patients – Category I

(refer to shaded areas)

Patient body weight (kg)	Intensive Phase			Continuation Phase		
	2 months			4 months		Or 6 months
	Daily	Or Daily	Or 3 Times Per Week	Daily	Or 3 Times Per Week	Daily
	RHZE 150 mg + 75 mg + 400 mg + 275 mg	RHZ 150 mg + 75 mg + 400 mg	RHZ 150 mg +150mg + 500 mg	RH 150 mg + 75 mg	RH 150 mg + 150 mg	EH 400 mg + 150 mg
30-39	2	2	2	2	2	1.5
40-54	3	3	3	3	3	2
55-70	4	4	4	4	4	3
71 and more	5	5	5	5	5	3

We find four tablets of RHZE are required. Now calculate how many tablets are needed for treatment during the full intensive phase as follows—

4 tablets daily × 28 days each month × 2 months = _____ tablets

4. Determine how many blister cards contain the number of tablets you just calculated; as there are 28 tablets in a blister card, you would calculate this way—

_____ tablets ÷ 28 = ____ blister cards

5. Since your RHZE patient kit for Category I comes to you already containing six blister cards for the intensive phase, subtract six from the number of blister

cards you calculated just above to determine how many additional blister cards of 28 tablets must be added to the patient kit. The calculation gives you ____ cards.

6. Remove the additional blister cards you calculated in number 5 from the RHZE supply box and add to the Category I patient kit you are adjusting for the Intensive Phase.

7. Now for the Continuation Phase, determine the number of tablets needed to treat the 57 kg Category I patient using the same table as you did above and which is repeated here—

Number of Tablets Required for Adult TB Patients – Category I

(refer to shaded areas)

Patient Body Weight (kg)	Intensive Phase			Continuation Phase		
	2 Months			4 Months		Or 6 Months
	Daily	Or Daily	Or 3 Times Per Week	Daily	Or 3 Times Per week	Daily
	RHZE 150 mg + 75 mg + 400 mg + 275 mg	RHZ 150 mg + 75mg + 400 mg	RHZ 150 mg + 150 mg + 500 mg	RH 150 mg+ 75mg	RH 150 mg+ 150 mg	EH 400 mg + 150 mg
30–39	2	2	2	2	2	1.5
40–54	3	3	3	3	3	2
55–70	4	4	4	4	4	3
71 and more	5	5	5	5	5	3

We find four tablets of RH are required. Now calculate how many tablets are needed for treatment during the full continuation phase as follows—

4 tablets daily × 28 days each month × 4 months = _____ tablets

8. Determine how many blister cards contain the number of tablets you just calculated; as there are 28 tablets in a blister card, calculate the number this way—

   _____ tablets ÷ 28 = ____ blister cards

9. Since your RH patient kit for Category I comes to you already containing 12 blister cards for the Continuation Phase, subtract 12 from the number of blister cards you calculated in number 8 to determine how many additional blister cards of 28 tablets must be added to the patient kit. The calculation gives you ____ cards.

10. Remove the additional blister cards you calculated in number 9 just above from the RH supply box and add to the Category I patient kit you are adjusting for the Continuation Phase.

11. Put the patient's name on the newly adjusted patient kit plus other information discussed in Module Three of this guide. Place the kit where you store kits of other patients currently in treatment.

Category II Patient

1. Always work on one patient kit adjustment at the time to avoid mix-ups.

2. Get a Category II patient kit as you received it at your treatment center.

3. Category II Kits do not need to be adjusted for streptomycin and water for injection.

4. For the Intensive Phase, determine the number of RHZE tablets needed to treat the 32 kg patient as follows—

   Hint: Since patient kits come to you already prepared for the middle-weight patient and this Category II patient is less than middle weight, you will have to remove the calculated number of blister cards from the Intensive and Continuation phase medicines in the patient kit.

Number of Tablets Required for Adult TB Patients – Category II
(refer to shaded areas)

Patient Body Weight (kg)	Intensive Phase	Continuation Phase		
	3 Months	5 Months		or
	Daily	Daily	Daily	Daily
	RHZE 150 mg + 75 mg + 400 mg + 275mg	RH 150 mg+ 75 mg	E 400 mg	RHE 150mg+ 75 mg + 275 mg
30–39	2	2	1.5	2
40–54	3	3	2	3
55–70	4	4	3	4
71 and more	5	5	3.5	5

We find two tablets of RHZE are required. Now calculate how many tablets are needed for treatment during the full intensive phase as follows—

2 tablets daily × 28 days each month × 3 months = _____ tablets

5. Determine how many blister cards contain the number of tablets you just calculated; there are 28 tablets in a blister card therefore you would calculate this way—

   _____ tablets ÷ 28 = ____ blister cards

6. Since your RHZE patient kit for Category II comes to you already containing 9 blister cards for the Intensive Phase, *subtract* from 9 the number of blister cards you calculated in number 5 to determine how many blister cards of 28 tablets must be *removed* from the patient kit. The calculation gives you ____ cards.

7. Remove the number of blister cards you calculated in number 6 from the Category II patient kit for the Intensive Phase and place in the RHZE supply box.

8. Now for the Continuation Phase determine the number of RH tablets and the separate E tablets needed to treat the 32 kg patient as follows—

Number of Tablets Required for Adult TB Patients – Category II
(refer to shaded areas)

Patient Body Weight (kg)	Intensive Phase	Continuation Phase		
	3 Months	5 Months		or
	Daily	Daily	Daily	Daily
	RHZE 150 mg + 75 mg + 400 mg + 275 mg	RH 150 mg + 75 mg	E 400 mg	RHE 150 mg + 75 mg + 275 mg
30–39	2	2	1.5	2
40–54	3	3	2	3
55–70	4	4	3	4
71 and more	5	5	3.5	5

We find two tablets of RH are required and 1.5 ($1\frac{1}{2}$) tablets of E are required (or 2 tablets of RHE if the 3-drug FDC is used). Now calculate how many tablets are needed for treatment during the full continuation phase as follows:

RH: 2 tablets daily × 28 days each month × 5 months = _____ tablets

E: 1.5 tablets daily × 28 days each month × 5 months = _____ tablets

9. Determine how many blister cards contain the number of tablets you just calculated; there are 28 tablets in a blister card therefore you would calculate this way:

   RH: _____ tablets ÷ 28 = _____ blister cards

   E: _____ tablets ÷ 28 = _____ blister cards

10. Since your patient kit for Category II comes to you already containing 15 blister cards of RH for the Continuation Phase, *subtract* the number of blister cards you calculated in number 9 just above from 15 to determine how many blister cards of 28 tablets must be *removed* from the patient kit. The calculation gives you _____ cards.

11. Remove the number of RH blister cards you calculated in number 10 just above from the Category II patient kit for the *Continuation Phase* and place in the RH supply box.

12. Since your patient kit for Category II comes to you already containing 10 blister cards of E for the Continuation Phase, *subtract* the number of blister cards you calculated in number 9 from number 10 to determine how many blister cards of 28 tablets must be *removed* from the patient kit. The calculation gives you ____ cards.

13. Remove the number of E blister cards you calculated in number 12 just above from the Category II patient kit for the Continuation Phase and place in the E supply box.

14. Put the patient's name on the newly adjusted patient kit plus other information discussed in Module Three of this guide. Place the kit where you store kits of other patients currently in treatment.

Annex 1. Treatment Look-up Tables

Number of Tablets Required for Adult TB Patients

Patient body weight (kg)	Intensive phase			Continuation Phase		
	2months			4 months		Or 6 months
	Daily	Or Daily	Or 3 Times per week	Daily	Or 3 times per week	Daily
	RHZE 150 mg + 75 mg + 400 mg + 275 mg	RHZ 150 mg + 75 mg + 400 mg	RHZ 150 mg + 150 mg + 500 mg	RH 150 mg + 75 mg	RH 150 mg + 150 mg	EH 400 mg + 150 mg
30–39	2	2	2	2	2	1.5
40–54	3	3	3	3	3	2
55–70	4	4	4	4	4	3
71 and more	5	5	5	5	5	3

	Daily	Daily	Daily	Daily	Daily	Daily	3 Times Per Week	3 Times Per Week
	R 150 mg	H 150 mg	Z 400 mg	E 400 mg	H 100 mg	E 400 mg	H 300 mg	R 150 mg
30–39	2	1.5	2	1.5	1.5	1.5	1	2
40–54	3	2.5	3	2	2.5	2	1.5	3
55–70	4	3	4	3	3	3	2	4
71 and more	5	3.5	5	3.5	3.5	3.5	2.5	5

Number of Tablets Required for Pediatric Patients—FDC products

	Weight in kg					
	Up to 7	8–9	10–14	15–19	20–24	25–29
Intensive Phase - daily						
HRZ (30 mg + 60 mg + 150 mg)	1	1.5	2	3	4	5
E 400 mg	-	-	-	-	1	1
S 1 gm	0.25	0.25	0.25	0.33	0.50	0.50
Continuation Phase—daily						
HR (30 mg + 60 mg)	1	1.5	2	3	4	5
Continuation Phase—intermittent						
HR (60 mg + 60 mg)	1	1.5	2	3	4	5

The above taken from WHO recommendations

Annex 2. Sample Daily Administration Form: Intensive Phase

NTP

Form: DOT monitoring at treatment clinic

# of patient file	____	TB doctor	____________
TB facility	____________	Diagnosis	____________
Patient	____________	Treatment category	____________
Age	____________	Weight	________
Address	____________		

Intensive phase

Month ____________

	Drugs					Patient Signature
tablets. Date						

Month ____________

	Drugs					Patient Signature
tablets. Date						

Month ____________

	Drugs					Patient Signature
tablets. Date						

Doctors visits ________________________________

Annex 3 Sample Daily Administration Form: Continuation Phase

Form: DOT Continuation phase of treatment

Month _____ Month _____ Month _____ Month _____ Month _____

	Drugs			Patient Signature
tablets / Date				

Doctors visits _____

Dates of smear microscopy monitoring _____

Annex 4. Checklist for Monitoring Usage of Patient Kits

(Note: although designed for use by the district supervisor, the health worker should use this form to conduct a self-assessment from time to time in order to guide them in good TB medicine management practices)

District: _____ Date: _____/_____/_____

Health Unit: _____ Supervisor: _____

1. Patient kits in treatment area	**Yes**	**No**
Are all kits arranged for easy access?		
Are all kits stored off the floor?		
Do patient kits have the name of the patient, TB register number, and patient's weight written on them?		
Do TB *register cards* show that TB medicines are being recorded when the patient takes them in the clinic?		
Do TB *register cards* show that TB medicines are being recorded when the patient takes them at home?		
Do *take home treatment cards* show that medicines are being recorded once the patient swallows them (ask patient to see their treatment cards)?		
2. Partly used patient kits	**Yes**	**No**
Are the excess drugs from patient kits stored in separate containers (supply box) for each type of drug? (Excess drugs occur when the patient is of lighter weight, transfers, stops coming to the health center, or dies.)		
If appropriate for your health system are you picking up the excess drugs from patient kits and carrying with you? If so, document the drug names, strength, expiry dates, and quantities removed, leaving a copy with the treatment center.		
3. Inventory practices in the store room	**Yes**	**No**
Are all kits arranged so products can be easily found?		
Are kits with shortest expiration dates stored in front of others?		
Are there damaged or expired products or kits sitting around?		
Are kits stored off the floor?		
Are the patient kits and other drug quantities needed for the next delivery period calculated correctly (based on expected number of patients)?		

MODULE SIX—SUPERVISION AND SELF-MONITORING

This module is intended for use by both the supervisor and the health worker in charge of TB pharmaceutical supply.

For the supervisor—the module provides steps on how to supervise and monitor TB pharmaceutical activities of treatment center health workers. Indicators are introduced and practical worksheets offered on how to calculate and explain the indicator data.

For both the health worker and supervisor—Annexes 1–3 of this module contain blank Job Aids which can be copied for use in evaluating pharmaceutical management aspects of TB treatment centers. They are the same as those presented at the end of each module but contain no sample data.

Why Supervise and Monitor Pharmaceutical Management Activities?

TB program management is an on-going job. To make sure the program's plans and objectives are being met, supervisors should carry out the following activities:

- Motivate and support health workers in the execution of their tasks
- Provide feedback to demonstrate the value and importance of information for decision making
- Observe progress, comparing actual performance against target performance
- Take follow-up action early on if actual performance is not reaching targeted levels

How to Supervise and Monitor Pharmaceutical Management Activities

While treatment center personnel are taught how to detect, diagnose, and treat TB patients, how to manage medicines and related supplies is often not part of the

schooling. This means the supervisor must provide some type of on-the-job training.

The steps below will help the supervisor systematically monitor and at the same time offer guidance on TB pharmaceutical management activities of treatment center personnel. This information is important to the health worker as well, so they can in turn know what the supervisor will be looking for.

During site visits supervisors should carry out the following steps—

1. Use the checklists below which are found in Annex 1 of this module to evaluate the medicine storage areas of the treatment center:
   - Checklist One: Evaluate the Treatment Center Storage Area
   - Checklist Two: Assess Current Practice for Receiving Orders
   - Checklist Three: Checklist for Monitoring Usage of Patient Kits

   Go over the results of the checklists with the treatment center personnel responsible for pharmaceutical management. Encourage them to work on the weak areas before your next supervisory visit.

2. While at the treatment center, check for the following:
   - Are there any medicines or supplies completely out of stock?

     Note that if only expired medicines are in stock you must count that item as out of stock. Expired medicines are not to be used on patients but returned to the district storeroom.

     If any item is out of stock, review the last order to see—
     - If quantities were calculated correctly
     - If it was placed on time
     - If it was delivered on time

     The steps that follow will show you how to work with treatment center personnel to improve weak areas in calculating and placing orders. If you

determine that weaknesses found are because of poor monitoring of existing stocks and the likelihood that items are being stolen, you may want to implement use of individual stock registers in the Treatment center such as the one in Annex 3 of this module, *Stock Register Form*.

- Are there expired medicines?

  If yes, go to Annex 2 of this module, use the form and procedure for *Calculation One: Cost of Expired Drugs and Supplies during Last Period* showing treatment center personnel how to calculate the cost of expired medicines so they will better understand the financial impact of their work. You can use this information to show trends in TB pharmaceutical management within your district.

- Are there problems with order calculations?

  Working with center personnel responsible for order calculations, do the following—

  - Review the names, dosage forms, and quantities of medicines and supplies requested during the last order period
  - Compare with the expected number of patients for treatment during the same period
  - Determine how much safety stock was included in the calculation for the period
  - Determine if there was an increase in the expected number of patients during this period
  - Using the forms and procedures in Annex 2, work with the center personnel to re-calculate order quantities for the *last* period, pointing out errors committed by center personnel
  - Repeat the same calculations, this time to determine order quantities for the *next* order period

- Are there problems with the quality of medicines?
  - Some tablets were crushed when received
  - Some packages were damaged when received

  - Some tablets have disintegrated, changed color, or developed a strange odor during storage in the center
  - Injectable liquids have changed color during storage in the center

- Did the quality problems happen before medicines were received?

  If so, review the checklist you already filled out in Step 1, Checklist Two: Assess Current Practice for Receiving Orders. Show center personnel how to review stock items for quality problems at the time they are received. Then show center personnel how to record any quantities with discrepancies on the receipt and delivery forms such as the ones found in Annex 3, Supply-Order Receipt Form and Delivery Receipt Form

- Make sure you instruct center personnel that they must request replacements from the district stores when many damaged items were received in a delivery since this could affect availability of medicines when patients need them.

- Did the quality problems happen during storage at the treatment center?

  If so, review the checklist filled out in Annex 1, Checklist One: Evaluate the Treatment center Storage Area. Instruct center personnel how to improve their stock management behaviors. If problems are due to poor building structure or lack of adequate cabinets or shelving, as the supervisor you should work to improve these as quickly as possible.

- Are patient medicine records filled out and are patients receiving all their medicines as they should?

  If medicine records are not filled out properly, review the administration records such as those in Annex 3 (*Daily Administration Form: Intensive Phase, Daily Administration Form: Continuation Phase)* with center personnel. Remind them of the importance of documentation to show percent compliance with treatment procedures and for reporting to the national TB program.

  If patients are *not* showing up for treatment, verify if the reasons are related to unavailability of medicines. If so, review order procedures previously described emphasizing the need to have medicines available when

the patient requires them to break the transmission of TB in the community and to gain the trust of the patient by showing the health system's interest in the patient's well-being.

- Are there problems with medicine use by patients or health workers?
    - Some patients complain of adverse effects upon starting to take TB medicines but these effects often go away without stopping the medicine. Tell health worker to assess how serious the adverse effects are and to refer patient to the next level of care if the adverse effects continue.
    - Some health workers are having problems putting medicines together as patient kits. Have health worker practice the assembly of patient kits in front of you.
    - Some health workers are having problems with adjusting patient kits for patients not in the middle weight band. Have health workers practice the kit adjustment procedures in front of you

What to Do if There Is No Funding to Carry Out Site Visits

In some health systems, the supervisor is given funding to make periodic visits to treatment centers. In others, site visits are much more difficult because the systems lack human or financial resources.

In those instances, the district supervisor can ask the treatment center personnel to complete the checklists and procedures by themselves and return copies to them. The District officer can reply in writing, and instruct center personnel what they should do to improve any weak areas identified on the checklists.

In the future when site visits are again possible by the District officer, the more tedious problems such as calculation of drug orders can be done side by side with center personnel.

Using Indicators to Monitor Pharmaceutical Management Activities

Indicators can be useful for monitoring the performance of the TB pharmaceutical management system. When selecting an indicator, keep in mind that indicators are most effective when they are—

- Clear: easily understood by everyone
- Useful: reflect an important dimension of performance
- Measurable:
    - Quantitative: such as rates, ratios, percentages, common denominator (for example, cure rate)
    - Qualitative: "yes," "no"
- Reliable: can be collected consistently by different data collectors
- Valid: represent a true measure

Other factors that must be considered when choosing indicators is to decide if they are for—

- Routine reporting—the treatment center will provide these data on a monthly or quarterly basis focusing on TB medicine supply, costs, training needs, quality assurance, and medicine use
- Sentinel reporting— useful when a system is undergoing rapid change and there is a need to detect unexpected or unintended outcomes; representative treatment centers are chosen as sentinel sites which means only target treatment centers are being monitored under this method
- Special study—this is not regular reporting, but is done as a single study to measure status of all or part of the TB pharmaceutical management system; it requires the use of experts to design and conduct the study

Selecting Appropriate Indicators for the Treatment Centers You Supervise

In Annex 4 of this module you will find a comprehensive list of TB pharmaceutical management indicators. Some of these are used to monitor the overall national TB program while others can be used at the local level to monitor activities in treatment centers. You may want to choose only three to five indicators to monitor

at first; then, once you have seen improvement in those areas being monitored you could choose other indicators for the following year or time period.

In the table below you will find some typical pharmaceutical management indicators used by treatment center personnel in many health systems.

Indicator	Calculation	Data Source
Existence of safety stock at treatment center	Either Yes or No	• TB treatment registers • Individual stock registers
Percentage of time TB medicines are out of stock	*Numerator:* Total number of stock out days for all first-line drugs × 100 *Denominator:* 365 × number of TB drugs usually in stock	• TB treatment registers • Individual stock registers
Percentage of TB medicines that are available on day of visit	*Numerator:* Number of TB medicines available on day of visit (must not have passed expiry) × 100 *Denominator:* Number of TB medicines normally stocked in the treatment facility	• Observation of products on storage shelves
Value of expired TB medicines last quarter	Calculate the sum of: Number of units expired for each medicine × unit cost for each medicine	• Order receipt • District stores • Central stores
Percentage of TB patients who reported regular observation by a health care worker during medicine intake	*Numerator:* Number of patients interviewed who report observation by health worker during medicine intake × 100 *Denominator:* Number of patients interviewed	• Patient interviews during treatment clinic hours

If you want to develop different pharmaceutical management indicators from the ones provided here and in Annex 4 of this module, you may want to seek technical assistance from an expert in that area.

Annex 1. Checklists

Checklist One: Evaluate the Treatment Center Storage Area

Checklist Two: Assess Current Practice for Receiving Orders

Checklist Three: Monitoring Usage of Patient Kits

Checklist One: Evaluate the Treatment Center Storage Area

Use this checklist to determine the overall status of the areas in the treatment center where medicines and supplies are kept.

		Yes	No
Is there easy movement about the area?	- Organized space for walking - No items blocking access to medicines		
Are windows in good condition?	- Sashes in good shape - Windows clean		
Are doors, walls, and ceilings in good condition?	- No leaking ceilings - No signs of dampness on walls		
Is there good air circulation?	- Vented openings allow movement of air - Shelves are spaced apart		
Are any products stored in direct sunlight?	- Not too near windows or doors		
Is the storage area clean?	- Free of insects and rats upon inspection - No trash on floors or counters		
Is the storage area secure?	- Doors in good shape - Hinges in good shape - Window bars in good shape - Locks in good shape		
Are products organized in a systematic way?	- Medicines grouped as a patient kit - Patient kits in use contain patient's name - Medicines not grouped as patient kits are identified with product names		
Are there sufficient storage cabinets for TB medicines?	- Are intact and functioning well - Are closed and have locks if door is not locked		
Are large quantities of medicines kept on pallets?	- Are stacked so as to keep medicines on the bottom from getting crushed - No products are stored on the floor		
Do refrigerators, freezers, and cold room work well?	- Temperature is maintained - Electricity is constant		
Are products available on day of inspection?	- FEFO is used; no products are passed expiry dates - All products are available		
Are there damaged or expired products?	- Such products are returned to district stores on a regular schedule - Such products are not mixed with useable stock		
Are excess medicines from patient defaults or transfers repackaged for use?	- Are returned to district stores on a regular schedule - Are repacked at the health center for new patients - Are returned to district stores for repacking		

Checklist Two: Assess Current Practice for Receiving Orders

This checklist should be used initially and then repeated again in six months to see progress in this practice.

Put a check (✓) mark beside each question is practiced by treatment center personnel and an (X) mark for each question not practiced.

Once completing the checklist above *a*ssess clinic performance by counting the total of all checked (✓) questions and dividing by the total number of questions multiplied by 100.

$$\text{Performance} = \frac{\text{Total number of check marks (✓)}}{\text{(Total number of questions)}} \times 100$$

	Assess Current Practice for Receiving Orders	
	Do you:	**✓ or X**
1	Check for broken, cracked, or leaking bottles?	
2	Check for broken or crushed tablets; damaged blisters?	
3	Check for expiry dates of each item?	
4	Check labels on each box to confirm medicine name and strength?	
5	Check whether refrigerated or cold chain items arrive within acceptable temperature ranges (e.g., BCG vaccine)? Omit if you do not stock refrigerated items.	
6	Check if all items listed on invoice were delivered (missing items)?	
7	Check items that were delivered but not ordered (wrong items)?	
8	Document discrepancies in quantities delivered when they occur?	
9	Document received items in stock registers the same day you receive deliveries? Omit this question if stock registers are not a requirement in your health system.	
10	Have a second person verify quantities received, missing, or damaged?	

Checklist Three: Monitoring Usage of Patient Kits

District: _____ Date: _____/_____/_____

Health Unit: _____ Supervisor: _____

1. Patient kits in treatment area	**Yes**	**No**
Are all kits arranged for easy access?		
Are all kits stored off the floor?		
Do patient kits have the name of the patient, TB register number, and patient's weight written on them?		
Do TB register cards show that TB medicines are being recorded when the patient takes them in the clinic?		
Do TB register cards show that TB medicines are being recorded when the patient takes them at home?		
Do take-home treatment cards show that medicines are being recorded once the patient swallows them? Ask patient to see their treatment cards.		
2. Partly used patient kits	**Yes**	**No**
Are the excess drugs from patient kits stored in separate containers (supply box) for each type of drug? Excess drugs occur when the patient is of lighter weight, transfers, stops coming to the health center, or dies.		
If appropriate for your health system, are you collecting the excess drugs from patient kits? If so, document the drug names, strength, expiry dates, and quantities removed leaving a copy with the treatment center		
3. Inventory practices in the store room	**Yes**	**No**
Are all kits arranged so products can be easily found?		
Are kits with shortest expiration dates stored in front of others?		
Are there damaged or expired products or kits sitting around?		
Are kits stored off the floor		
Are the patient kits and other drug quantities needed for the next delivery period calculated correctly (based on expected number of patients)?		

Annex 2. Calculations

Calculation One: Cost of Expired Drugs and Supplies during Last Period

Calculation Two: Dose Quantities for One Patient Treatment

Calculation Three: Quantities of Safety Stock to Order

Calculation Four: Total Quantities to Order

Calculation One: Cost of Expired Medicines and Supplies during Last Period

Use this form and the following procedure to calculate cost of expired medicines and supplies. In health centers where expired products happen all the time you may want to calculate this indicator monthly or quarterly. If expired medicines are not a constant problem in your facility, you may want to calculate this indicator every six to 12 months.

Date	Item Name and Strength, Dosage Form, Pack Size	Date Expired	(A) Quantity Expired Tablet, Vial	(B) Unit Cost Tablet, Vial	(C) Total Cost (A × B = C)	Comments
				TOTAL		

- Make a list of all expired drugs and supplies during the last period
- For each item past the expiry date, count the quantity of tablets, vials or other measuring unit and record in column (A)
- Obtain the cost of one tablet, vial, or unit for each expired product and record in column (B)
- Multiply the unit cost times the quantity expired (A × B) for each item and record in column (C)
- Add up the total cost of all expired items

Calculation Two: Dose Quantities for One Patient Treatment

Product Name	Treatment Category	Treatment Phase	(A) Basic Units Per Dose (e.g., tablet, vial)	(B) Doses Per Month	(C) Months Treatment	(D) Basic Units Per Treatment Phase (A × B × C)	(E) Basic Units per Patient (e.g., tablet, vial)
RH 150/75 mg Blisters of 672 tablets per pack	I	Intensive					
		Continuation					
	II	Intensive					
		Continuation					
	III	Intensive					
		Continuation					
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	I	Intensive					
		Continuation					
	II	Intensive					
		Continuation					
	III	Intensive					
		Continuation					
Ethambutol 400 mg Blisters of 672 tablets per pack	I	Intensive					
		Continuation					
	II	Intensive					
		Continuation					
	III	Intensive					
		Continuation					
Streptomycin powder for injection, 1 gm vial 50 vials per pack	I	Intensive					
		Continuation					
	II	Intensive					
		Continuation					
	III	Intensive					
		Continuation					
Water for injection, 5 ml vial for streptomycin 100 vials per pack	I	Intensive					
		Continuation					
	II	Intensive					
		Continuation					
	III	Intensive					
		Continuation					

Calculation Three: Quantities of Safety Stock to Order

Product Name	Treatment Category	Estimated Patients for Order Period	Adjustment for Safety Stock (%)	Round Number of Patients to Adjust	Adjusted Number of Patients per Order Period
RH 150/75 mg Blisters of 672 tablets per pack	I				
	II				
	III				
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	I				
	II				
	III				
Ethambutol 400 mg Blisters of 672 tablets per pack	I				
	II				
	III				
Streptomycin powder for injection, 1 gm vial 50 vials per pack	I				
	II				
	III				
Water for injection, 5 ml vial for streptomycin 100 vials per pack	I				
	II				
	III				

Calculation Four: Total Quantities to Order

Product Name	Treatment Category	(F) Adjusted Number of Patients per Order Period*	(G) Basic Units per Patient (e.g., tablet, vial)	(H) Basic Units Needed (each category) (F × G)	(I) Total Basic Units per Product (sum of (H) per product)	(J) Total Basic Units *on hand* or *on order*	(K) Quantity to Order in Basic Units (I – J)	(L) Basic Units per Pack	(M) Number Packs to Order** (K ÷ L)
RH 150/75 mg Blisters of 672 tablets per pack	I								
	II								
	III								
RHZE 150/75/400/275 mg Blisters of 672 tablets per pack	I								
	II								
	III								
Ethambutol 400 mg Blisters of 672 tablets per pack	I								
	II								
	III								
Streptomycin powder for injection, 1 gm vial 50 vials per pack	I								
	II								
	III								
Water for injection, 5ml vial for streptomycin 100 vials per pack	I								
	II								
	III								

** Adjusted with safety stock factor equal to an additional ___% of expected patients*
***Rounded to the nearest whole number*

Annex 3. Forms

1. Supply-Order Receipt Form
2. Delivery Receipt Form
3. Daily Administration Form: Intensive Phase
4. Daily Administration Form: Continuation Phase
5. Stock Register Form

Supply Order Receipt Form

Facility:				District:				No.	
Ordered By:				Supplier:					
Date Ordered:				Date Received:					
Items Ordered				Items Supplied				Items Received	
Filled Out by Requester				Filled Out by Supplier				Filled Out by Receiver	
Code	Description/units	Stock Level	Quantity Ordered	Quantity Supplied	Expiry Date	Unit Value	Total Value	Quantity Received	Discrepancy
Ordered by: Authorized Signature				Supplied by: Authorized Signature					
Ordered by: Approval Signature				Received by: Authorized Signature					
				Confirmed by: (Quantity Received, Discrepancies, Expiry Dates above) Authorized Signature:					
Comments:									

Use this form to document a supply order and delivery between any type of facility, such as storeroom to health center or storeroom to hospital.

Delivery Receipt Form

Delivery Note **Facility Making Delivery:** **Health Facility Receiving Delivery:** **District:**		
Description: **drug name, strength, form, package**	**Qty sent**	**Qty received**
Observations		
Received by (Date) **Delivered by (Date)** **Received by (Date)**		

Use this form to record delivery and receipt of medicine orders. This form should be used to track the number of boxes or containers delivered; it cannot be used to track the total quantity of medicines in the storage area.

This form may not be necessary if the Supply Order Receipt Form previously shown on the previous page can be used for that purpose.

Daily Administration Form: Intensive Phase

NTP

Form: DOT monitoring at treatment clinic

of patent file ___ TB doctor ______

TB facility ______ Diagnosis ______

Patient ______ Treatment category ______

Age ______ Weight ______

Address ______

Intensive phase

Month ______

	Drugs					Patient Signature
tablets. / Date						

Month ______

	Drugs					Patient Signature
tablets. / Date						

Month ______

	Drugs					Patient Signature
tablets. / Date						

Doctors visits ______

Dates of smear microscopy monitoring ______

Daily Administration Form: Continuation Phase

Form: DOT Continuation phase of treatment

Month _____ Month _____ Month _____ Month _____ Month _____

	Drugs			Patient Signature
tablets / Date				

Doctors visits _____

Dates of smear microscopy monitoring _____

Individual Product - Stock Register Form

Facility:_____ Medicine:_____ Code:_____

Date	Stock on Hand (balance)	Received/Issued	Expiration Date	Signature

To this you may add columns with information on prices, invoice number, or other information required by your health system.

Annex 4. Illustrative TB Pharmaceutical Management Indicators

The TB medicine indicators listed here are for consideration by national TB programs. Many of the indicators are more appropriate for national TB program level use (e.g., existence of drug policy or of a quality assurance program), while others are more appropriate for district storerooms and TB treatment centers (e.g., availability of medicines in stock).

Several have been tested through general essential medicines programs and the International Stop TB partnership uses four of the key indicators for global monitoring of national TB programs.

For clarity, the indicators are grouped under corresponding components of the pharmaceutical management cycle. The number assigned to each indicator corresponds to the detailed description of indicators in Annex 2 of the RPM Plus publication (2004) *Pharmaceutical Management for Tuberculosis Assessment Manual*. The description of the indicators in the RPM Plus publication will help identify what data need to be collected and where and how to calculate the indicator. If the indicator number contains a *K*, the indicator is *key* (always needs to be collected); if it is a *C,* the indicator is *complementary* (used to broaden the monitoring of TB pharmaceutical management activities).

The indicators without a number may also be used by your program. TB partners may be able to provide the necessary technical assistance in setting up a TB medicine indicator system based on local requirements.

For indicators relevant to only the treatment center level, see the following two pharmaceutical areas: S*tock Management and Distribution*; and *Rational Use*

Indicators by Pharmaceutical Area	Where Useful
Medicine Policy	
C-4. Percentage of TB facilities visited where the most recent official manual of treatment guidelines for TB was present	NTP Secretariat
C-1. Percentage of NTP medicine products included on the national essential medicines list	NTP Secretariat
C-2. Percentage of NTP medicine products included on the WHO tuberculosis essential medicines list	NTP Secretariat
• Existence of a national TB medicine policy to support national TB program goals	NTP Secretariat
• Number of suppliers of TB medicines registered in the country	NTP Secretariat
• Average number of days to register or re-register TB medicines	NTP Secretariat
• Cost of TB medicine registration (single dose, combo pack, FDC)	NTP Secretariat
• Percentage of TB medicines that are registered in the country	NTP Secretariat
Medicine Procurement	
K-5. Percentage of median international price paid for a set of TB commodities that was part of the last regular procurement	NTP Secretariat
C-8. Number of days that a person has to work at minimum wage to pay for a complete TB treatment course taking into account the price of medicines in the public or private market	NTP Secretariat
• Costs of TB medicines prescribed per course (by patient category) as a percentage of costs if the GDF medicines were used	NTP Secretariat
• Average lead time for orders placed for TB medicines from international sources during the last three procurements. The time is measured from when the order is submitted to procurement department or office for purchasing to the time the order is received in warehouse.	NTP Secretariat
• Average lead time for orders placed for TB medicines from local sources during the last three procurements	NTP Secretariat
• Average lead time to submit procurement order for TB medicines to suppliers measured from the time order is submitted to the procurement department until order is placed with the suppliers	NTP Secretariat
• Average lead time to receive approvals for a TB medicines order, measured from the time the procurement department prepares the order, subsequent to tendering, until the order is approved for placement with suppliers	NTP Secretariat

Stock Management and Distribution	
K-1. Average percentage of time out of stock for a set of TB tracer commodities in TB facilities	-Treatment center -Warehouses
K-2. Average percentage of a set of TB commodities available in TB facilities and medical stores	-Treatment center -Warehouses
C-7. Average percentage of stock records that correspond with physical counts for a set of TB tracer commodities in TB storage facilities	-Treatment center -Warehouses
• Percentage of facilities that store TB medicines according to standard TB storage specifications	Treatment center
• Value of expired TB medicines last month or quarter	Treatment center
Rational Use	
K-3. Percentage of new smear-positive patients with pulmonary TB who were prescribed correct medicines in conformity with the standard treatment guidelines used in the country	Treatment center
C-6. Percentage of TB patients who reported regular observation by a health care worker during medicine intake	Treatment center
C-5. Percentage of TB outpatients who could correctly describe how the prescribed medication should be used	Treatment center
• Percentage of drug retail outlets where rifampicin and streptomycin were available without a prescription (and/or for indications other than TB)	Retail outlet (Pharmacy)
• Cost of medicines actually prescribed for treating one Category I TB patient compared to the cost of medicines if DOTS norms for treatment had been followed instead (only meaningful if regimens other than DOTS are followed)	Retail outlet (Pharmacy)
Quality Control	
K-4. Percentage of TB medicines in the past three shipments that were accompanied with a batch certificate	NTP Secretariat
C-3. Percentage of TB medicine samples that failed quality-control testing out of the total number of TB medicine samples tested during the past year	NTP Secretariat