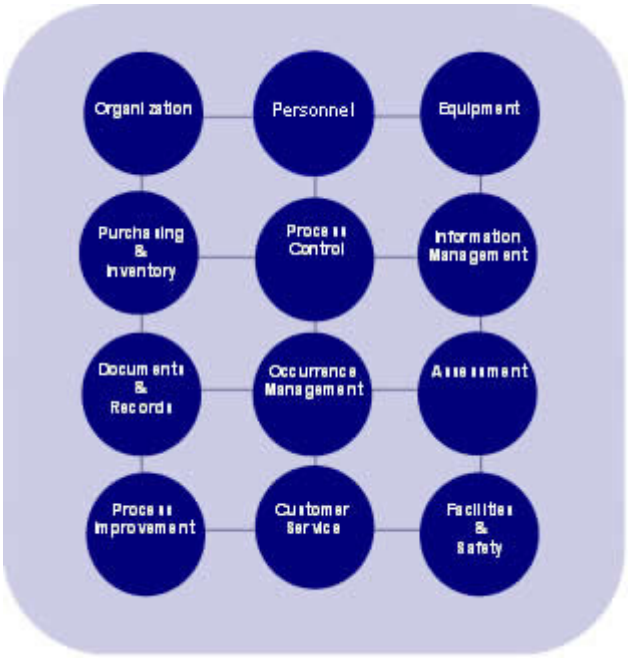
Content Sheet 4-1: Purchasing and Inventory Overview

Role in quality management systems

Purchasing and inventory management is a critical, or essential, component of the quality management system.

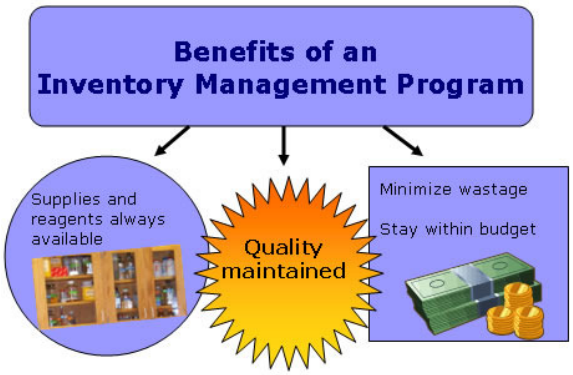
Efficient and cost-effective laboratory operations need the uninterrupted availability of reagents, supplies, and services. Inability to test, even for a short time, is very disruptive to clinical care, prevention activities, and public health programs.



Benefits

Careful management of inventory helps to prevent waste, which can occur if reagents and supplies are stored improperly, or if reagents become out-dated before they can be used. Establishing a purchasing and inventory management program will ensure that:

- supplies and reagents are always available when needed;
- high quality reagents are obtained at an appropriate cost;
- reagents and supplies are not lost to improper storage or kept and used beyond expiration.



Considerations

Methods for obtaining reagents and supplies vary considerably between laboratories. Some laboratories may purchase directly, but, in many countries, a national procurement system is in place, with a central stores area that distributes directly to the laboratories. Also, in many places, donors have a major role in the procurement of supplies and reagents.

The laboratory system for managing the reagents and supplies must take into account these variables.

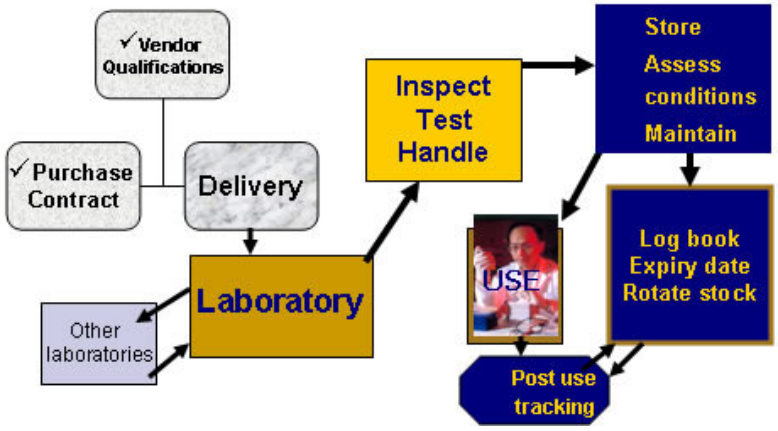
Challenges

The challenge of inventory management is balancing the availability of supplies and reagents in stock with their expiration dates. The life-span of reagents can vary from a few weeks to a number of years. It is important to continuously monitor the expiration dates to make sure needed reagents are always on hand and have not expired. However, it is too costly and wasteful to overstock.

Equipment and supplies received or accepted from donors must meet the clients' and operational needs of the laboratory. Managers may sometimes need to refuse donations, but this should be done in a diplomatic way to ensure future offers are not discouraged.

Key components

Successful purchasing and inventory management requires that policies and procedures be established for managing all critical materials and services. Some of the key components to address are:



- vendor/manufacturer qualifications;
- purchase agreements;
- receiving, inspecting, testing, storing, and handling of materials; all purchased material should be inspected and appropriately tested to ensure that specifications are met. Policies should be established for storing and handling materials as they are delivered to the laboratory.
- tracking materials to individual patients; the management system must allow for tracking materials to individual patients; that is, the laboratory should be able to identify specific test materials used for performing tests on any given day, so that if there is a problem with a patient result, the laboratory will know what reagents were used.
- assessing and maintaining inventory;
- controlling expiration periods;
- dispatching supplies to satellite laboratories.

Content Sheet 4-2: Purchasing

Selecting vendors

It is very important to set expectations and build and maintain relationships with providers of materials and services. Laboratories that purchase directly should look very carefully at vendors' and manufacturers' qualifications, examining such things as specifications and methods of transport. Laboratories that receive reagents and supplies from a central stores area managed by their government should interact with those managing the central stores area to accomplish these same objectives.

At the outset, the laboratory should:

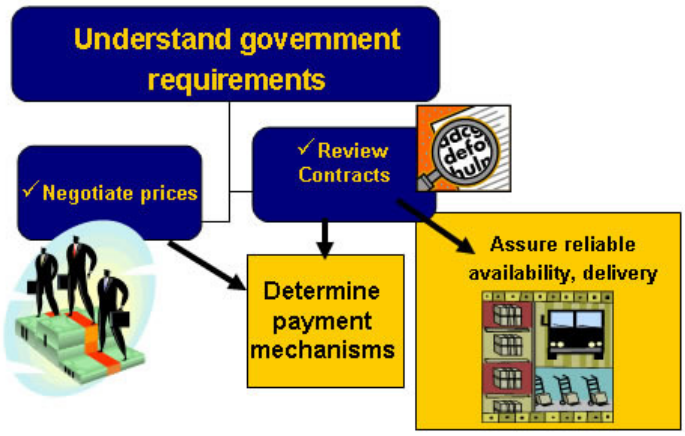
- define criteria for supplies or materials to be purchased;
- look for the best price, taking into account the qualifications and credibility of the supplier;
- consider the advantages and disadvantages of purchasing "brand name" vs. "generic" products, e.g., is it better to purchase specific pipette tips for a specific pipette, or is it just as effective to use generic pipette tips that cost less?

It may be useful to seek information from other laboratories when considering quality, reliability of supply, and cost.

It is equally important to evaluate vendors after purchase. Consider such factors as whether the vendor delivered the specified goods, or whether the central procurement body assured that user specifications were met.

Considerations

When setting up procedures for purchasing, there are a number of considerations:



- understand any local or national government requirements that need to be accommodated in the contracts;
- negotiate for the best price without undermining quality;
- carefully review all contracts to make sure the laboratory's requirements are being met;

  (Contracts should clearly address payment mechanisms and provisions to assure reliable availability and delivery of reagents and supplies. Ask if there are penalties for ending a contract.)
- determine how payments will be made, and how the vendor will assure reliable availability and delivery of supplies and reagents.

Content Sheet 4-3: Implementing an Inventory Management Program

Implementation steps

In establishing an inventory control program, there are a number of factors to consider. A system should be designed so that the laboratory can closely monitor the condition of all supplies and reagents, know what quantities are available, and be alerted when there is a need to re-order.

The following are important steps for implementation:

- assign responsibility–without this, nothing may get done;
- analyze the needs of the laboratory;
- establish the minimum stock needed for an appropriate time period;
- develop needed forms and logs;
- establish a system for receiving, inspecting, and storing supplies;
- maintain an inventory system in all storage areas, and for all reagents and supplies used in the laboratory.

Analyze needs

A laboratory needs a process for analyzing its needs for materials; and for determining how many kits for a particular test should be on hand.

The laboratory should make a list of all the tests it performs and identify all the supplies and reagents that are needed for each test.

It is wise to use all available information to help estimate the usage of supplies and reagents for the period of time between ordering new materials. The information necessary for analyzing needs includes:

- a complete description of each item used;
- the package count or number of units in which the item is supplied, e.g., a kit can include 12 tests or 100 tests and pipette tips can be packaged as 100 per box, or 1000 per box;
- approximate usage per month (quantification), for example, 6 boxes used per month;
- the priority or importance level the item has in doing the work of the laboratory-is it used every day or only once a month?
- length of time required to receive a delivery-will the order take a day, week, or month to arrive?
- storage space and conditions-will a bulk order use too much storage space? Does the item require storage in a refrigerator?

Content Sheet 4-4: Quantification

Quantification Why?

How can a laboratory determine how much of any particular item to order?

Quantification is a very important process that can help calculate how much is required of any particular item for a given period of time, and it is an essential part of a successful inventory management program.

Accurate quantification will:

- ensure essential supplies will be available when needed;
- prevent overstocking, which can lead to wastage of expensive materials.

Quantification provides information for:

- estimating annual budget requirements;
- allowing for better planning;
- making decisions and monitoring performance of the inventory management system.

Quantification When?

Quantification is performed when making annual plans for the laboratory and this planning will take into account the usual usage of supplies and reagents.

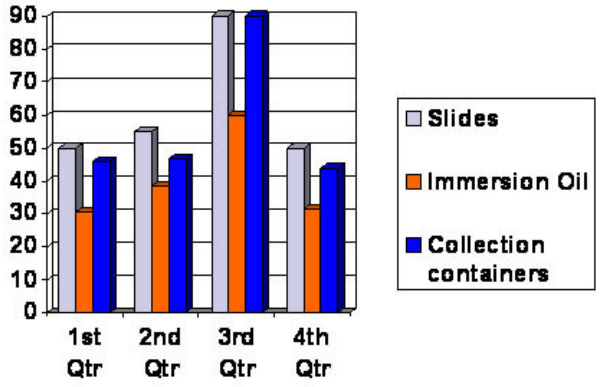
There are times when it is important to consider how new demands on the laboratory will create a need for greater testing volume. This often occurs when new health programs are being implemented, and in preparation for epidemics, either identified or potential.

Quantification How?

The two frequently used methods are consumption-based quantification and morbidity-based quantification.

Consumption-based quantification

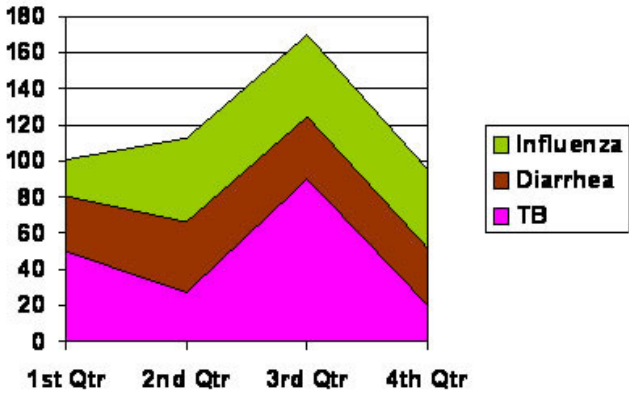
Laboratories most frequently use the consumption-based method, drawing on their experience over time. This method is based on actual consumption, so there are a number of factors to consider. For example, to determine the actual usage, it is important to also estimate how much wastage has occurred and how many expired or spoiled reagents and supplies have been discarded.



For planning, it is a good idea to consider whether any supplies or reagents have been out of stock for more that 15 days during any time of the year. This may mean that supplies are not ordered in sufficient quantities, or that the wastage or expiry is higher than predicted.

Morbidity-based quantification

In using the morbidity-based quantification method, the laboratory must take into account the actual number of episodes, illnesses, and health problems that require laboratory testing. In other words, the laboratory needs to estimate an expected frequency of the disease in question–how many cases will occur per unit of population (per 1000, per 10,000, etc). Then, considering how many people the laboratory serves, it can estimate the total number of cases the community might reasonably expect to observe. Using standard guidelines for diagnosis and treatment and considering how well health care providers adhere to these guidelines can help to estimate how many laboratory tests will be performed.



A good morbidity-based quantification method is more accurate than the quantification by consumption method, but it depends on accurate data.

Content Sheet 4-5: Forms and Logs

Developing forms and logs

Developing an appropriate recordkeeping system is an important step for inventory management. Good tools for managing the stock include:

- standardized forms
- card systems
- log books.

For any system that is used, the following information should be recorded:

- date reagent or set of supplies are received;
- lot numbers for all supplies, reagents, and kits;
- pass or fail acceptance criteria;
- date the lot number or box of supplies was put into service, or if not usable, the date and method of disposition.

See Annex 4-A: Inventory log form example, Annex 4-B: Supplies request form example.

Logbook

The stock logbook or card system will provide a way to keep track of all supplies and reagents that are on hand at any given time. In addition to information mentioned above, it is a good idea to record:

- name and signature of the person receiving materials;
- date of receipt;
- expiration date;
- quantity of the material received;
- minimum stock that should be on hand;
- current stock balance.

Additional information to record could include:

- shelf number or name;
- destination, for example, to -20^{o}C freezer, to media room.

It is a good idea to keep the stock logbook in the storage area.

Content Sheet 4-6: Receipt and Storage of Supplies

Receiving and inspecting supplies

A system should be established so when supplies are received, personnel know what is expected. All supplies and reagents should be inspected as they arrive in the laboratory to be sure that they are in good condition, and to verify that what is received is what was ordered.

In addition, the person receiving supplies should:

- sign their name verifying receipt of goods;
- date each item received;
- note expiration date;
- store new shipment behind existing shipment;
- create or update logbook records.

Storage

Storage of reagents and supplies is a very important part of inventory control. Good practices to keep in mind are:

- keep the storeroom clean, organized, and locked to protect the inventory;
- make sure storage areas are well-ventilated and protected from direct sunlight;
- storage conditions are in accordance with manufacturer's instructions, paying particular attention to any temperature requirements or other specifications such as safety requirements.
- use good shelving strong enough to support items, and organize items carefully on the shelves to prevent movement shifts or falls; shelves should be attached firmly to support walls to prevent tipping.
- items should be easily accessible to staff; sturdy step stools should be available for reaching higher shelves; heavier items should be stored on lower shelves; laboratory staff should not be required to lift heavy items.

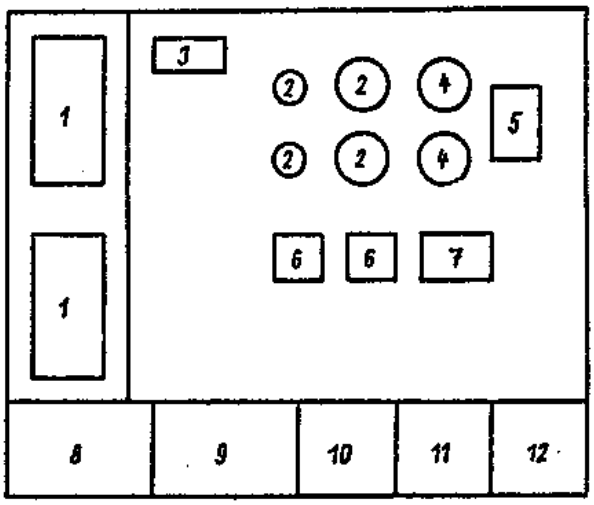
- when storing, put the new shipment behind existing materials that are already in the laboratory; organize the reagents and materials so that the older materials get used first–items with the first expiry dates are the first used.

Organization of shelves

Labeling shelves is a useful tool for storing inventory and will help to systemize and organize storage space.

- Assign a number (or name) to different areas of the shelves;
- Record in the log book what shelves are used for which reagents and supplies.

This system helps to avoid "losing" a product, and will save staff time that might be used for hunting through a number of shelves. Even someone who is not familiar with the storeroom can find a product if this system is in place. It is also useful to number cold rooms, refrigerators, and freezers for the same purpose.



Labeling reagents

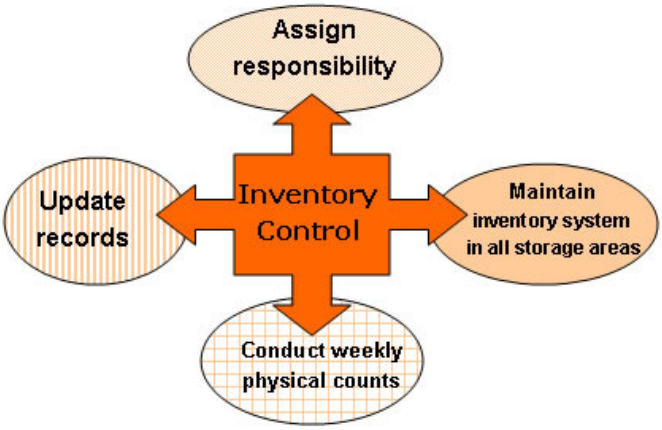
Establishing a system for labeling reagents will be very helpful. It is important to label reagents with the date they are opened, and to make sure the expiration date is clearly visible.

This picture shows a label with important information, and to it has been added the date the bottle was first opened.

Content Sheet 4-7: Monitoring Inventory

Continuous monitoring of inventory

Procedures should be developed and put in place for continuous monitoring of the inventory. To ensure this is done effectively:



- assign the responsibility for this task to an appropriate person or persons; someone must be in charge;
- be sure that all supplies and reagents in the laboratory are covered by the system and maintain inventory management in all of the storage areas;.
- conduct weekly physical counts of reagents and supplies in order to check the system, and as a part of the monitoring process;
- make sure that all records relevant to inventory management are updated and maintained.

Computerized inventory management

In many laboratories, a simple computerized system can be set up for management of inventory.

Advantages and drawbacks

There are many advantages to using a computer. A computer will:

- keep track of the exact number of supplies and reagents on hand, as it can be updated daily;
- allow for good management of expiration dates; the system can be set up to alert when lot numbers are near the expiration date, and therefore use of resources can be optimized;
- generate statistics that will help when planning and making purchases;
- help manage the process for distributing reagents to satellite laboratories;
- ease the burden of inventory management.

Some drawbacks to setting up a computerized system are:

- an on-site computer is needed, and it could be expensive to purchase;
- staff using the system will need to be trained.

Example

Annex 4-C provides an example of a computerized inventory report.

The soft-ware program that developed this inventory report example is free of charge and is available on the CD. There are other free soft-ware programs available.

Content Sheet 4-8: Summary

Summary

A well-managed laboratory will have a system for inventory maintenance and purchasing. The system will require planning and monitoring to ensure that appropriate quantities of supplies and reagents are always available, and also to prevent wastage.

In implementing an inventory management system, the laboratory must assign responsibility for the program, analyze the needs of the laboratory, and establish the minimum stock needed for an appropriate time period. Appropriate logs and forms will be needed, as well as a procedure for receiving, inspecting, and storing supplies.

The laboratory will need to maintain an inventory system for all reagents and supplies used in the laboratory; this system must include all areas where reagents and supplies are stored.

Key messages

Properly managing inventory will:

- increase the efficiency and effectiveness of the laboratory, because it will provide an uninterrupted flow of needed materials;
- assure products are available when they are needed;
- assure that patient and clinical needs are met.