February 1994

NCCLS Document GP6-A
Vol. 14 No. 3

Inventory Control Systems for Laboratory Supplies; Approved Guideline

This document contains recommendations for inventory control systems to insure the availability of reagents and supplies in the laboratory.

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Inventory Control Systems for Laboratory Supplies; Approved Guideline

Abstract

Inventory Control Systems for Laboratory Supplies; Approved Guideline (NCCLS document GP6-A) is intended to address the needs of the clinical laboratory as they relate to the availability of reagents and supplies on an uninterrupted basis. This guideline reviews various types of systems, terminology, and recommendations for establishing or updating an inventory control system. The basic concepts apply to both a manual and automated system. Sample forms are provided for internal use.

[National Committee for Clinical Laboratory Standards. Inventory Control Systems for Laboratory Supplies; Approved Guideline. NCCLS document GP6-A (ISBN 1-56238-228-4). NCCLS, 771 East Lancaster Avenue, Villanova, Pennsylvania 19085, 1994.]

NCCLS Document GP6-A
ISBN 1-56238-228-4
ISSN 0273-3099

February 1994

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VOLUME 14 NUMBER 3

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Suggested Citation

National Committee for Clinical Laboratory Standards. Inventory Control Systems for Laboratory Supplies; Approved Guideline. NCCLS document GP6-A (ISBN 1-56238-228-4). NCCLS, 771 East Lancaster Avenue, Villanova, Pennsylvania 19085, 1994.

Proposed Guideline
June 1993

Approved Guideline

Approved by Board of Directors
September 1993

Approved by Membership
December 1993

Published
February 1994

ISBN 1-56238-228-4
ISSN 0273-3099

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FOREWORD

Efficient and cost-effective clinical laboratory operations require the uninterrupted availability of reagents and supplies. The inability to perform a test because of lack of reagents or supplies is costly, disruptive, wasteful, and might extend hospital stays, postpone surgery, or interfere with patient care.

The clinical laboratory is primarily responsible for identifying needed products and suggesting potential suppliers. Initially, this endeavor includes the establishment and fostering of a good working relationship with the manufacturers and suppliers of needed products. Subsequently, the laboratory must establish an internal inventory control system to assure the maintenance of adequate supplies.

An inventory control action plan facilitates close communication between the laboratory, hospital purchasing system, and industry. Any plan adopted must emphasize maximum efficiency. Carefully prepared procedures, appropriate decisions on ordering of supplies, and continued emphasis on control of expenses are the basic characteristics of good management required to satisfy those who audit the entire system, including the purchasing, receiving, and accounts payable departments.

This guideline reviews various types of systems and terminology and provides numerous specific suggestions worth considering when establishing an inventory system or when improving an existing system. Many of these apply even if an automated system is in place, and the subcommittee recommends that automated inventory systems be considered as a basic program objective. We recommend reviewing the entire document, including the appendices. A number of forms are recommended with examples, as well as blank copies for those who may wish to have copies reproduced by their local printer.

The summary lists basic steps to follow in implementing the general recommendations of the committee. The system should be modified according to laboratory requirements, as well as efficiency requirements imposed by external departments.

The control of blood component inventories is not addressed in this document.

KEY WORDS

Inventory control, purchasing, supplier, receiving, accounts payable, materials management, supply requisitioning, blanket orders, standing orders, backorders, confirming order, traveling purchase requisition, inventory levels, safety stock, order point, expiration dating, storage.

INVENTORY CONTROL SYSTEMS FOR LABORATORY SUPPLIES; APPROVED GUIDELINE

1.0 INTRODUCTION

To maintain its ability to function efficiently and provide uninterrupted data that contribute to patient care, a clinical laboratory must have on hand an adequate quantity of supplies. A consumer survey by NCCLS showed that 47% of users experienced a stock-out at least once a month. Weekly stock-outs were noted by 13% of those who replied. In the same survey, 52% of the stock-outs were attributed to vendor backorders. The laboratories themselves accepted responsibility for the remaining 48% of stock-outs for reasons including failure to order promptly, inappropriate stock levels for average use, and other laboratory-based reasons. There is a need to establish better consumer buying practices and an improved capability to respond to inventory shortages.

2.0 SCOPE

2.1 General

Acquiring supplies and controlling the inventory may be an operations function that occurs totally within the clinical laboratory. However, external departments are always involved, at least to the extent of receiving incoming shipments, transferring goods to the laboratory, and in payment through accounts payable. Staff members within the clinical laboratory must recognize their finite roles and establish clearly defined procedures to be implemented by well-trained personnel. Careful attention to the entire process is essential so that the system works smoothly and does not burden the laboratory or external departments.

Generally, the laboratory is responsible for specifications, as well as storage and use of products. Most often, communication with the vendor is required, especially concerning product improvements, method changes, and similar information that affects the test procedure or quality control. The clinical laboratory must accept the responsibility for these functions and provide accurate records to allow traceability for overall audit purposes.

As a first step, each department head/supervisor should prepare a rough draft listing the products used and how frequently they need to be ordered (see Appendix A). Specific information should include the name of the product, catalog number, package configuration, average monthly usage (AMU), unit of measure (U/M), normal lead time for delivery, and storage area or single site use. Shipping frequency should be listed or minimum inventory should be stated to serve as a cue for delivery authorizations. It is useful to know shipping costs, as well.

Unless the supply system is thoroughly understood and operating smoothly, panic situations occur because of shortage or overstocking. Obsolescence is also a strong possibility if expiration dates are imminent or if improved technology changes the needs of the laboratory.

Routine orders and standing orders should be reviewed every 6 months, at a minimum, to ensure the requirements, vendors, and pricing are acceptable and correct. Vendor representatives should be able to assist the laboratory in determining what standing order levels can and should be, and they may be able to help in monitoring the process. This is a good way to ensure that the vendor's representative is not contributing to any overstock.

An inflation factor for budgeting appears warranted. It is important that managers and supervisors verify that pricing changes are factored into the laboratory budget. Involving

major vendors in the process will help determine the likelihood of pricing changes in the upcoming fiscal year.

2.2 **Objectives**

The following basic objectives serve to plan a course of action.

(1) Simplify paperwork. Avoid duplication of effort in requisitioning and preparing purchase orders.

(2) Reduce costly inventory. Develop timely ordering and standardization.

(3) Improve communications. Use systems to facilitate rapid and clear interactions among, purchasing, receiving, accounts payable, material suppliers, and the laboratory.

(4) Avoid costly emergency deliveries.

(5) Improve methods of budget preparation.

(6) Reduce prices paid for laboratory products and services.

(7) Educate laboratory personnel in inventory control (materials management) procedures to enhance their management skills.

(8) To reduce labor of inventory management, centralize control and automate. (Consider computers, bar coding, stockless and consignment systems, and group purchases.)

3.0 DEFINITIONS

For purposes of this guideline, the following terms have been defined as they apply to the clinical laboratory in a general hospital. Many of the suggestions may also apply to a clinical laboratory in a medical group practice, a medical school, an independent clinical laboratory, a reference laboratory, or even industry.

3.1 **Basic Function Definitions**

3.1.1 *Purchasing*

The department or person authorized to purchase goods and services for the laboratory.

3.1.2 *Supplier/Vendor*

That person or entity for whom the purchase requisition for goods or services is directly intended, e.g., distributors and manufacturers.

3.1.3 *Receiving*

The department that handles the physical receipt of material; the inspection of the shipment for conformance with the purchase order (quantity and damage); identification of and delivery to laboratory destination; and the preparation of receiving reports.

3.1.4 *Accounts Payable*

The accounting function of comparing the receiving record with the purchase order to ensure that the information agrees prior to payment of the supplier.

3.1.5 *Materials Management*

The function that is responsible for knowing the unit cost of supplies, the logistics to support receiving, distribution, and disposal of materials.

3.1.6 *Inventory Records*

The management tools used to set up specifications, adjust to varying usage, and provide a smooth flow of supplies and audit records. These may include but are not limited to traveling purchase requisitions, periodic count records, perpetual inventory records, and specialized inventory records. (See examples in the appendices.)

3.1.7 *Supply Requisitioning*

This function involves recommending when to order and the quantity to order (based on usage, delivery time, quantity, packaging, available storage space, and similar factors). Because supply requisitioning is one of the most sensitive parts of the inventory management process, training and good judgement are required. To ensure that there is a mutual understanding of expectations, any change to orders, shipping dates, or pricing should be clarified between the laboratory and the vendor before the order is placed.

3.1.8 *Purchase Orders*

The official record sent to the supplier to authorize shipping and billing. To ensure that there is a mutual understanding of expectations, any change to orders, shipping dates, or pricing should be clarified between the laboratory and the vendor before the order is placed.

3.1.9 *Blanket Orders*

A long-term (e.g., 6 months) commitment to a supplier to ship based on delivery authorizations specifying delivery, often over a short period such as 15 to 30 days. This procedure is especially useful for shortdated products.

3.1.10 *Standing Order (Ordinary)*

An order with a vendor to deliver a specific quantity at stated intervals. Because changes in usage may increase or decrease needs, inventory should be reviewed periodically (e.g., every 3 months) to keep standing order quantity in balance with needs. At least 30 days notice should be given to the vendor when a standing order is changed.

3.1.11 *Standing Order (Protected)*

An order that covers a specific lot number to be delivered over a long period of time, in which case the vendor sequesters inventory for a specific customer. Some vendors also protect the inventory designated for customers with standing orders by declaring an item out of stock for other customers for an agreed time

interval, usually 60 days. Such arrangements with a supplier may require a price adjustment for inventory carrying costs.

3.1.12 *Backorder*

An unfilled customer order or commitment that places an immediate demand against an item which has inventory insufficient to immediately satisfy the demand.

3.1.13 *Confirming Order*

A purchase order issued to a vendor, listing the goods or services and terms of a verbal order or written order before issuing the usual purchase document.

3.1.14 *Delivery Schedule*

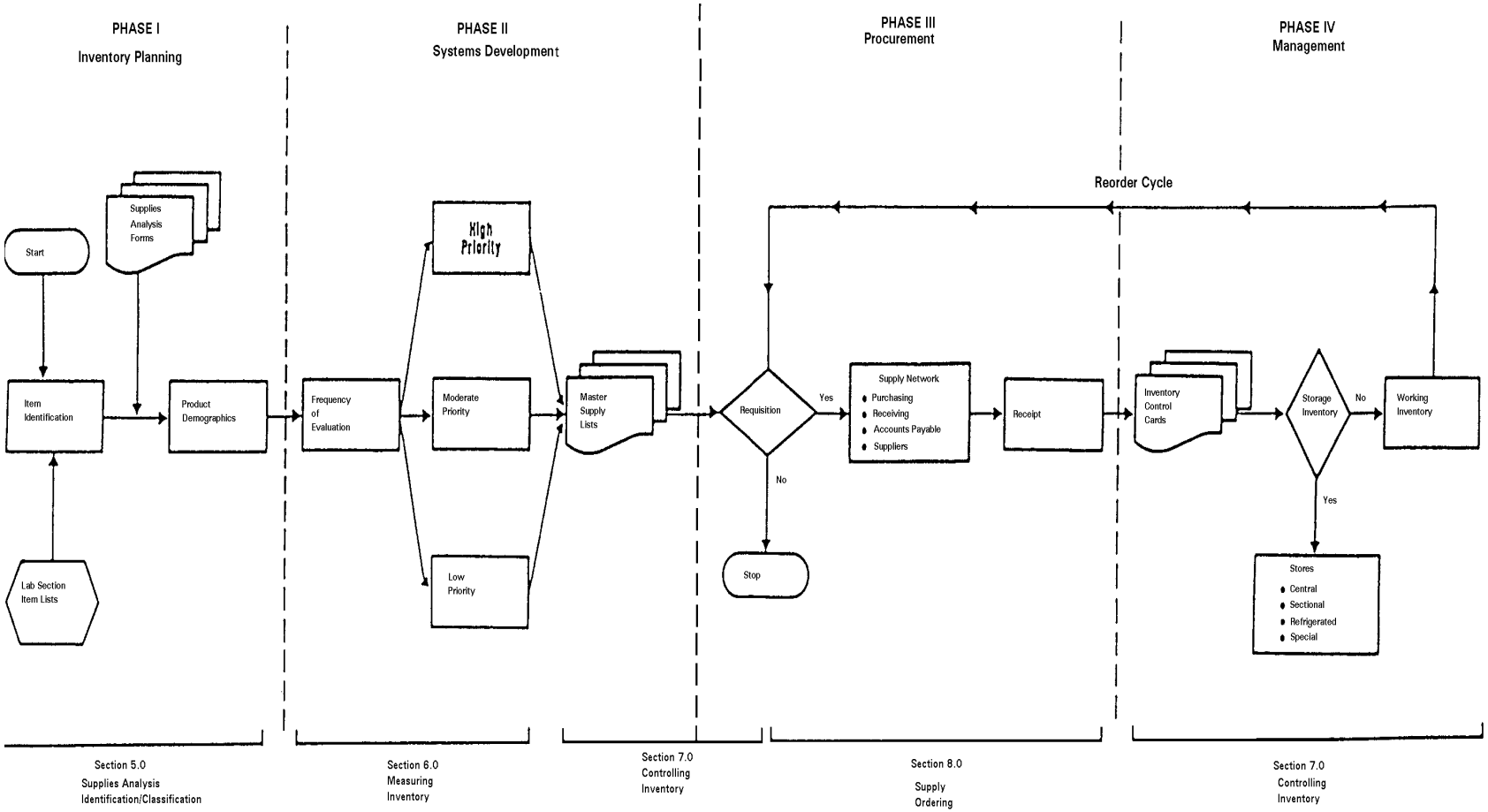
The required or agreed time or rate of delivery of goods or services purchased for a future period.

3.1.15 *Order Preparation Lead Time*

The time needed to analyze requirements and open order status (if any) and to create and release a purchase requisition or a work order.

4.0 GENERAL SYSTEMS AND FLOWCHART

A flowchart can be a useful tool in analyzing and establishing an inventory control system. A flowchart for a generic inventory control system is shown on the following page. The flowchart has been divided into separate phases of inventory control, including Inventory Planning (I), Systems Development (II), Procurement (III), and Management (IV). In addition, specific sections of this guideline are referenced on the flowchart to various elements of this general inventory control system.



Inventory Control: Flow Analysis

5.0 SUPPLY ANALYSIS AND IDENTIFICATION

5.1 Laboratory Section Lists

Development of a classification and list of products used by the clinical laboratory, preferably by section (i.e., Chemistry, Cytology, Hematology, Histology, Immunology, Microbiology and Radioimmunoassay), is the first step in addressing any inventory problem.

5.1.1 *Basic Analysis*

Begin with a basic analysis of items used (see Appendix A). Use the form to list not only the products used by the section but also to indicate the following pertinent information:

(1) complete description of the item;

(2) unit of count;

(3) approximate (average) usage per month (variances may be useful);

(4) priority level: high, medium, low;

(5) order lead time/delivery time;

(6) where stored and conditions of storage;

(7) comments such as supplier/catalog number.

5.1.2 *Demographic Information*

The form may be expanded to include most of the product demographic information. The additional information is not needed for the basic analysis. It would, however, expedite the development process in future steps. As a minimum, include the specifications of the product in 5.1.1 and the following specifications:

(1) standard packaging and alternative configurations, if available and known;

(2) part number or manufacturer's number;

(3) vendor (alternative vendors should be listed if available) and notations of when no substitutions are permissible;

(4) shipping costs (important for determining budget allocations) because some materials (e.g., RIA test kits) are expensive to ship.

5.2 Item Identification

5.2.1 *Department Forms*

As the forms are completed by each of the sections in the laboratory, verify the products listed and list them alphabetically for each section.

5.2.2 *Form Review*

Because one product might serve several sections, review and analyze the lists from all laboratory sections to identify duplicate or similar items.

5.2.3 *Inventory Monitoring*

Assign responsibility for monitoring the inventory in each of the storage areas (i.e., hospital storeroom, laboratory storeroom, section storage areas, and special storage areas for flammable supplies or refrigerated supplies).

Different inventory control procedures may be needed for the various storage areas. Traveling purchase requisitions (Appendix B) may be convenient for ordering and for special storage areas such as corrosive, flammable, or refrigerated products not kept in individual section storage areas. Weekly physical count records (Appendix C) or perpetual inventory records (Appendix D) may be used for both hospital and laboratory storeroom products. A traveling requisition system and a perpetual or a weekly count inventory record are needed for section storage areas supervised by a section supervisor. The specific steps are explained in the following sections.

5.3 **Product Demographics**

5.3.1 *Product Listing*

After all products are listed by laboratory section and storage area, obtain the demographic information for each product. (As mentioned in 5.1.1, much of the product description can be recorded at the same time the product lists are generated.)

5.3.2 *Minimum Information*

As a minimum, obtain the following demographic information for the product:

(1) complete description;

(2) standard packaging and alternative configurations, if available and known;

(3) part number or manufacturer's number;

(4) vendor (alternative vendors should be listed if available);

(5) price breaks (i.e., standing order);

(6) unit cost;

(7) all special ordering instructions (i.e., required delivery schedule and deadline for receipt; need for product to be all one lot number; need for product to have long shelf life).

6.0 MONITORING INVENTORY

6.1 General

To ensure the efficient, uninterrupted, and economical operation of a clinical laboratory the following factors are evaluated:

6.1.1 *Requirements*

Requirements are demands on a unit/time basis that depend on historical (past) and projected usage data. The rate of use can be determined by checking purchase records over a 6-to-12-month period and by reviewing specific laboratory test volumes. Measure the average amount of stock to be maintained against a 30-day period.

6.1.2 *Procurement Time*

Procurement time, also known as order preparation "lead time," is the total period of time necessary to obtain a new supply of an item or to have any item replaced that may have been unavailable due to an unforeseen variable.

6.2 Optimal Frequency

Once these factors are considered, determine the optimal frequency of measure by evaluating the activity of the item. Assign a priority to the actual frequency of review and measure as shown in the table on the following page. Alternatively, the actual frequency can be inserted. The frequency should be part of the procedures manual of the appropriate section.

Frequency of Evaluations

Example of Item	High Priority[a]	Moderate Priority[b]	Low Priority[c]
Syringes			X
Chemistry controls		X	
Creatinine reagents	X		
Hematology controls		X	
Anti-D typing sera	X		
RIA kits		X	
Blood culture plates		X	
Evacuated tubes			X
Urine cups			X
Coombs sera	X		

a. High priority items require constant review due to unusual requirements, use, and special orders.
b. Moderate priority items require periodic review due to use, expiration dates or storage requirements, or blanket orders.
c. Low priority items are on standing orders and automatic reorders; or they are items whose absence would not interrupt the work flow.

6.3 **Specific Operating Procedures**

Based on active stock and safety stock requirements, and after the physical counts are made, appropriate checklists and requisitions are used and appropriate documentation made on a stock record for each item.

7.0 CONTROLLING INVENTORY

Effective inventory control is expected to increase efficiency by providing an uninterrupted flow of materials needed to operate the laboratory, while reducing both quantity of inventory and the physical space needed for its storage. Analysis of the effects on use and on storage can be used to develop master supply lists for inventory.

7.1 Usage

7.1.1 *Inventory Levels*

To save space and reallocate funds for other needs, inventory should be maintained at a minimum level. Inventory is generally measured in "weeks' supply," or, the amount of a particular item used in a week's time. Use a minimum of 2 and a maximum of 6 weeks' supply as an initial guideline to establish inventory levels. Inventory level is the sum of the minimum inventory plus safety stock.

Vendors can and should help in determining minimum and particularly maximum inventory levels for the laboratory. If the vendor will "sign up" for rapid shipment turnaround time (from receipt of order) and is reliable (e.g., no or minimal backorders or delayed shipments), maximum inventory levels can be reduced, which results in real cost savings and improved cash flow to the customer.

7.1.1.1 Inventory Rotation

To rotate inventory, use older supplies before newer supplies. Place new shelf items behind the older items so the older items will be used first. Label the containers holding stores.

7.1.1.2 Minimum Inventory Level

Minimum inventory levels are the amounts necessary to support normal operations until additional material can be supplied, either from a vendor, an isolated storeroom, or general storeroom.

7.1.1.3 Safety Stock

Inventory maintenance depends on many factors that the laboratory cannot control. Lead time is the total time between placing an order and receipt of the product in the laboratory. Several intra-hospital departments may be involved with order processing in addition to the manufacturer, distributor, and shipper. Lead time is determined through analysis of past history of supply and is a prime consideration in setting inventory levels. Safety stock is that amount of inventory that allows for unusual demand

or usage plus the usual lead time for receipt of the item. In setting safety stock, consider the product's importance in laboratory operation.

7.1.2 *Order Point*

The order point is the inventory level at which the decision is made to replenish stock. The order point is generally the minimum inventory level.

7.2 **Handling/Storage**

7.2.1 *Receipt/Expiration Dating*

Review manufacturers' expiration dates on laboratory material upon delivery and determine the acceptability of the item. Shipments must be reviewed by a person who has a knowledge of the product usage, so that a decision can be made before the item is entered into inventory. To prevent the possibility of disagreements with the vendor, it is important that the laboratory establish an upfront understanding of expectations with regard to delivery and expiration dates.

Arrange with the supplier a return mechanism for rejected shipments. Advance arrangements will reduce negotiation with the supplier who must take back material with short expiration dates. The supplier is also alerted that dates are reviewed as products are received by the laboratory, thereby reducing the likelihood that the supplier will ship shortly-expiring material in the future.

Receipt-date all products (manually, with a mechanical dating device or by automated means), upon entering them into inventory.

7.2.2 *Product Changes by Manufacturer*

7.2.2.1 Configuration Changes

The manufacturer/supplier should notify the user of package configuration changes prior to shipment to allow for appropriate adjustment for storage location and space.

7.2.2.2 Methodology Changes

To alert the user of changes in methodology, color or graphic changes in packaging and product labeling should be used by the manufacturer. Package inserts should clearly note the revision date and direct the user to the specific change(s) involved. Laboratories should have a documented protocol for ensuring that changes to the package insert are incorporated into the current laboratory protocol and procedure manual.

7.2.2.3 Change Notification

Those laboratory employees who participate in the inventory function should formally acknowledge vendor change

notification because it may require attention by laboratory management.

7.2.2.4 Recalls

Unsatisfactory products that must be returned to the vendor should be announced to the laboratory directors (medical and managerial). To avoid possible usage before return shipment or on-site destruction, all merchandise to be sent back or destroyed (as requested in some cases) should be immediately isolated and appropriately marked.

7.2.3 *Storage*

Adequate space must be provided for inventory storage. The inventory area may be an internal laboratory storeroom or part of a hospital general supply area. There should be adequate space to stock inventory items and to permit a clear view of all inventory. Unpack shipping cases and store items in the unit by which they will be delivered to individual sections.

Certain items may fall into special categories and should be stored outside the supply area, as appropriate.

7.2.3.1 Section Supplies

Store items that are purchased rarely, have a short shelf life, or in small quantity for use by a single section within that section and requisition them as needed. For example, radioimmunoassay (RIA) kits and blood bank reagents have short shelf lives and are probably best controlled within the section involved. Nevertheless, apply the same basic principles of inventory control to these items as to general laboratory inventories.

7.2.3.2 Refrigerated Supplies

Reserve a master storage area for inventory that must be kept under refrigeration. Back up freezers may be required in addition to those necessary for minimum inventories (i.e., minimum freezer space should exceed the volume necessary to store minimum frozen inventories).

7.2.3.3 Flammables and Hazardous Chemicals

Reserve specialized storage areas for flammable reagents and hazardous chemicals (e.g., strong acids and bases).

7.3 **Inventory Recording**

Devise a system to maintain a written record of inventory levels and usage. This record may be as complete as desired, but it should include at least the item name, a minimum quantity that sets the order point, and a maximum quantity that sets the order quantity. Depending on requirements, this system can be a weekly count record, a perpetual inventory record, or a specialized inventory record. It is possible to train clerical staff to be responsible for inventory recordkeeping.

7.3.1 *Periodic Count Record*

Where strict control of inventory is not necessary, make a weekly or biweekly count of in stock inventory and simultaneously update written records. (See example in Appendix C.)

7.3.2 *Perpetual Inventory Record*

Where strict control of inventory is desired, maintain a perpetual inventory record. Note the date and movement of individual items into and out of inventory storage. To operate the system most efficiently, limit the number of people who have access to inventory storage areas. Accuracy of physical count and inventory record count is mandatory. A comparison of actual stock on hand and the record count must be made at least annually. (See example in Appendix D.)

7.3.3 *Specialized Inventory Record*

Replacement parts for instruments are a good example of a slow-moving, limited quantity inventory that is vital to laboratory operations. Keep a record of replacement parts showing the name; catalogue, model, and serial numbers; and manufacturer's name and address. Provide adequate space for recording inventory periodically (e.g., on a monthly or bimonthly basis). (See example in Appendix E.)

8.0 ORDERING SUPPLIES

8.1 General

The manner in which inventory is ordered may vary depending on the size and function of the laboratory and the requirements of the institution's materials management or administrative departments. A single person may be responsible for ordering in a small laboratory, whereas a number of persons may be more practical in a larger, departmentalized laboratory. It is important that the laboratory have a protocol documenting the procedure to ensure that mutual expectations between internal "customers" (e.g., the laboratory, purchasing, and accounting) are clearly defined.

8.2 Specifications

The basic information necessary for ordering inventory must be provided in a thorough and explicit manner. As a minimum, include the following product specifications:

(1) complete description;

(2) standard packaging;

(3) part number or manufacturer's number;

(4) vendor (alternative vendors should be listed if available);

(5) price breaks (i.e., standing order);

(6) unit cost;

(7) all special ordering instructions (i.e., required delivery schedule and deadline for receipt; need for product to be of all one lot number; need for product to have a long shelf life).

8.3 **Ordering Formats**

The prescribed format for a requisition will be determined by the laboratory's needs and organization and the institution's materials management and administrative departments. In creating any ordering system, attempt to limit the required paperwork by consolidating several functions into one form.

8.3.1 *Order Forms*

In some institutional settings, the within-laboratory form is used to prepare the institutional requisition, which is then used as the reference for the purchase order that is sent to the manufacturer/distributor.

8.3.1.1 Inventory Control Sheet

We recommend an inventory control sheet or stock inventory record (see example in Appendix C) because it combines the inventory control and the laboratory ordering functions. Regardless of the format, each list must contain all of the information referenced in Section 8.2. Additionally, the following information should be included: maximum/minimum stock levels; an area to record the periodic inventory; an area to document that a product has been ordered (including the date and quantity ordered); and for what and where the product is used.

Organize the stock inventory record by laboratory section, area, instrument, and analysis. If available, it may be appropriate to use a computer-based ordering and inventory system to eliminate human oversight and error.

8.3.1.2 Periodic Inventory

The actual periodic inventory can be taken by whomever is responsible for a laboratory section, area, instrument, or analysis.

8.3.1.3 Review

The inventory control sheets are reviewed by the laboratory supervisor and an order generated using the institution's requisition. Regardless of the format, each requisition should contain all the information referenced in Section 8.2.

8.3.1.4 Signal Flags

Place signal flags on lists that contain items that have been ordered. If the items are not received within the appropriate length of time, the signal flags will alert the laboratory and a follow-up inquiry can be made.

8.3.2 *Traveling Purchase Requisition*

This requisition is well established in manufacturing firms and is useful as a basic record to "travel" within a laboratory inventory control-purchasing-receiving system. The card is used repeatedly to accomplish the following objectives:

(1) initiate a requisition by the section supervisor;

(2) receive authorization;

(3) travel to the point of purchase order preparation;

(4) return to the section to await receipt from the vendor;

(5) remain in the file pending the next requisition-purchase from the receiving file.

8.3.3 *Format*

The traveling purchase requisition can be either a one- or two-part form. When a one-part form is used, the ordering information is recorded on one side of the card and the inventory information is recorded on the opposite side. When two cards are used, the ordering information is recorded on one card and the inventory information is recorded on another.

9.0 INVENTORY EFFECTIVENESS REVIEW

9.1 General

A review of the products for changes that might affect the entire inventory control program is a fundamental but sometimes overlooked aspect of laboratory inventory control. The inventory control program must incorporate, where appropriate, an effectiveness check mechanism to address these product changes. To assure continued supply in the proper quantities, as well as continued proper use, early recognition of product change is important. The following sections discuss some product changes that can occur and that should be identified via an inventory effectiveness check system.

9.1.1 *Required Changes*

Potential or required changes for the specific source of supplies and/or changes in specific brand names. Changes in supply brand or distributor are sometimes initiated from within the laboratory but may originate in the purchasing department or even with the vendor.

The laboratory should let the purchasing department and the vendor/distributor know what alternate brands are acceptable and any that are specifically not acceptable. A vendor should not be permitted to substitute a brand not on the list of acceptable alternatives without consulting the laboratory.

9.1.1.1 Investigation

Investigate changes in product source, i.e., vendors or distributors, for impact on supply capability, delivery lead times, differences in shipping and/or billing procedures, availability of discounts, and availability of the proper or required brand name product.

9.1.1.2 Evaluation

Evaluate changes in specific brand names for their impact on availability, suitability for direct substitution, and qualification of specific and required performance characteristics.

9.1.2 *Known Changes*

Any potential or known changes in product configuration, e.g., the number of assays per unit (kit) should be routinely evaluated. The knowledge of and record of package configuration on inventory records can be helpful should a particular configuration be temporarily unavailable or discontinued.

9.1.3 *Effectiveness Check*

Effectiveness checks with respect to the supplied directions for use must also be a part of inventory records.

9.1.3.1 Effect on Inventory

Although major changes in package inserts are usually highlighted by the product manufacturer, the laboratory must ascertain whether these changes affect the required inventory supply.

9.1.3.2 Record Dates

Publication and revision dates appear on package inserts and should be entered into inventory records.

9.2 **Additional Checks**

Effectiveness checks are helpful in maintaining continuity in the use and supply of laboratory products. When this pertinent information is incorporated as part of the inventory record, the management of inventory at the bench level is more effective because the information is immediately available. The recognition of a change, evaluation of its impact (including effects on patient care, laboratory safety, and cost), and review of approval requirements to institute or accept the change will enhance efficient inventory use.

10.0 SUMMARY

Cost containment is emphasized in basic inventory management. A good system requires training in inventory systems and record keeping. The program need not be overly complex or burdensome, if there is good training and careful follow-up.

An unfilled order that has aged beyond the normally expected delivery time is a danger signal to be checked with all elements of the supply network, including purchasing, receiving, accounts payable, and the supplier. Suppliers may sometimes hold shipments for credit reasons that are unknown to the laboratory. In such cases, contacting the vendor representative may result in the release of the shipment (or at least a partial shipment) while payment negotiations proceed. Consult with your local representative and have your payables department be proactive in telling vendors when to expect payment. The sales representative can be invaluable in a credit problem situation. Delays may also be the result of manufacturers experiencing unforeseen backorders in the receipt of raw materials from their suppliers.

When productive communication exists between all groups in the supply network, the systems should work well so that the need for, and frequency of, emergency orders is minimal. Because the functioning of the laboratory is a critical element in health care delivery, sound inventory control is essential.

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APPENDIX A

Basic Analysis of Items Used: Example

Section *Chemistry* **Supervisor** *Jane Smith*

ITEM	Unit of Count	Usage per Month	PRIORITY			Delivery in Weeks	Where Stored	Comments
			H	M	L			
Acetic acid AR	*pint*	*1*		*X*		*1*	*acid cabinet*	
Filter paper	*box*	*1*			*1*	*1*	*general stores*	
Cuvette micro	*box*	*12*	*X*			*2*	*general stores*	
Centrifuge tubes 15 mL	*bag*	*4*		*X*		*2*	*general stores*	
Pipet tips #4	*box*	*3*	*X*			*1*	*general stores*	
Kit-Gentamicin	*kit*	*3*	*X*			*2*	*refrigerator*	
Kit-Calcium	*kit*	*1*	*X*			*1*	*general stores*	
AMP buffer 9.0	*4 1*	*1/2*	*X*			*1*	*general stores*	
Control level 1 - unassayed	*box*	*2*	*X*			*1*	*freezer*	
Lithium concentrate - 150 mmol/L	*bottle*	*1/2*		*X*		*2*	*general stores*	

Explanation: This analysis form is used to record all items in each section of the laboratory. In working with those managing the program, the section supervisor reviews the usage, priority, delivery, storage, and similar factors to set up stock inventory control records with appropriate maximum and minimum levels, as well as the traveling purchase requisition.

All items used within a section should be listed. Considerable effort is required to start a good basic inventory control system; once established, however, the problems of supply are greatly reduced.

Because this record is used only in the start-up phase, the form can be prepared on ordinary weight paper by a standard copy machine.

H, high.
M, medium.
L, low.

APPENDIX A

Basic Analysis of Items Used

Section_____ **Supervisor**_____

ITEM	Unit of Count	Usage per Month	PRIORITY			Delivery in Weeks	Where Stored	Comments
			H	M	L			

Shipping frequency_____

Critical inventory_____

Cost of shipping_____

APPENDIX B

Traveling Purchase Requisition: Example

ITEM	TRAVELING PURCHASE REQUISITION
Acetic acid AR grade Pint	DEPT. ***Lab.*** SECTION ***Chem.***

CATEGORY/CODE NO.	SUPPLIER	TELEPHONE	PRICE
1. ***5726***	***ABC Lab Supply Co.***	***356-7711***	***3.60***
2. ***1296***	***STAR Chemical Co.***	***295-1111***	***3.40***
3.			

Stock on Hand	REQUISITIONED		ORDERED			RECEIVED	
	Approved By	Quantity	P.O. No.	SPLR.	Date	Date	Quantity
1	***JL***	***2***	***537***	***#2***	***6/1***	***6/10***	***2***
1	***JL***	***2***	***683***	***#2***	***8/4***	***8/9***	***2***

Usage	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL	REMARKS
19***83***	***1***	***2***	***1***	***1***	***2***	***1***	***1***							
19__														

Explanation: The traveling purchase requisition is used to establish and maintain accurate specifications on purchase records. A card is set up for each item. Normally, cards are maintained by the section supervisor and are filed alphabetically by item. Each card is designed for 40 transactions using the front and back sides. For durability, cards should be printed on 140# heavy card stock.

APPENDIX B

Traveling Purchase Requisition

ITEM	TRAVELING PURCHASE REQUISITION DEPT. SECTION

CATEGORY/CODE NO.	SUPPLIER	TELEPHONE	PRICE
1.			
2.			
3.			

Stock on Hand	REQUISITIONED		ORDERED			RECEIVED	
	Approved By	Quantity	P.O. No.	SPLR.	Date	Date	Quantity

Usage	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL	REMARKS
19__														
19__														
19__														

APPENDIX C
Stock Inventory Record

___QTY ON HAND ___QTY TO ORDER Item	Delivery in Weeks	Use per Month	Maximum/ Minimum	DATE INVENTORY COUNTED												
				5/1	6/1	7/1										
Centrifuge tubes 15 mL 24/Case	*2*	*4*	*8/3*	*4*	*1* *5*	*5*										
Cuvette micro	*2*	*12*	*30/12*	*18*	*6* *24*	*22*										
Filter paper #1 12.5	*1*	*1*	*4/1*	*3*	*2*	*1* *2*										
Kit Calcium	*1*	*1*	*3/1*	*2*	*1* *2*	*2*										
Lithium concentrate 150 mmol/L	*2*	*1/2*	*3/1*	*2*	*1*	*1* *1*										

Explanation: This record provides an efficient means of recording inventory to be counted periodically or on a "cycle" basis. The record provides for recording 20 items with columns to show the approximate delivery in weeks and the approximate usage per month. Using this information, one can set up a maximum and minimum inventory.

The inventory is counted and recorded. A judgement is made as to whether more stock is to be requisitioned. If additional stock is needed, the traveling purchase requisition then activates the purchasing procedure.

This record should be printed on 140# heavy stock because it can be used for 19 counts, which, on a monthly basis, would be one and one-half years. Consideration should be given to setting up the stock inventory record by location of storage (acid cabinet, freezer, refrigerator, general stores) and then in sequence as the items are stored.

APPENDIX C

Stock Inventory Record

__QTY ON HAND __QTY TO ORDER

ITEM	Delivery in Weeks	Use per Month	Max./Min	DATE INVENTORY COUNTED												

APPENDIX D

Perpetual Inventory Record

ITEM	MAXIMUM	MINIMUM
XYZ Media, Lot. A4	*12*	*3*

PERPETUAL INVENTORY RECORD

DATE	IN	OUT	BALANCE	DATE	IN	OUT	BALANCE	DATE	IN	OUT	BALANCE	DATE	IN	OUT	BALANCE
1/8	*14*	*0*	*14*												
1/12		*3*	*11*												
1/24		*4*	*7*												
2/1		*5*	*2*												
2/5	*12*	--	*14*												

Explanation: The perpetual stock record is for items that must be recorded for each and every withdrawal from inventory. This provides the most accurate and strict inventory control. A typical example is microbiological media that must be tested upon receipt before going into stock. Records include not only items but also approved lot numbers. It is recommended that the card be printed on two sides with a banker's turn.

APPENDIX D

Perpetual Inventory Record

ITEM	MAXIMUM	MINIMUM

PERPETUAL INVENTORY RECORD

DATE	IN	OUT	BALANCE	DATE	IN	OUT	BALANCE	DATE	IN	OUT	BALANCE	DATE	IN	OUT	BALANCE

APPENDIX E

Instrument Parts Inventory Record: Example

Cat./Model No. *FA-3* **Serial No.** *467* **Date Purchased** *4/3/83*

Manufacturer: *XYZ Instrument Company*
421 Ash Street
Anytown, NY 14567

Phone: *(123) 456-7891*
Local Sales: *Tim Smith (215) 123-4567*
Local Service: *Jim Jones (215) 765-4321*

Code Number	Part	Cost Estimate		Min. Inv.	Quantity on Hand at Date Counted								
					6/1	7/1							
21-203	Potassium filter	43	00	1	2	1							
21-207	Sodium filter	43	00	1	2	2							
21-304	Flame screen conical	8	00	2	1	3							
21-312	Flame spreader 3/package	9	00	1	2	1							
18-164	Ballast lamp	4	30	2	2	2							
15-162	Burner ring	9	00	1	1	0							

Explanation: This record of parts inventory should be kept at the instrument station and probably should be in the instrument manual. For existing instruments, the user can set up the information and start the inventory recording program. For new instruments being delivered, it is ideal if the manufacturer obtains a purchase order for replacement parts and sets up the inventory record as part of the instrument maintenance manual delivered to the laboratory. It is important to show the specific information that identifies the instrument, as well as specific ordering information by catalog number and part title. The record provides both inventory control information, as well as purchasing information.

Min. inv., minimum inventory.

APPENDIX E

Instrument Parts Inventory Record

Cat./Model No._____ **Serial No.**_____ **Date Purchased**_____

Manufacturer -

Phone:

Local Sales:_____

Local Service: _____

Code Number	Part	Cost Estimate		Min. Inv.	Quantity on Hand at Date Counted								

Min. inv., minimum inventory.

SUMMARY OF COMMENTS AND SUBCOMMITTEE RESPONSES

GP6-P: *Inventory Control Systems for Laboratory Supplies; Proposed Guideline*

General

1. The one suggestion I have for making the document more manageable for the laboratory is to adapt them to a personal computer. The program should be written as a separate unit with a cost accounting program (GP11-P) so that they may be tied together if the laboratory so wishes. This would allow the test costing to be updated as new supplies are added or procedures changed. It would also give an end-of-the-month report of the actual supplies purchased and used per test or laboratory section. The cost per test could be compared against a standard cost for that test.

   Currently, there is no computer-based costing system for the clinical laboratory, and to try and do the costing for even a few hundred tests manually is not practical. The numerous forms could probably be programmed into a computerized system.

   - **NCCLS is planning to evaluate various options for electronic information and storage. The Subcommittee on Inventory Control will refer this request to the Area Committee on General Laboratory Practices for further consideration and subsequent document development.**

2. There is some concern that the title could lead some readers to expect more than what is presented. The guidelines are for a system that is basic and manual. This should be emphasized, or perhaps an additional section or supplement could be prepared on automated systems using microcomputers, minicomputers, or the potential of automated ordering systems to keep inventory levels down.

   - **See the response to Comment 1. The subcommittee does recommend in Section 2.2 of GP6-T that centralized control and systems for automation be considered as a basic program objective.**

3. There is no provision for handling recalled or defective products. A notification to the user, the replacement of the product, and defined time limits should be specified according to the importance of the product.

   - **As part of the revision process, Section 7.2.2.4, Recalls, was added. In addition, Section 7.2.1 recommends that the laboratory make advance arrangements with suppliers for returning shipments.**

Section 7.1.1 and 7.1.2

4. Page 184 of the proposed standard states, "Inventory level is the sum of the minimum inventory plus safety stock." Page 186 claims, "The order point is generally the sum of the minimum inventory and the safety stock amount." These definitions appear to say that inventory level equals order point.

SUMMARY OF COMMENTS AND SUBCOMMITTEE RESPONSES (Continued)

While minimum level inventory is suggested to maintain cost effectiveness and efficiency, it appears that one would always be at the order point. We do not believe this is the intent of the guideline. The cost of generating requisitions must be considered when cost effectiveness is a goal. Frequency of requisitions affects the cost. Buying larger quantities often reduces costs.

- **As part of the document revision, the definition of "order point" was revised in Section 7.1.2 of GP6-T.**

Section 7.1.1.2

5. How does the minimum inventory level definition relate to safety stock?

   - **The minimum inventory control = [usage/day · lead time (in days)] + safety stock.**

Section 7.2.3.2

6. In this section it states, "Reserve a master storage area for inventory which must be kept under refrigeration." This is somewhat contradictory to 7.2.3.1 which states, "Store items purchased rarely or in small quantity for use by a single section within that section and requisition them as needed."

   - **The subcommittee intends Section 7.2.3.1 to refer to unrefrigerated items with long shelf lives, whereas Section 7.2.3.2 refers to refrigerated items.**

Questionnaire

7. In response to question 6, I feel there is no justification for a manufacturer (supplier) to backorder standing orders. It would seem acceptable if the order placed was a spot order.

   - **Standing orders reduce both user and vendor costs. The subcommittee agrees that standing orders should be a supplier's priority. The unavailability of raw materials may be a cause of backorders.**

RELATED NCCLS PUBLICATIONS

GP2-A2 **CLINICAL LABORATORY TECHNICAL PROCEDURE MANUALS--SECOND EDITION; Approved Guideline (1992).** Offers guidelines that address the design, preparation, maintenance, and use of technical procedure manuals in the clinical laboratory.

GP11-T **COST ACCOUNTING IN THE CLINICAL LABORATORY; PROPOSED GUIDELINE (1993).** Discusses principles and techniques to help laboratory managers establish a workable cost-accounting system.