Laboratory Supply Chain and Inventory Management

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Materials Management

Discussion

- Have you ever had to miss out a meal due to shortage of salt at home?
- What goes into management of materials consumed in a kitchen?

Overview of today’s talk

1. Introduction to supply chain and inventory management
2. Unique challenges in medical laboratory supply chain
3. A brief overview of demand forecasting
4. List the factors to be considered for optimal storage
5. Identify a few key safety signs in the lab commodities
6. Enlist the steps in receiving the lab commodities

Real life scenarios

Lab XYZ is left with Dengue kits (120 tests) with expiry of August 2024 .

Question:

1. What more information would you like to know before placing an order for the next quarter?

Role of Clinical Laboratories

• Provide diagnostic testing to support clinicians in the treatment and overall clinical management of health conditions in individual health facilities, such as hospitals and clinics

• Serve as a reference laboratory for clinics at lower levels of the health system

Why Supply Chain Matters?

Health programs cannot succeed unless the supply

chain delivers a reliable, continuous supply of health commodities to its customers.

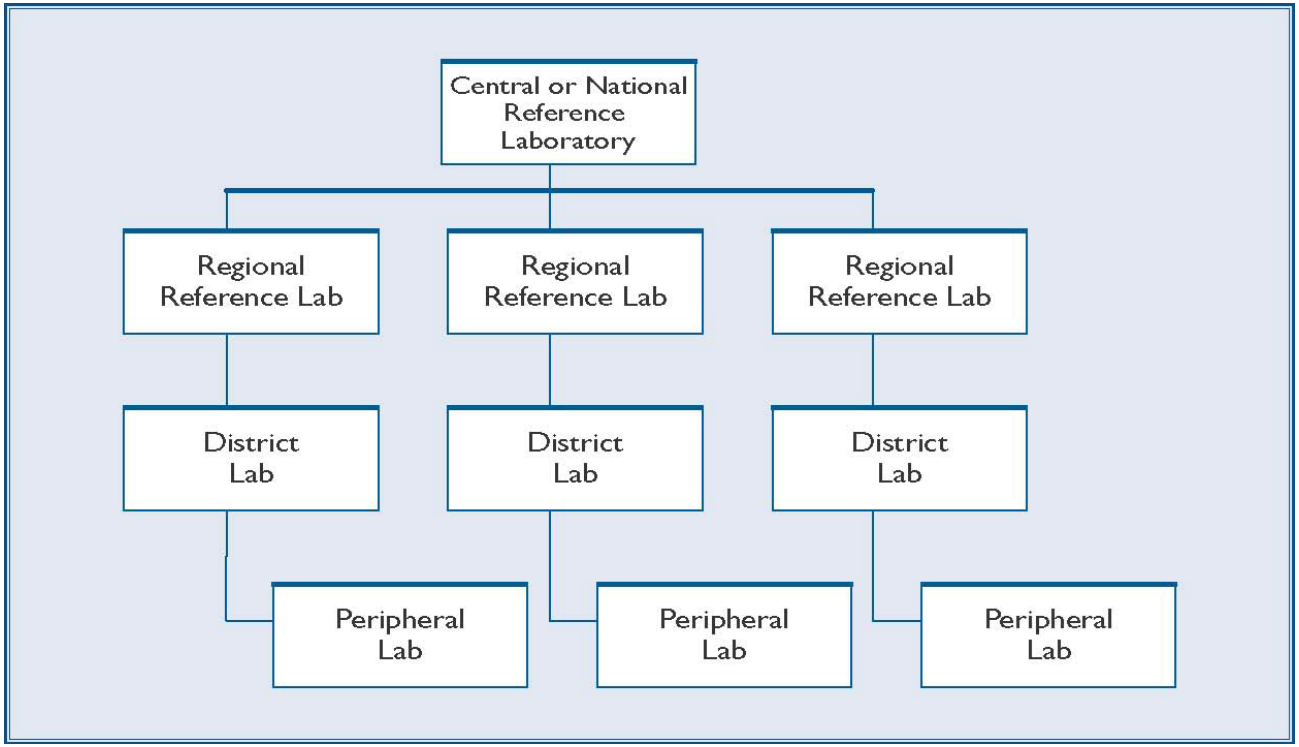
NO PRODUCT?

NO PROGRAM!

- John Snow, Inc. (JSI)

The Six Rights of Logistics

Organization of Laboratory Services



Types of Laboratory Commodities

1. Reagents - Chemical or Biological agents

   Variable costs, stability,cold chain requirements, availability and hazards

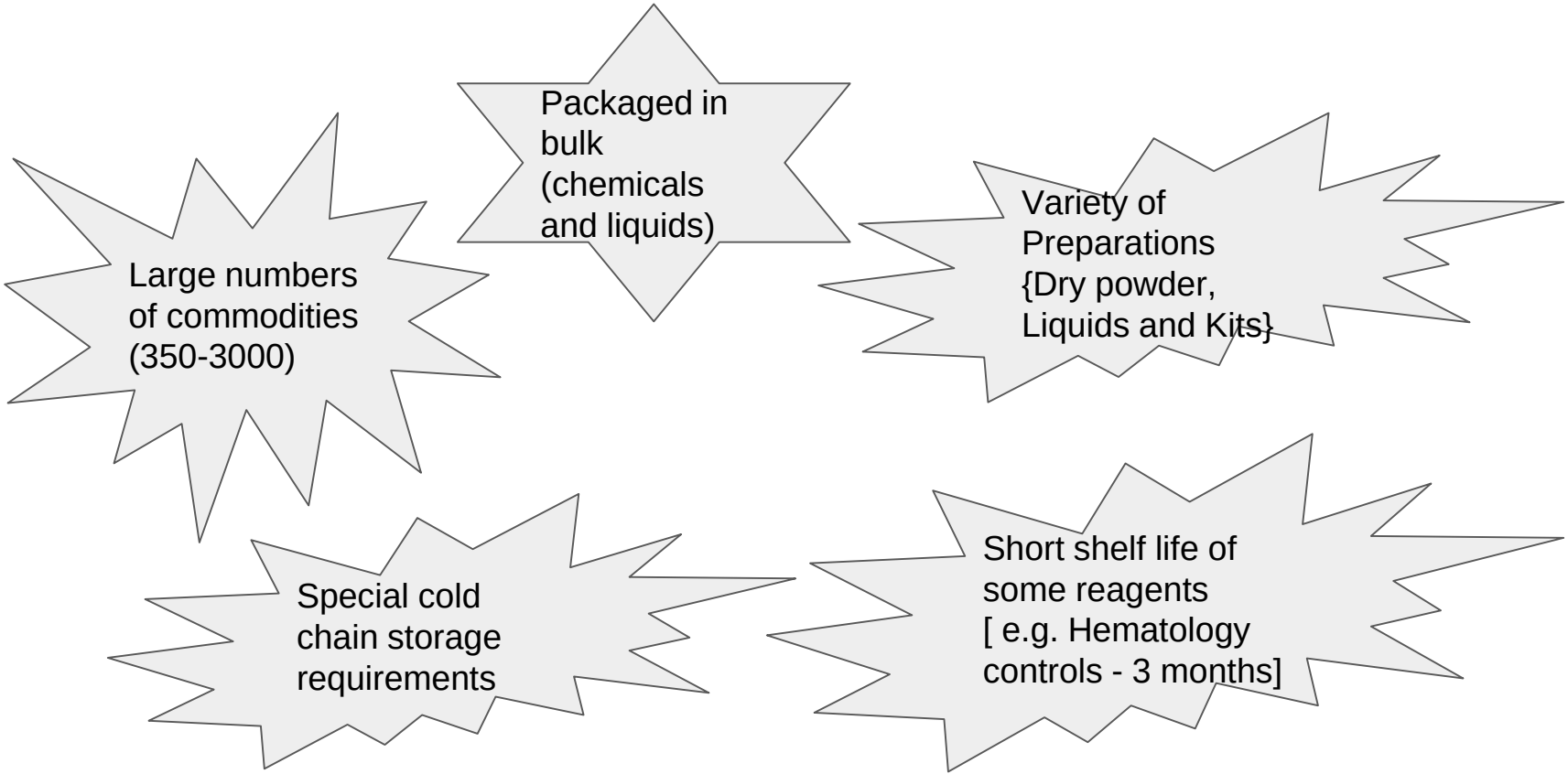
2. Consumables - Items used only once while performing a test

   E.g. Microscope cover slips, Gloves, Pipette tips, Bleach, Alcohol

   3. Durables- Equipment used for testing (can be re-used)

   E.g. Glasswares, Instruments

Peculiar characteristics of Laboratory Commodities



Reagents	Shelf Life	Storage Temperature	Packaging
Blood typing sera	24 months	2°–8°C	5 mL bottle (6 bottles in a package)
Bacteriological media	36 months	21°–30°C	500 g bottle
Chemistry reagent kits	12 months	2°–8°C or 21°–24°C	100 tests per kit
CD4 antibody reagent	≥7 months	2°–8°C	50 tests per kit
Stains, dry powder	60 months	21°–30°C	25 g bottle

Slow moving and fast moving commodities

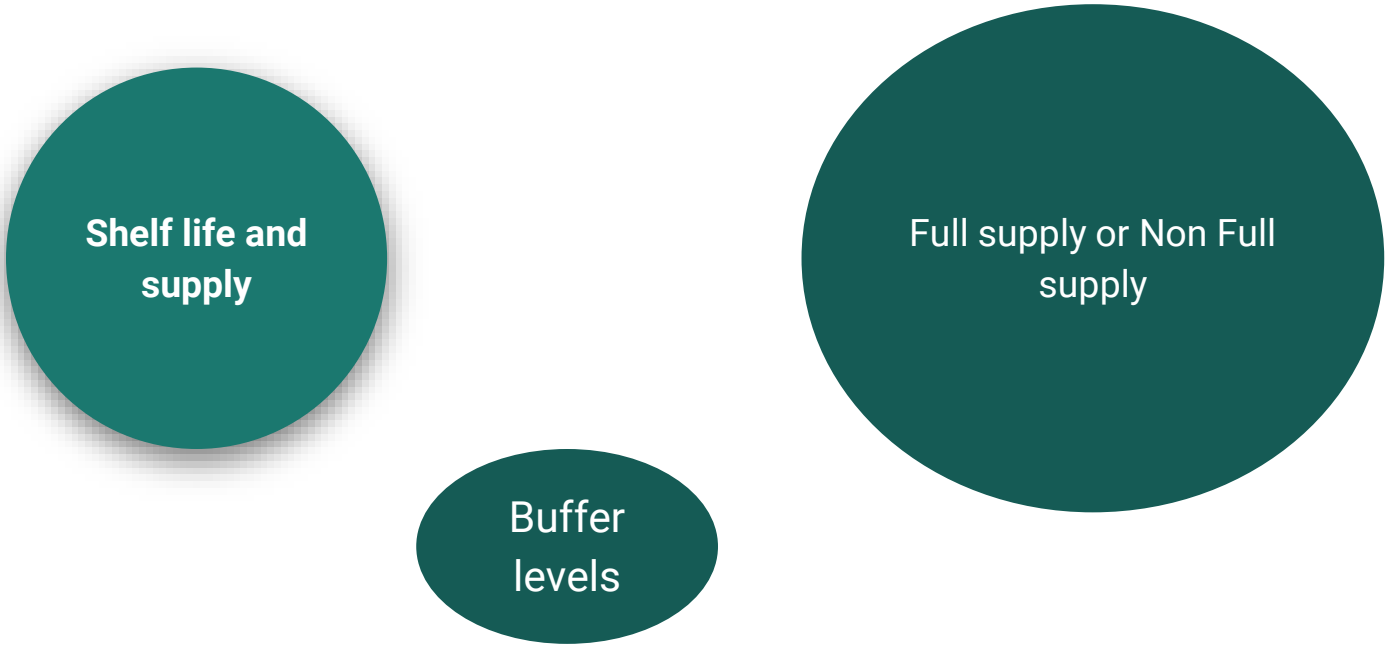
Slow moving commodities -several months to be consumed when issued to the bench

How much stock a facility would want to keep?

How much should be reordered and when?

Based on how quickly and how much product was consumed.

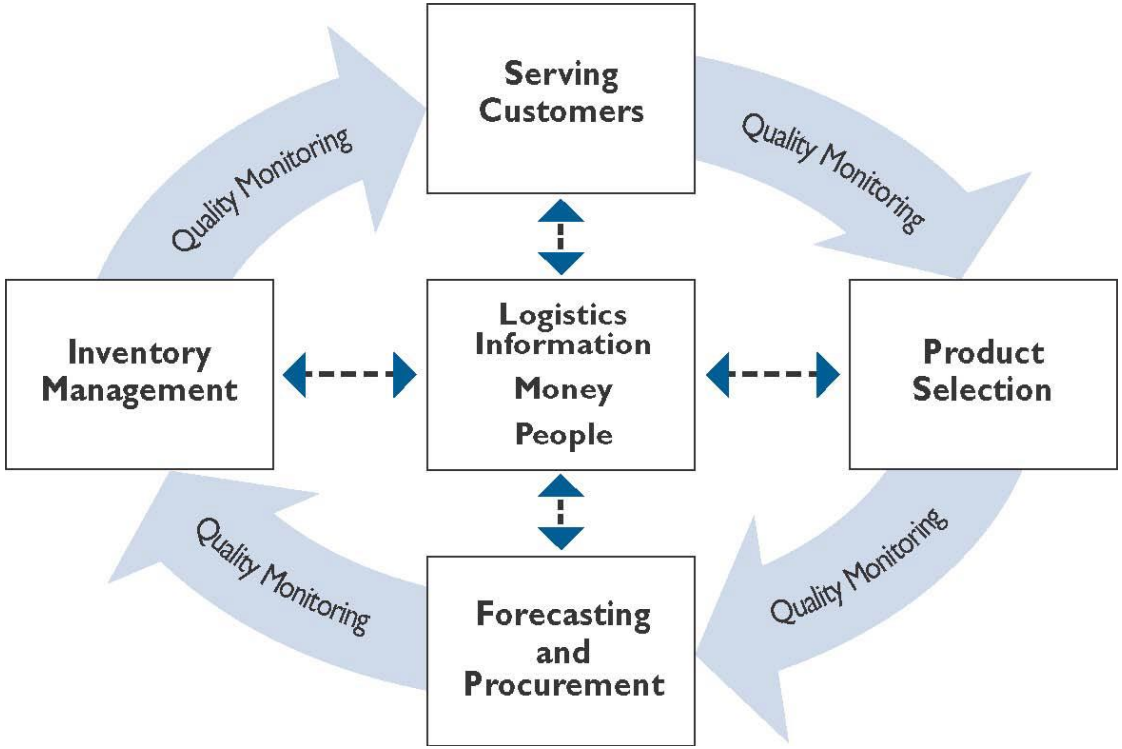
Shelf life and Supply



Advantages of Standardization in Inventory Management

1. Improved service provision to clients
2. Streamlining the number and range of laboratory products
3. Rational decision making throughout supply chain: product selection, forecasting, quantification, and procurement
4. Agility in the supply chain, allowing redistribution of supplies to reduce stock imbalances
5. Affordability through economies of scale when procuring reagents and supplies.

The Logistics Cycle



Materials Management

Steps Involved in Materials Management

Inventory Management

Quantity Management	Quality Management	Process Management
• Demand Forecasting & Planning • Inventory Planning • Inventory Movement Control • Consumption, Inventory and Operations Planning (CIOP) • Tools and techniques	• Setting Quality Specifications for the lab • Market survey to find reagents fit for purpose • Writing technical bids • Pre-purchase evaluation • Verification of reagents before introduction into service • Lot verifications Clinic	• Purchasing Considerations • Supplier Evaluation • Reception of Material • Storage of Material • Labeling • Acceptance Testing • Usage • Safety and Adverse Incident Reporting • Disposal of Unused And Expired Material • Documentation

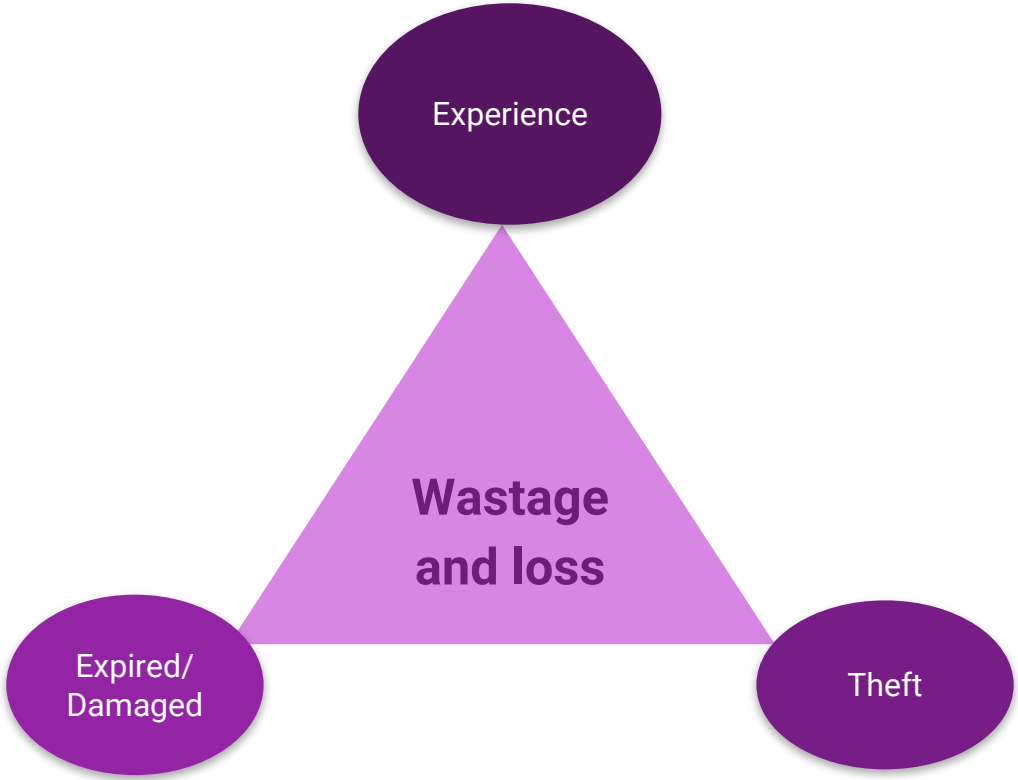
Serving Customers of Laboratory Logistics System

1. Patients
2. Clinicians
3. Epidemiologists
4. Policy makers
5. **Lab staff**

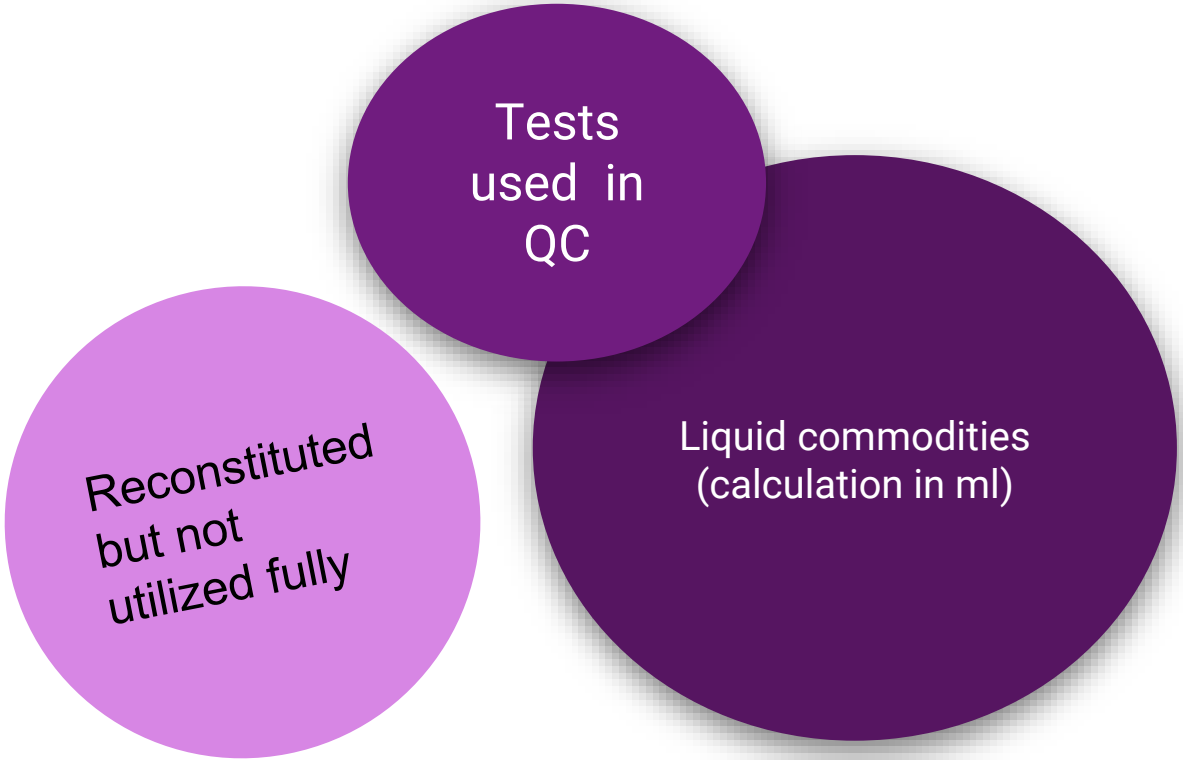
LMIS- Logistics Management Inventory System

Three essential data items needed to make logistics decisions

1. Stock in hand
2. Quantities dispensed to user used in a given period of time (consumption)
3. Adjustments to stock for purposes other than use (expiry, damage, wastage, theft, etc.


Experience
Wastage and loss
Expired/ Damaged
Theft

Challenges in LMIS



Recommendation for LMIS

1. Use issues from stock as consumption data. Use and maintain stock-keeping records.
2. Use the smallest unit of issue as the unit for stock keeping and reporting.
3. Routinely report stock levels, issues, losses and adjustments, and stockouts. Link reporting with resupply.
4. Use an Activity Register to track the actual consumption of a small number of tracer commodities.
5. Computerize the logistics management information system where possible.

Importance of Quantification

- To avoid surpluses that may lead to over--stocking, expiries and/or wastage of commodities
- To avoid shortages/stock--outs
- To assist with the preparation and justification of a budget
- To make informed adjustments to procurement when faced with budgetary constraints
- To plan for new policies and new or expanding programs
- To estimate how much storage space may be required in the future

Common terminologies used in quantification

Consumption- Quantity of an item used used to carry out diagnostic tests

Consumption review period: Period over which consumption is being reviewed usually 1 month

Average monthly consumption:A measure of the number of units of a commodity that was used in an average month over a specified period (e.g.in the last 1or 3 or 6 or 12 months)

Maximum stock level: The maximum quantity of a laboratory commodity that should be held at the facility at any given time

Common terminologies used in quantification

Minimum stock level: The minimum quantity of laboratory commodity that the facility should hold at any given time.

Maximum Months of stock: This is the highest stock level that the facility should hold of an item at any given time, expressed in months

- Stock on hand (SoH) /Closing stock – The quantity of a lab commodity in stock at a specified time(best when based on the Physical count)

- Quantity to Order (QO) The quantity required to be ordered for the next consumption period, e.g. 1 month

Common terminologies used in quantification

Stock out : When there is no stock of a commodity, in the whole facility

- Safety / Buffer stock – This is the minimum quantity that should be kept in stock in the lab at any given time, to cushion against uncertainties in demand and supply.

- Unit of issue – The quantity of a commodity in a container or pack size (e.g. tests, pieces, mls,litres, gms, vials)


RE-ORDER NOW

Consumption based method

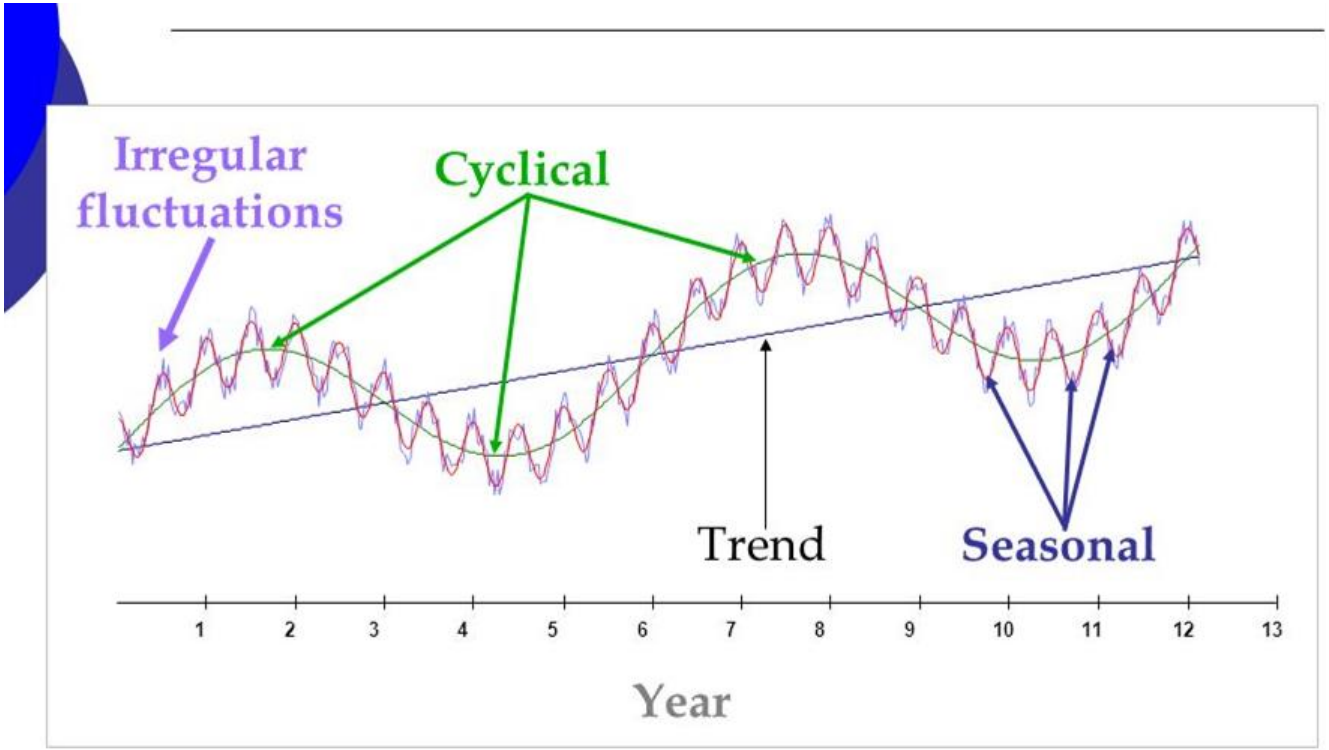
- It estimates the commodity needs based on records of past consumption
- Works well where: – All records are available,up--to--date and the information is reliable – There are minimal stock out periods – Consumption patterns are stable
- Adjustments are made for stock--outs, wastage and losses.

Sources of data in inventory management by Consumption based Method

Records that provide for information for quantification:

- Consumption data report and request forms (Workload for the last 3 months/ 6 months)
- Analyse the Pattern in the workload (Seasonal, Cyclical)
- Lab stocks

Components of Time series forecasting



Steps in calculating inventory by consumption method

1. Select the consumption period (CP)
2. Determine the consumption (C)
3. Detemine the average monthly consumption (AMC): consumption / consumption period = C/CP
4. Maximum month of stocks Max MoS = (Desired consumption periods + Buffer in months)
5. Calculate the Maximum Stock level (MSL) MSL = AMC x Max MoS
6. Conduct the Physical count to get the Stock on Hand (SoH) Ensure that the SoH covers the stock at the various service points as well as the lab store, if any
7. Calculate the Quantity to Order (QO)= MSL – SoH

Example of a stock sheet with consumption data

Kit Name	Part number	Department	present stock in kit on 1/12/2022	No.of test As per Kit	present stock in tests on 1/12/2022	Expiry	CONSUMPTION	Reagent Received quantity in kits	Reagent Received quantity in Tests	Received Date	Total Stock	Remaining Stock in Tests	Remaining Stock in Kit
1													
GLUCOSE	OSR6221	Biochemistry	3.70	5200	19325	1-8-2024	12096	2	10400	16-12-2022	29725	17629	3.39
UREA	OSR6234	Biochemistry	2.80	4920	13532	1-10-2023	9775	2	9840	19-12-2022	23372	13597	2.76
CREATININE	OSR6178	Biochemistry	3.00	3960	11724	1-4-2023	10633	4	15840	16-12-2022	27564	16931	4.28

Activity Group 1

What factors should be considered for optimal storage of commodities in the laboratory?

Guidelines to good storage practice

Provide appropriate space and security for stored stock

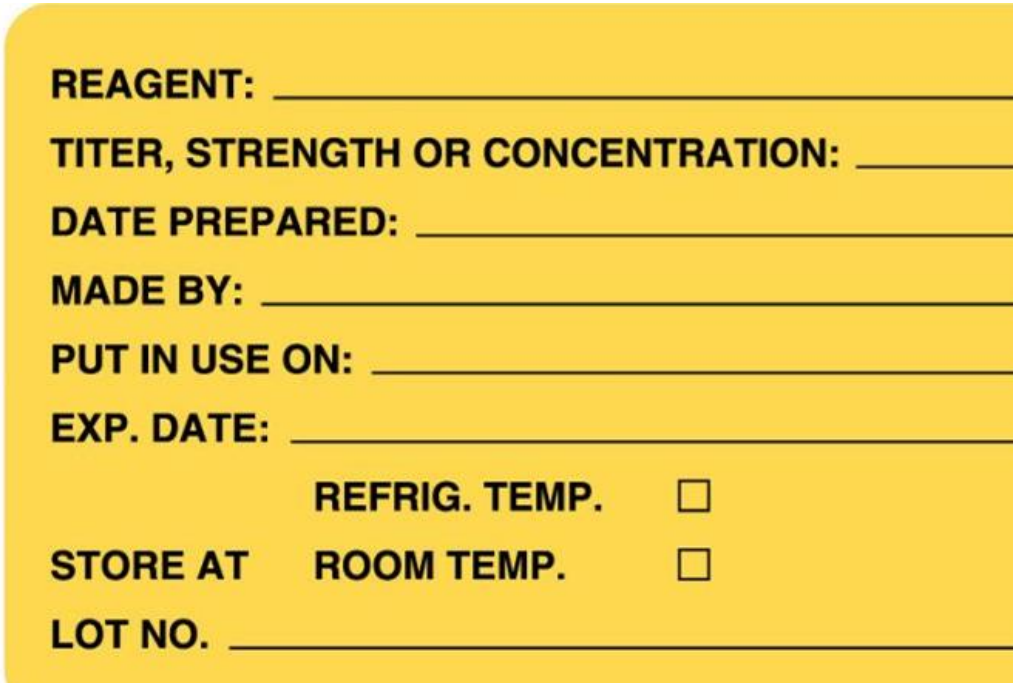
Provide safe and orderly arrangement of stock in storage

Maintain correct storage conditions to safeguard quality

Good stock control and rotation-(practice FEFO&FIFO)

Guidelines to good storage practice- is this pic ok ??

Prepared reagent labels




S
M
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S

Guidelines to good storage practice

Activity 2

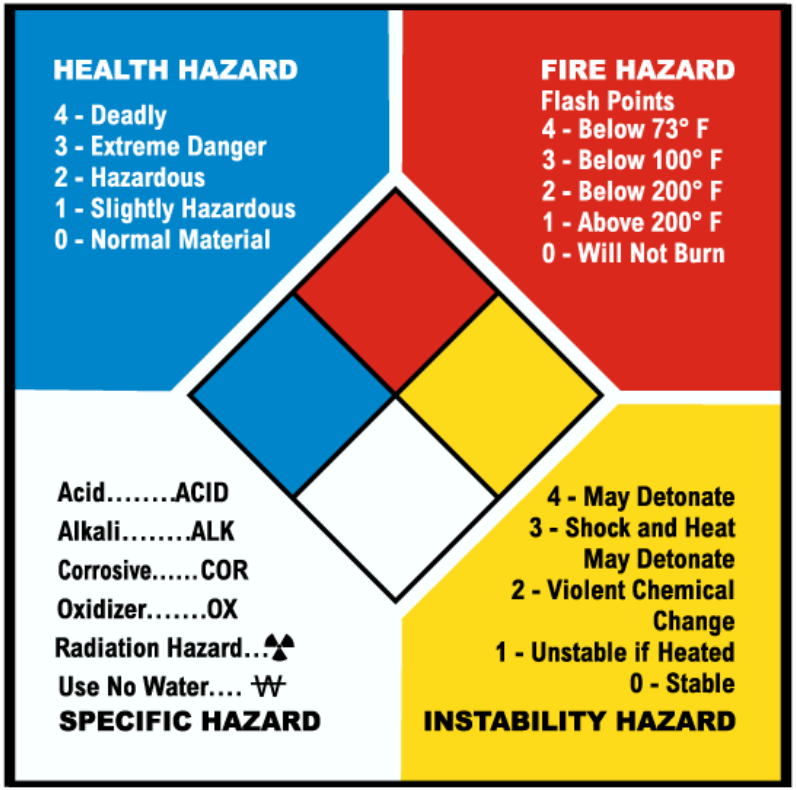
Identify these symbols in the laboratory of GHS Pictogram

1

2

3

NFPA hazard rating system



Best practices in Material receiving in laboratory

Supplier’s Name
Item Description
Date of Receiving Material
Invoice No./Challan No.-
Invoice Date./Challan Date
PO Number-
Pack Size (as requested) ☐Yes ☐No
Quantity Received as per order ☐Yes ☐No
Expired (No short expiry or as requested) ☐Yes ☐No
Adequate Temperature Condition(Cold Chain) ☐Yes ☐No
Physical Condition (Damaged/Broken)
(if yes please specify Details) ☐Yes ☐No
Other(please specify)-
Receivers/Store Manager Sign:

Practical tips and concerns for reducing inventory wastage

1. Training on pipetting to minimize wastage
2. Instrument timely maintenance will reduce re-runs
3. Timely aliquoting and storage at proper temperature
4. Timely Calibration of equipments and reagents
5. Be a visionary and do forecasting

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3. EFFECTIVE MANAGEMENT OF LABORATORY COMMODITIES PARTICIPANTS MANUAL
4. Labs for life project : Inventory management module