

Unit 2: Hospital Formulary, Procurement, Inventory, Distribution, IV Admixtures and Waste

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2.1 The hospital formulary: concept and guidelines

The hospital formulary is the continuously revised list of medicines approved for use in the hospital by its medical staff through the Pharmacy and Therapeutics Committee, together with the information needed to use them well. The formulary system is the method behind the list: a standing process by which medicines are evaluated, selected, monitored and reviewed, so that the hospital stocks a deliberately chosen range rather than everything any prescriber might ask for. The reasons for a formulary are practical and clinical at once. No hospital can stock every brand and strength of every medicine; an unselected stock multiplies cost, expiry and error, especially where look alike products crowd the shelves. A selected formulary concentrates purchasing into fewer items bought in larger quantity, keeps prescribers working with medicines they know well, makes therapeutic guidelines possible, and lets the pharmacy guarantee availability and quality for the items that matter most.

2.2 Development of the formulary

Developing a formulary is a project with a recognisable sequence. It begins with the decision to establish or revise the formulary and the constitution or reactivation of the PTC as the deciding body, with pharmacy given the working responsibility for the drafting. The pharmacy then assembles the raw material: the medicines currently stocked and prescribed, consumption and cost data, the range of conditions the hospital actually treats, and the essential medicines lists and standard treatment guidelines that frame rational selection at national level. Draft selection follows therapeutic category by therapeutic category: for each condition, the medicines that the evidence and the hospital's practice support are listed, duplicates within a class are compared on efficacy, safety, familiarity, dosage form and cost, and a preferred selection is proposed, keeping alternatives where patients genuinely differ, for example by route, age group or organ function. The draft passes through consultation with the clinical departments, whose comments are recorded and answered, and then through PTC approval, section by section.

Developing the hospital formulary



A formulary copied without local consultation stays a document, not a system

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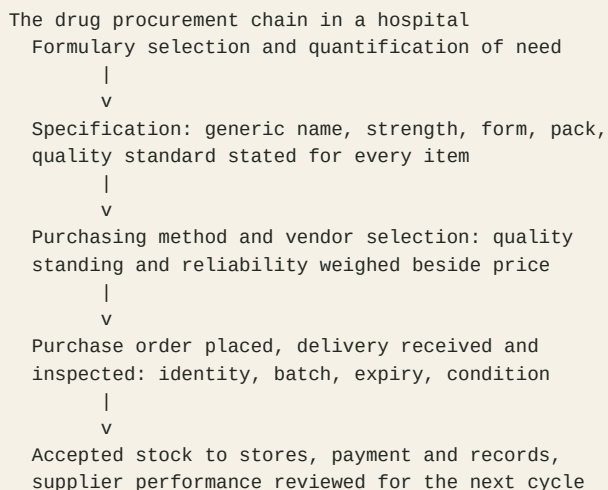
Figure: Building a formulary. Local data and consultation turn a stock list into the medical staff's own agreed selection.

2.3 Developing therapeutic guidelines

Therapeutic guidelines are the hospital's agreed statements of how defined conditions are to be treated, including the medicines to be used, in what order, by what route, and what monitoring and referral each stage requires. Where the formulary answers the question which medicines the hospital stocks, guidelines answer the question how those medicines are to be used for this condition in this hospital, and the two documents are developed together, usually under the same committee. Guideline development follows a disciplined method. A topic is chosen where variation in practice is wide, risk is high, cost is significant or evidence has recently changed. A small working group, clinicians of the relevant speciality with a pharmacist and, where needed, microbiology, nursing and other input, reviews the evidence and the recognised national and international guidelines, and adapts them to local reality: the local formulary, local resistance patterns for antimicrobials, the investigations actually available, and the skills and equipment of the hospital. Adaptation, not copying, is the professional step, because a guideline that assumes unavailable medicines or tests will be ignored.

2.4 The drug procurement process

Procurement is the process by which the hospital obtains its medicines and related supplies at the required quality, in the required quantity, at the right time and at a justified price. Its stages form a chain in which an error at any link reaches the patient or the budget. The chain begins with selection, already decided by the formulary, and quantification: how much of each item the hospital will need in the coming period, estimated from past consumption, morbidity and service plans, expected losses and the stock already in hand. Specification follows: each item is defined precisely by generic name, strength, dosage form, pack and quality standard, so that offers can be compared on the same goods. The purchasing method is then chosen under the institution's rules: open or limited tender, rate contract, quotation based purchase, or direct purchase for emergencies and proprietary items, each with its own approval level. Vendor selection weighs quality standing and reliability beside price: licences, manufacturing and distribution authorisations, past supply performance and recall history are pharmacy concerns, not clerical detail, because the cheapest offer for a substandard medicine is the most expensive purchase a hospital can make.



2.5 Methods of inventory control

Inventory control is the set of methods by which the pharmacy keeps stock sufficient for uninterrupted care without locking money and shelf life into excess. Its core records state, for every item, the stock in hand, the rate of consumption, the lead time between ordering and delivery, and the levels that trigger action: the reorder level at which a fresh order is placed, the buffer or safety stock held against delay and sudden demand, and the maximum level beyond which stock is not allowed to grow. Around these levels, the named methods of the syllabus operate. ABC analysis classifies items by annual consumption value: a small proportion of items, class A, accounts for most of the value and receives tight control, frequent review and careful ordering; class B receives moderate control; the many low value items of class C are controlled simply, in bulk and with less frequent review. VED analysis classifies by criticality: vital items, whose absence endangers life or stops a service, essential items, whose absence degrades care, and desirable items, whose absence is an inconvenience.

Inventory control: ABC value meets VED criticality

ABC: BY VALUE	THE MATRIX DECIDES	VED: BY CRITICALITY
A: few items, most of the annual value Tight control, frequent review B: moderate value, moderate control C: many items, low value, simple control	Vital and costly: protect both ways Vital and cheap: never out of stock Costly and desirable: scrutinise the spend Cheap and desirable: simplest control	Vital: absence endangers life or stops a service Essential: absence degrades care Desirable: absence is an inconvenience FEFO issues earliest expiry stock first

ABC watches the money, VED watches the patient, the matrix sets the control

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Figure: Two lenses on one stock. ABC watches the money, VED watches the patient, and the matrix decides the control each item gets.

2.6 Storage and stores management in the hospital pharmacy

The stores function is where procurement becomes availability. Received and accepted stock enters a storage system organised so that every item is identifiable, protected and retrievable: medicines are shelved by a consistent logic, commonly therapeutic class or alphabetical order within sections, with labelling that survives handling. Storage conditions are controlled and monitored: room temperature ranges observed, refrigerators and freezers for cold chain items with recorded temperatures and alarm or escalation arrangements when readings stray, protection from light and moisture where products require it, and separation, physical and visual, of look alike and sound alike medicines, of internal and external preparations, and of returned, expired and recalled stock, which is quarantined and never allowed to drift back into usable shelves. Controlled medicines are held in secure custody with their own registers and balance checks. Stores records, manual or electronic, carry receipts, issues, balances, batch and expiry details, and support the inventory methods of Section 2.5: an issue is recorded as it happens, so that the record balance is a fact and not a reconstruction.

2.7 Methods of drug distribution

Drug distribution is the system by which medicines travel from the pharmacy to the patient inside the hospital, and the syllabus expects the standard systems to be known comparatively. The individual prescription system, the traditional method, dispenses medicines for a named patient against that patient's prescription or medication order, labelled for that patient for a short period. It gives the pharmacy full sight of every order and the strongest check before issue, at the cost of pharmacy workload and some delay. The floor stock or ward stock system places a stock of commonly used medicines on the ward, from which nurses administer doses as prescribed, replenished by the pharmacy against usage. It is fast and convenient, and weakest in control: the pharmacist may never see the individual order, stock can expire or be borrowed between patients, and records are thin. The unit dose system dispenses each dose for each patient separately packaged and labelled, ready to administer, supplied for a defined period, commonly a day, against the pharmacist verified order.

System	What reaches the ward	Pharmacist check of the individual order	Main strength	Main weakness
Individual prescription	Medicines labelled for the named patient	Yes, before issue	Strong checking and records	Workload and delay
Floor stock	A ward stock of common medicines	No, order not seen per dose	Speed and convenience	Weak control, expiry and borrowing
Unit dose	Each dose packaged and labelled per patient	Yes, before preparation	Checking, traceability, least waste	Highest preparation workload
Combination	Unit dose or individual supply plus limited floor stock	Yes, for pharmacy supplied items	Balance of safety and practicality	Needs clear rules for which items sit where

Drug distribution systems compared

INDIVIDUAL / UNIT DOSE	FLOOR STOCK	COMBINATION
Order written for a named patient Pharmacist verifies the order first Labelled for the patient, or each dose packaged separately Strong check, traceable	Common medicines held on the ward Nurse administers as prescribed Fast and convenient Pharmacist does not see each order Weakest control	Verified supply for most medicines Limited floor stock for emergencies and common night items Clear rules for which items sit where Safety with practicality

The dividing line: does a pharmacist verify the individual order before issue?

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Figure: Four ways medicines reach the ward. The systems differ chiefly in whether a pharmacist verifies the individual order before issue.

2.8 Intravenous admixtures

An intravenous admixture is a sterile preparation made by adding one or more medicines to an intravenous fluid, prepared ready for administration. Centralising this work in the pharmacy, as an intravenous admixture service, is one of the clearest safety advances in hospital pharmacy: preparations are made by trained staff, in a controlled clean environment, against a pharmacist verified order, with standardised calculations, labelling and records, instead of being improvised on wards under interruption and variable technique. The service rests on defined elements. The environment and equipment: a clean area with a laminar airflow workstation or equivalent containment appropriate to the preparation, maintained, cleaned and monitored under written procedures, with staff gowned and trained in aseptic technique, because the patient receiving an intravenous product has no defence against a contaminated one. The order and its verification: the prescriber's order is checked for the medicine, the diluent and volume, compatibility, stability, concentration and the patient's particulars before preparation begins. Preparation: components are assembled and checked, the admixture is made by aseptic manipulation, and in process and final checks confirm identity, appearance and label.

The intravenous admixture service



Verification before, asepsis during, traceability after: the service in one line

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Figure: The admixture service. Verification before preparation, asepsis during it, and a label and record that make every bag traceable.

2.9 Total parenteral nutrition as part of the admixture service

Total parenteral nutrition, the intravenous feeding of a patient who cannot use the gastrointestinal route, is prepared within the admixture service and is its most complex routine product, which is why it is taught with this unit. A parenteral nutrition preparation combines the patient's fluid, energy, amino acid, electrolyte, vitamin and trace element requirements in one sterile system, compounded to an individual prescription that changes as the patient's condition and laboratory results change. The pharmacist's role spans the whole process: checking the prescription for completeness and internal consistency, including the compatibility and stability limits of a mixture in which calcium and phosphate and many other components must coexist without precipitating; planning the compounding sequence and method, manual or automated, that keeps the mixture stable and sterile; applying the filtration, labelling and storage rules appropriate to the formulation; and monitoring with the clinical team, since the nutrition prescription is reviewed against the patient's progress, fluid balance and biochemistry at regular intervals.

2.10 Hospital waste management

Hospital waste management is the system by which the waste a hospital generates is segregated, collected, transported, treated and disposed of without harming patients, staff, the public or the environment, under the biomedical waste management rules in force. The pharmacy meets this system in two directions: as a generator of waste itself, and as the department accountable for pharmaceutical waste wherever it arises. The governing principle is segregation at the point of generation: waste is separated, at the place and moment it is produced, into the colour coded categories the rules prescribe, broadly infectious waste, sharps, glassware and metallic items, and pharmaceutical and chemical waste, because mixing defeats every later stage and turns a whole consignment into hazardous waste. Sharps are placed at once into puncture proof containers and never recapped or carried loose. Pharmaceutical waste has its own discipline: expired, damaged, returned and recalled medicines are quarantined from usable stock under Section 2.6, recorded, and sent for authorised treatment or disposal by the prescribed route, with controlled medicines destroyed under the specific authorisation and witnessing their rules require; cytotoxic waste, where the hospital prepares cytotoxic medicines, is segregated and handled as its own high hazard stream.

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