

Demand, Capacity and Patient Flow

Practical hospital governance in Punjab, Pakistan

Measure the work waiting to be done.
Match it to safe, available capacity.

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LECTURE

A busy hospital needs a clear account of capacity

The Medical Superintendent needs to know what work is arriving, where patients wait and which resources can safely deliver care.

- Count patients, visits and work consistently.
- Calculate waiting-list change and bed use.
- Find the step that limits completed care.
- Build a practical capacity and action review.

OFFICIAL SOURCE

A principle tied to a named law, standard or official guidance.

WORKING METHOD

A practical control or teaching format to adapt to the authorised system.

TEACHING CASE

An invented hospital example, used to practise applying the correct process.

Study output

A service dashboard, a checked capacity estimate and an action plan for one patient pathway.

Module 9 | Presentation 2 of 4. Allow 45-60 minutes with exercises. All explanations are on the pages; check the cited sources before live use.

Use guidance within the authorised Punjab system

This lecture teaches measurement and planning. It does not create authority to open beds, appoint staff, charge fees or change a clinical service.

Official sources

- Punjab Healthcare Commission (PHC) standards address equipment readiness, staff credentials and patient records. Read the applicable standards with the institution's scope of services.
- World Health Organization (WHO) methods support analysis. They do not replace Punjab rules, sanctioned posts, institutional approvals or clinical decisions.

Working decisions

- Confirm who may change sessions, rosters, referrals and service capacity. Identify approvals and recurring resources before promising additional care.
- The numerical cases are invented. Their time assumptions and service levels are not clinical standards or required staffing ratios.

Keep the statistical definition, the clinical safety requirement and the administrative approval separate.

Sources: **F3**: indicators 122-125, 142-144 | **F1**: planning method

Need, demand and completed care are different

These working definitions help explain why attendance alone is an incomplete basis for planning.

Question	Meaning	What to examine
Who needs care?	People who could benefit from the service.	Disease burden, clinical advice, access barriers and unmet need.
Who asks for care?	Requests, referrals or attendances received.	Origin, urgency, repeat requests and people turned away.
What is delivered?	Work actually completed.	Visits, tests, procedures and admissions, each counted separately.
What is still waiting?	Valid requests not yet completed.	Number waiting, time waiting, clinical priority and next action.

A low attendance count may reflect poor access or a closed service. It does not, by itself, show low need.

WORKING METHOD | Illustrative material is identified in the text.

Choose the unit before reporting a total

A person can generate several visits, tests and admissions. Each total answers a different question.

Unit	Count it as	Common error
Unique patient	One identified person in the stated period.	Calling repeat visits additional people.
Outpatient visit	One completed attendance under the agreed definition.	Combining registration slips and actual consultations.
Admission / stay	One inpatient episode with defined start and end.	Counting an internal ward transfer as a new hospital admission.
Test or procedure	A named completed service.	Mixing samples, test panels and individual analytes.

PHC indicator 144 addresses a unique patient-record identifier. Service-event counting still needs its own written definition.

Sources: **F3**: indicator 144

Give every indicator a short definition card

A definition card lets two people reproduce the same figure from the same records.

01 Purpose

What decision will this measure support?

02 Population

Which service, patients and location are included?

03 Period

Which dates and time cut-offs apply?

04 Calculation

What is counted or divided, and in which units?

05 Exclusions

What is left out, and how are duplicates handled?

06 Source / owner

Which record is used, who checks it and when?

WHO promotes defined indicators and integrated analysis. This six-field card is a suggested local working format.

Sources: **F2**: indicator interpretation and use

Check the data before interpreting the trend

A change in recording can look like a change in clinical workload.

Reconcile the count

- Compare a sample of source registers with the hospital information system. Check missing shifts, duplicate entries and records entered after the reporting cut-off.
- Reconcile opening and closing waiting lists. Check whether cancelled sessions or incomplete activity returns are missing from the report.

Explain a change

- Record a new counting rule, new software, additional clinic or change in referral arrangements. Compare equivalent periods and services.
- Mark incomplete data clearly. Do not fill an empty cell with zero unless it has been confirmed that no events occurred.

State the limitation beside the number. A precise-looking figure can still be incomplete.

Map the whole route through the service

For one patient group, draw the actual sequence from referral to completed care and follow-up.

1	Entry	How does the patient arrive, and who checks urgency and the correct destination?
2	Assessment	What consultation or test is needed, and where does the patient wait?
3	Treatment	What staff, room, equipment, medicine and support must be ready together?
4	Exit / follow-up	Who decides discharge or transfer, completes the record and confirms the next step?

At each step record arrivals, completions, waiting and the reason for delay. Confirm the map with staff who do the work.

WORKING METHOD | Illustrative material is identified in the text.

Worked example 1: reconcile a waiting list

All people, events and hospital details in this teaching example are invented. They do not describe an actual hospital event.

Opening list	A procedure list starts the month with 120 valid patients waiting.
New entries	During the month, 80 new patients enter the same list.
Exits	The service treats 70 patients. Another 10 have verified non-treatment exits, such as a documented decision to receive care elsewhere.
Calculation	Closing list = $120 + 80 - 70 - 10 = 120$ patients.
Interpretation	The list has not reduced. Treatment and other verified exits together only matched new entries.

This is a list of patients, not appointments. Each exit is counted once and has a recorded reason.

The extra activity must exceed new demand

Continue example 1. These are planning assumptions, not a promised clearance date.

Proposed output	Treat 90 patients per month while 80 new patients enter each month.
Other exits	Assume zero non-treatment exits for this forecast. Do not depend on removing patients administratively.
Monthly reduction	$90 \text{ treatments} - 80 \text{ new entries} = 10 \text{ fewer patients waiting per month.}$
Target calculation	$\text{Reduce the list from } 120 \text{ to } 60: 60 \text{ patients} / 10 \text{ per month} = 6 \text{ months.}$
Check the risk	If new entries rise to 95 per month, the list grows by 5 per month at the same treatment rate.

Recheck clinical priorities and actual arrivals each month. More treatments alone do not prove that waiting has improved.

Count how long people wait, not only how many

A stable total can conceal a small group waiting for a very long time or patients whose condition has changed.

Track meaningful dates

- Define the clock: referral received, clinical acceptance, booking and completed treatment are different dates. Record the start and end used for each measure.
- Show the oldest waits, a typical wait and the numbers in agreed time bands. Keep urgent and routine pathways distinct.

Keep the list clinically safe

- Arrange clinician-led review when risk or symptoms change. Priority and safe timing are clinical decisions; the MS ensures the review route works.
- Verify contact attempts and removal reasons. Do not close a case merely to improve the indicator or reset its clock without a valid recorded basis.

A waiting-time measure must state whether it covers patients already treated or patients still waiting.

A physical bed is not always an available bed

For local operations, count capacity that can deliver the stated level of care safely.

Capacity description	What it tells you	What it does not prove
Approved / sanctioned	The capacity authorised in the relevant record.	That staff and equipment are present today.
Installed	The physical beds in place.	That every bed is open and ready for care.
Operationally available	Beds open, staffed and equipped for the stated service.	That each is empty or suitable for every patient.
Vacant and suitable now	Ready capacity for this patient's clinical needs.	That the same capacity will exist on the next shift.

Define these local terms. Keep the required official return unchanged and explain any difference from the operational count.

WORKING METHOD | Illustrative material is identified in the text.

Bed occupancy needs matched bed-days

A bed-day is one bed counted for one day. Use the same service, period and counting convention throughout.

Calculation

- $\text{Occupancy (\%)} = \frac{\text{occupied bed-days}}{\text{available bed-days}} \times 100$. If availability changes, add the available beds for each day.
- A single morning census shows one moment. A period occupancy rate needs the daily counts or the specified bed-day records for that period.

Definition and limits

- Document which beds and patients are included, the daily cut-off and treatment of same-day care. Match the numerator and denominator.
- The WHO statistical reference supports this ratio. This lecture sets no universal safe or compulsory occupancy percentage.

A zero denominator makes the rate undefined. Investigate it; do not report a percentage obtained by dividing by zero.

Sources: **F4**: statistical definition

Worked example 2: a closure changes the denominator

All people, events and hospital details in this teaching example are invented. They do not describe an actual hospital event.

Bed availability	The ward has 30 installed beds. For the first 10 days, only 20 are open and staffed. All 30 are available for the next 20 days.
Available bed-days	$(20 \text{ beds} \times 10 \text{ days}) + (30 \text{ beds} \times 20 \text{ days}) = 800 \text{ available bed-days.}$
Occupied bed-days	The checked daily record totals 680 occupied bed-days in the same 30-day period.
Correct rate	$680 / 800 \times 100 = 85\%$ occupancy of the defined available capacity.
Wrong denominator	Using $30 \times 30 = 900$ bed-days would give 75.6%. That includes capacity that was closed.

The 85% is a calculated result in an invented case. It is not a recommended target.

Read the occupancy result with the clinical picture

The average does not show whether a suitable bed was available when a particular patient needed it.

Look beneath the average

- Separate critical care, isolation and other clinically distinct beds. An empty general bed is not automatically an available intensive care bed.
- Review peaks by day and shift, patients waiting for admission, cancellations and temporary closures. Explain any rate above 100% against its definition.

Keep care safe

- Agree local escalation triggers with clinical and nursing leads. Link each trigger to a named action and authorised decision-maker.
- Do not open a closed bed merely to lower the rate. Do not move or discharge a patient solely to meet an occupancy figure.

Capacity headroom is room to respond to variation and urgent arrivals. Its amount needs a local service and safety assessment.

WORKING METHOD | Illustrative material is identified in the text.

Average length of stay needs a clear denominator

Average length of stay (ALOS) is the mean time spent in hospital. The record and calculation must identify the patient group.

Working cohort calculation

- For this lecture, select inpatient stays completed in the month. Add the full length of those stays, including days before the month started.
- Divide by the number of completed stays in that same group. Include deaths as completed stays; analyse outcomes separately. Exclude day cases from this example.

Do not mix measures

- Example: 200 completed stays contain 1,000 total stay-days. $ALOS = 1,000 / 200 = 5$ days per completed stay.
- Those 1,000 days are not necessarily the occupied bed-days in that calendar month. Patients still admitted are absent from this completed-stay calculation.

Official systems may use a different defined reporting convention. Reconcile it; never mix its numerator with this cohort denominator.

Sources: **F5**: length of stay and comparability

Shorter stay is useful only when care remains safe

Case mix means the types and complexity of the patients treated. A change in case mix can change average stay.

Investigate the delay

- Review delayed tests, specialist decisions, medicine supply, transport and arrangements for continuing care. Identify the task, owner and next review.
- Separate clinically necessary care from a process delay through clinical review. Avoid naming every long stay as poor performance.

Check the outcome

- Compare similar patient groups and review readmissions, complications and patient experience. A lower average can conceal harm or a changed patient group.
- Arrange discharge or referral records and clear follow-up information. Confirm safe transfer arrangements through the clinical team.

PHC indicators 151 and 152 address transfer information and discharge summaries. Faster movement must retain these requirements.

Sources: **F3**: indicators 151-152

Capacity is a chain of linked resources

A bottleneck is the step that limits completed care. Adding capacity elsewhere may only move the queue.

Step	Resource to check	Question for the MS
Assessment	Clinician, room, record and access to tests.	Can assessment produce a timely, usable plan?
Procedure	Team, equipment, consumables and sterile supplies.	Are all inputs ready at the scheduled time?
Recovery / admission	Suitable bed, nursing care and support.	Can the patient safely leave the procedure room?
Completion	Results, discharge medicine and follow-up.	Is care completed, or has waiting moved elsewhere?

Measure each step in compatible units and periods. Confirm the limiting step with observed delays, not assumptions.

WORKING METHOD | Illustrative material is identified in the text.

Worked example 3: calculate clinic capacity

All people, events and hospital details in this teaching example are invented. They do not describe an actual hospital event.

Session	One clinic operates for 240 minutes. Set aside 30 minutes for the team's fixed preparation and closing tasks.
Usable time	$240 - 30 = 210$ minutes for patient work, including its documentation.
Assumed case mix	Six new visits at 20 minutes use 120 minutes. Nine follow-up visits at 10 minutes use 90 minutes.
Planned capacity	$120 + 90 = 210$ minutes: 15 visits per session. Four such sessions provide 60 planned visits per week.
Reality check	An observed 54 completed visits from 60 planned visits is 90%. Investigate the six-visit gap by recorded reason.

The times are invented planning assumptions. Clinicians must validate safe consultation time; do not shorten care to force this output.

Use session time without concealing unfinished work

A planned slot, a booked patient, an attended appointment and a completed consultation are different measures.

Manage the clinic list

- Record late starts, cancellations, patient non-attendance and work that could not be completed. Distinguish missing staff from missing tests or records.
- Match new and follow-up slots to clinical need. Arrange booking changes through the approved service policy and communicate them to patients.

Avoid a misleading improvement

- Do not count a registration as completed care. Check whether additional visits create a longer test queue or more repeated appointments.
- Do not double-book solely because some patients previously failed to attend. Assess the risk if all patients arrive and protect urgent review capacity.

An unused slot is a prompt to find the cause. It is not proof that a staff member avoided work.

Theatre and procedure capacity needs the whole team

A room timetable alone does not establish how many cases the service can safely complete.

Before the list

- Check case duration and complexity, anaesthesia cover, nursing, sterile sets, blood where needed, consumables and equipment readiness.
- Confirm recovery and admission capacity. Account for preparation, cleaning, turnaround, emergency work and planned maintenance.

After the list

- Record planned and completed cases, start and finish times, cancellations and the actual reasons. Keep patient-related and system-related causes distinct.
- Review overruns and safety events with clinical leads. Increasing cases must not depend on skipped checks or unsupported overtime.

Define the start and end of a time-use measure. Two percentages using different theatre clocks cannot be fairly compared.

WORKING METHOD | Illustrative material is identified in the text.

Diagnostic capacity includes more than machine speed

A test is useful when an accurate result reaches the person who must act on it.

Map the diagnostic route

- Check request quality, preparation, sample collection, transport, processing, reporting and communication. Identify where the longest delay occurs.
- Distinguish specimens, tests and reports. Check rejected samples, repeats, urgent work and time lost to equipment or supply failure.

Measure the relevant interval

- For turnaround time, name the clock: request to report, receipt to report or another agreed interval. Use the same definition over time.
- Check reporting and clinical review capacity before adding tests. A faster analyser cannot by itself correct delayed transport or unreviewed results.

Separate routine and urgent work where their clinical requirements differ. Do not adopt a universal turnaround target from this lecture.

Equipment readiness is part of usable capacity

PHC standards connect equipment planning to services, staff competence and documented maintenance.

Source requirements

- Indicator 122 addresses equipment planning, installation, testing and calibration. Indicator 123 calls for a collaborative selection process.
- Indicators 124 and 125 address qualified personnel and documented inspection, servicing, calibration and maintenance arrangements.

Working application

- Record which device is usable, for which work and during which hours. Check the trained operator, consumables, utilities and service support.
- Agree the action for failure: safe alternative, repair, rescheduling or referral. Record responsibility and the next update time.

A purchased or installed machine is not automatically available clinical capacity.

Sources: **F3**: indicators 122-125

Use workload to inform staffing requirements

WHO's Workload Indicators of Staffing Need (WISN) links staffing estimates to the work performed and the time needed to do it properly.

The method asks

- How much working time is available over the year after relevant absences? What activities does the staff group perform?
- What acceptable time is required for each activity? Account for patient-service work, support work and duties performed by only some staff.

Apply it carefully

- Use checked activity data and locally validated time standards. Historical activity may understate need when services were restricted or demand went unmet.
- Treat the result as planning evidence. Check skill mix, shift coverage and the applicable approval process before changing the establishment.

An annual workload estimate does not, by itself, prove that emergency or overnight cover is safe.

Sources: **F1**: WISN method | **F6**: workload and activity standards

Check coverage at the time care is needed

Suggested roster review. Total headcount does not show who is present, competent and available for a task.

01 Skill

Which qualification, competence and supervision are required?

02 Shift

Who covers mornings, evenings, nights and weekends?

03 Absence

What happens during leave, sickness or training?

04 Concurrent work

Is the same person promised to two places at once?

05 Backup

Who can respond, within what time, and through which route?

06 Escalation

Who decides when available cover cannot support the service?

Use the applicable service and employment rules. This checklist sets no universal staff-to-patient ratio.

Use scenarios instead of one precise forecast

Illustrative service: the current checked average is 100 new requests per week. These scenarios are assumptions for discussion.

Scenario	Assumed new requests	Question to test
Lower demand	90 per week.	Can resources be adjusted without losing essential access?
Base demand	100 per week.	Can reliable output match arrivals and reduce any backlog?
Higher demand	120 per week.	Which resource fails first, and what response is authorised?
Capacity disruption	Demand unchanged, one key device unavailable.	What alternative care and recovery plan are workable?

Consider season, outbreaks, referral changes and closures. Review the assumptions against actual figures; a scenario is not a prediction.

Daily review: what could interrupt care today?

Suggested short operational meeting. Use current information and leave with actions, not only a status report.

01 Patients waiting

Who needs urgent assessment, admission or transfer?

02 Safe capacity

Which suitable beds, rooms and sessions are ready?

03 Staff

Which essential roles lack current or next-shift cover?

04 Supplies / devices

Which shortage or failure could stop care?

05 Discharge / transfer

What clinically agreed next step is delayed, and why?

06 Actions

Who will do what, by when, and who must be informed?

Use the approved emergency escalation route for immediate risk. Do not wait for the routine meeting.

Weekly review: connect activity, access and safety

Suggested dashboard. Each measure needs its definition, source, responsible owner and comparison period.

View	Useful measures	Decision it supports
Demand / waiting	New requests, completions, valid list size and oldest waits.	Whether the backlog is growing and which group needs review.
Available capacity	Open beds, staffed sessions and device downtime.	Where reliable capacity has been lost.
Flow	Cancellations, delays and comparable length of stay.	Which process needs a targeted change.
Safety / access	Relevant harm, readmissions, complaints and unmet requests.	Whether more output is helping patients safely and fairly.

Keep the dashboard short enough to act on. Avoid a favourable activity total hiding a worsening access or safety measure.

WORKING METHOD | Illustrative material is identified in the text.

Turn an escalation into a decision-ready request

Invented working example: a diagnostic service loses its only available machine.

Facts	State the failure time, confirmed technical status, affected work and source of the waiting count.
Immediate care	Record clinician-led priority review and the safe alternative already arranged within authority.
Options	Describe repair, temporary authorised access elsewhere and rescheduling, including limitations.
Decision needed	Identify the approval, funding or coordination required, its decision-maker and the time needed.
Follow-through	Name the owner, next update and evidence that patients reached the agreed alternative.

A dashboard identifies the problem. A decision request explains the action, resources, authority and remaining risk.

TEACHING CASE | Illustrative material is identified in the text.

Test a change before promising permanent expansion

Working approach: use a defined trial with appropriate approval and clinical safeguards.

Before the trial

- State the problem, baseline, proposed change and expected effect. Confirm staff, equipment, recurrent costs and the required approvals.
- Define measures of completed care, waiting and safety. State when the change must stop or be reconsidered and who makes that decision.

After the trial

- Compare like periods and patient groups. Check whether work moved to another queue or depended on temporary support that cannot continue.
- Record the result, limitations and decision to continue, adjust or stop. Lecture 40 examines the costs behind the capacity choice.

A higher activity count is useful only when the service remains safe, accessible and supportable.

WORKING METHOD | Illustrative material is identified in the text.

Apply the calculations and the safety checks

Write your answer and the reason before turning to the next page.

1. Waiting list

A list opens at 200 patients.
There are 90 new entries, 100 treatments and 5 verified other exits.

What is the closing list? Does this alone prove shorter waiting times?

2. Ward occupancy

Ten beds are available for 15 days and 20 beds for the next 15 days. There are 360 occupied bed-days.

Calculate occupancy using the correct available bed-days.

3. Clinic expansion

A manager proposes more booked patients because consultation rooms are empty, but the qualified team and reporting support are unchanged.

What must be checked before accepting the extra capacity?

These are invented cases. Show the arithmetic, units and the reason for each management decision.

Answers and reasons

Use the evidence, the calculation and the cited source.

1. Closing list: 185 patients.

$200 + 90 - 100 - 5 = 185$. The total falls by 15, but wait dates and clinical priority still need review. A smaller list does not prove every patient waited less.

2. Occupancy: 80%.

Available bed-days = $(10 \times 15) + (20 \times 15) = 450$. Occupancy = $360 / 450 \times 100 = 80\%$. The result is a measurement, not a safety target.

3. Check the limiting resource.

Validate clinical time, staff skills and cover, diagnostics, reporting and downstream care. An empty room cannot provide a consultation without the required team and support.

Do not infer patient safety, staff fault or unmet need from one arithmetic result.

Prepare one service capacity review

Use a non-confidential real case or the invented examples in this lecture.

Define and measure

Choose a service and period.
Check arrivals, completions,
waiting and usable capacity.
State the units.

Find the constraint

Identify the step limiting
completed care. Check clinical
safety and alternative
explanations.

Propose the action

Set out the change, owner,
approvals, cost questions and
review measures.

Ask a clinical lead and the data owner to challenge the definitions, arithmetic, safety assumptions and proposed action.

Next: Lecture 40 - Understanding Hospital Costs and Unit Costs.

Six questions before signing the capacity plan

The plan should make the service decision clearer and the assumptions open to examination.

01 Need

Who requires care and who may be missing from the attendance data?

02 Demand

What is arriving, waiting and being completed?

03 Definitions

Do counts, dates and denominators match?

04 Capacity

Which staff, equipment and support are reliably available?

05 Safety

What clinical safeguards and escalation arrangements apply?

06 Decision

What action, authority, resources and review are required?

Keep the source record, calculation and decision together so the next review can explain what changed.

WORKING METHOD | Illustrative material is identified in the text.

Sources and continued use | 1

Select a source title or its official-source link to open the document.

F1

Workload Indicators of Staffing Need: user manual

WHO, second edition, 2023; ISBN 9789240070066. Workload, available working time, activity standards and allowances inform staffing estimates. A planning method, not a Punjab staffing entitlement or appointment power.

World Health Organization | [Official source](#) | [WHO manual](#)

F2

Toolkit for analysis and use of routine health facility data

Integrated health services analysis: district and facility level, 2023; electronic ISBN 9789240060609. Covers indicators, interpretation and dashboards. Formats here are original.

World Health Organization | [Official source](#)

F3

Minimum Service Delivery Standards for Hospitals

2024 cover edition; CG-01MS-Ed2-01092023. Equipment indicators 122-125; staff credentials 142-143; patient identifier 144; transfer record 151; discharge summary 152. Apply the standards relevant to the institution.

Punjab Healthcare Commission | [Official source](#)

Educational material by Dr Qurban Hussain Khan. Source editions are stated; verify later amendments and applicable institutional orders before live use.

Sources and continued use | 2

Select a source title or its official-source link to open the document.

F4

Bed occupancy rate: acute care hospitals

European Health Information Gateway, HFA_542-6210; checked 4 October 2026. Occupied bed-days divided by available bed-days, as a percentage. Statistical reference only; no Punjab occupancy target is claimed.

WHO Regional Office for Europe | [Official source](#)

F5

Hospital activity: Health at a Glance 2025

Published 13 November 2025. Definition and comparability notes explain length of stay, discharge counting and exclusions. No international average is adopted here as a Punjab performance target.

Organisation for Economic Co-operation and Development | [Official source](#)

F6

Workload Indicators of Staffing Need: methodology

WHO WISN tool page; accessed 4 October 2026. Describes workload-based staffing using activity time standards and links to the current manual. Used alongside F1 for introductory workforce planning only.

World Health Organization | [Official source](#)

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