

ED PIP: Diagnostic Phase

Tools: Matching Capacity to Demand

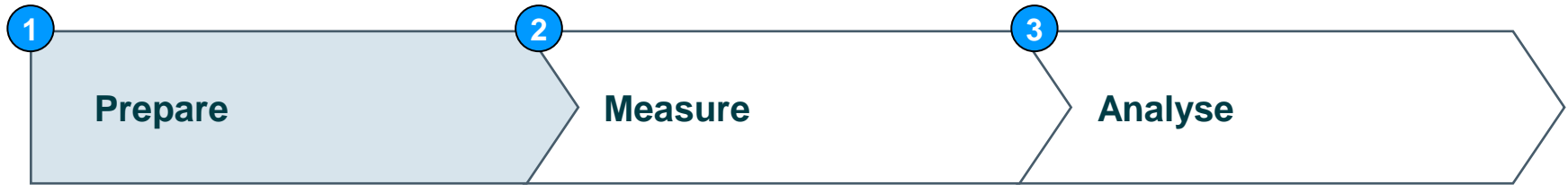
Matching Capacity to Demand – Overview

Outcome	<ul style="list-style-type: none"> ■ Understanding the source of queues (waiting) or delays at bottleneck resources
Definition: ‘What is it?’	<ul style="list-style-type: none"> ■ The use of data to accurately assess demand and capacity to reduce patient wait times through sustainable improvements in service delivery
Objectives: ‘What is it used for?’	<ul style="list-style-type: none"> ■ Matching Capacity to Demand <ul style="list-style-type: none"> ● Like value stream mapping, helps people understand flows, queues and bottlenecks ● Assist healthcare providers to understand system variation which results in unnecessary delays for patients and providers ● Identifies potential for changes in capacity allocation to better meet patient needs ● Identifies the source(s) of queues in healthcare organizations
Benefits:	<ul style="list-style-type: none"> ■ Reduce variation which negatively impacts patient flow ■ Help stakeholders understand mismatches between demand and capacity, in order to make changes within a process that will decrease the time spent waiting for services by patients ■ Ensures that key resources limiting patient flow (e.g. constraints) are optimally utilized
When to use	<ul style="list-style-type: none"> ■ Examining demand and capacity should be completed when a constraint (bottleneck) for a value stream has been identified and queues for services have formed

Tip for integrating Lean principles into healthcare:

- *Part of successfully implementing Lean in healthcare is adopting common language that may have originated in manufacturing and internalizing how it is used in a healthcare environment.*
- Frequently, queues form as a result of mismatches in demand and capacity as opposed to purely being a result of insufficient capacity
- Matching capacity to demand is an analytical technique used to ensure that resources are being optimally utilized.

Matching Capacity and Demand - Instructions For Use (1/3)

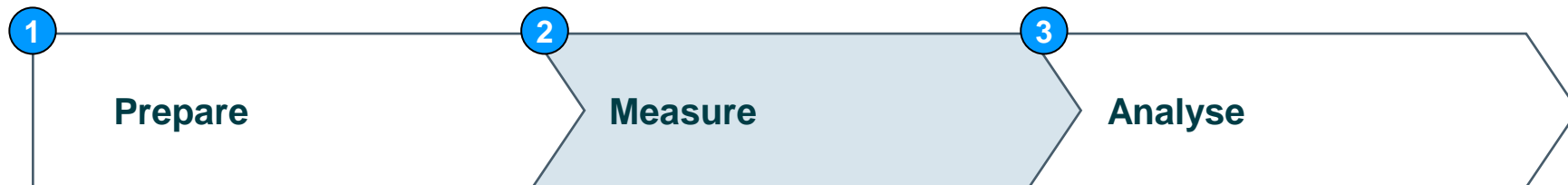


1. Review/assess any existing current state process flow maps, value stream maps and metrics
2. Identify bottlenecks which are the source of the longest delays for patients and identify the true constraint by using root cause analysis (5 Whys)
3. Prepare to capture metrics (Demand, Capacity, Activity and Backlog):
 - Ascertain the type of data that needs to be collected, and standardise units to be used
 - Develop a plan to gather data that needs to be measured on site (e.g. touch time)
 - Collect data from historical sources (e.g. volumes)



- Additional value stream mapping at the bottleneck may assist in the root cause analysis for the delay
- Failing to identify the 'true' constraint and the reason for the delay will result in analysis which does not significantly affect the performance of the process
- In a high level process, more than one bottleneck may be present
- Queues may be intermittent and still have a significant impact on the process that is examined
- Attempt to understand how the current queue(s) are being managed. Are there several groups of people waiting to be processed by the bottleneck? Does the current process 'carve out' capacity unnecessarily?

Matching Capacity and Demand - Instructions For Use (2/3)



1. As applicable, collect data on the following key measures:

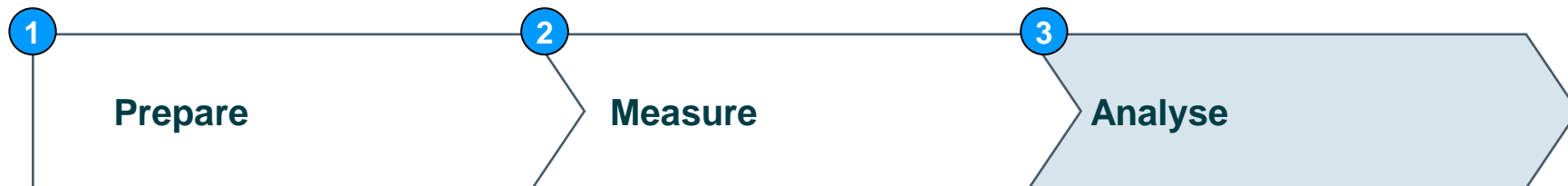
- Demand: Demand are all requests (referrals) for service, from all sources, at the bottleneck step. To measure demand, multiply the number of referrals (requests) by the time it takes to process the patient at the bottleneck step
- Capacity: Capacity is the resource availability at the bottleneck step to respond to demand. To measure capacity, multiply the number of resources available (e.g.. staff or equipment) by the time in minutes available at the bottleneck
- Backlog: Backlog is the queue, or wait list, resulting from previous demand not being met. To measure backlog at the bottleneck step, multiply the number of patients or requests for service by the time it takes to process at the bottleneck step
- Activity: Activity is the actual work being completed at the bottleneck step. To calculate activity, multiply the number of patients processed through the bottleneck by the time is took to process each patient

2. Accurately collecting data on demand and capacity may require the improvement team to manually measure cycle times for bottleneck activities



- Make sure to measure demand, capacity, backlog and activity in the same units of time such as hours, days or weeks
- In some cases, you may need to incorporate concealed or unseen demand when calculating actual demand. Concealed demand can occur when patients should, but are not, being referred to a service. For example, long wait times to access a service might deter referrals when they should, in fact, be made
- When determining capacity of a staff member, make sure to consider all the activities he/she completes and not assume availability for an entire day to work on bottleneck activities
- When measuring backlog, make sure that each patient is only counted once. In situations where long wait lists occur, patients can be referred to multiple servers in an attempt to speed up access to care
- The determination of activity may be impacted by demand carried over by earlier time periods or low utilization levels as a result of processes which keep the bottleneck waiting

Matching Capacity and Demand - Instructions For Use (3/3)



1. Determine why a queue has formed. Was it because of demand exceeding available capacity? A result of mismatches in demand and capacity at certain periods of time?
2. Review the data to determine if any patterns in demand, capacity and backlog:
 - As appropriate, look for hourly, daily, weekly or seasonal variations in demand
 - Is the backlog pattern relatively stable? If the number of requests for service are constant over time then demand and capacity are equal. Note: Even when demand and capacity are matched and a stable queue exists, waiting times may still be increasing
3. Allow analysis of backlog to inform the next steps of the improvement team. Is there is insufficient capacity, how can this best be addressed? If demand and capacity are poorly aligned, use the data to inform improvements in allocation of resources



- The Bottleneck determines the pace at which the entire process can work. The first step must be to identify the bottleneck and then, using improvement techniques, elevate its capacity to increase throughput (the rate at which service is provided). In other words, the bottleneck determines the performance of the entire system
- It is helpful to develop 'triggers' which cause action when mismatches between demand and capacity occur. This could be due to greater than anticipated demand or unexpected resource shortfalls. These triggers allow the team to respond to this situation proactively and mitigate any impact on the patient

Tips and Tricks for matching capacity and demand (1 of 2)



• There are only two opportunities to improve flow at the bottleneck; **Reduce demand or increase capacity.**

- When considering improving flow through the bottleneck, two initial questions to ask are:
 - Are all referrals to the bottleneck necessary?
 - Is the bottleneck working on activities that could be completed by someone else?
 - Real Time Flexibility
 - Are staff cross trained so that extra capacity is available during times of peak demand?
Does the organization have sufficient capacity to respond to changes in demand?
 - Capability to React
 - If portering services are a bottleneck for patient flow, is there an upstream process flaw which delays the notification that a patient is ready to be transported to an inpatient unit?
How quickly can the bottleneck respond to demand?
 - Manage Downtime
 - If patient room availability are a constraint to admissions, how quickly can a room be turned around? Is turning a room, with minimal delay, the top priority of staff allocated these responsibilities?

Tips and Tricks for matching capacity and demand (2 of 2)

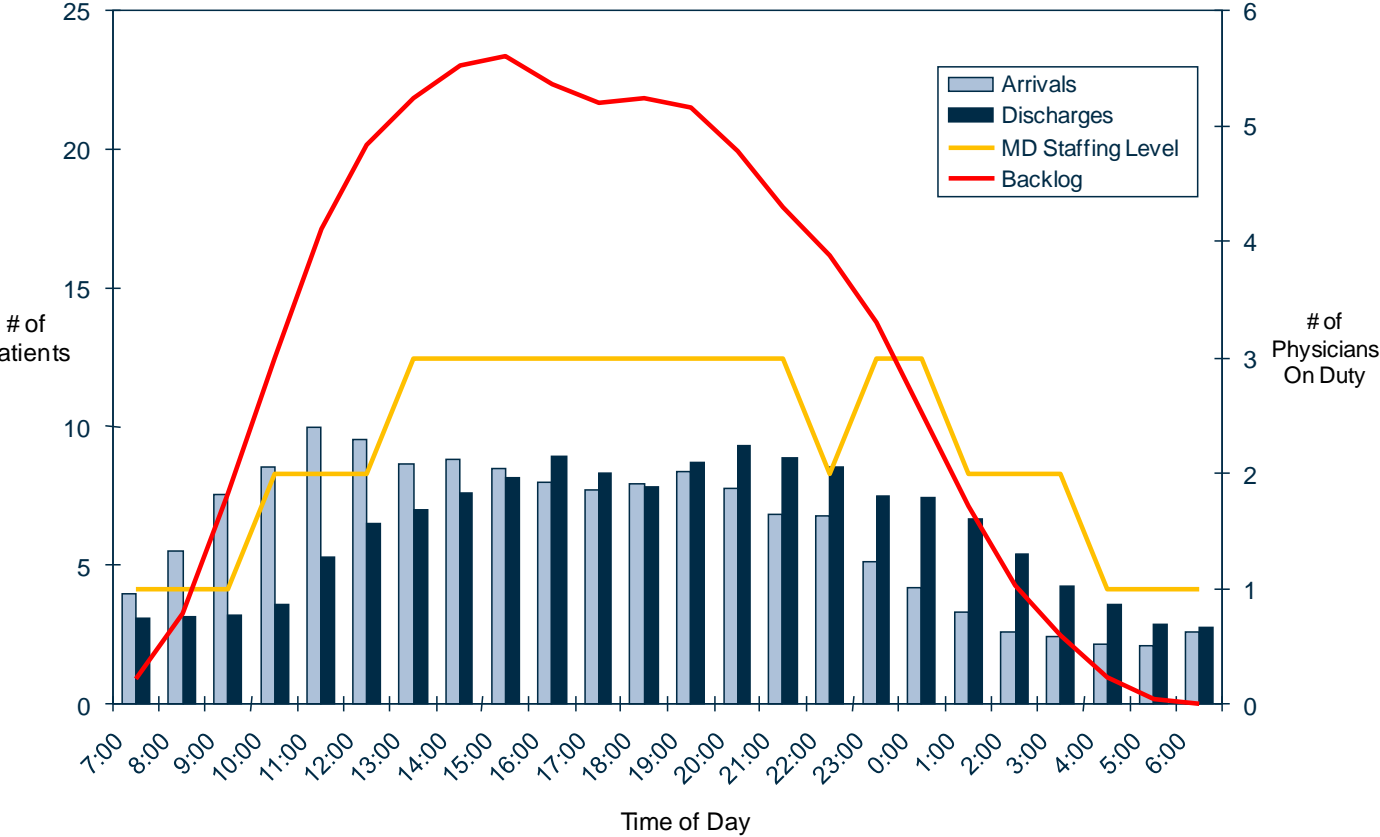
- The Value Stream Map can be used to identify key areas where demand and capacity are not matched which, in turn, leads the improvement team to begin the data analysis
- Setting average capacity with average demand will always end up with a queue because unused capacity cannot be carried forward but the demand can be in the form of backlog
- Once the backlog has been eliminated, the objective is to match capacity and demand on an hourly or daily basis
- As a rule of thumb, in order to prevent queues from forming, set average capacity at 80% of the variability in the fluctuation of demand
- Remember to employ a systems view, very often the output of one service constitutes the demand for another service.
- Working to avoid harmful practices such as the batching of work, which amplifies demand for the downstream process, improves the organizations' ability to match demand with capacity



- Beware of the common belief that long waiting lists are a clear result of a capacity problem; in many cases they are not!

Example: A front line ED nurse tells you that 3pm is the busiest time for the ED...

Hourly Arrivals, Discharges & Backlog within the ED



Interpretation

- Units are frequently staffed to match the backlog of patient, not the arrival pattern
- Once the ED is behind and the backlog exists, it is very hard to get ahead
- By shifting resources to match when the workload arrives you can mitigate any backlog building up.