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Demand and Capacity Management

Chat time

What is your experience? Do you have a capacity and demand problem? What sort of problem?

Please type briefly into the chat box. The box is below where it says 'All participants' at the bottom right of your screen.

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Some definitions…

Measuring demand

Demand on the service:

All the requests or referrals from all sources into a service

How to measure:

All patients needing a service x

time taken to process

Example:
5 patients referred for an endoscopic procedure
that takes 45 minutes to complete
5 x 45 = 225 minutes (3 hours 45 minutes)

Measuring capacity

Capacity is all of the resources required to do the work and includes equipment, rooms and the people with the necessary skills to use it.

How to measure:

Number of resources available x

staff time available to run resources

Example:

Two treatment machines with 480 minutes of session time

2 x 480= 960 minutes (16 hrs per day)

Measuring activity

It is the actual work done, the throughput of the system.

How to measure:

Number of patients seen **x**

time taken to process a patient

Example:

100 patients processed x 20 minutes each

100 x 20 = 2000 minutes

Measuring backlog

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Backlog:

Demand which has not been dealt with - manifests as a queue or waiting list. Forms whenever demand exceeds activity or when demand and capacity are mismatched

How to measure backlog;
Number of patients in the queue **x**
time taken to process them

Example:
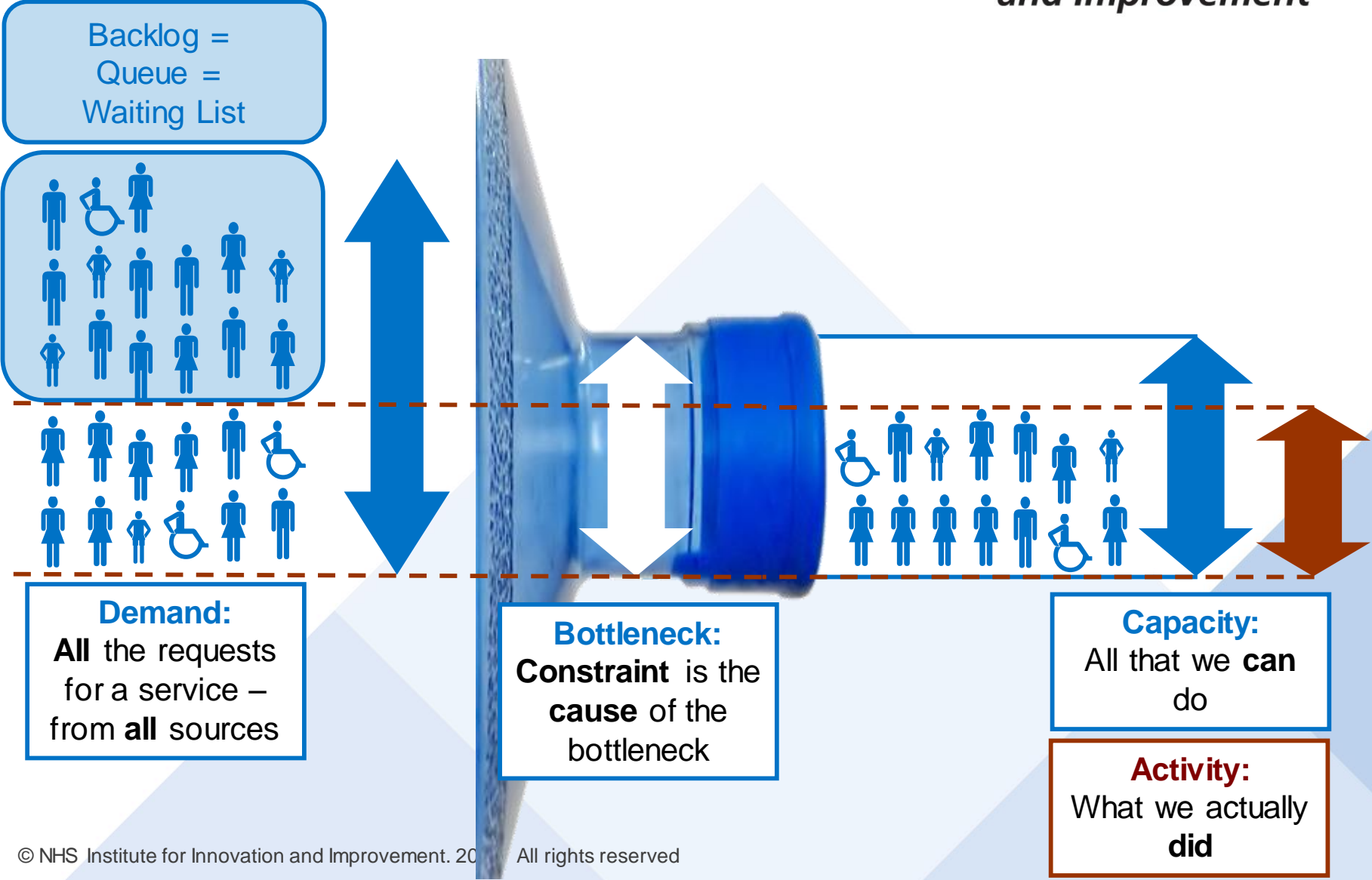100 patients waiting x 20 minutes per treatment
100 x 20 = 2000 minutes backlog.

Key message

Measure everything in the same units for the same period

How do they fit together?

Backlog =
Queue =
Waiting List

Demand:
All the requests for a service – from **all** sources

Bottleneck:
Constraint is the **cause** of the bottleneck

Capacity:
All that we **can** do

Activity:
What we actually **did**

Bottlenecks

A bottleneck is where the queues form - it will slow down the whole process

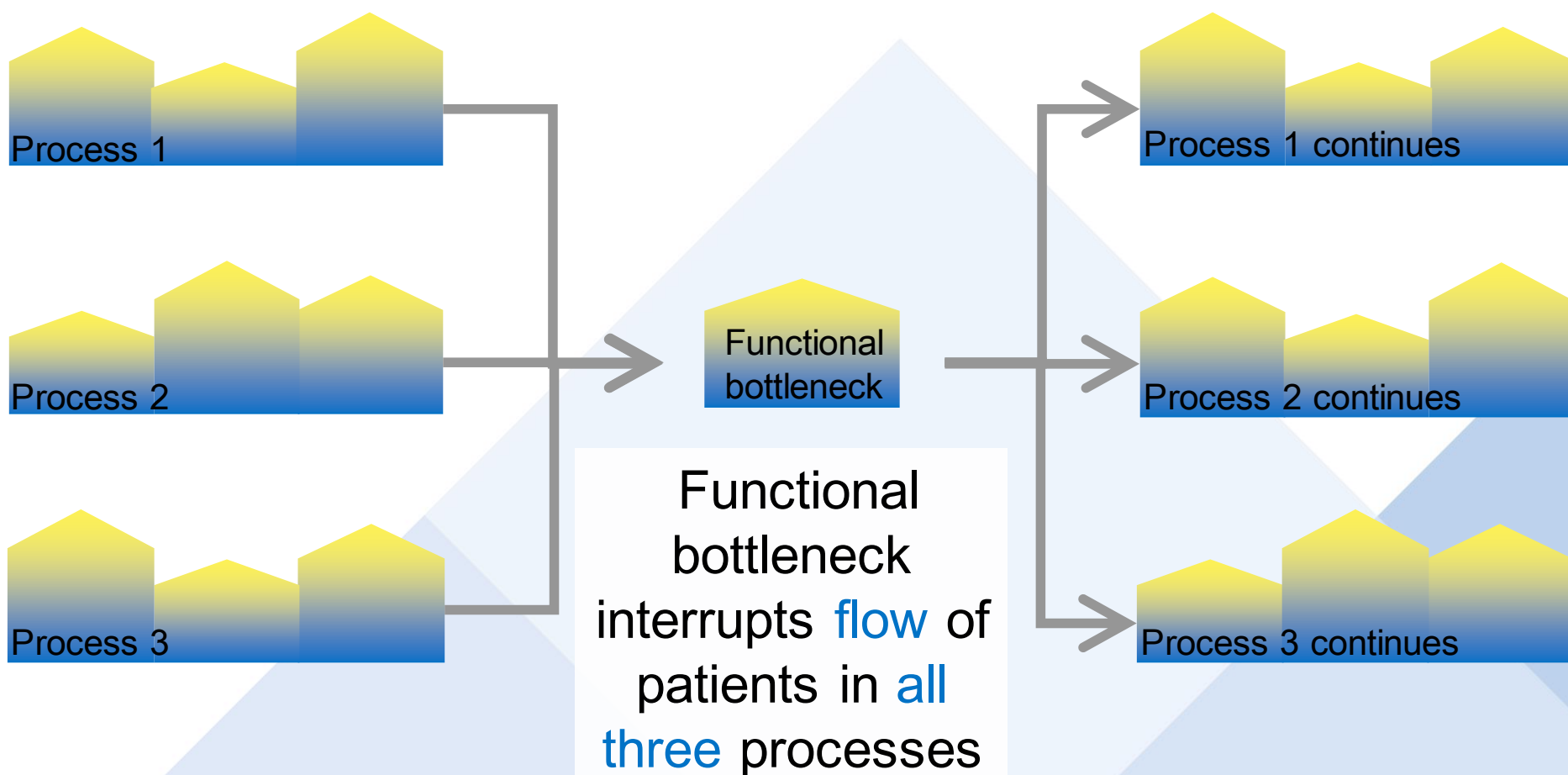Two types of bottleneck:

- Process
- Functional

Process bottleneck

Process bottlenecks are the process stage that takes longest to complete. Sometimes referred to as 'rate limiting' step or task

Time

Process bottleneck

1 2 3 4
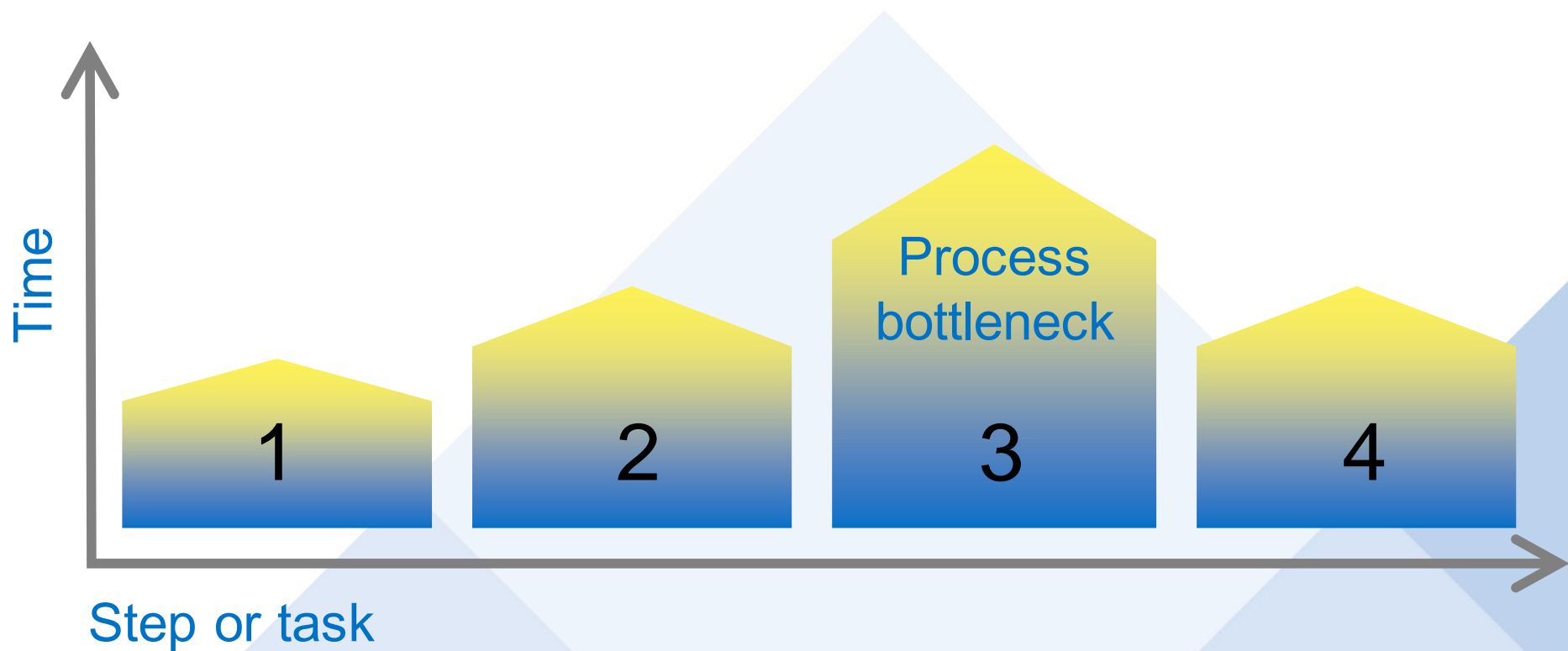
Step or task

Which step or task is the bottleneck?

Functional bottleneck

Functional bottlenecks caused by services that have demand from a number of sources e.g. radiology, pathology, porters

Process 1

Process 2

Process 3

Functional bottleneck

Process 1 continues

Process 2 continues

Process 3 continues

Functional bottleneck interrupts flow of patients in all three processes

Constraints

Bottlenecks caused by a constraint

This restricts the capacity (flow) of the service

It may be a particular skill or piece of equipment

Constraint examples:

- Number of treatment rooms
- Specialist skills i.e. surgeon, radiologist
- Decontamination washer/machine
- Theatres
- CT scanner
- Phlebotomist

How to deal with them:

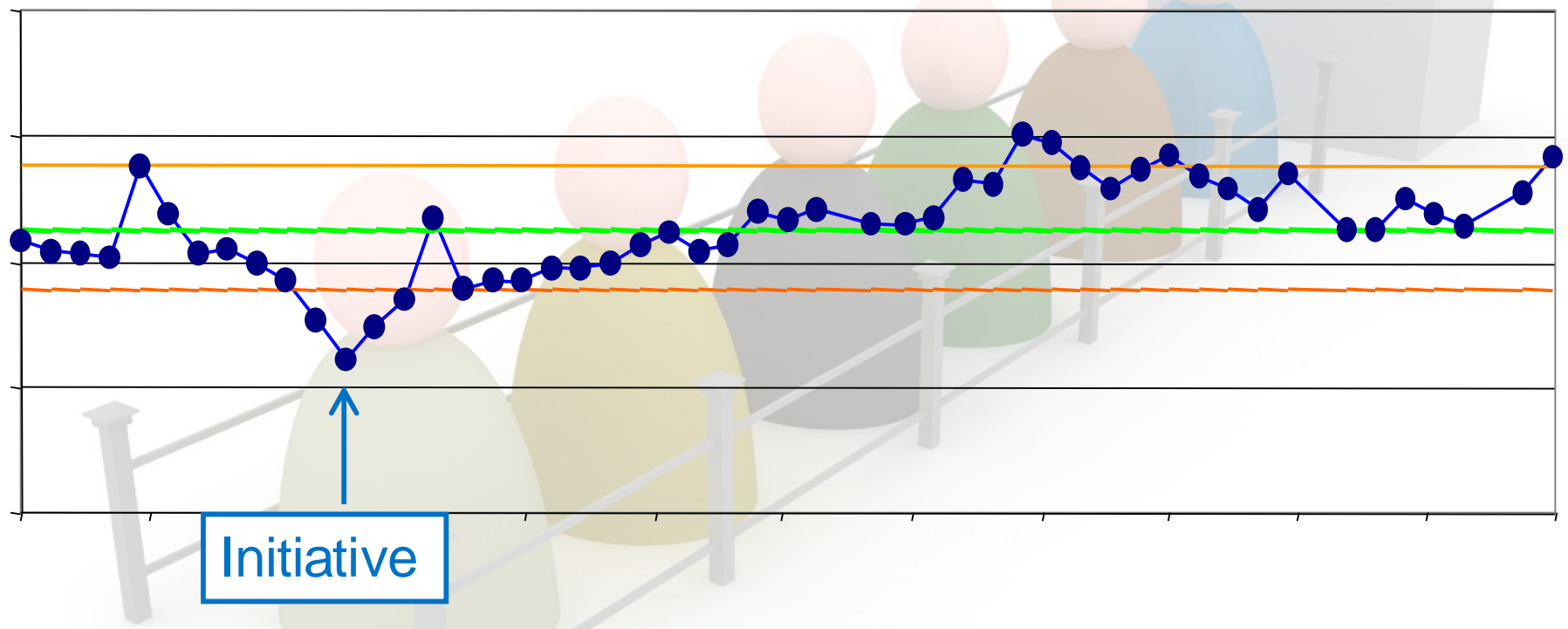Maximise utilisation of constraint - as not easily increased?

Examples from the group?

6 Common reactions to dealing with queues

Waiting list initiatives

Waiting list numbers
52 weeks from Jan to Jan
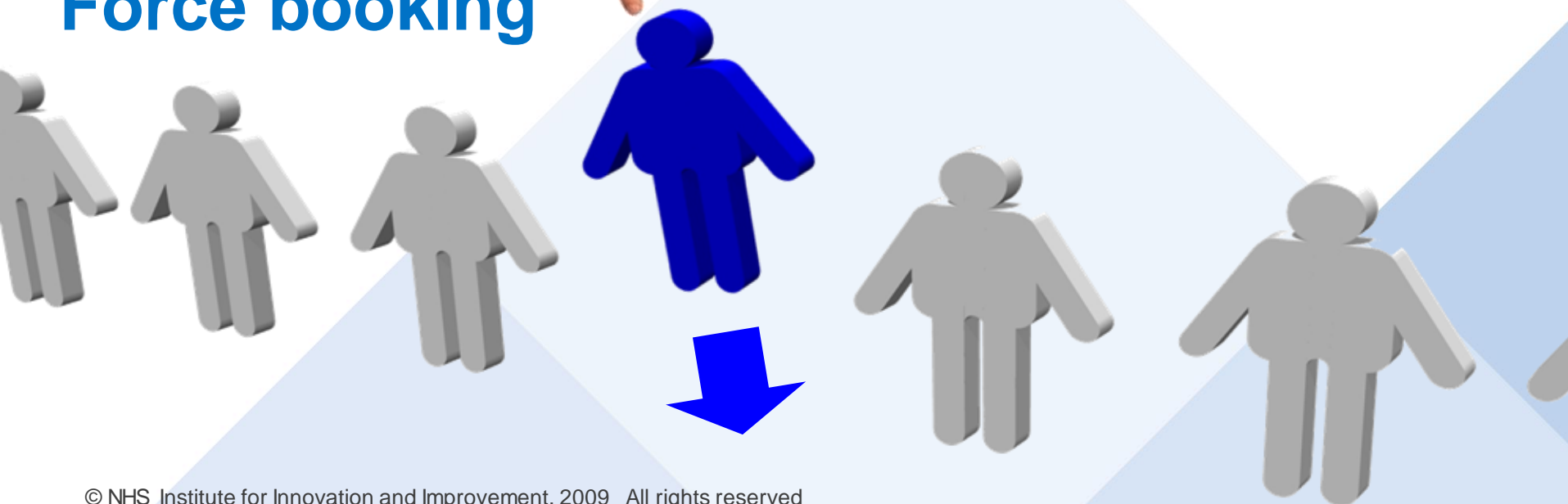Luton and Dunstable NHS Trust

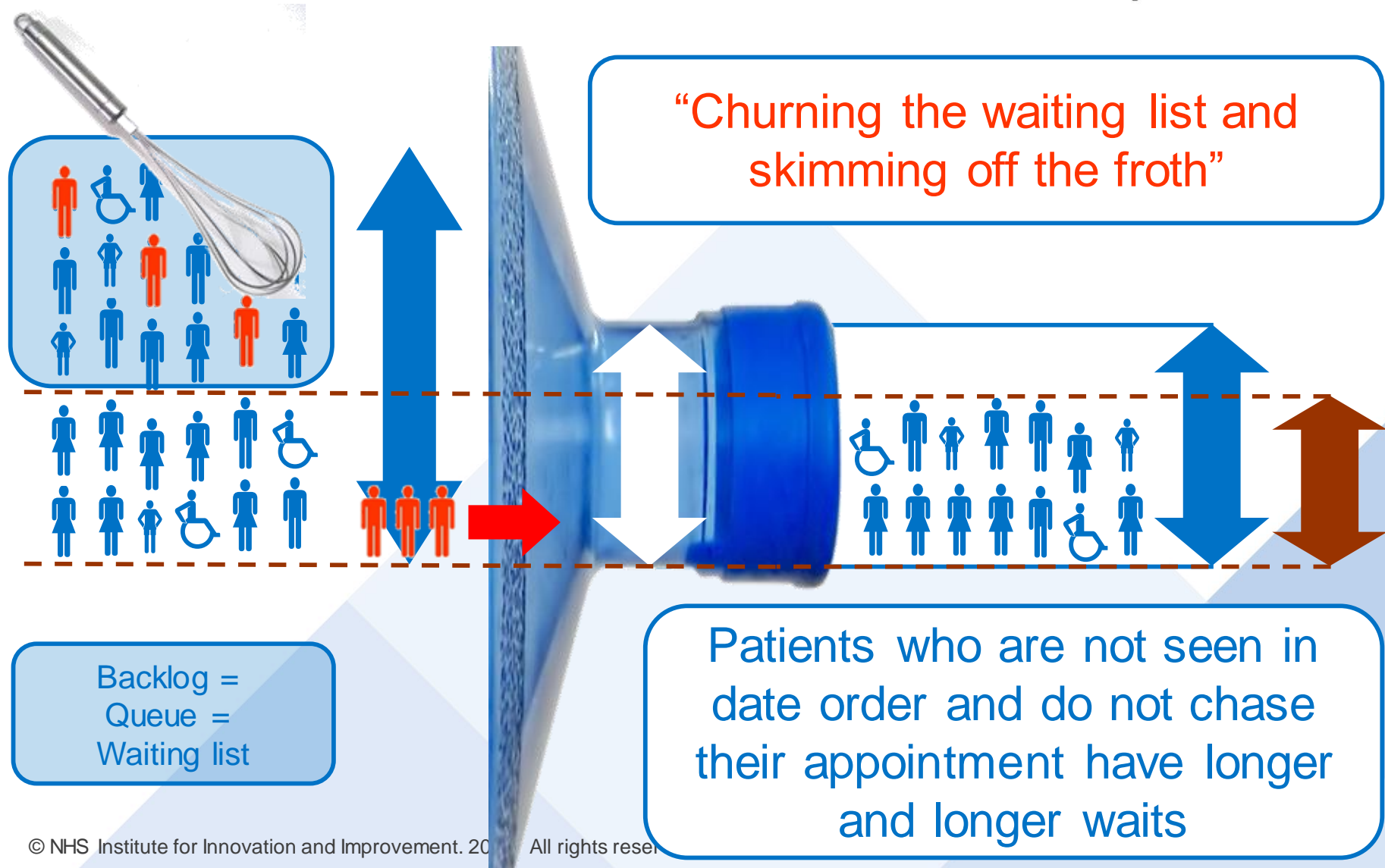Initiative

Was the reduction sustained?

High Utilisation

Utilisation is a measure of how much capacity is used.

Services often aim for 100% however these services are set up to fail as the pressure to fully utilise resources will lower staff morale and trigger adverse changes in behaviour.
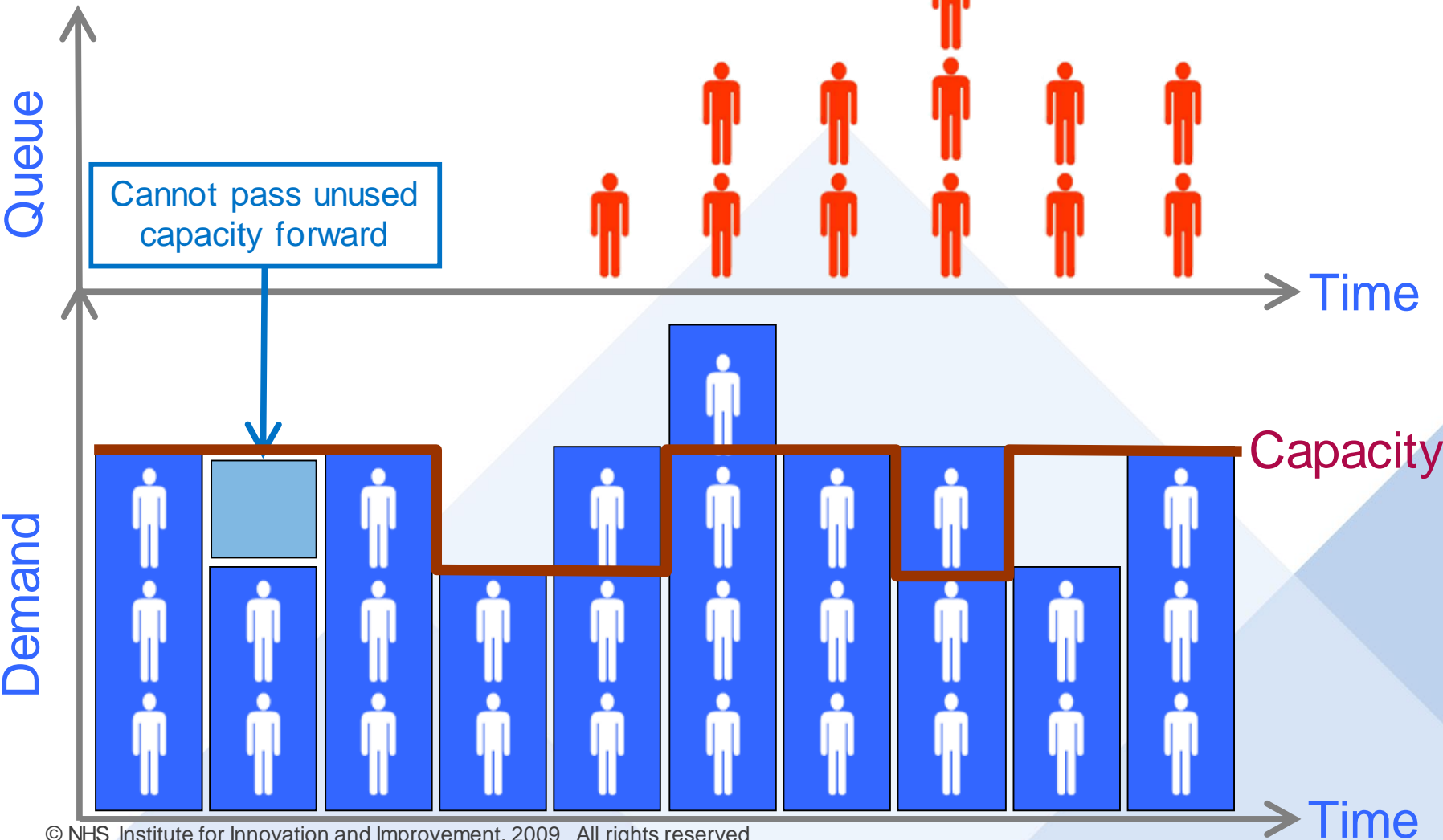
Force booking

Churn - based on urgency

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"Churning the waiting list and skimming off the froth"

Backlog =
Queue =
Waiting list

Patients who are not seen in date order and do not chase their appointment have longer and longer waits

Ignore variation

Variation mismatch = queue


Cannot pass unused capacity forward

Queue

Time

Demand

Capacity

Time

Carve out

Specialists ➜		Surgeon				Physician					R
Appointment type ⬇		1	2	3	4	1	2	3	4	5	
Flexi Sig	Urgent	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Soon	◎	◎	◎	◎	◎	◎	◎		◎	
	Routine	◎	◎	◎	◎	◎		◎		◎	
Colonoscopy	Urgent	◎		◎	◎	◎	◎	◎	◎	◎	
	Soon	◎	◎	◎					◎	◎	
	Routine	◎	◎						◎	◎	
OGD	Urgent	◎		◎	◎	◎	◎	◎	◎	◎	
	Soon	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Routine	◎	◎	◎	◎	◎	◎	◎	◎	◎	
ERCP	--										◎

73 Queues!

Backlogs form because….

1. **There are mismatches in capacity and demand**
   -caused by variation and exacerbated by initiatives

2. **We see people out of turn**
   -churn and force booking

3. **We batch patients**
   -to keep us busy and give high utilisation

4. **We ring fence capacity**
   -to protect time for urgent patients
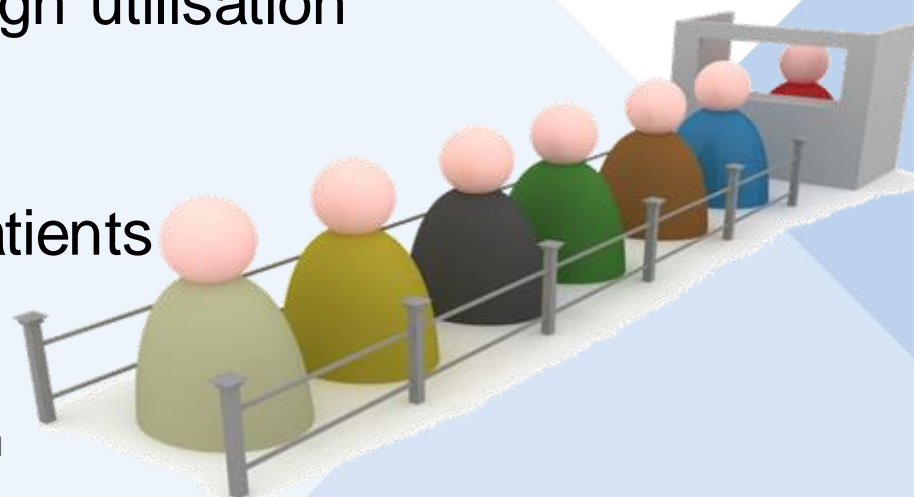
Chat time

What is your experience? Which of these common reactions have you seen or been responsible for?

Please type briefly into the chat box. The box is below where it says 'All participants' at the bottom right of your screen.

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What can we do differently?
7 ways to no delays

Seven Ways to No Delays

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1. Balance capacity and demand

2. Focus on the whole patient journey

3. Plan ahead along all stages of a patient's pathway

4. Pool similar work together and share staff resources

5. Keep things moving - see and treat patients in order (consider clinical priority)

6. Reduce things that do not add value to patients

7. Keep the flow - reduce unnecessary waits

1. Balance capacity and demand

There are two key strategies:

- Look for ways of gaining capacity or flexing capacity
  – Role redesign, reduce lost time
- Look for ways of reducing the variation in demand
  – Divert the peaks, reduce the peaks

Setting capacity (theoretical) at 80% of the variation in demand will allow for flexibility in the demand
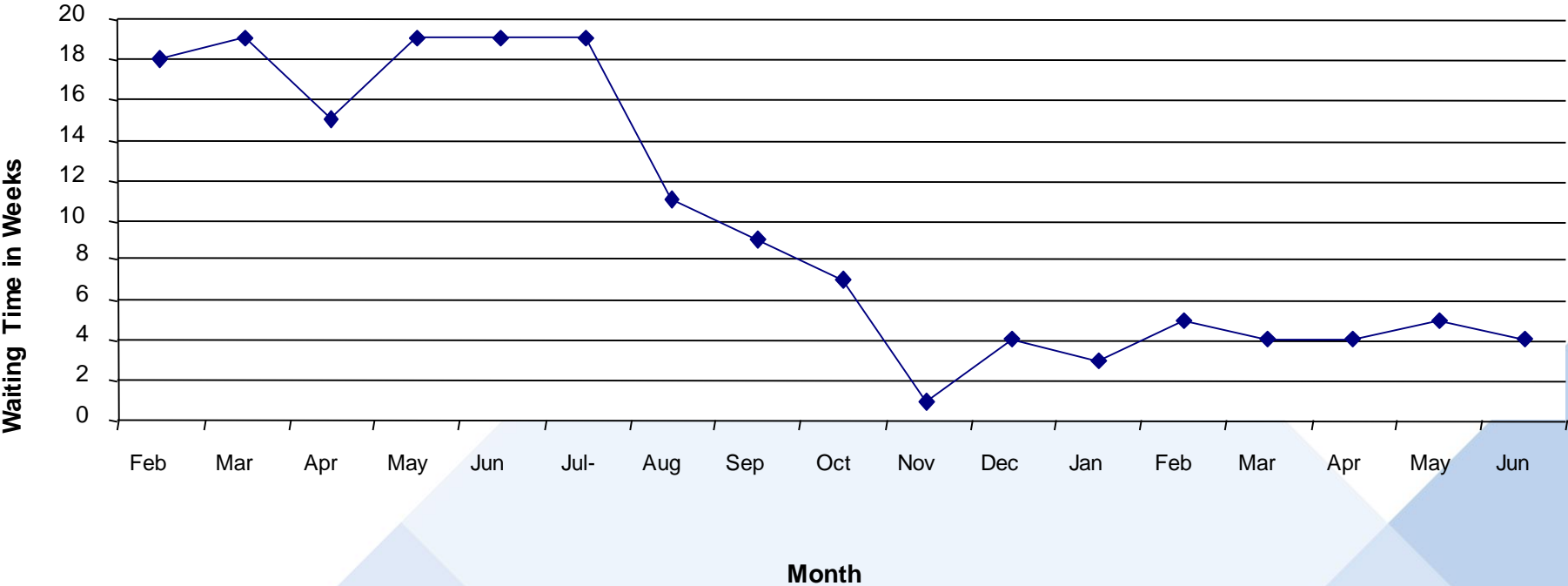
6 common reactions:

Mismatched capacity and demand

Role redesign

City Hospitals Sunderland NHS Trust

Barium Enema Waiting List January - June (18 months)

An advanced practitioner role in radiology was introduced and reduced waiting times

2. Focus on the whole patient journey

The efficiency of the whole patient journey is more important than the individual teams' efficiencies.
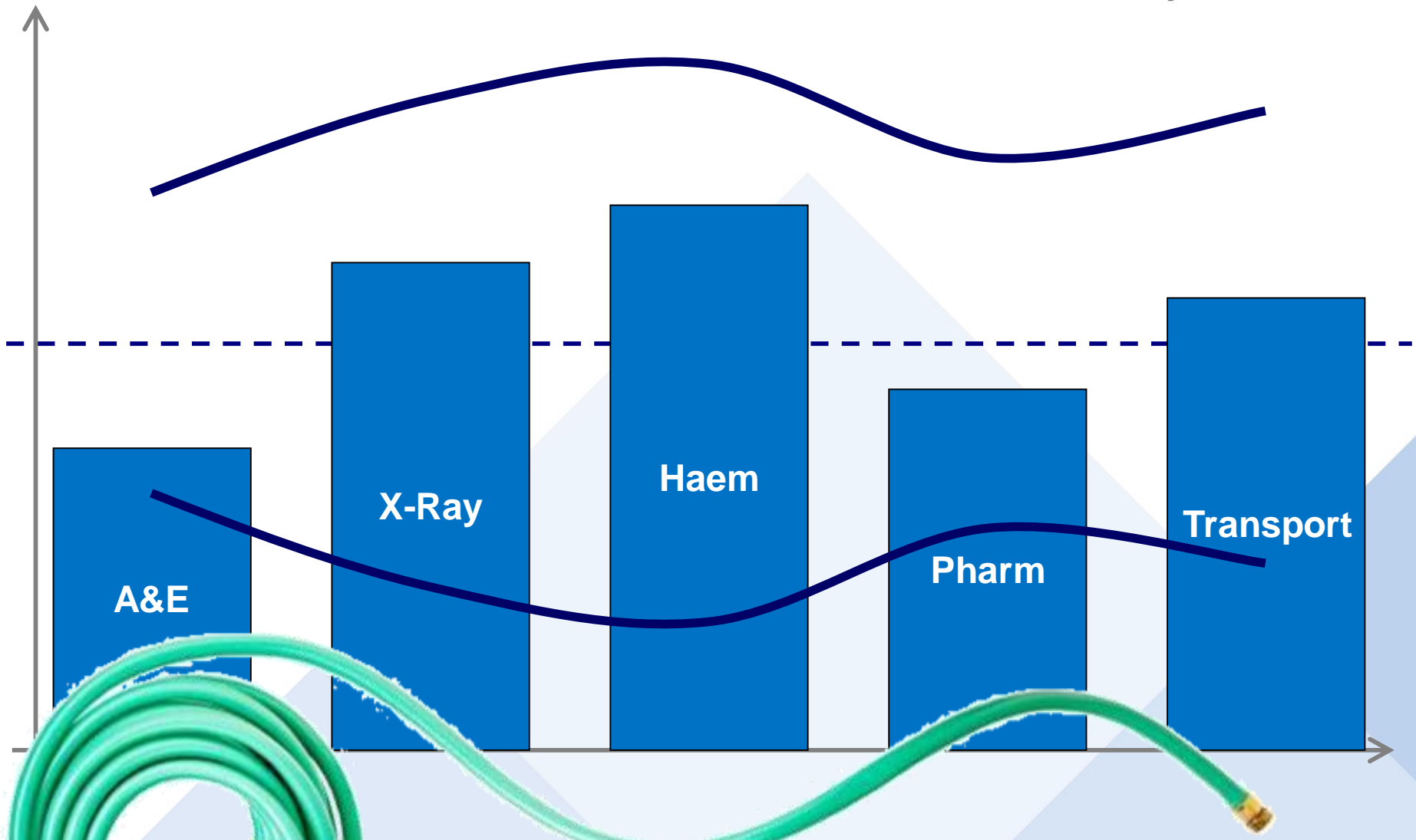
Taking steps to reduce waiting times in one part of the hospital service often highlights something else that prevents further improvement.
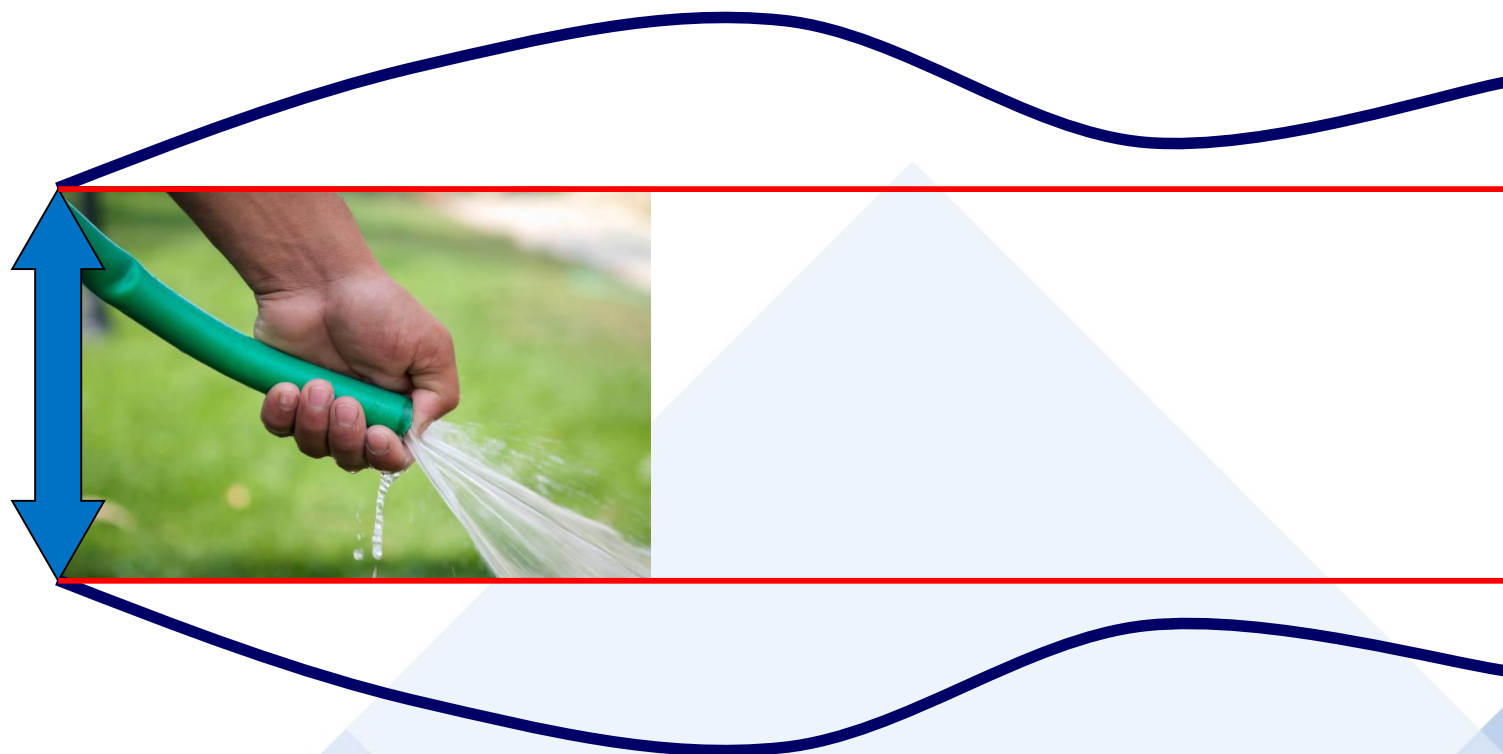
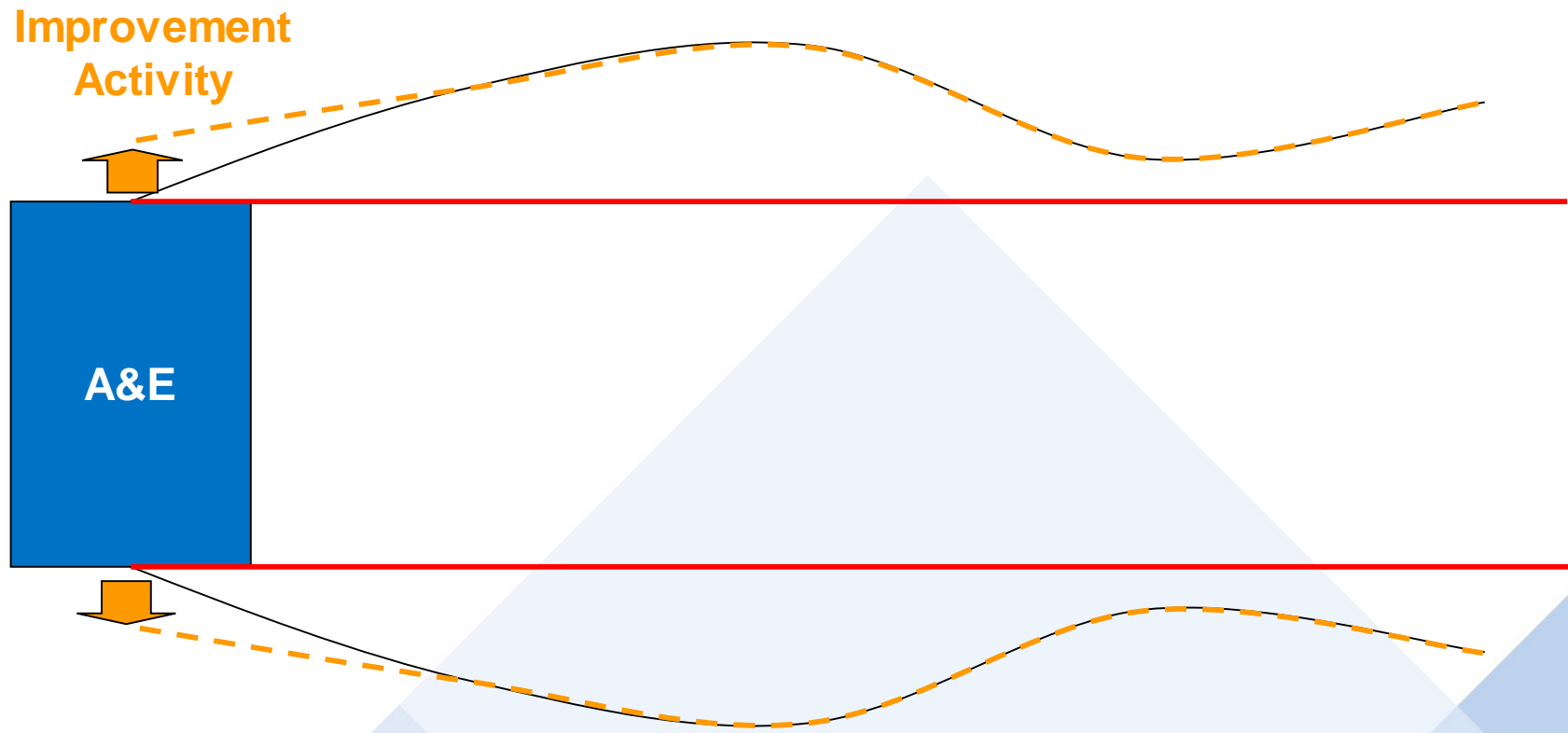**6 common reactions:**

High utilisation

Managing constraints

A&E

X-Ray

Haem

Pharm

Transport

Managing constraints

Area with least capacity is the bottleneck
This constrains the entire end-to-end process – think
"*thumb on hosepipe*!"

Managing constraints

Improvement Activity
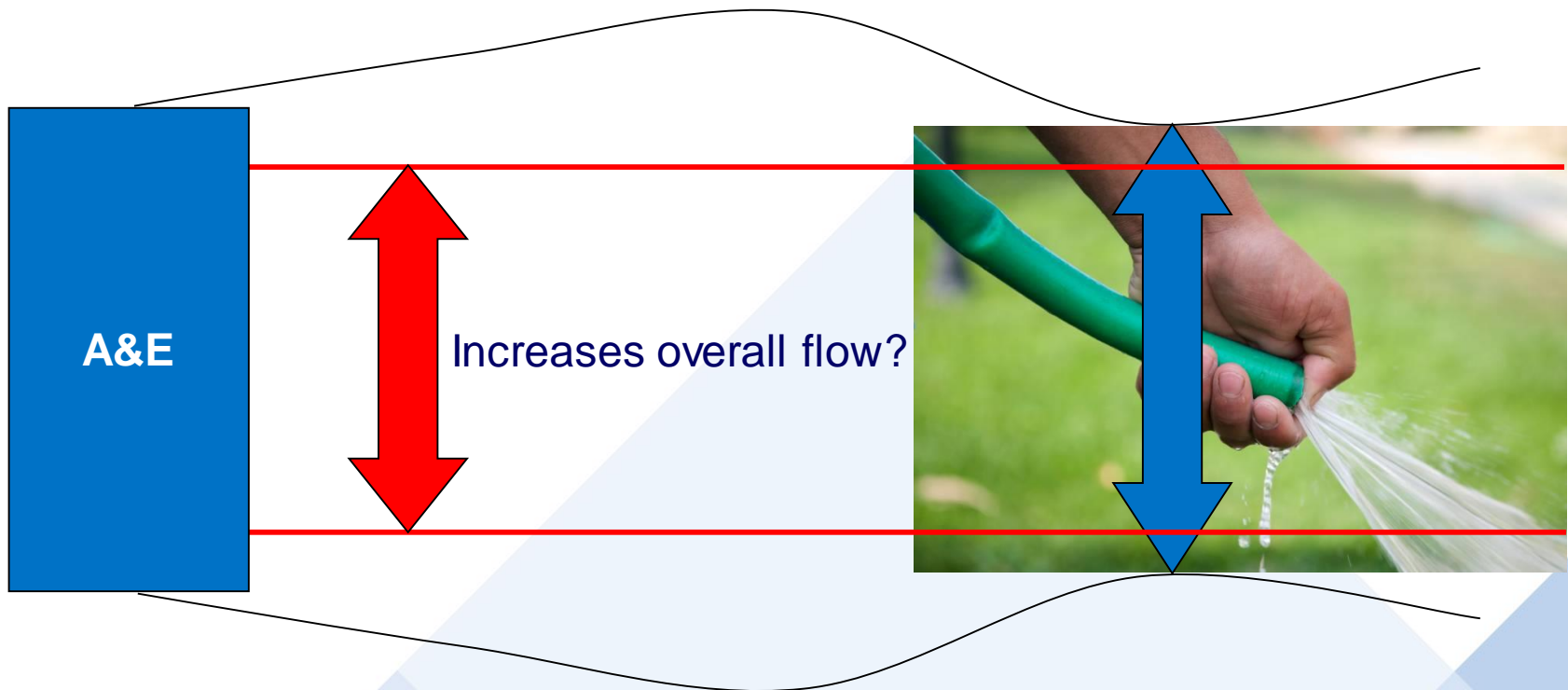
A&E

Tackle the bottleneck – Widen the highway

Managing constraints

What next? - continue in A&E?

A&E

Increases overall flow?

But constrained by the next bottleneck…
remember – the new bottleneck could be an earlier process…

Managing constraints

Improvement Activity

Pharm
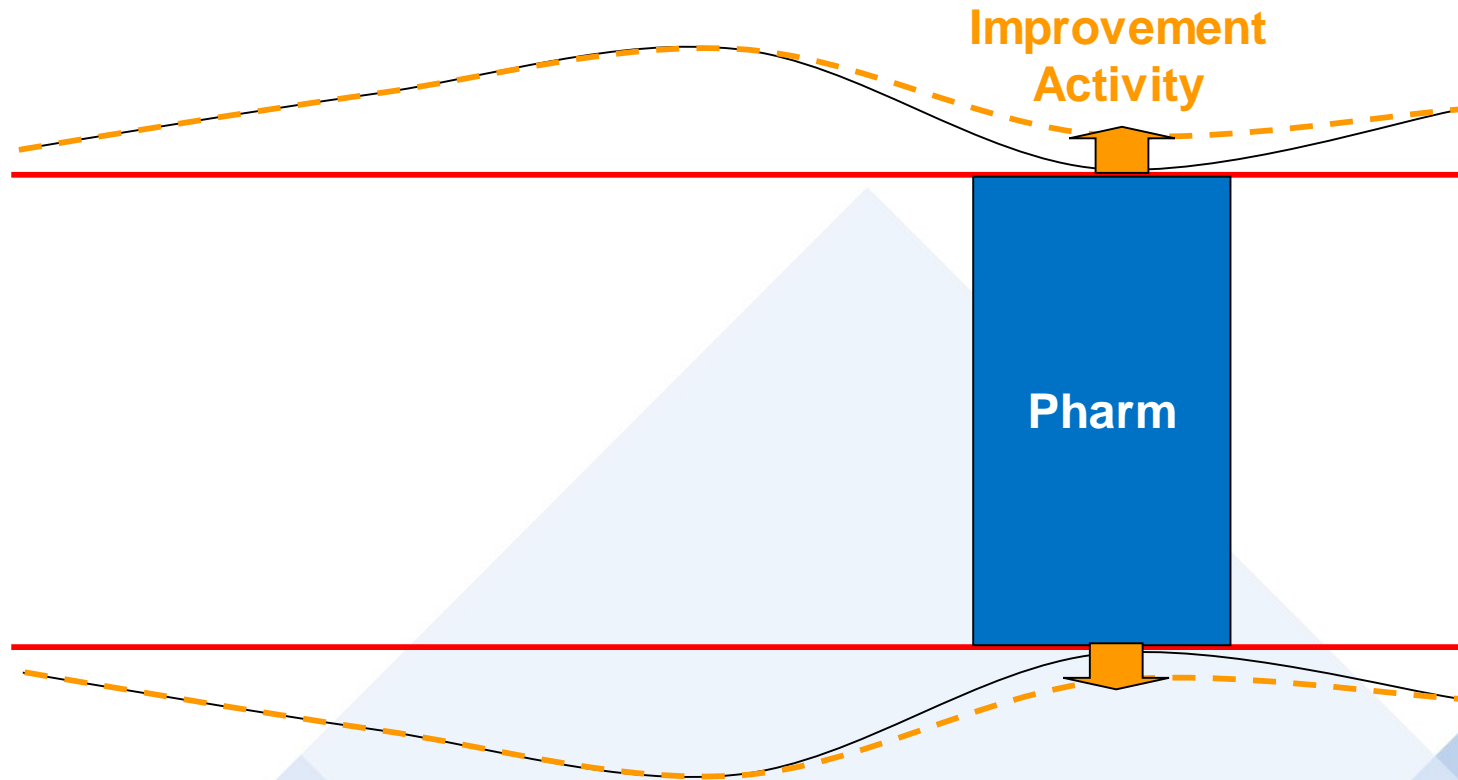
Step 5 - Tackle the "new" bottleneck

Example

After extensive and detailed further improvement work in ultrasound, the service improvement lead stated:
 "without improving transport we can go no further to improve ultrasound services."
As a result the hospital decided to review portering services.

Theory of constraints
Introduced by Eli Goldratt in "*The Goal*" 1984

3. Plan ahead: along all stages in a patient's journey

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"If everyone knows what's going on, it's easier to stay on track."

Example: The enhanced recovery programme

- Plan developed in pre-operative assessment tells patients what to expect
- Patients whose recovery doesn't go to plan stand out and have more focus

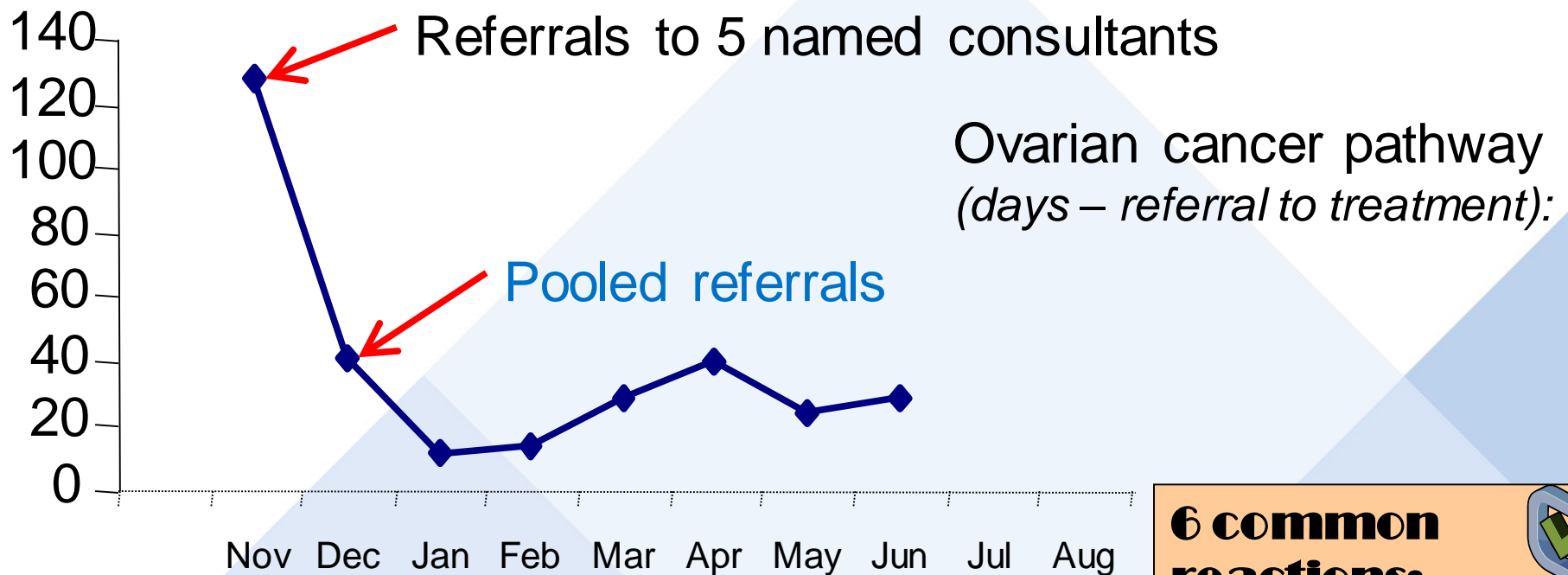**Result: reduced readmissions and length of stay down from *12.6 days to 6.0 days.***

6 common reactions:

Waiting list initiatives

4. Pool similar work together and share staff resources

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Pool the work of consultants, clinicians, technicians and administrative staff where there is common and equivalent work

Referrals to 5 named consultants
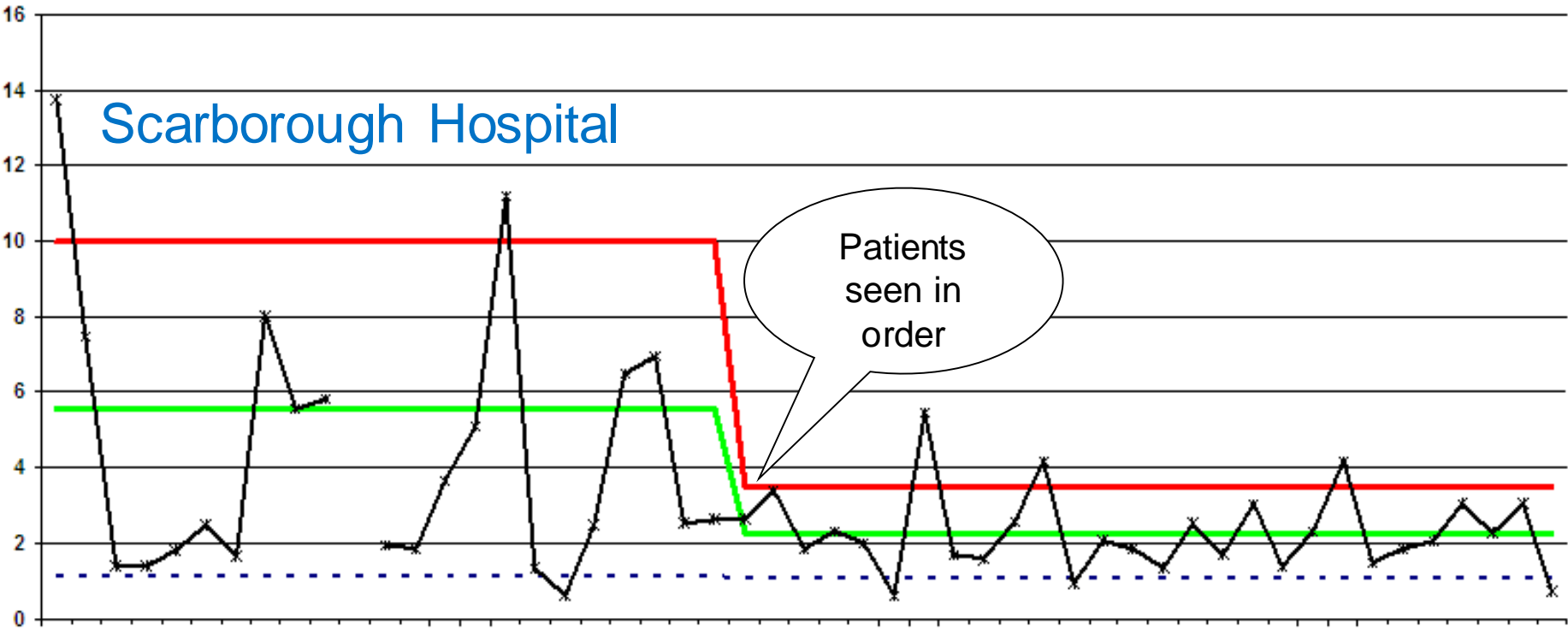
Ovarian cancer pathway
(days – referral to treatment):

Pooled referrals

| Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug |

6 common reactions:

Carve out

5. See and treat patients in order

Scarborough Hospital

Patients seen in order

Patients treated by a single consultant –

Transurethral Resection of Prostate (TURP).

6 common reactions:

Force book & churn

6. Reduce things that do not add value to patients

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A lot of our work adds value to patients: right referral, right diagnostic tests, right diagnosis, right information and communication, right advice, right treatment, right aftercare and right handover.

Hereford Hospitals NHS Trust - Biochemistry -
Time of arrival of Specimen to the start of it being processed

Before Change - unmanned reception

After Change - manned reception

Delay in minutes

Specimens in order of arrival

7. Keep the flow – reduce unnecessary waits

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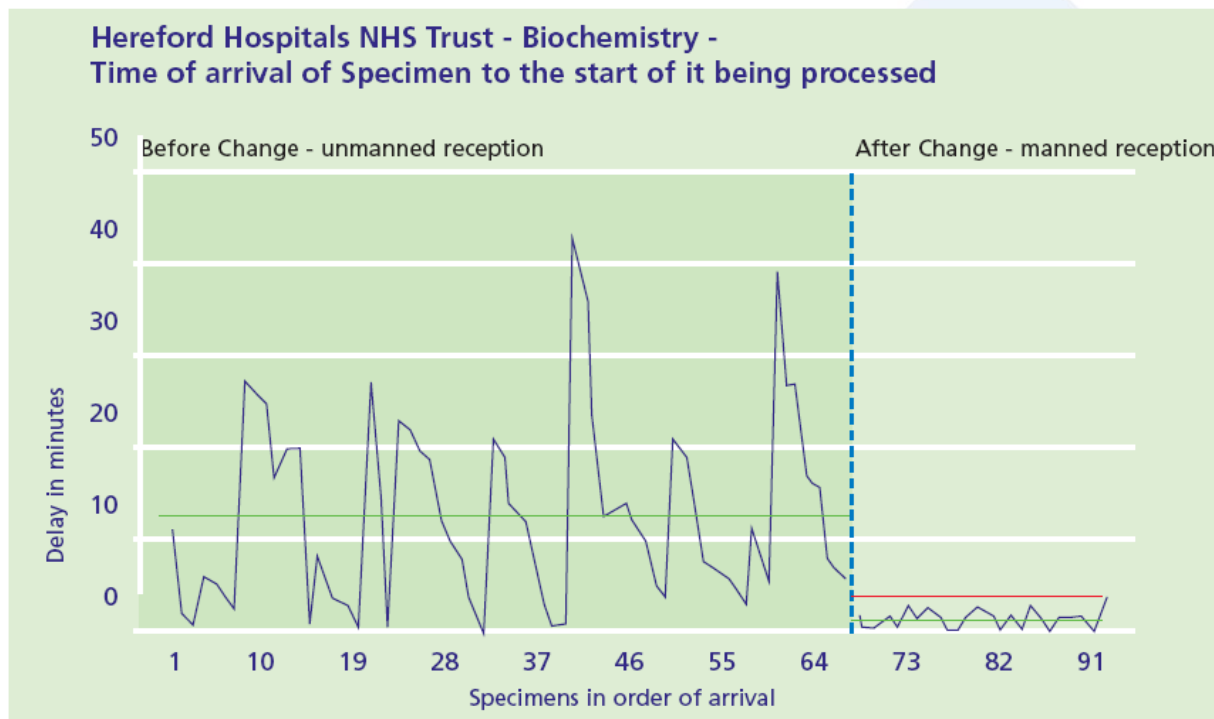
Every decision every:

Month

to

Week

to

2 Days

to

Day

to

Hour

Effect of reducing batch size.

Average number of patients waiting with <u>weekly</u> decision making

Average number of patients waiting with <u>daily</u> decision making
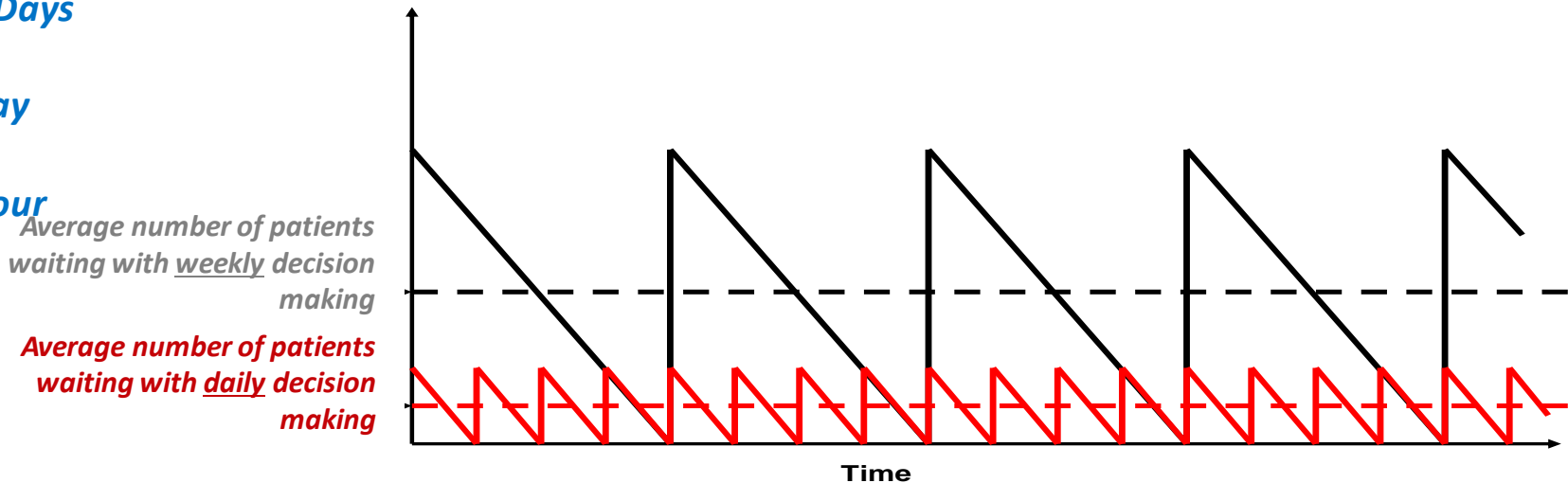
Time

The availability/timeliness of decision making has directly impacts the number of patients in hospital

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Creating a capacity model

The 5 step guide to estimating required capacity

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1
Estimate demand

2
Convert to time

3a
Describe the trends
Calculate the average and a measure of variation

3b
Chart the trend
Show the variation in demand over time

4
Derive session capacity
Use the measure of variation to estimate capacity required

5
Convert to facility
Using number of sessions per week
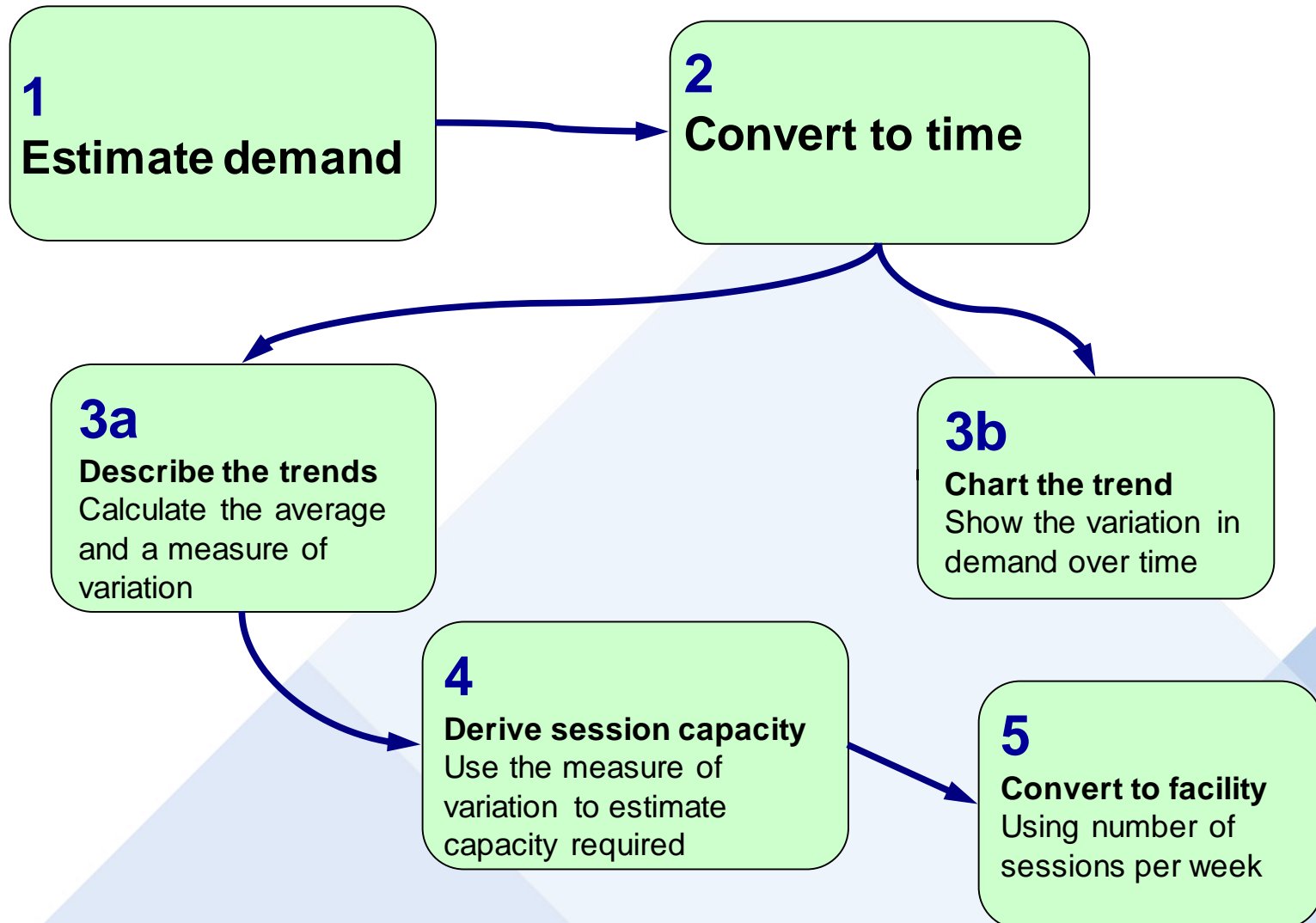
Calculate the typical weekly variation

Set capacity - options

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Mr X Net clinic hours
Weekly totals from Trust Net clinic hours
LTHT
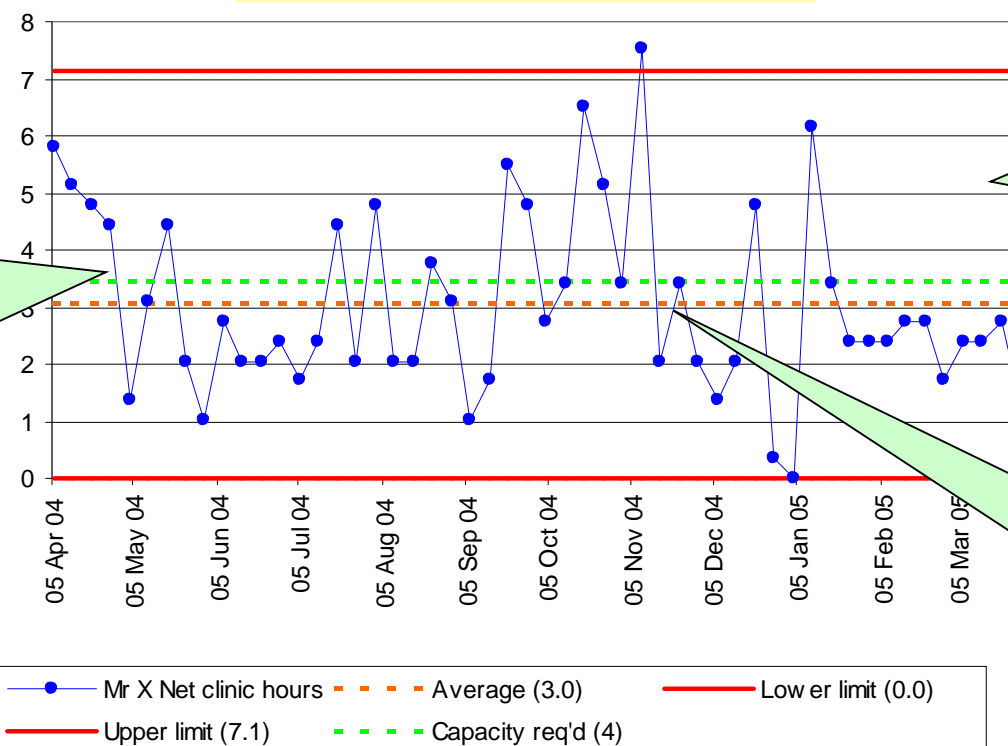
2
Sprint capacity

Lower utilisation and stable waits

3
Immediate response

Low utilisation and no waits

1
Average demand
High utilisation and volatile waits

Legend:
- Mr X Net clinic hours
- Average (3.0)
- Lower limit (0.0)
- Upper limit (7.1)
- Capacity req'd (4)

Any questions ?

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