

Improving Queue Management Through Operational Research and System Redesign

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Presentation and Models at
www.steyn.org.uk

Problem Solving 1

- We have a problem
- Find a solution or someone else to blame
- Implement
 - or divert attention
 - or “manage” the problem
 - or hide the problem

Problem solving 2

- Is there a problem?
- What is the problem?
- Understand the problem & system
- Develop potential solutions
- How to implement, monitor, evaluate
- Implement, monitor, evaluate

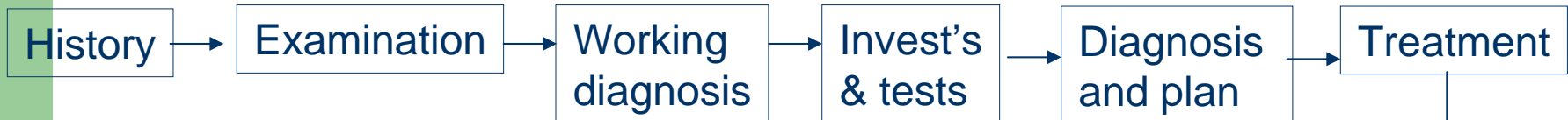
- Is there a problem?

Parallel Universes

- there must be queues
 - good utilisation
 - demand > capacity
- targets help manage queues
- aim to keep queue at safest length

- queues are a liability not an asset
- use targets to help redesign, improve and make more effective
- aim is no queue/minimal queues

Process View:



- Doctor requests 'test'
- Porter picks up request
- Porter delivers request to dpt
- Clerk logs request
- Clerks puts request for prioritisation
- Consultant for prioritises request
- Consultant returns request
- Clerk files request in priority order
- Clerk draws request from file
- Clerk makes appointment
- Clerk sends appointment by post (>6 steps)
- Patient receives appointment
- Patient travels to hospital
- Patient finds car parking slot
- Patient finds X-ray department
- Patient checks in at reception
- etc



Discharge (or death)



Value?

Waste!

Impact on Quality

Probability of Performing Perfectly

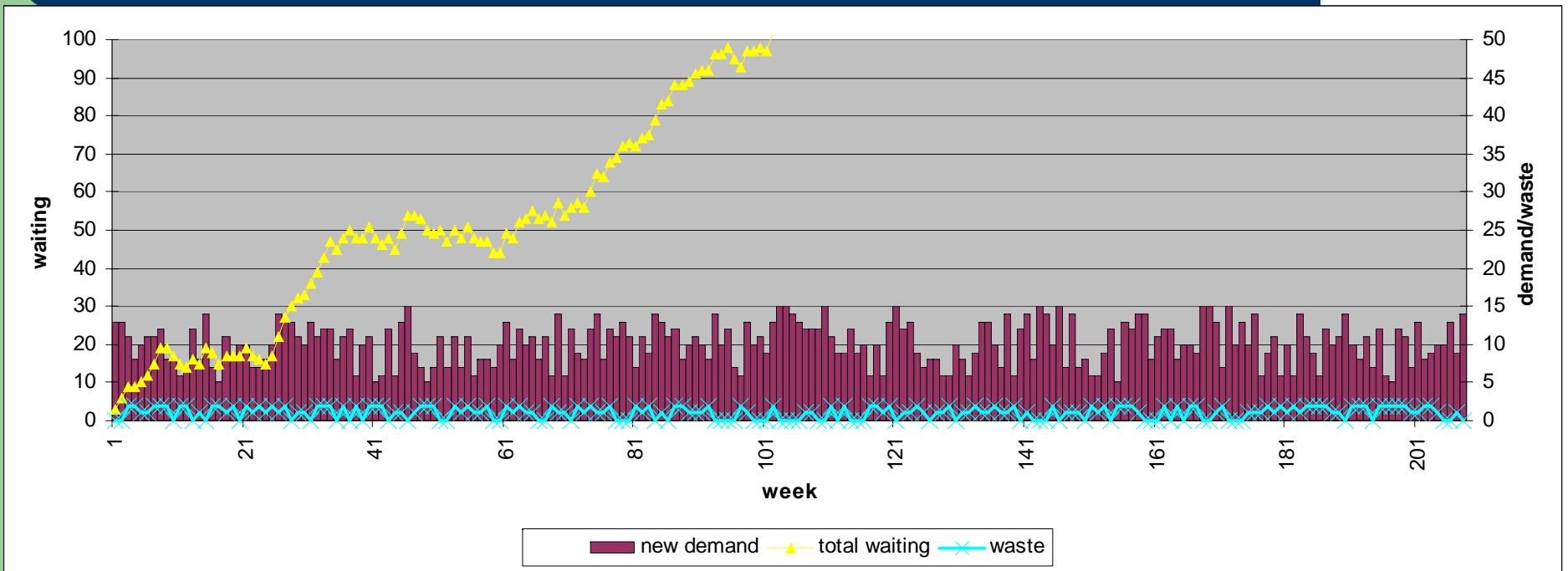
No. process steps	Probability of Success, Each Process Step			
	0.95	0.990	0.999	0.999999
1	0.95	0.990	0.999	0.9999
25	0.28	0.78	0.98	0.998
50	0.08	0.61	0.95	0.995
100	0.006	0.37	0.90	0.99

Improve the quality of each step

Remove the steps...

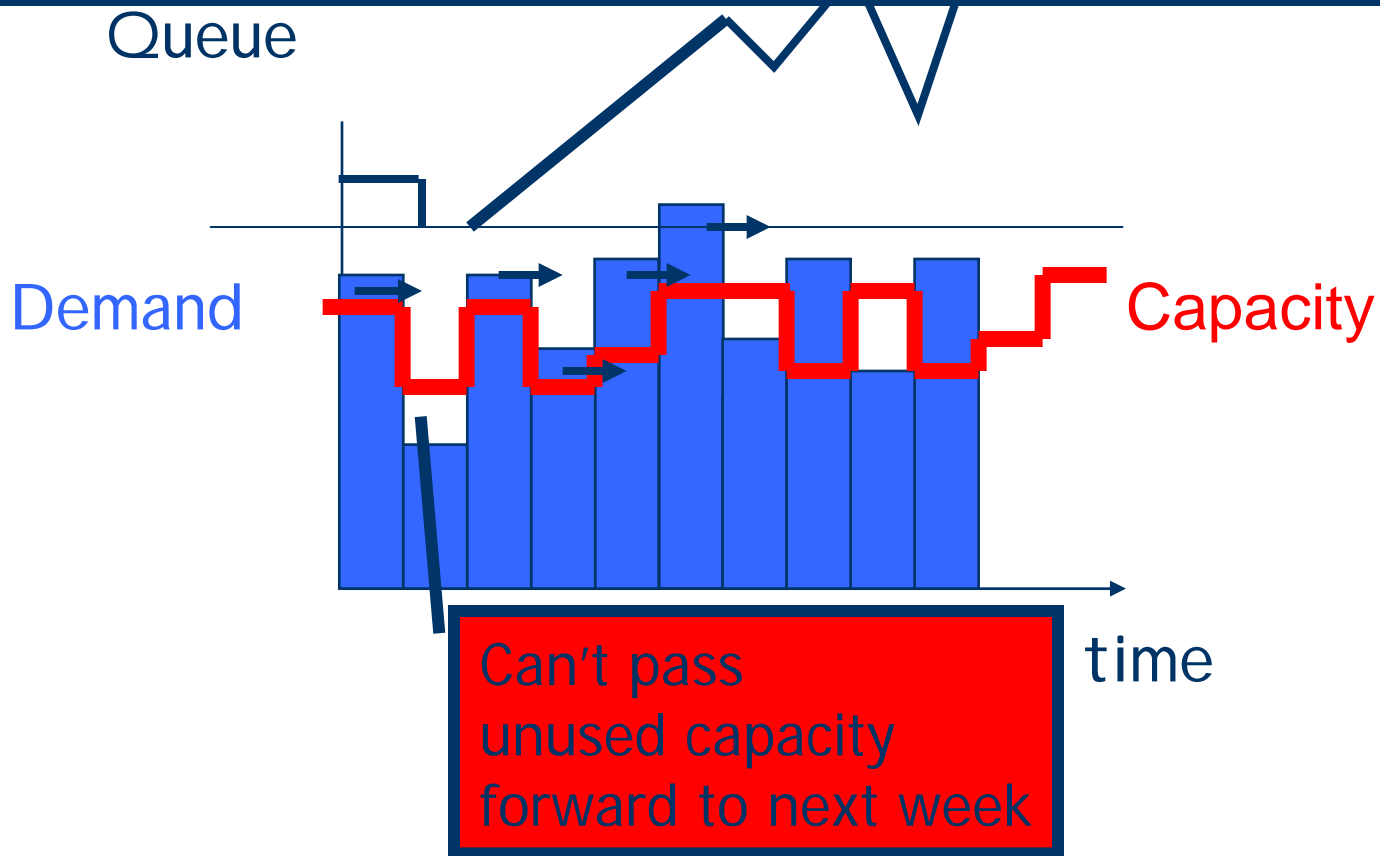
Demand and capacity definitions



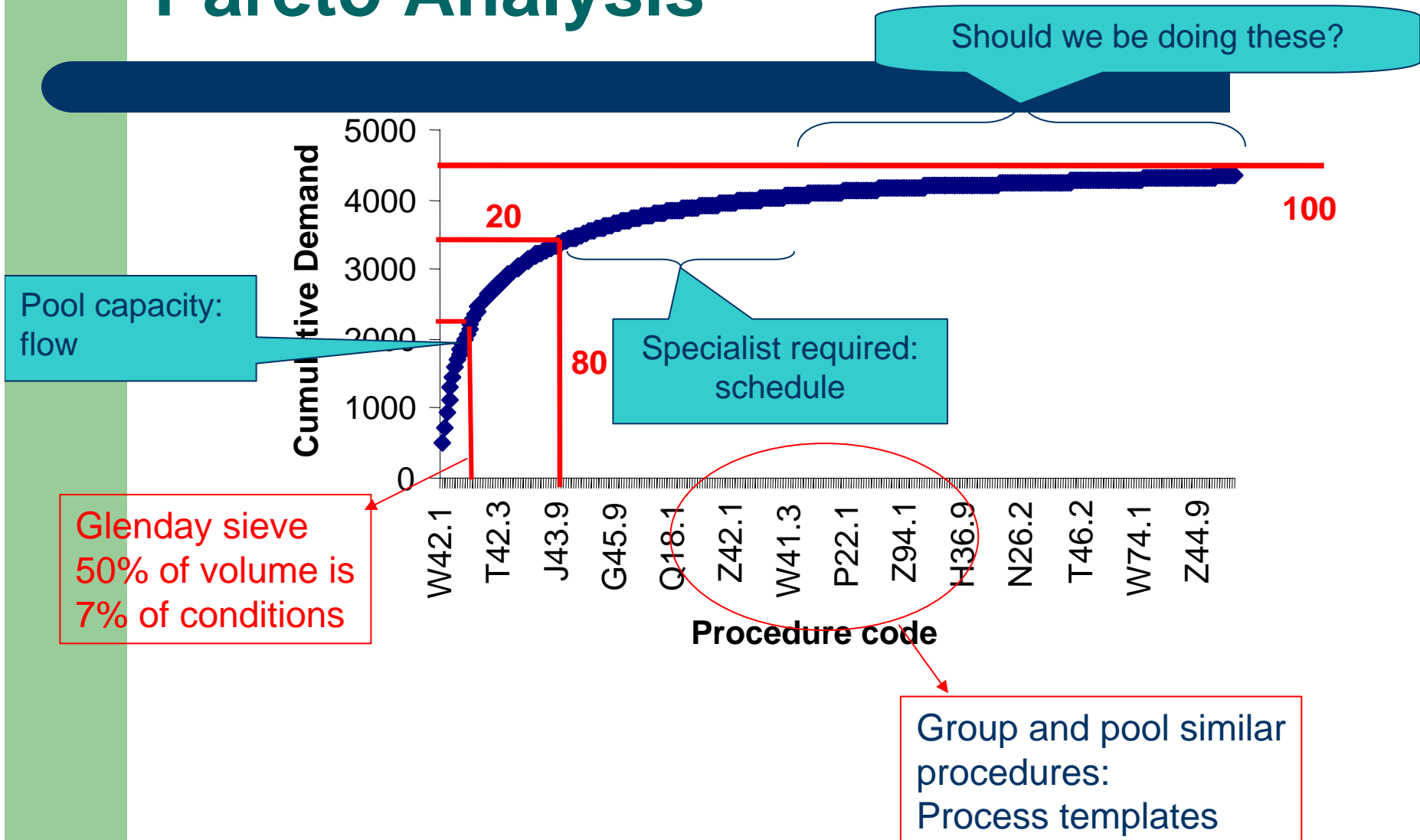


www.steyn.org.uk/models.htm

If av. Demand = av. Capacity,
variation mismatch = queue



Pareto Analysis



Segmenting to control variation and improve flow

- 1. Are the processes different for:
 - Emergencies / Elective
 - Inpatients / Outpatients
 - Different specialties?
- 2. Is the process dynamic different?
 - Is average process (cycle) time different?
 - Is variation in process time different?
- 3. Is the demand variation different?
- NB: Danger of carve out and wasting capacity
 - Rule of thumb: Need 30% increase in total throughput to justify separation (return on net assets)

Segmentation v carve out

Segmentation:

- Controls variation
 - Demand variation
 - Process time variation
- Improves flow for all patients
- Increases Return on Net Assets

Carve out:

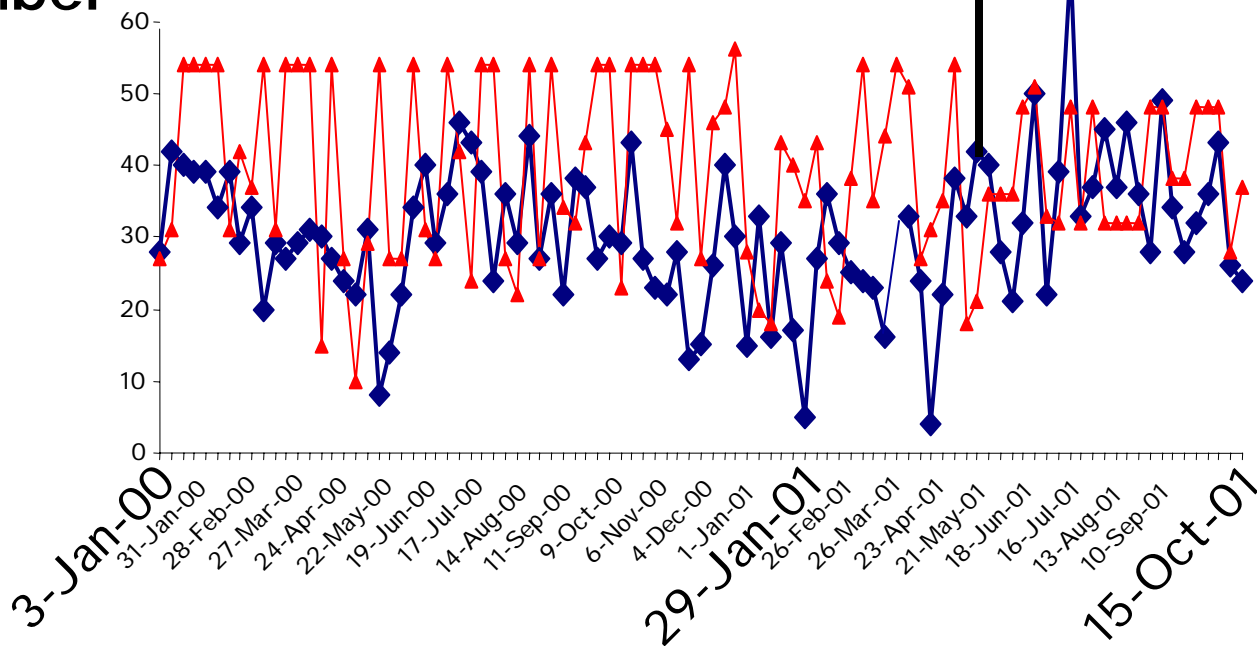
- Doesn't control variation
- Flow for one group of patients improved to the detriment of another
- Wastes capacity
 - Inefficient

Matching variation in clinic demand and capacity

2 clinics per week
= mismatch of capacity to demand
= max 54 slots over 2 clinics
struggle to see all patients in 2 weeks

3 clinics per week
= better match of
capacity to demand
= max 48 slots over 3 clinics
All patients seen in 5 days

Number



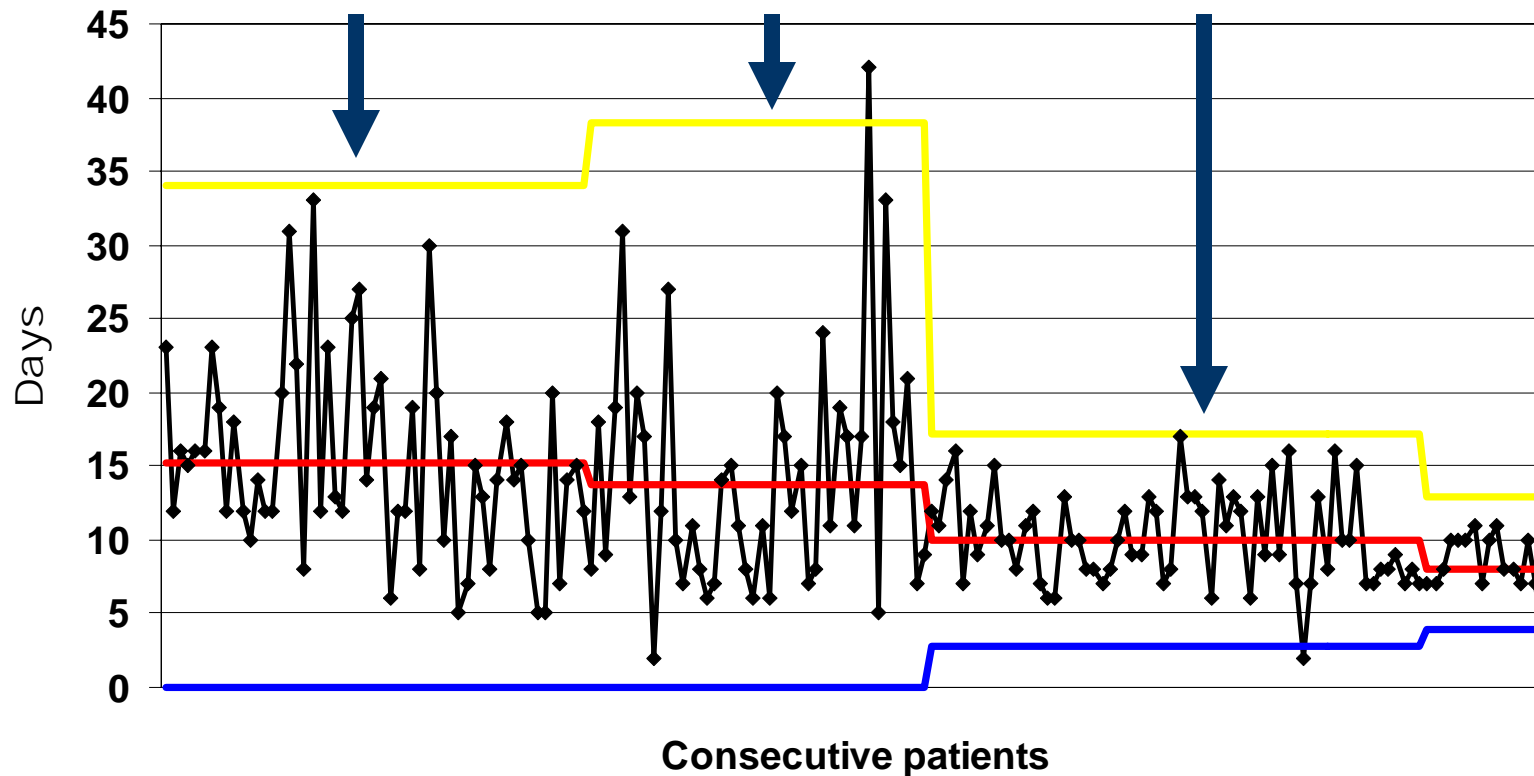
◆ Total number of Patients referred
◆ Number of clinic slots available

Week

**Baseline
3-5/2002**

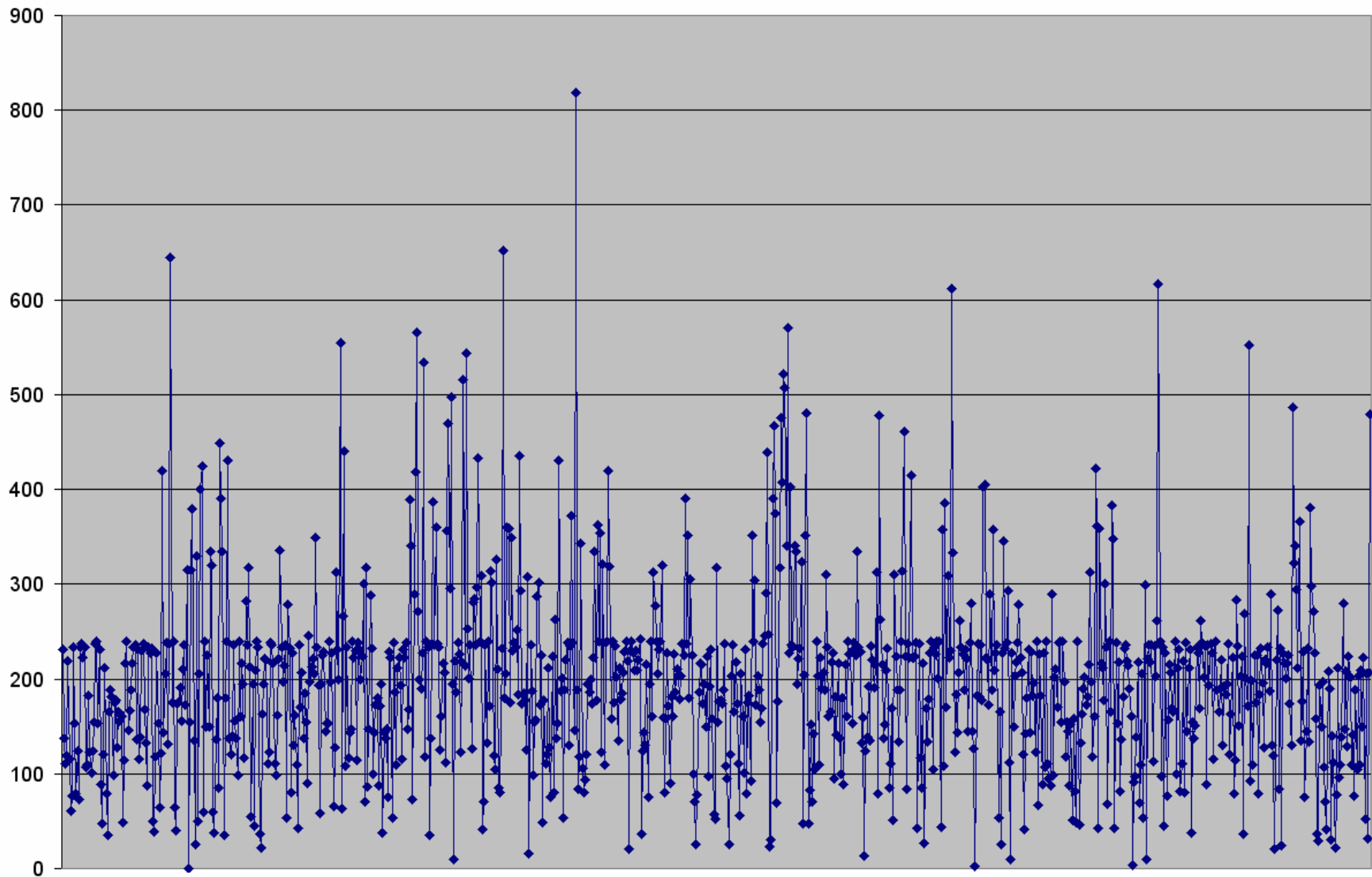
**Carve Out
6/2002**

**Booked Appts.
from 7/2002**

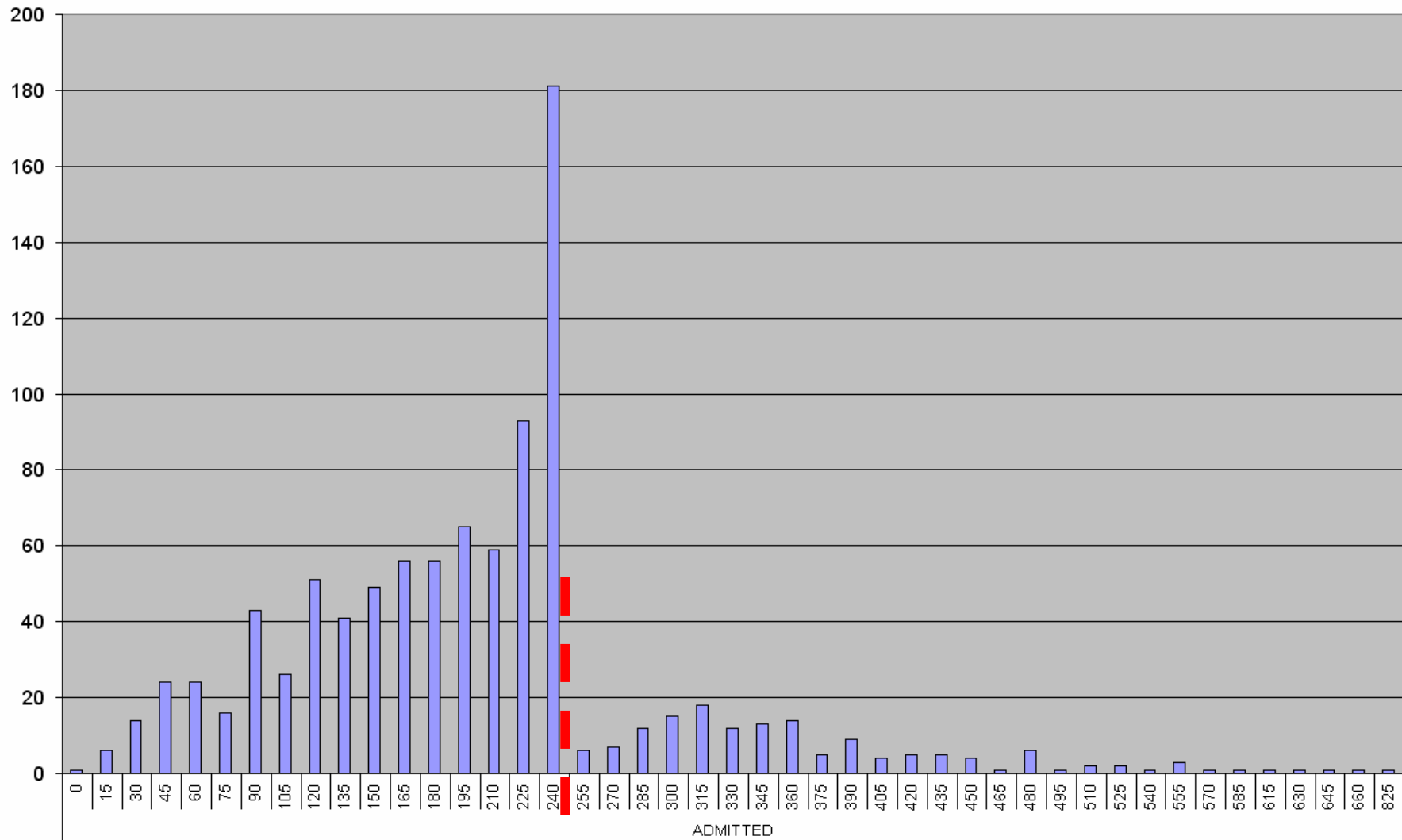


◆ waiting time — mean — upper process limit — lower process limit

Consecutive Emerg Times Hosp A

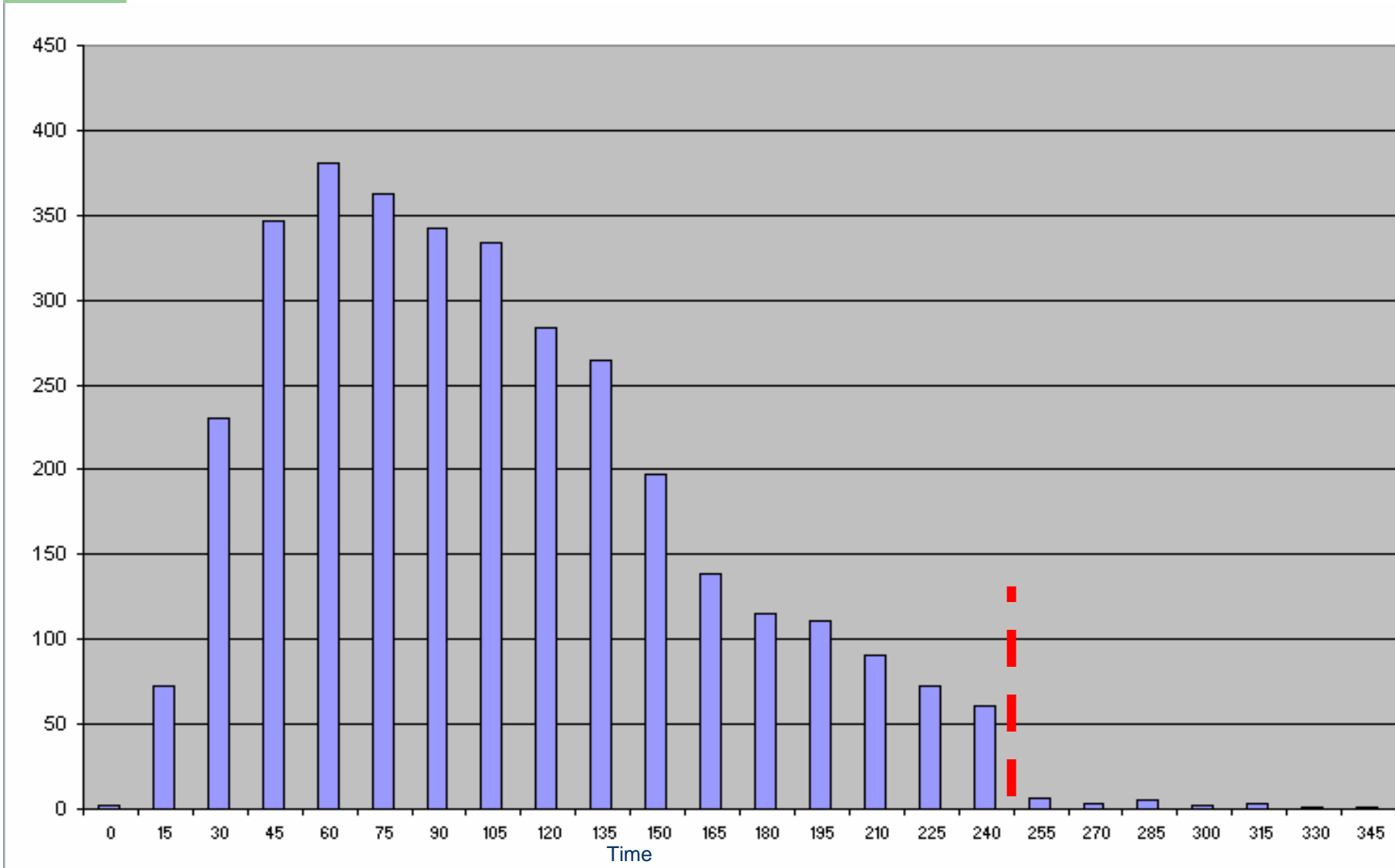


Emergency Dept Time Hosp A

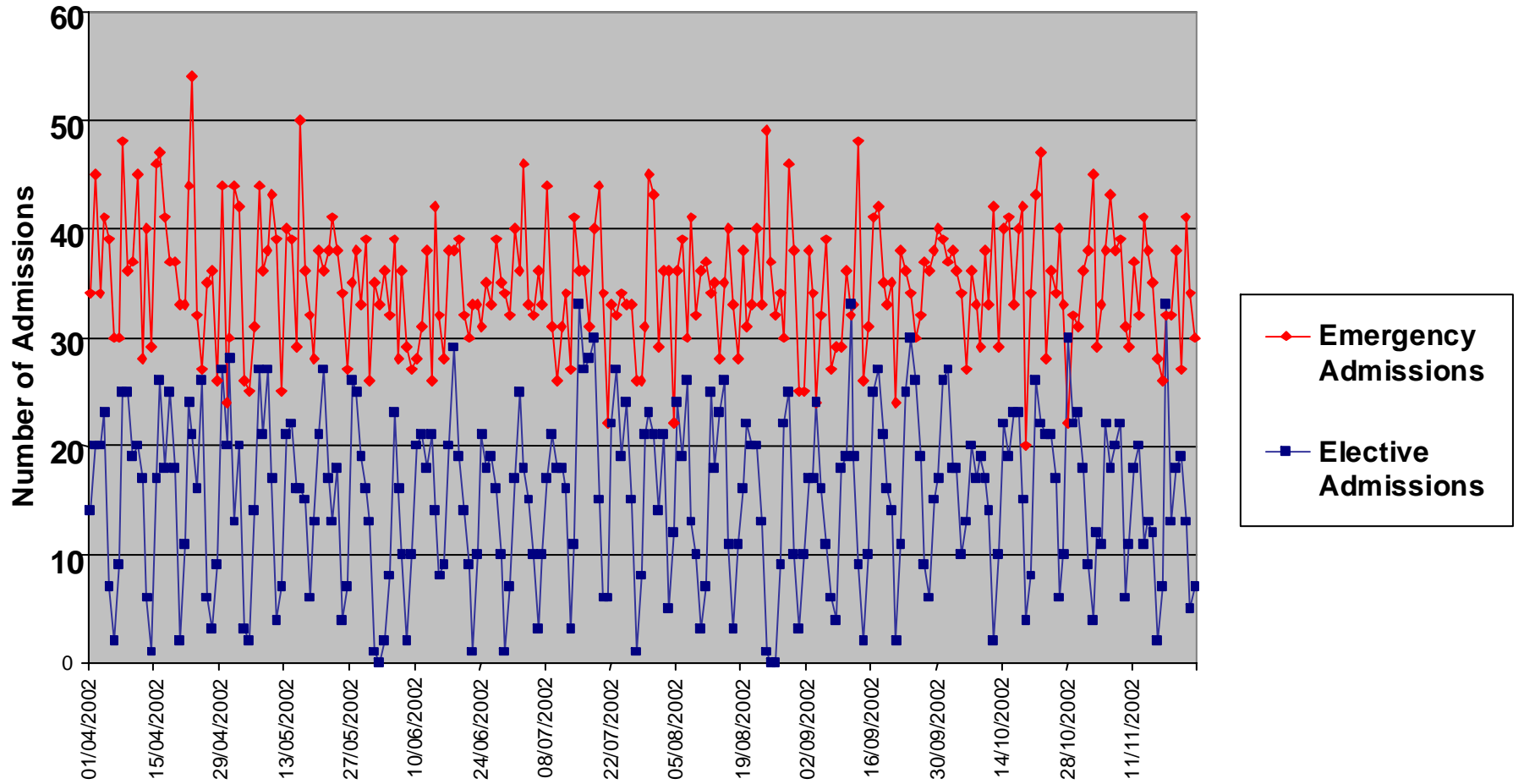


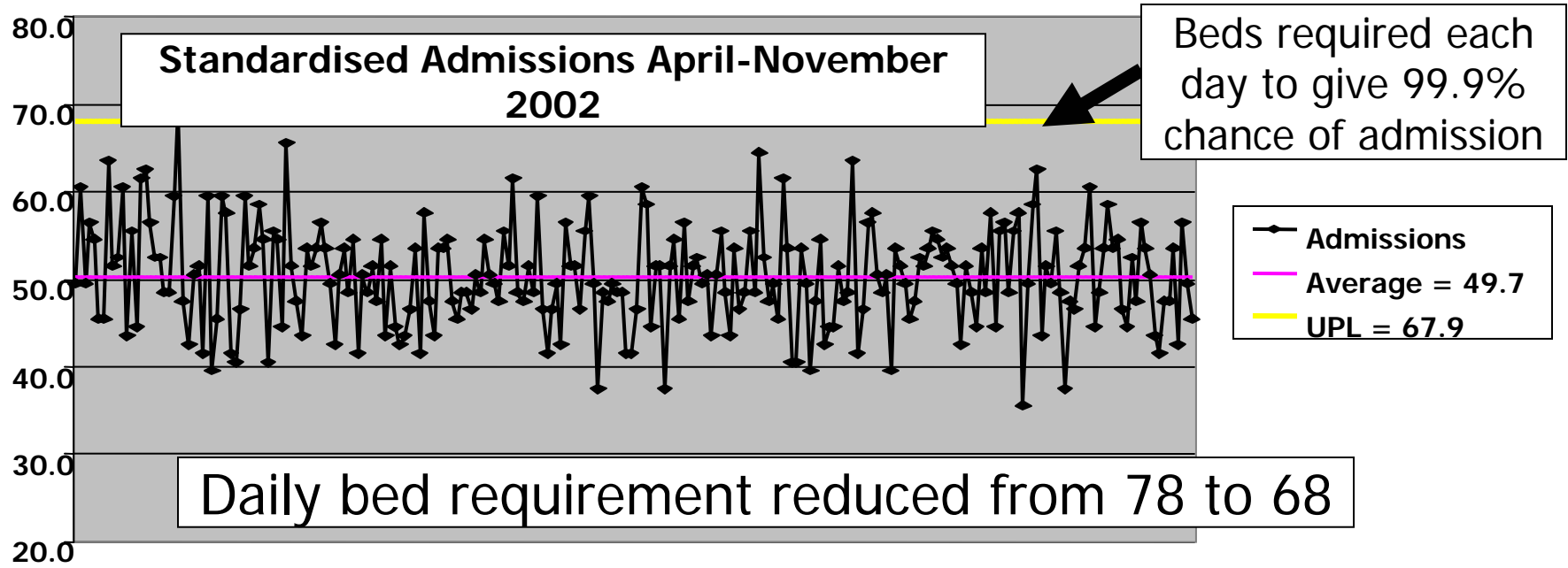
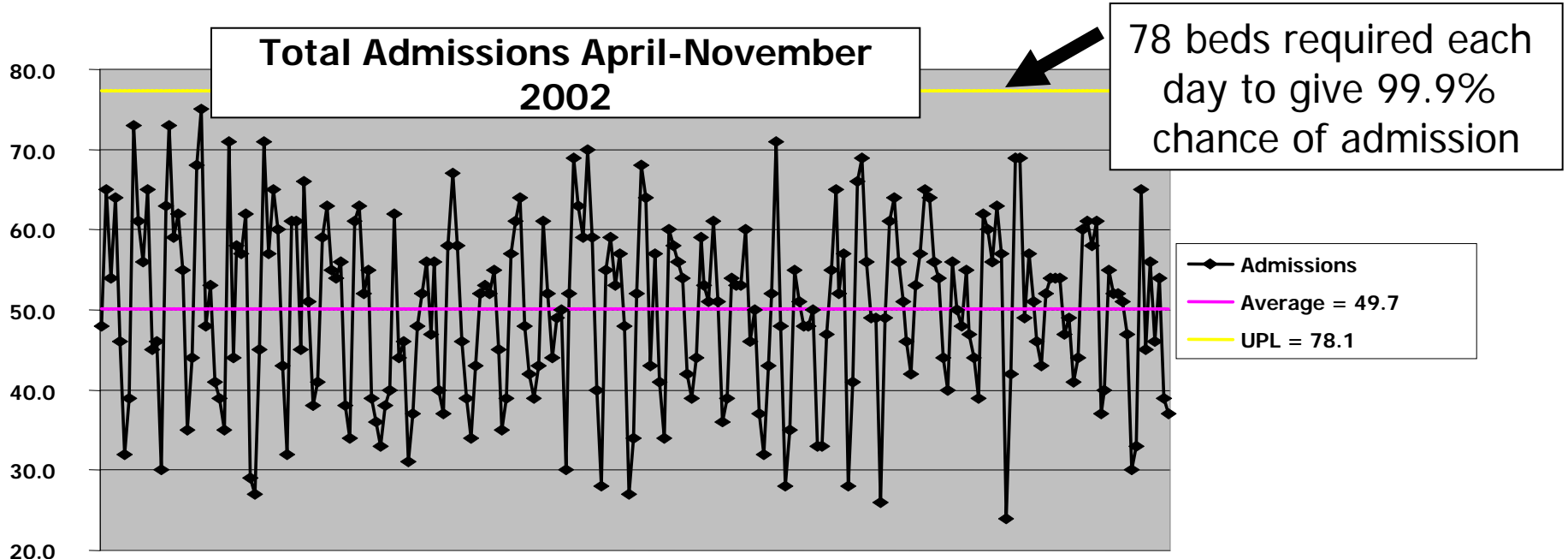
Emergency Dept Time Hosp B

No



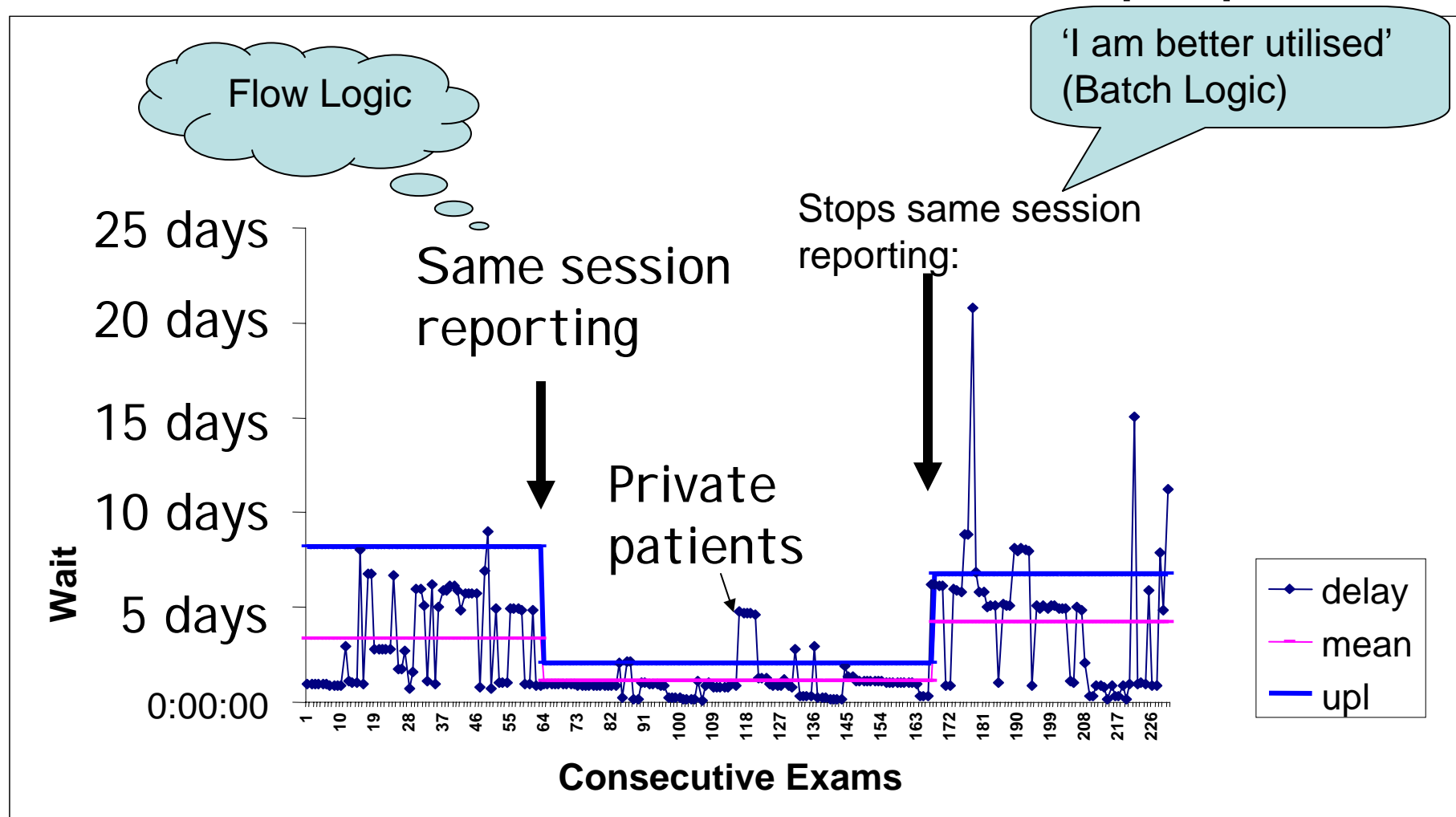
Emergency & Elective Admissions April-November 2002





SPC Control Chart

Wait- between CT Exam time and CT Report printed



Impact on total process cost = 5 days @ £125/day x 10% of 195 admissions = £12,000 per week

Understand the system

- Root cause of delays for patients is variability and high utilisation
 - not volume
- We create most of the variability and demand high utilisation
- Short term: Optimise current capacity
 - Reduce number of steps, reduce number of queues
 - First in first out, pool capacity
 - Stop rework – right first time, appropriate & effective
 - Maximise skill use
- For Long term: Plan for no queue (minimal queues)
 - Measure & shape demand, plan capacity
 - Reduce variation

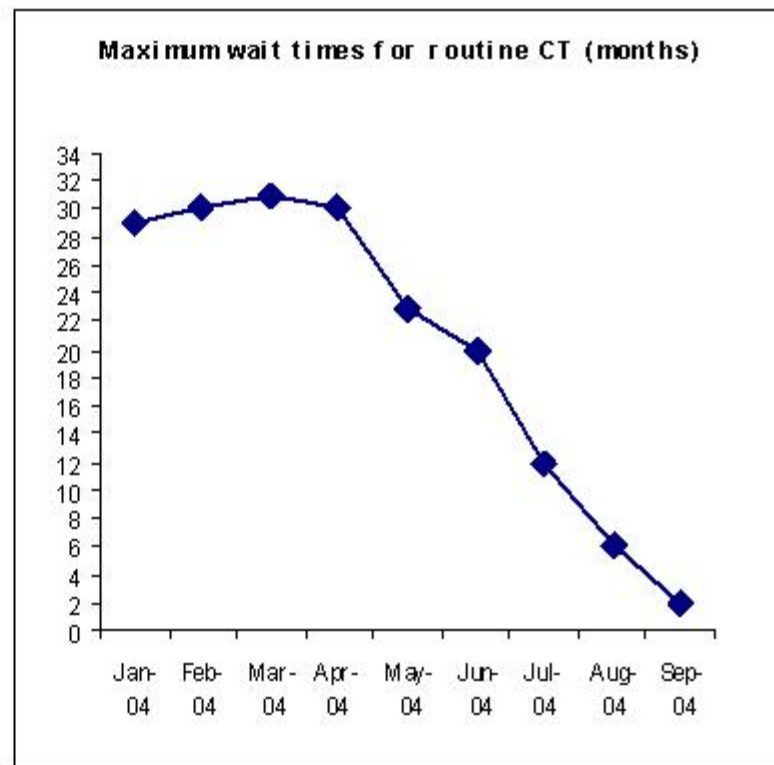
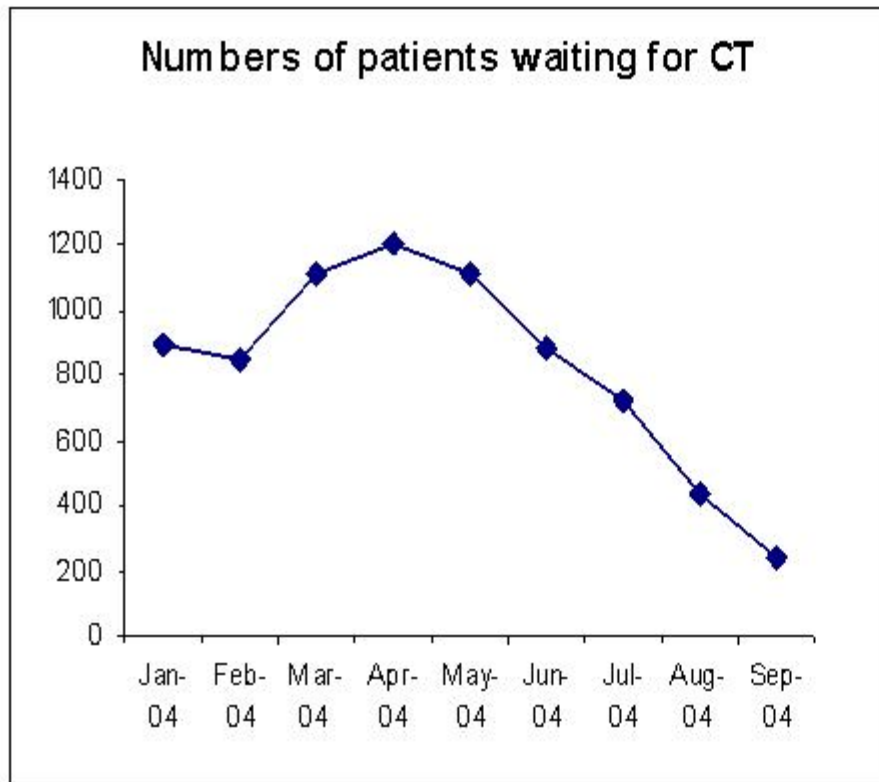
Osprey Programme Objectives

- Train clinicians in manufacturing systems engineering principles
- so that they can improve healthcare:
 - timeliness,
 - cost efficiency (Return on Net Assets)
 - quality
 - clinical outcomes and service experience

Clinical Systems Engineers

- Sponsored by the service
 - 2004 – 06: 9 doctors
 - 2006 – 08 : 5 doctors, 4 nurses, 1 physiotherapist
- 2 year training programme
 - £12,500 each
 - + Minimum 3/7 week salary
 - + Kate's salary
- Coaches:
 - Kate Silvester, Richard Lendon, Richard Steyn + external trainers

Patients waiting for CT Scans



Time:

From 18 months OP wait for routine CT scan to 2 months. Anecdotally IP wait also reduced.

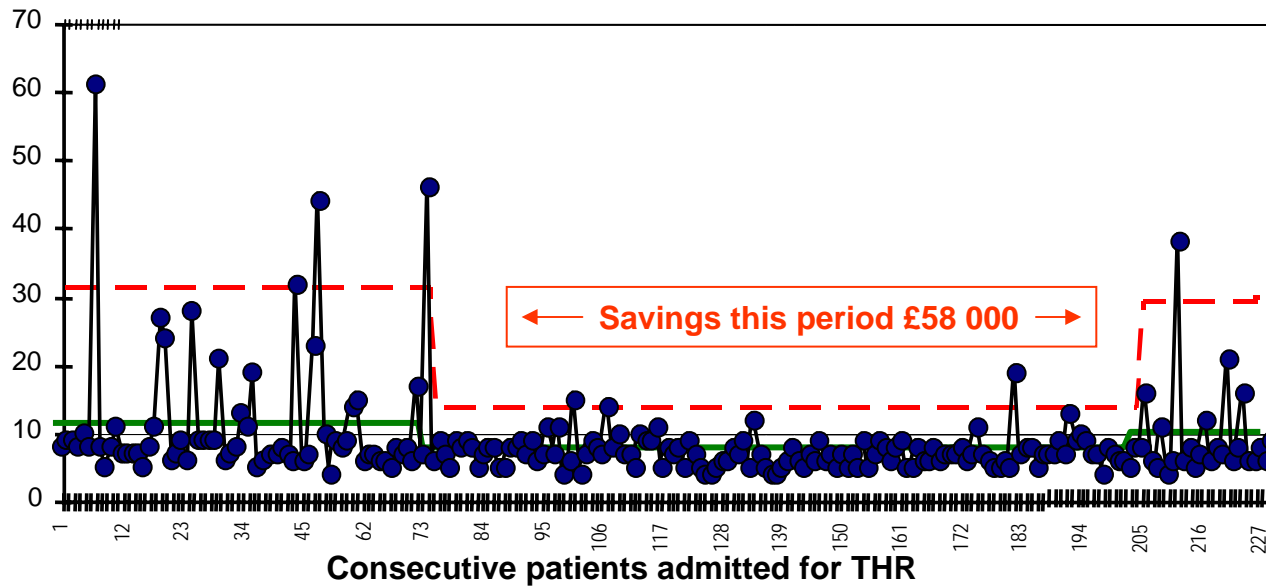
Saving:

Cost neutral as internal recruitment. Administrative saving as rework reduced. Reduced DNA's.

Quality:

Huge benefit to patients – better outcomes, reduced LOS.

Length of Stay Total Hip Replacement May 04 – Feb 05



Aim is early discharge day 4 with home rehab

Hotel costs only for 4 day LOS £480

Time:
Reduced LOS

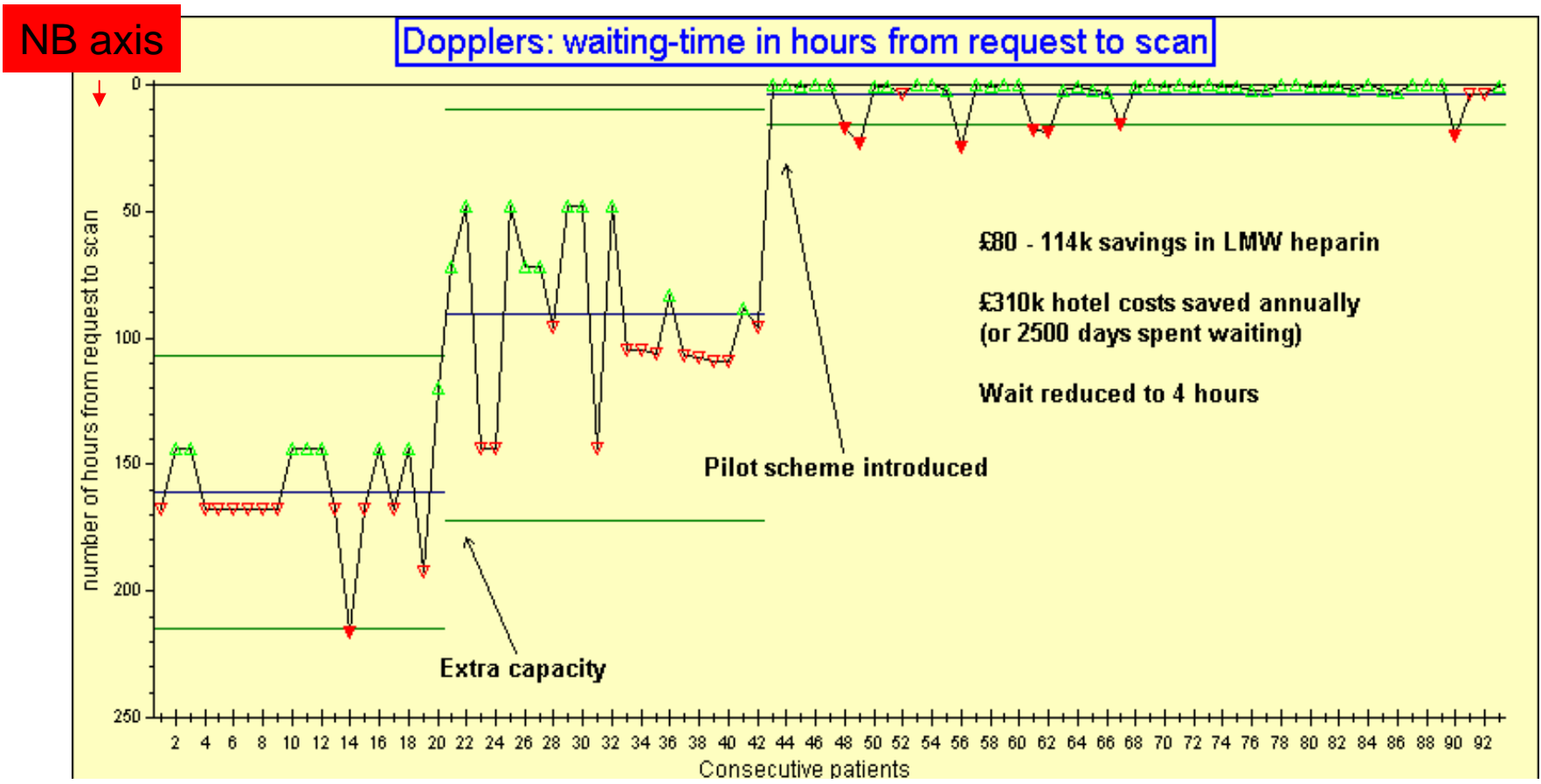
Saving:
Related to reduced LOS **hotel costs only** = £58 000
Increase procedures done for same capacity

Quality:
Related to reduced LOS (reduced infection risk)

Dermatology 'Frequent Flyer'

- Pts with long-term Eczema/Psoriasis
- Launched as pilot November 2004
- 109 pts enrolled
- 11 contacts
 - 7 telephone consults, 3 nurse treatments, 1 admission
- 98 follow-up appts saved every 6 months
 - £70 each therefore approximately £13,720 per annum saved

Patients with possible Deep Vein Thrombosis

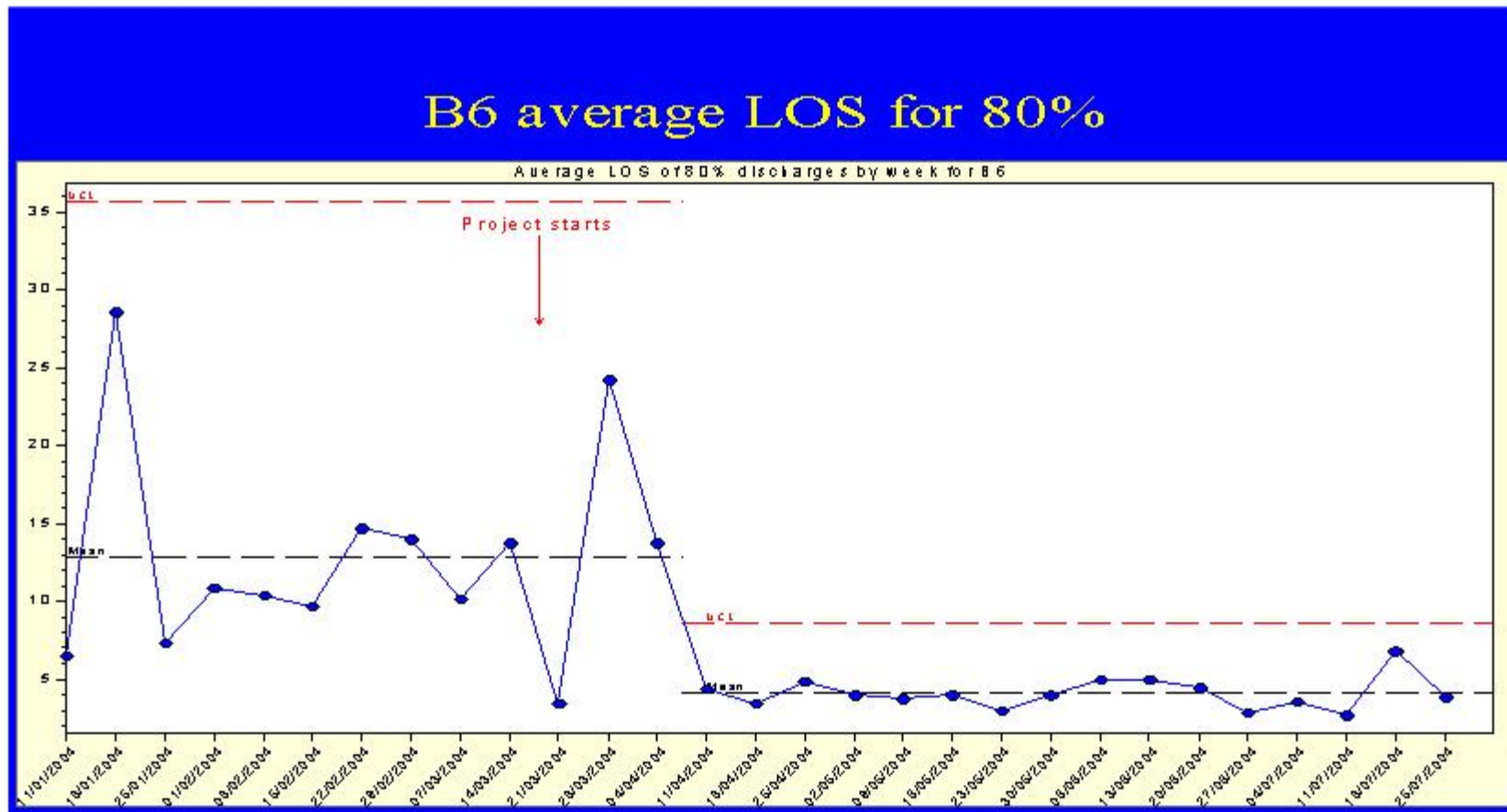


Time:
Reduced wait from 7 days to 4 hours

Saving:
£80-114 k on heparin
£310 k Hotel costs
(2500 bed days saved)

Quality:
Appropriate treatment received: reduced side effects

Improving medical discharge & length of stay on one ward

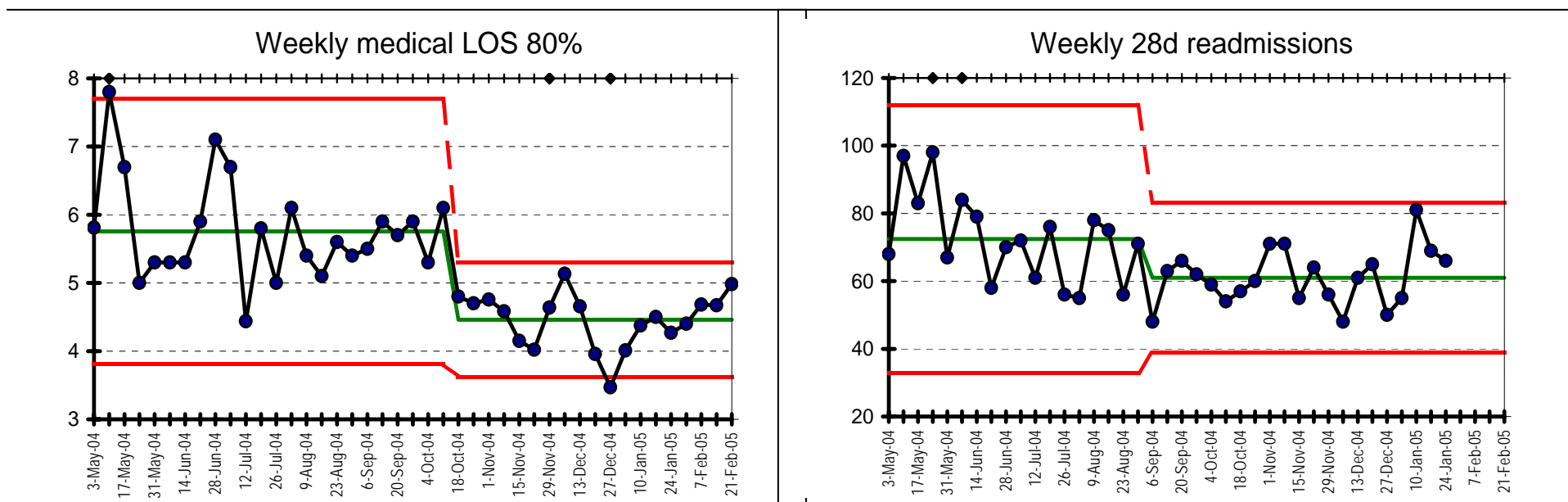


Time: average LOS for 80 % of patients reduced by 8.8 days

Saving: £514,800 per annum (based on reduced LOS hotel costs)

Quality: reduced infection risk due to reduced LOS

Improving medical discharge & length of stay one hospital



Time: average LOS for 80% of medical patients reduced by >1 day

Saving: £1,368,750 p.a. (based on 30 discharges per day and hotel costs £125/day)

Quality: better discharge planning with no increase in readmissions

Mental Health: bed occupancy

LMH Total

Special Cause Flag

Bed Occupancy %



In-patient consultants
In front line

Crisis team
(trying to
block admissions)

Time: 3 day wait to
same day assessment

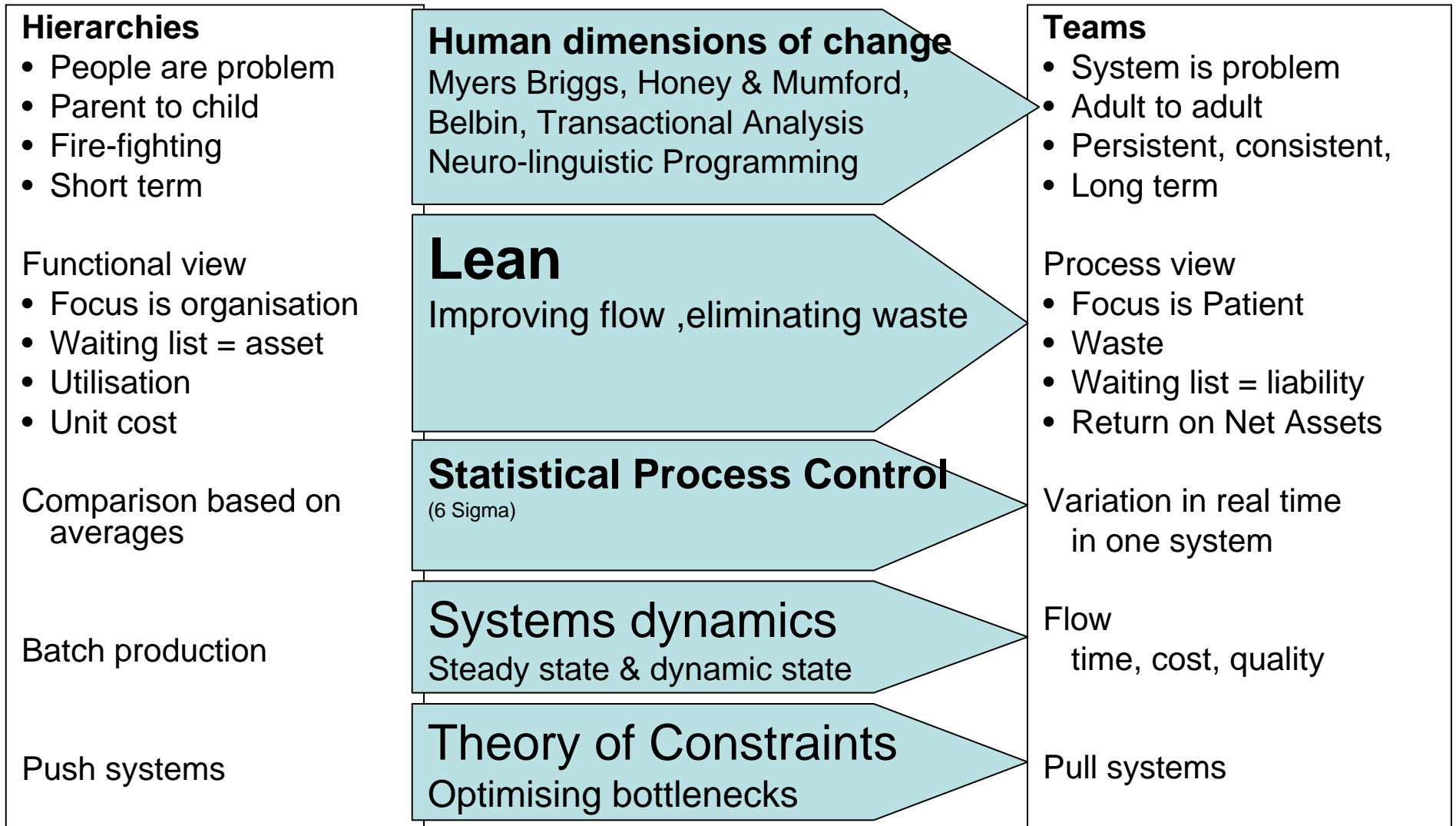
Savings: minimal: some agency
Nurse costs, but Crisis team cost+

Quality: no increase
in suicide rate.
Patients Delighted
Staff 'Thrilled'

Evaluation of first clutch of Ospreys

- Clinicians can apply manufacturing systems principles to healthcare
 - Physiology and biochemistry
 - Numerate & scientific (evidence driven)
 - SPC was the secret...
- Local projects cost £1.3 Million & delivered £9.4 Million

Paradigm shift



Leadership

Getting There

