

Hospital Waiting List Dynamics

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Outline

- The Issue
- Problems with previous approaches
- Modelling potential problems with current approaches
- Conclusions

The Issue

- Long waiting lists and long waiting times have been a major problem for the UK NHS since its inception in 1948.
- Many attempts to solve the problem, all of which have failed (though some local successes).
- Will current attempts to manage waiting lists and meet 18 week targets fare any better?

Problems with previous approaches - I

- Consultant X has a long inpatient waiting list
- So give consultant X some more beds - FAIL!
- ...because:
 - Beds not the bottleneck
 - Consultant X likes to have a long waiting list
 -

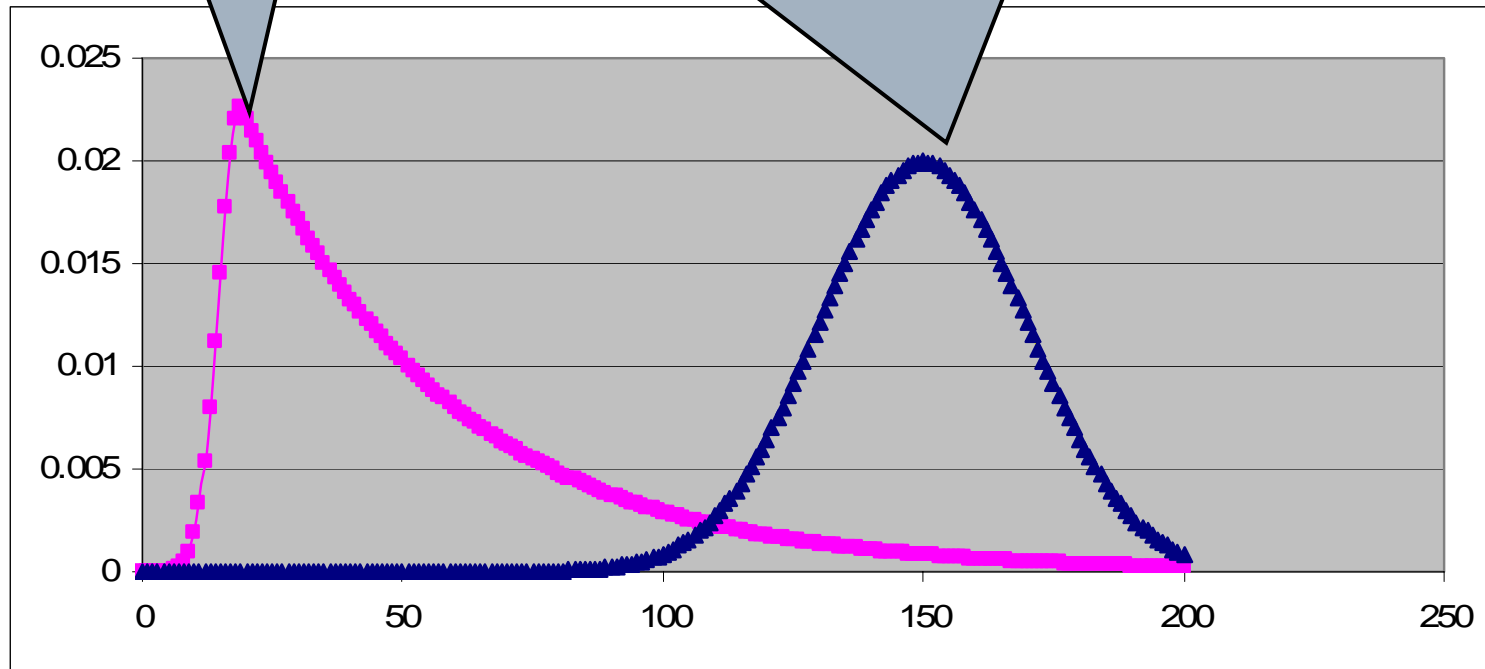
Problems with previous approaches - 2

- Consultant X has a long inpatient waiting list and insufficient theatre time
- So give consultant X more theatre time - FAIL!
- ...because:
 - X transfers more patients from outpatient WL
 - And allows more patients onto OP WL;
 - Current GPs refer more patients to X;
 - Extra GPs start to refer to X

Problems with previous approaches - 3

Classic Queue behaviour

Observed Queue behaviour, explained by:
(a) Unnecessary systematic delays, and/or
(b) Waiting time acting as rationing mechanism



Potential Problems with Current Approaches

- Concentrating on (a) – unnecessary systematic delays:
 - NHS Institute for Innovation and Improvement believe: *No Evidence that Demand exceeds Capacity;*
 - Experienced Trust Manager argues: *where clinical gatekeepers/triage mechanisms or tangible clinical thresholds exist there is no reason why referral rates should rise when waits drop.*

Potential Problems with Current Approaches

- and crossing fingers about (b) – rationing mechanism:
 - Evidence of history;
 - Experienced Trust Manager:
 - caveat is diagnostics where our intervention rates are well below European rates;
 - Having said all that I admit to having a nervousness about referral rates
 - Choose and Book

Simple System Dynamics model

- Designed to demonstrate risks to which current measures are susceptible.
- Model incorporates:
 - Throughput changes
 - Possible natural growth in underlying demand
 - Rationing effect of waiting times
 - Deterrence effect of distance
- Model (deliberately) ignores:
 - queue discipline, OP/IP shunting, random variation.

Components of Model

Simple Bathtub principle, with:

$$\begin{aligned} & \text{arrivalrate (area A to hospital H)} \\ & = D_A e^{-\gamma(W_A + d_{AH})} \end{aligned}$$

Where:

D_A = underlying demand in area A,

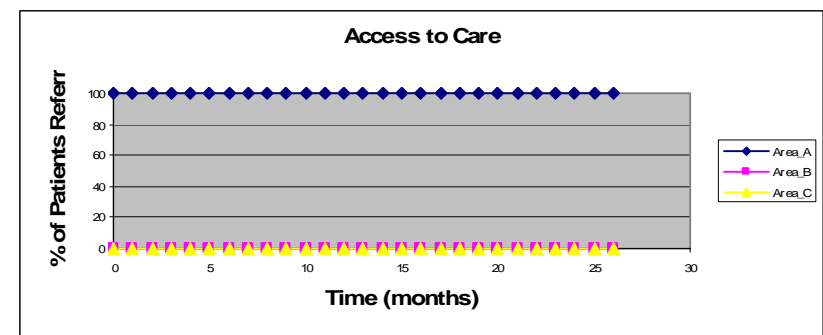
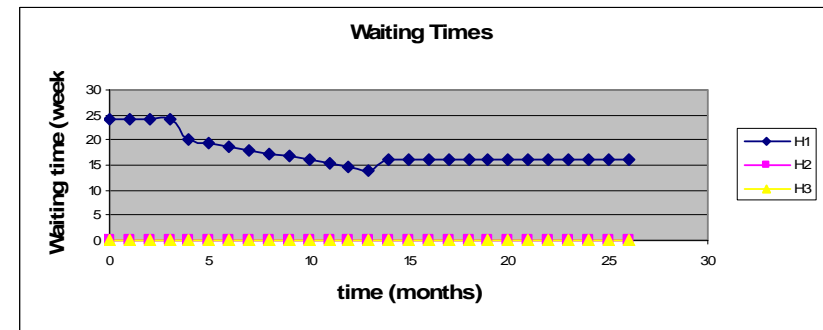
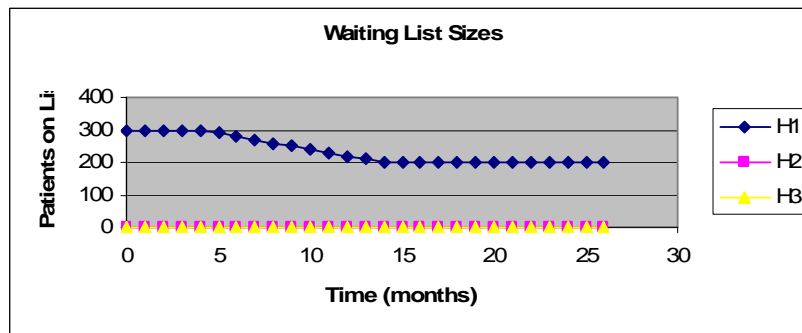
γ indicates strength of rationing/deterrence effects,

W_A = anticipated waiting time;

d_{AH} = deterrence effect of distance from area A to hospital H, in equivalent weeks

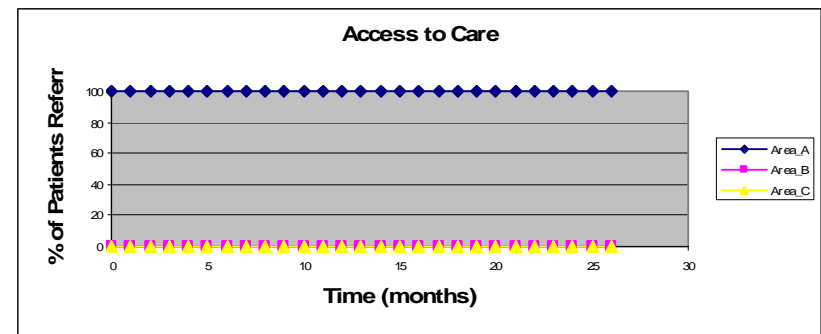
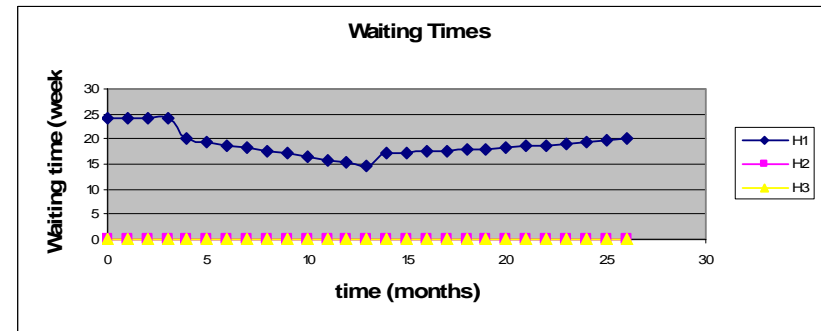
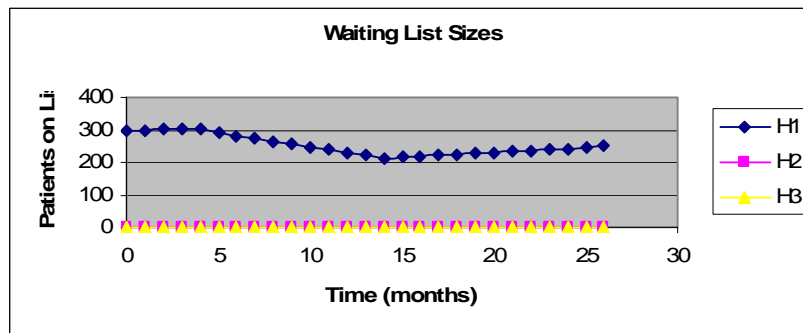
Scenario I: Throughput at Hospital I increased for 10 months to reduce backlog

No other factors



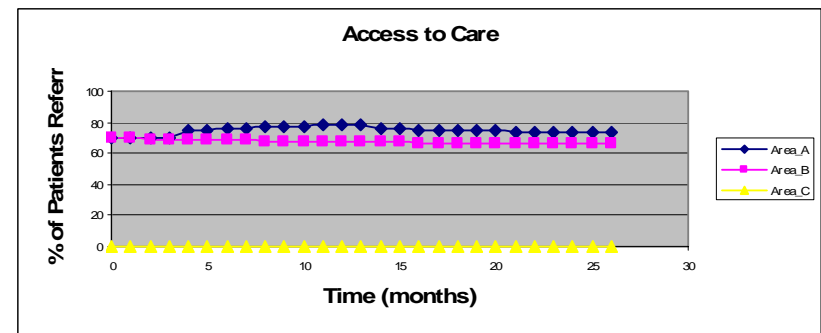
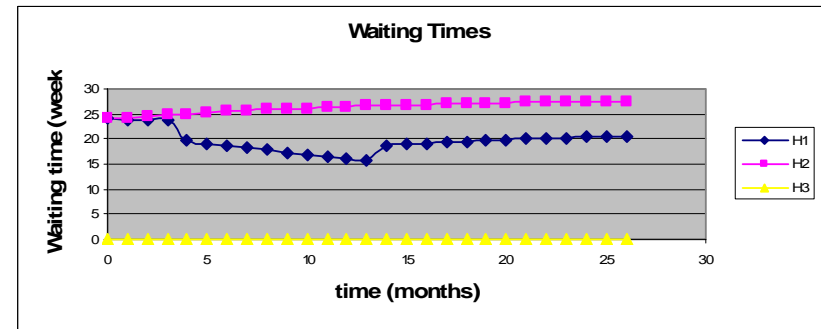
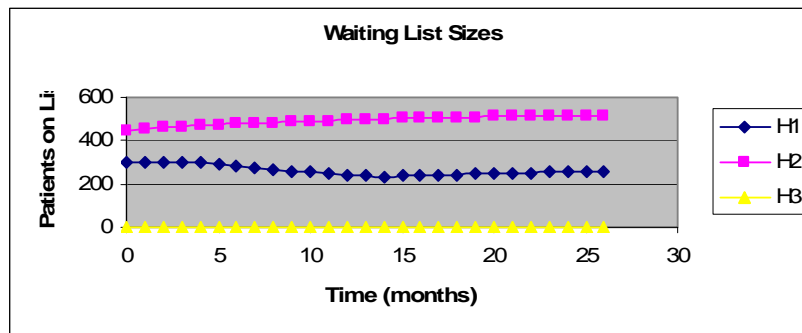
Scenario 2: Throughput at Hospital I increased for 10 months to reduce backlog

Some natural growth in demand



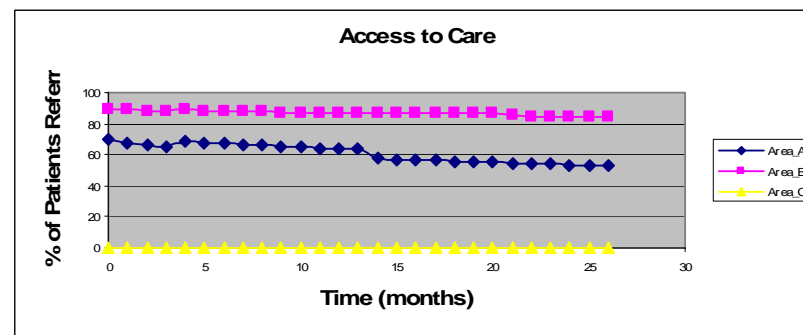
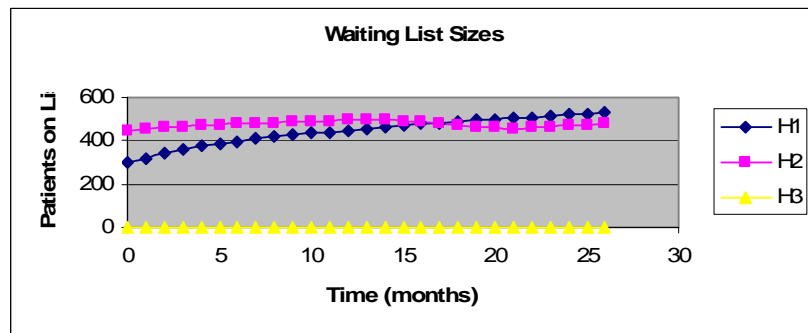
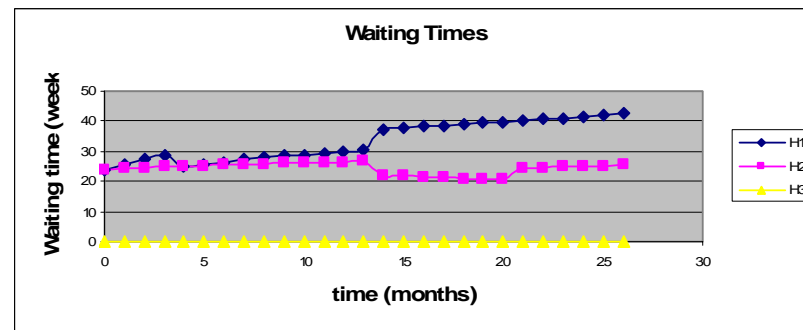
Scenario 3: Throughput at Hospital I increased for 10 months to reduce backlog

Some feedback,
no Choose and Book



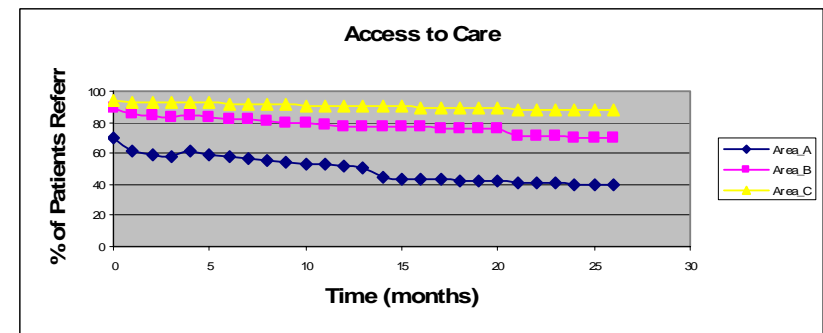
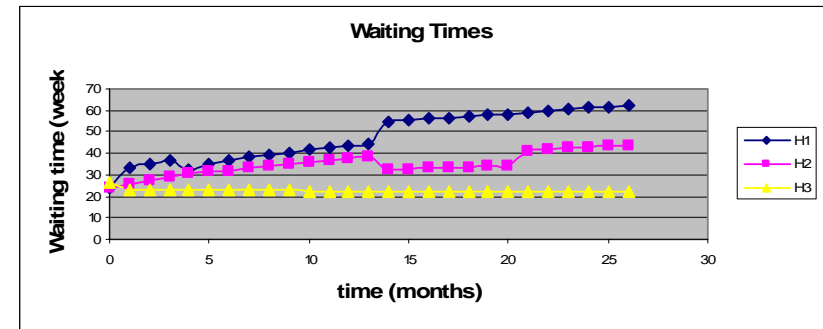
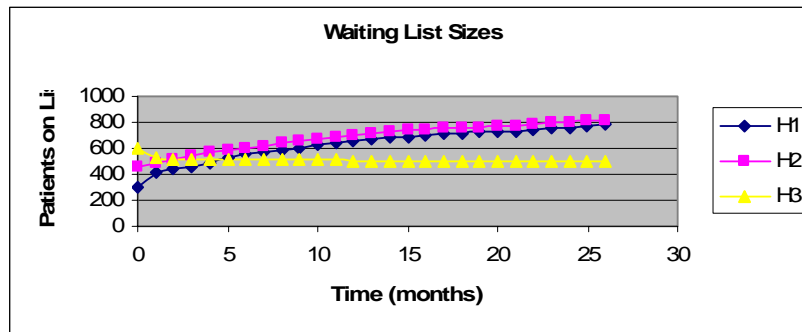
Scenario 4: Throughput at Hospital I increased for 10 months to reduce backlog

Some feedback,
some Choose & Book
From Area B to H1



Scenario 5: Throughput at Hospital I increased for 10 months to reduce backlog

Some feedback, some Choose and Book from Areas B & C to H1



In Summary

- Current measures to 'solve' waiting lists may well not have the predicted effects of achieving 18 week targets;
- They may also have some undesirable implications for equity of access;
- Careful choice of model may be key to understanding issues, and SD seems appropriate here.