# Referral-To-Treatment (RTT) Times Simulation: Patients Waiting for Elective Care

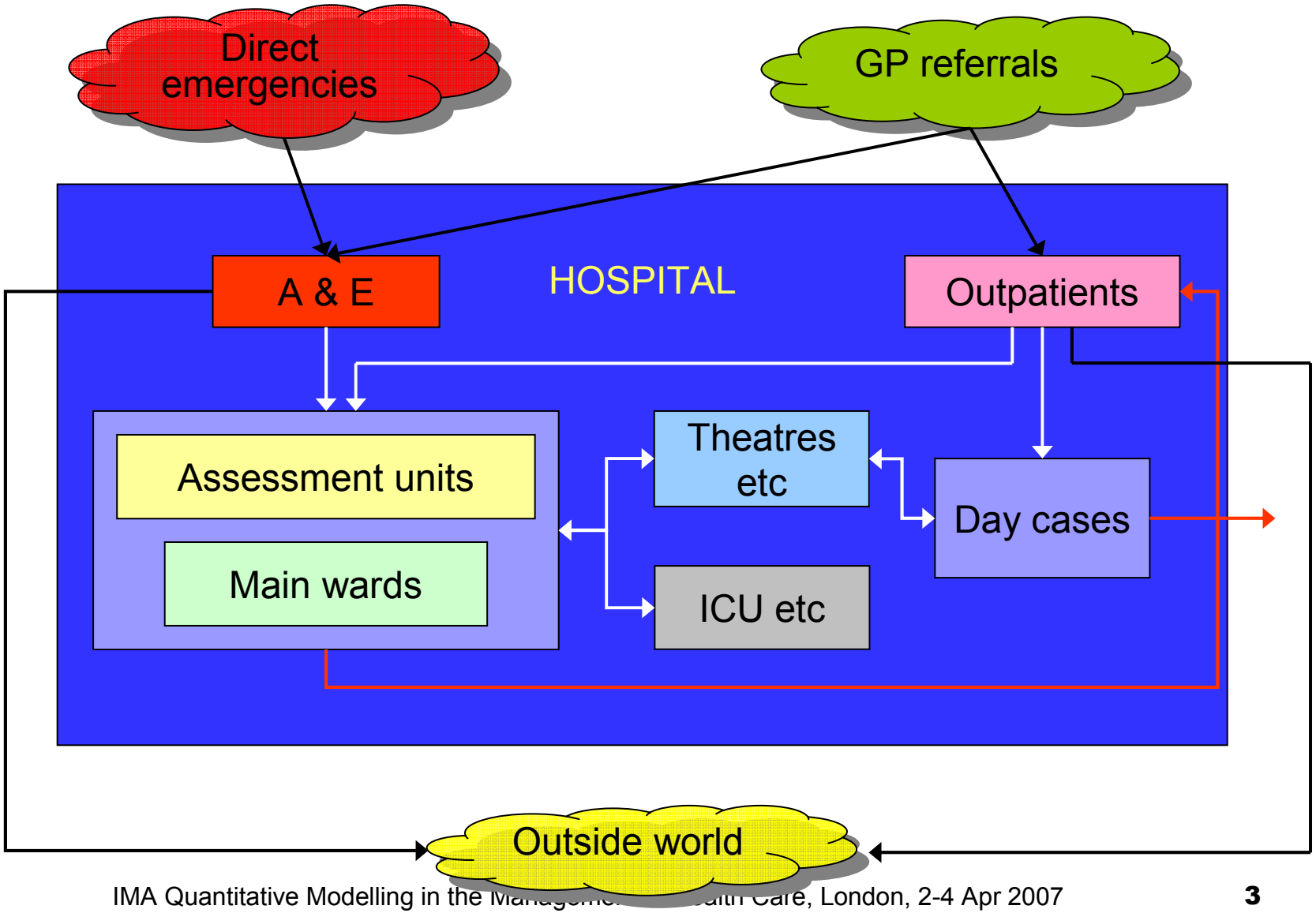
**Murat M.Gunal, Gwyn Bevan, Alec Morton, Mike Pidd**

IMA Quantitative Modelling in the Management of Health Care
London, 2-4 Apr 2007

# Outline

- Introduction
  - NHS Performance Measurement framework
  - The 18-week Target
  - DGHPSim Project
- A Simulation Model for the 3 Phases in Referral-To-Treatment (RTT) Patient Journey
  - Waiting for First Out-patient appointment
  - Waiting for Decision to admit
  - Waiting for Bed
- Data and validation issues
- Conclusion

# DGHPSim project



# Performance Measurement & Targets

National Health Service (NHS) performance assessment framework

- Government wants value for money from £90B
- Performance assessment framework
  - Had star ratings for hospitals
  - Now have Annual health check (on hospitals not patients!)
  - Includes targets
- Some waiting time targets
  - Patients should spend max 4 hour in A&Es
  - First outpatient appointment in under 13 weeks
  - Referral-to-Treatment (RTT) in 18 weeks

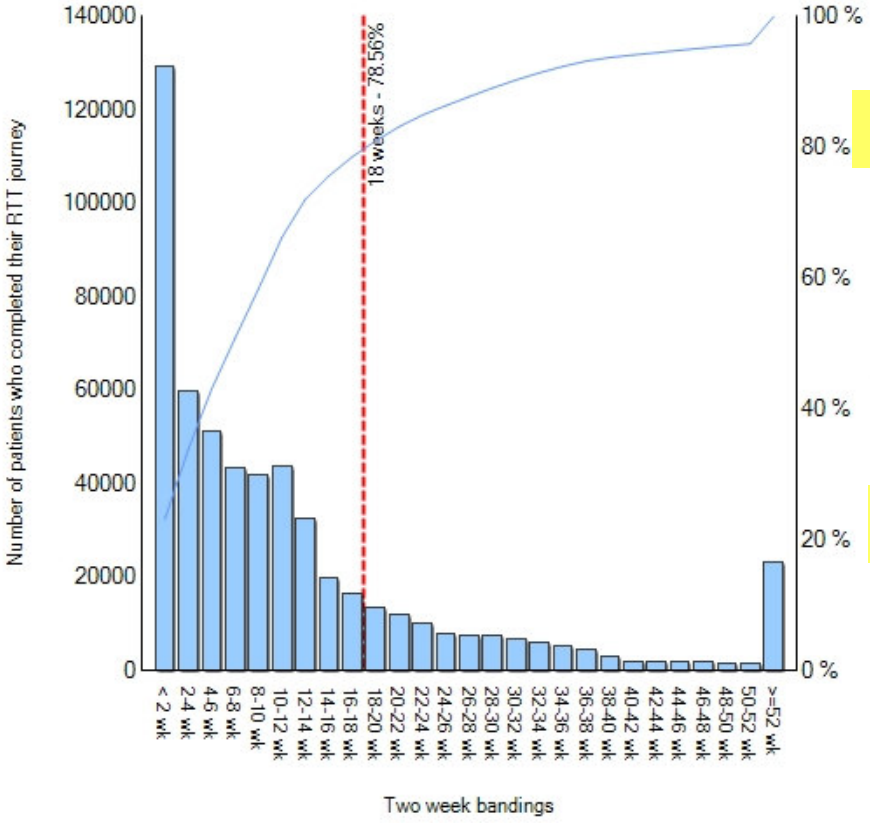
# Performance Targets

- Targets now tighter, e.g.
  - RTT down from 26 weeks to 18 weeks by 2008
- Have led to real improvements in England
  - A&E waits down from max 8 hours to 4
  - Elective in-patient waits down by 50%
  - But, some unknowns and concerns
    - Interactions
    - Feasibilities (e.g. of 18 weeks RTT)
- DGHPSim Project
  - To investigate;
    - Interaction between targets
    - Feasibility of targets

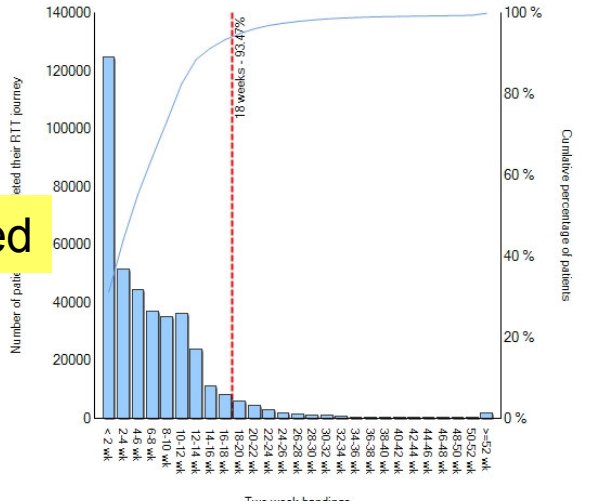
DG H PSim
District General Hospital Performance Simulation

# 18-Week RTT – Current Situation

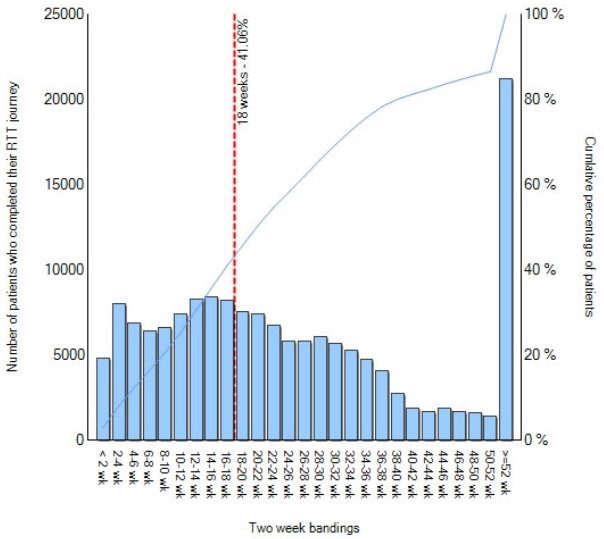
ALL Hospitals in England (Admitted and Non-admitted)
from NHS Institute's No Delay Achiever – Patient Journey Analyzer Tool
as of October 2006




Non-Admitted

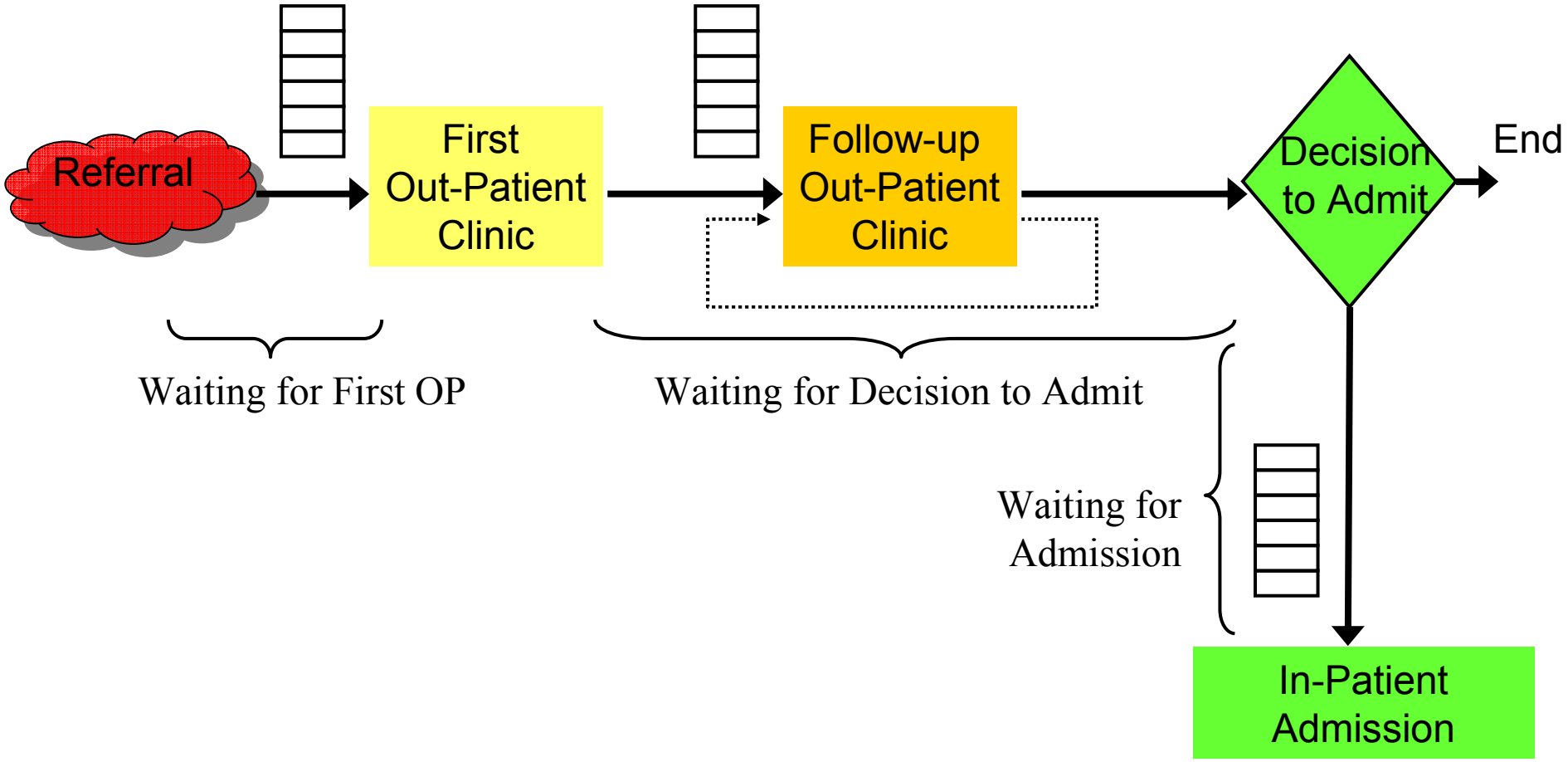



Admitted




IMA Quantitative Modelling in the Management of Health Care

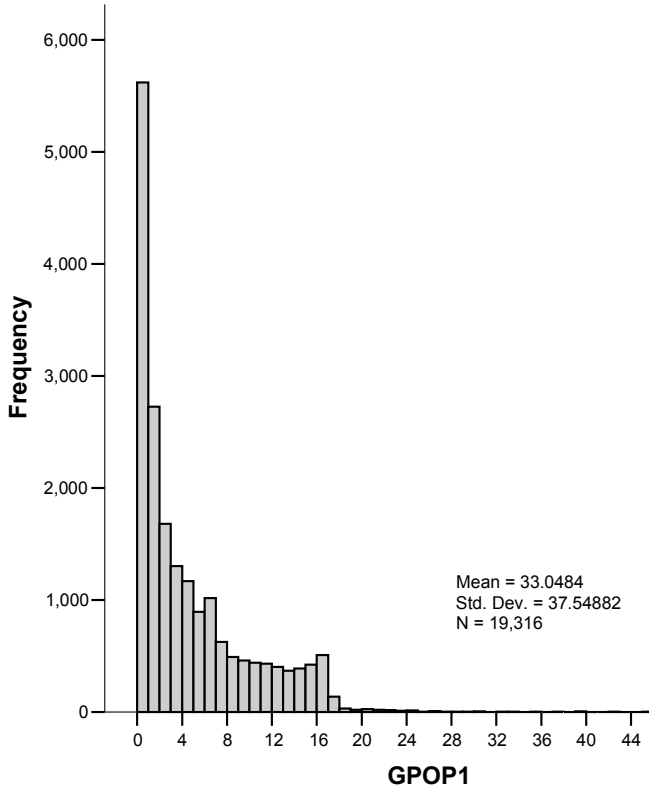
# RTT Phases (for Admitted Patients)



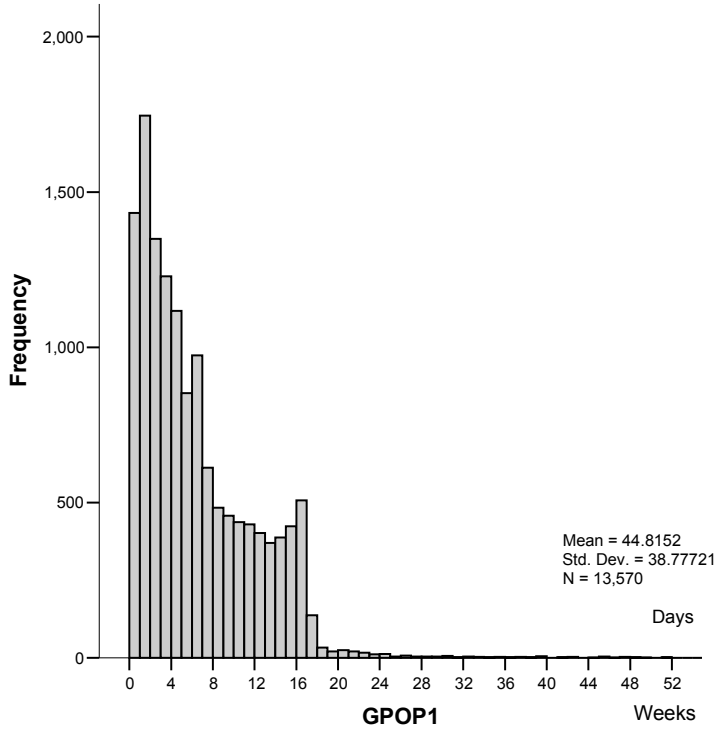
DG H PSim
District General Hospital Performance Simulation

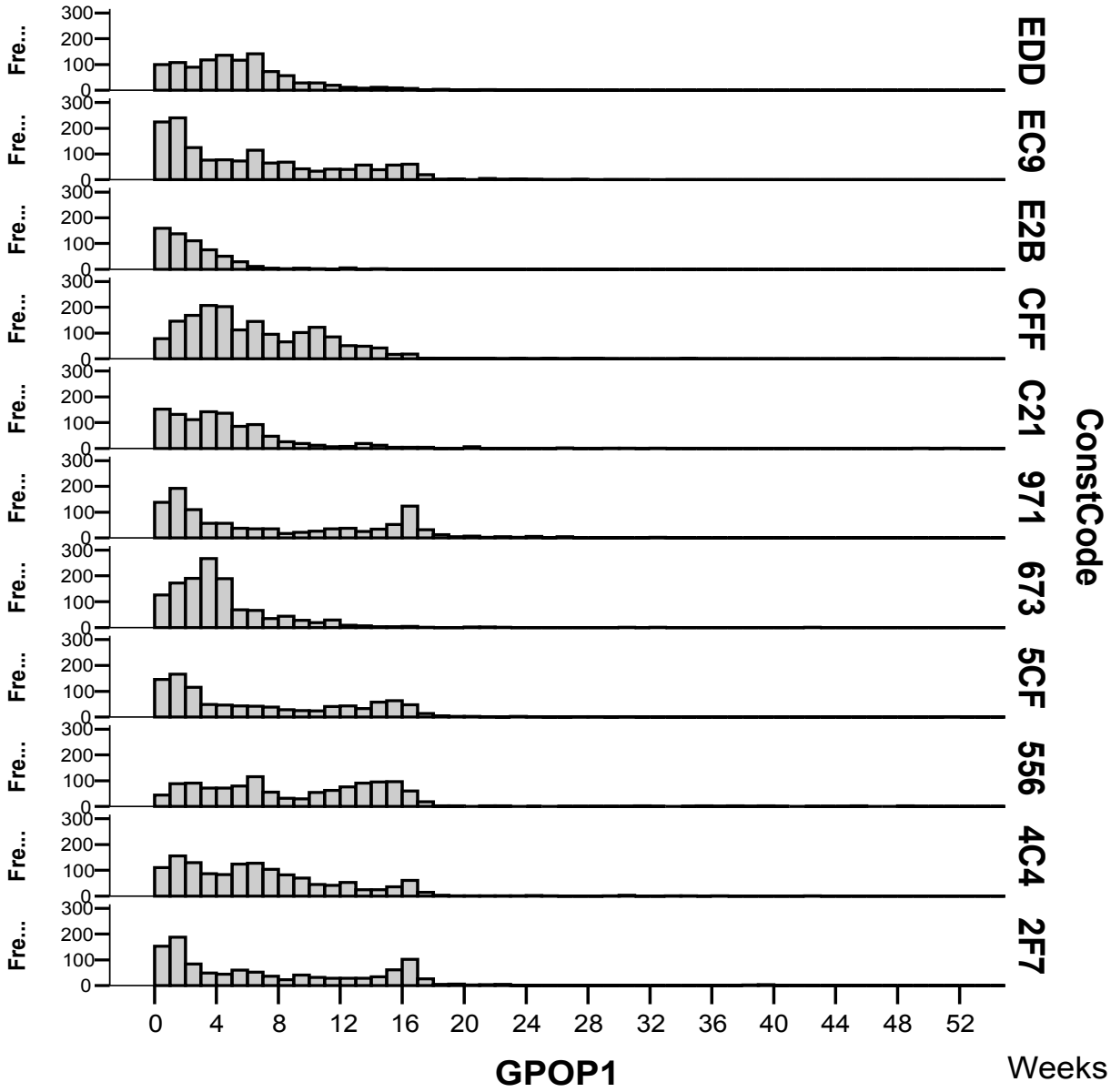
# Royal Lancaster Infirmary (RLI)
## Trauma & Orthopaedics

### Waiting for First Appointment
### All referrals




### After excluding A&E referrals






**RLI**

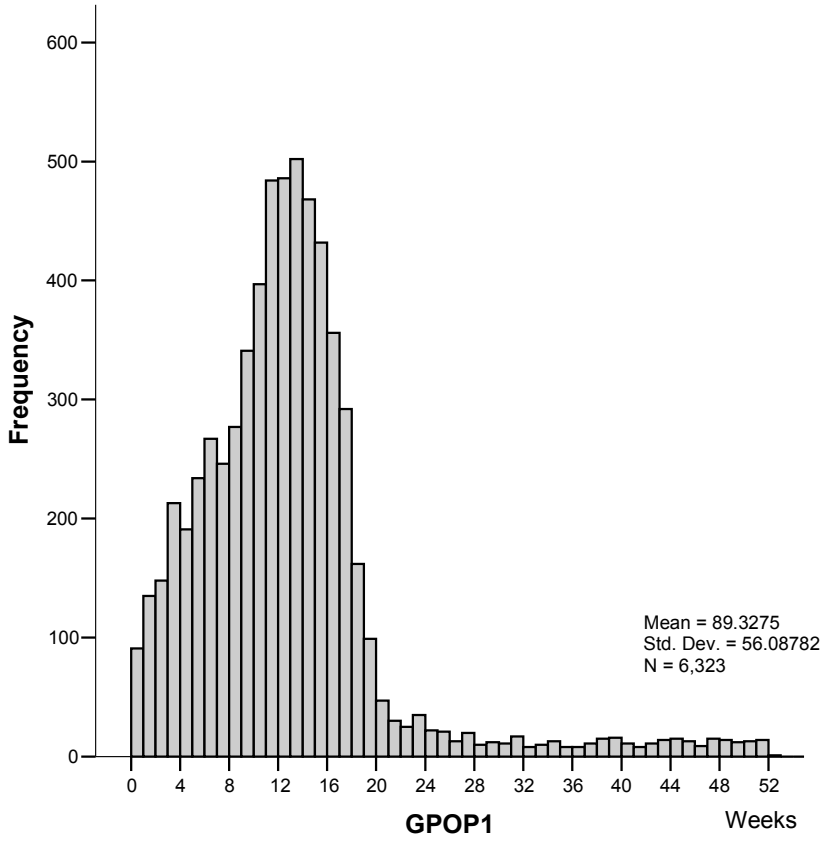
Trauma & Orthopaedics

Consultant Level

Waiting Times for First OP Appointment

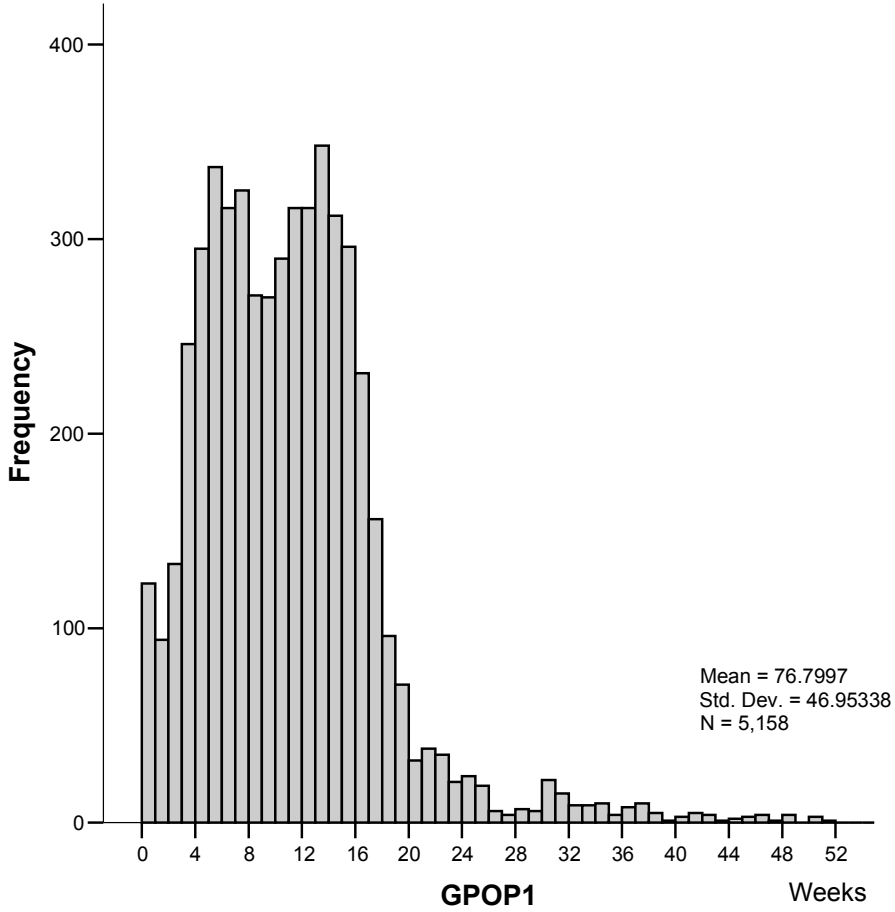
## Luton & Dunstable Hospital

Trauma & Orthopaedics




## Hope Hospital - Salford

Trauma & Orthopaedics



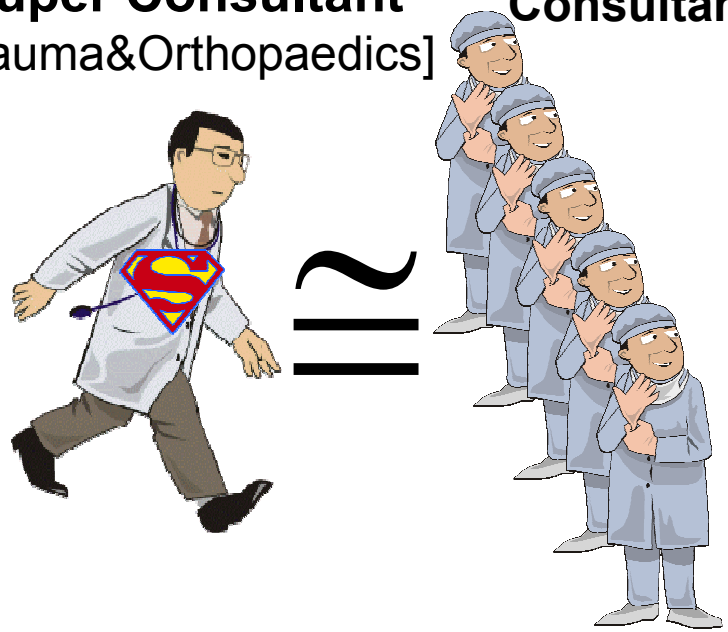
# Issues – Outpatient Model

- Needs a booking system, which increases level of detail
  - Unlikely to fit same model to each consultant, and each specialty, in every hospital
- Ratio of new/follow-up patients may vary according to change in demand
  - The system may regulate itself
- Problem of estimating delays from 1st OP to Decision to Admit
  - Clock stops & game playing

# Specialties, not Consultants?

**Super Consultant**
[Trauma&Orthopaedics]

**Consultants**



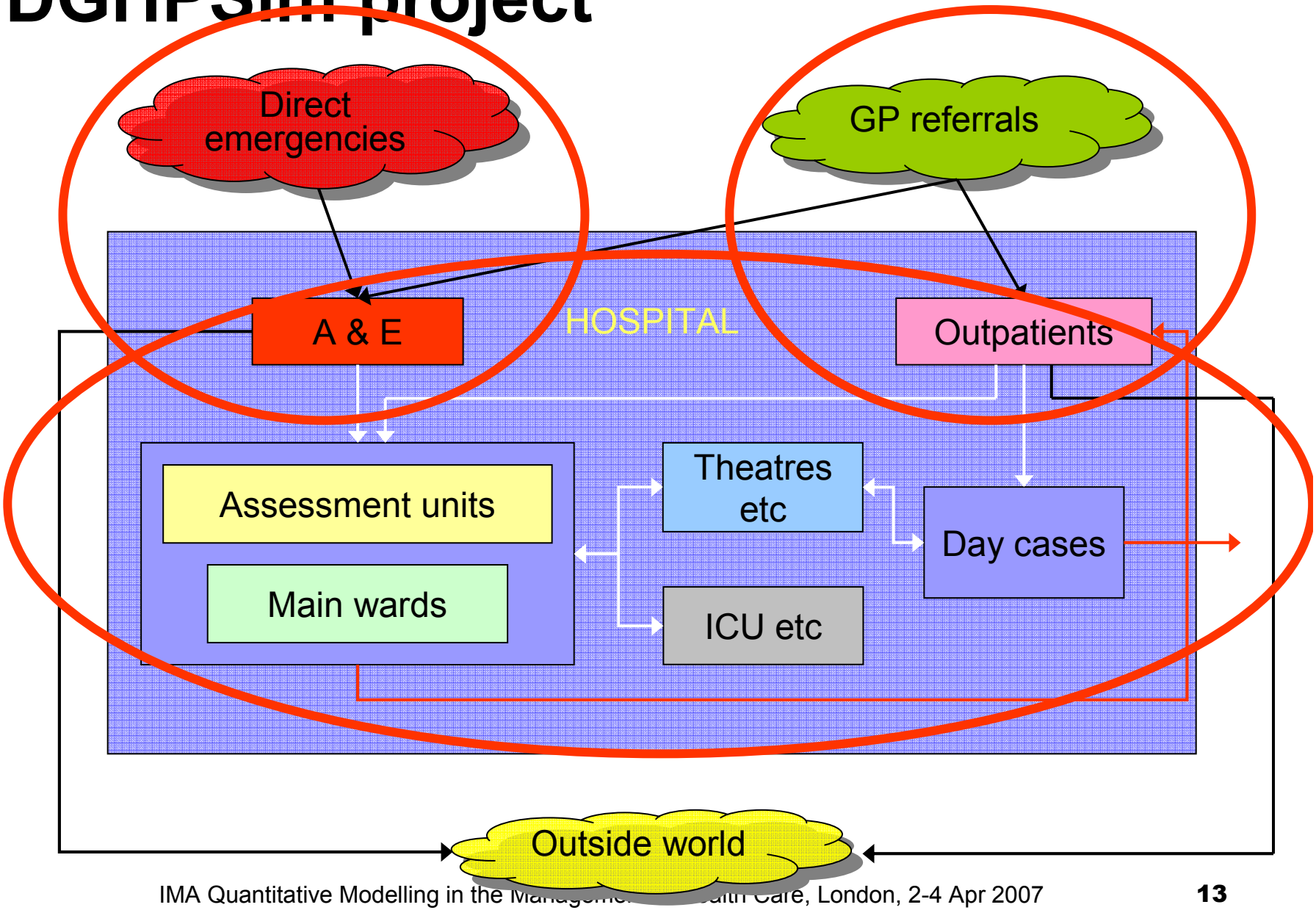
## Attributes of Super Consultant

- Number of Consultants
- Number of Clinics in a week
- Types of Appointments
- Duration of Appointments
- Priority rules

**A consultant's schedule, such as**

| Consultant | Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|
| 1 | 0.5 | 1 | 0.25 | 0.25 | 0 | 0 | 0 |
| 2 | 0.75 | 0 | 1 | 0 | 0.25 | 0 | 0 |
| 3 | 0 | 0 | 0.5 | 1 | 0 | 0 | 0 |
| 4 | 0.5 | 0 | 0.5 | 0 | 1 | 0 | 0 |
| 5 | 0 | 0.75 | 0 | 1 | 0 | 0 | 0 |

# DGHPSim project



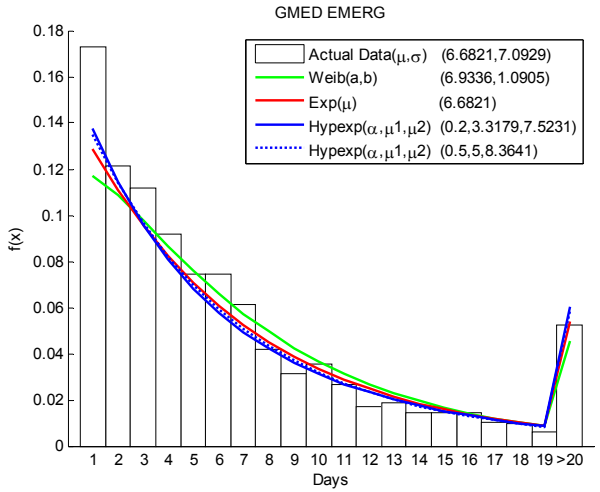
DGHPSim
District General Hospital Performance Simulation

# Inpatient Model – Overview

- Links OP Demand with IP (& Emergency) Bed Capacity
- Patient journeys in hospital: Ward Transition Matrix, e.g.

| Emergency | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Gate | GMED | GSUR | GCRI | GSPE | GELD | GWOC | GASM | Disc | Row Total |
| Gate | | 0.069 | 0.002 | 0.080 | 0.001 | 0.001 | 0.001 | 0.846 | | 1.000 |
| GMED | | 0.090 | 0.052 | 0.011 | 0.007 | 0.069 | 0.021 | 0.003 | 0.746 | 1.000 |
| GSUR | | 0.034 | 0.086 | 0.022 | 0.003 | 0.037 | 0.015 | | 0.802 | 1.000 |
| GCRI | | 0.357 | 0.025 | 0.016 | | 0.007 | | 0.032 | 0.564 | 1.000 |
| GSPE | | 0.135 | 0.054 | | 0.135 | 0.027 | | | 0.649 | 1.000 |
| GELD | | 0.043 | 0.017 | 0.009 | | 0.088 | | 0.009 | 0.835 | 1.000 |
| GWOC | | 0.010 | 0.031 | | | 0.010 | 0.041 | | 0.907 | 1.000 |
| GASM | | 0.525 | 0.025 | 0.019 | 0.003 | 0.052 | 0.006 | 0.012 | 0.358 | 1.000 |
| Disc | | | | | | | | | | |

- Duration of Stay Distributions for each Ward, e.g.



DG H PSim
District General Hospital Performance Simulation

# Conclusion

- Measuring RTT phases and data issues
- Outpatient Modelling
  - First, Follow-up, post-admission appointments
  - Consultant level thinking
- A model that can be used for any specialty? and any Hospital?