Demand and Capacity Planning

Putting Theory into Practice

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Contents

The workshop will include:

• a refresh of demand and capacity modelling methodology
• tips around effective demand and capacity planning
• examples of how Trusts have used proper demand and capacity modelling to deliver tangible service improvement
Group exercise instructions

You are the service manager for the general surgery specialty in a medium size acute trust. Over the last few months the service has started to underperform against the RTT national standards. Anecdotally, you are being told that the issues relate to theatre capacity but no evidence has been provided to support this. You decide that you need to undertake a demand and capacity modelling exercise to understand the cause and extent of the situation:

In groups, discuss:

- What are the key outputs you are looking to produce from the modelling exercise?
- What data will you need to input into the model?
- Who should lead this exercise and who should be involved?
- Who should sign off the model?
The 5 most important factors in delivering short elective waiting times

1. Pathways need to be designed holistically and in line with key waiting time parameters
2. The number of patients waiting needs to be in balance with the required waiting time for each pathway milestone
3. Sufficient capacity needs to be made available to meet demand
4. Patients should be treated according to clinical priority and in order of wait
5. Patient pathways should be actively managed
The 5 most important factors in delivering short elective waiting times

1. Pathways need to be designed holistically and to key waiting time parameters
2. The number of patients waiting needs to be consistent with the required waiting time for each pathway milestone
3. Sufficient capacity need to be made available to meet demand
4. Patients should be treated in order and by clinical priority
5. Patient pathways should be actively managed
The 3 core elements of demand and capacity modelling

1. Setting maximum waiting times (milestones) for:
   - 1st outpatient appointment
   - Diagnostics
   - Follow-up
   - Decision to Admit

2. Fully identifying and understanding the demand into the service and total core capacity available

3. Determining the current and desirable waiting list sizes
Basic principles of delivering short waits

1. Clinically appropriate sequence & chronology i.e. what should happen, in what order & when
2. Take account of likely diagnostics required
3. Understand surgical conversion ratios
4. Understand % of clock stops at 1st outpatient appointment
5. Surgical pathways will look different to medical pathways
6. Take into consideration internal transfers between specialties e.g. dermatology to plastics
7. Understand impact of inter-provider transfers and agree maximum transfer milestones
Interim Management and Support

Referral → 1st Outpatient Appointment → DTA → Admission
Demand and capacity

What we should do

What we actually did

What we could do

What stops us from doing

What we plan to do

Interim Management and Support

NHS
Maximum waiting list sizes
Why is the size of the list important?
Why is the size of the list important?
Why is the size of the list important?
Why is the size of the list important?
Did this patient breach the maximum waiting time?
Access to Demand and Capacity Tools

- NHS IMAS Elective Care Intensive Support Team has developed a suite of demand and capacity modelling tools for elective care.
- Available for free via the IMAS website: [www.nhsimas.nhs.uk/ist](http://www.nhsimas.nhs.uk/ist)
- ALWAYS – download a fresh version of the model from the website – they are constantly being updated / improved or de-bugged!
- FOLLOW THE INSTRUCTIONS - especially around pasting data or contact the Intensive Support Team
- We are able to offer advice on using these tools and good practice guidance around undertaking demand and capacity modelling and planning.
**Benefits and limitations of models**

- Models are essentially mathematical calculations, therefore:
  - they cannot predict the precise variations of reality
  - they don’t guarantee compliant waiting times performance
  - they become less reliable where data quality is poor
- However, models can support more informed, less anecdotal discussions (but they are not designed to replace them)
- Models get people talking and help to increase the level of understanding of services
Purpose of the models

The models help you to:

• Understand your demand and the variation in demand
• Understand the current service (median waits, DNAs, ROTT and rebookings)
• Understand the core capacity you have to see patients and the ad hoc/flexible capacity you rely on to deliver the service

The model will indicate:

• An estimate of the capacity you need to meet your demand
• The backlog that may need to be cleared to achieve a sustainable position
Outpatient Demand and Capacity Model

• Understand your outpatient demand and capacity
• Use when looking at RTT 18 Week pathways
• Incorporates all types of outpatient referrals and urgency
Cancer First Outpatient Capacity and Demand Model

• Understand your urgent 2 week wait demand and capacity
• Use when looking at suspected cancer and breast symptoms pathways
• Provides outputs in days
• Includes patient experience indicators e.g. choice and booking behaviours
Waiting List Dynamics Model

- Understand your inpatient and daycase demand
- Use when looking to model admitted pathways
- Understand the core capacity you genuinely have available to admit patients
Endoscopy Model

• Understand your endoscopy capacity
• Allows modelling by modality e.g. flexi sigmoidoscopy, colonoscopy, gastroscopy etc.
• Allows points/units or patients volumes to be used
Advanced Flow
Capacity and Demand Tool

• Understand your specialty demand across the entire patient pathway
• Understand the variation in demand
• Demonstrates the relationship between the various parts of the patient pathway e.g. outpatients and decisions to admit
• Understand the core capacity you genuinely have available to see patients across the whole pathway
Welcome - The IST IMAS First Outpatients Demand and Capacity (D&C) Model

Purpose

This model helps you to understand how many patients are referred to your Trust (your demand), how this changes from day to day and week to week (the variation). It is then intended to help you understand how many slots (your capacity) you currently have to see patients and how much you might need to meet your demand.

Scope

This model is intended for use in Trusts providing a first outpatient service to patients. This model is aimed primarily at operational managers as users, with the summary and conclusions intended for a mixed audience of managers and clinicians.

Requirements

To use this model you need:

- 12 months' recent referral data
- data for your most recent 1-3 months' attendances
- details of available slots to see new patients, both for core and ad-hoc extra capacity
- an understanding of how many of your patients Do Not Attend (DNA) their first appointment (although this can be inferred from your attendance data)
- an understanding of how many of your patients are referred using the Choose and Book (C&B) system
- an understanding of how many of your patients' appointments are rearranged

Assumptions

The estimated sustainable levels given in this model are based on the 85th percentile level of your referrals. This model assumes no growth in referrals, i.e. that the same number will be received in the coming year as were received over the past year.

Limitations

Any model is by definition a theoretical guide and should be used as one of a number of tools to help you to better understand, plan and manage your service. The use of this model does not give any assurance of waiting times performance and should not be taken as a guarantee. The outputs of any model are only as good as the information entered. If you do not accurately enter your demand and capacity information the model will not give meaningful results. The numbers displayed are rounded for ease of reading.

This model uses mean referrals per week as a proxy for your demand to produce approximate results.

Description of Tabs

Data This is where you enter your referral and attendance here. The model will not work if this sheet is not fully completed.
### Your Trust:
A. N. Other NHS Foundation Trust

### Specialty:
Other (Enter Below)

<table>
<thead>
<tr>
<th>Specialty</th>
<th>1,495</th>
</tr>
</thead>
</table>

### Your Current Waiting List Size
(Both With and Without an Date)
1,495

#### Attendance Data

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Total Referrals Received</th>
<th>By Choose &amp; Book</th>
<th>By Paper/Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>153</td>
<td>104</td>
<td>49</td>
</tr>
<tr>
<td>2</td>
<td>123</td>
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<td>45</td>
</tr>
<tr>
<td>3</td>
<td>127</td>
<td>88</td>
<td>39</td>
</tr>
<tr>
<td>4</td>
<td>141</td>
<td>94</td>
<td>47</td>
</tr>
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<td>5</td>
<td>137</td>
<td>100</td>
<td>37</td>
</tr>
<tr>
<td>6</td>
<td>128</td>
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<td>7</td>
<td>152</td>
<td>116</td>
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<td>8</td>
<td>125</td>
<td>82</td>
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</tr>
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<td>9</td>
<td>134</td>
<td>91</td>
<td>43</td>
</tr>
<tr>
<td>10</td>
<td>130</td>
<td>80</td>
<td>50</td>
</tr>
</tbody>
</table>

#### Referral Data

<table>
<thead>
<tr>
<th>Referral Date</th>
<th>Choice Given?</th>
<th>DNA Date (If Available)</th>
<th>Offer Date (If Available)</th>
<th>First Seen Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>09/05/2011</td>
</tr>
<tr>
<td>08/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>09/05/2011</td>
</tr>
<tr>
<td>11/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>15/04/2011</td>
</tr>
<tr>
<td>13/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>17/04/2011</td>
</tr>
<tr>
<td>11/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>24/04/2011</td>
</tr>
<tr>
<td>11/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>20/04/2011</td>
</tr>
<tr>
<td>11/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>15/04/2011</td>
</tr>
<tr>
<td>11/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>20/04/2011</td>
</tr>
<tr>
<td>12/04/2011</td>
<td></td>
<td></td>
<td></td>
<td>12/04/2011</td>
</tr>
<tr>
<td>Clinic Name on PAS</td>
<td>Description 1 e.g. cons. name</td>
<td>Description 2 e.g. day of week, site</td>
<td>Weeks Per Year</td>
<td>Totals</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>SM222</td>
<td>Smith</td>
<td>Thursday</td>
<td>38</td>
<td>14</td>
</tr>
<tr>
<td>JN001</td>
<td>Jones</td>
<td>Wednesday</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td>FK001</td>
<td>Frank</td>
<td>Monday</td>
<td>38</td>
<td>12</td>
</tr>
<tr>
<td>BL123</td>
<td>Blythe</td>
<td>Monday</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td>RG234</td>
<td>Rogers</td>
<td>Tuesday</td>
<td>38</td>
<td>20</td>
</tr>
<tr>
<td>WT980</td>
<td>Watson</td>
<td>Monday</td>
<td>38</td>
<td>20</td>
</tr>
</tbody>
</table>
Parameters Tab

Mean Referrals Per Week
157

Mean referrals Per Day (includes weekends)
22

Proportion of Urgent Referrals Received
10%

Appointments Where Choice Not Given
100.0%

C&B Appointments
70.8%

Target Urgent Waiting Time
2

Rearranged Appointments
0.0%

DNA Rate
19.0%

Maximum Routine Waiting Time (Weeks)
6

Week Routine Appointments Commence
3

DNA Discharged to Primary Care
40%
### Current Service

**A. N. Other NHS Foundation Trust - A Specialty**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Per Week</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean referrals Received</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>Of Which Urgent</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Routine Paper/Fax</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Routine Choose &amp; Book</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Mean DNAs (routine referrals)</td>
<td>29.8</td>
<td></td>
</tr>
<tr>
<td>Of Which Reappointed</td>
<td>16.1</td>
<td></td>
</tr>
<tr>
<td>Of Which Discharged</td>
<td>10.7</td>
<td></td>
</tr>
<tr>
<td>Mean Rearranged Slots</td>
<td>0.0</td>
<td></td>
</tr>
</tbody>
</table>

**Patient Experience**

<table>
<thead>
<tr>
<th>Indicator</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean waiting time</td>
<td>4 Weeks</td>
</tr>
<tr>
<td>Median waiting time</td>
<td>5 Weeks</td>
</tr>
<tr>
<td>After planned mid-point (week 5)</td>
<td>36.2%</td>
</tr>
<tr>
<td>In planned final week (week 6)</td>
<td>25.4%</td>
</tr>
</tbody>
</table>

### Required Capacity

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Sustainable Range</td>
<td>176 to 222</td>
</tr>
<tr>
<td>Mean Referrals Received</td>
<td>157</td>
</tr>
<tr>
<td>Mean DNAs Reappointed</td>
<td>16</td>
</tr>
<tr>
<td>65th Percentile</td>
<td>176</td>
</tr>
<tr>
<td>85th Percentile</td>
<td>222</td>
</tr>
</tbody>
</table>

*You currently have 28 fewer slot(s) than required to sustain the service at a comfortable level (85th percentile)*
Outpatient Model- Trust 1

Ophthalmology Service

Context

- Two-site medium sized district general hospital-Foundation Trust
- Decided to undertake demand and capacity modeling across all specialties
- Ophthalmology was a pilot specialty as had significant capacity deficit in relation to delivering timely 1st outpatient appointments
- Waiting list initiative clinics used to manage backlog but on an ad-hoc basis resulting in batching
Outpatient Model- Trust 1 (2)

Model Outputs

**Required Capacity**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Sustainable Range</td>
<td>166</td>
</tr>
<tr>
<td>Mean Referrals Received</td>
<td>155</td>
</tr>
<tr>
<td>Mean DNAs Reappointed</td>
<td>2</td>
</tr>
<tr>
<td>65th Percentile</td>
<td>166</td>
</tr>
<tr>
<td>85th Percentile</td>
<td>188</td>
</tr>
</tbody>
</table>

You currently have 22 fewer slot(s) available than referrals coming in plus reappointed DNAs

You currently have 31 fewer slot(s) than required to sustain the service at a minimum level (65th percentile)

You currently have 55 fewer slot(s) than required to sustain the service at a comfortable level (85th percentile)
Outpatient Model - Trust 1 (3)

Outcome

• A significant capacity deficit for first outpatient appointments (between 31 and 55 slots per week).
• The specialty had a significant backlog of between 226 and 282 slots, with no plan to clear this backlog
• The Contract with the Commissioners was set at sessional capacity and not at demand - the model facilitated discussions to change this
• The Trust formulated a plan to set capacity at the correct level and clear the backlog
Inpatient Model- Trust 2

Trauma and Orthopedics Service

Context

• Two site Foundation Trust
• Had failed to achieve the admitted target for three consecutive quarters and was projecting failure for the fourth- Monitor issue
• Concerns about underlying RTT processes and planning capability
• Lack of robust Demand and Capacity modeling within the organisation
• Trauma and Orthopedics identified as a potential issue
Inpatient Model- Trust 2 (2)

Model Outputs

![Graph showing capacity versus demand over weeks.]

**Clearing a Backlog**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL consistent with RTT delivery</td>
<td>139 to 153</td>
</tr>
<tr>
<td>Current waiting list size</td>
<td>156</td>
</tr>
<tr>
<td>Required reduction in backlog</td>
<td>3 to 17</td>
</tr>
</tbody>
</table>

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients on a Social Pause</td>
<td>40</td>
</tr>
<tr>
<td>Proportion of Waiting ListPaused</td>
<td>26%</td>
</tr>
<tr>
<td>Planned Waiting List Size</td>
<td>0</td>
</tr>
</tbody>
</table>

- Less Than 2%
  - 2%-5%
  - Over 5%
Inpatient Model- Trust 2 (3)

Outcomes

• Demand is broadly in-line with capacity for the service, although the service is propped up through additional sessions and ROTT rate.

• Slight waiting list backlog that needs to be cleared, but can be managed through the regular additional / ad-hoc capacity in place.

• High rate of pauses gives an indication that RTT rules are not being applied correctly across the specialty.

• Limited evidence of validation of breaches to understand reasons.
Endoscopy Model- Trust 3

Context
• Medium sized teaching hospital with two sites- Foundation Trust.
• One Endoscopy Unit with three procedure rooms.
• Very poor patient environment with significant space issues.
• The services outsources work too four different external providers to deal with demand- Commissioners have asked the Trust to take additional work for 2013-14.
• Problems with achieving diagnostic target
Endoscopy Model - Trust 3 (2)

Model Outputs

### Required Capacity

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Sustainable Range</td>
<td>450 to 540</td>
</tr>
<tr>
<td>Mean Active DTAs</td>
<td>419</td>
</tr>
<tr>
<td>Mean DNAs Rebooked</td>
<td>4</td>
</tr>
<tr>
<td>65th Percentile (minus ROTT)</td>
<td>490</td>
</tr>
<tr>
<td>85th Percentile (minus ROTT)</td>
<td>540</td>
</tr>
</tbody>
</table>

- You currently have 109 fewer slot(s) available than DTAs per week plus DNAs minus ROTT.
- You currently have 265 fewer slot(s) than required to sustain the service at a minimum level (65th percentile).
- You currently have 256 fewer slot(s) than required to sustain the service at a comfortable level (85th percentile).

### Clearing a Backlog

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL consistent with delivery</td>
<td>581 to 643</td>
</tr>
<tr>
<td>Current waiting list size</td>
<td>1066</td>
</tr>
<tr>
<td>Required reduction in backlog</td>
<td>423 to 485</td>
</tr>
<tr>
<td>Net Weekly Reduction of Backlog</td>
<td>45</td>
</tr>
<tr>
<td>Of Which Core Activity</td>
<td>n/a</td>
</tr>
<tr>
<td>Of Which Additional Activity</td>
<td>45</td>
</tr>
<tr>
<td>To Clear Backlog At This Rate</td>
<td>9 to 11 wks</td>
</tr>
</tbody>
</table>
Endoscopy Model- Trust 3 (3)

Outcome

• The service has a very significant capacity deficit against core capacity (between 205 and 256 points per week).
• The service is entirely propped up through outsourcing work to four external providers and additional sessions completed out of hours.
• A backlog of patients (423-485 points) exists which requires clearing.
• The modeling has supported the Trusts Business Case to develop a new unit and bring all work in-house
Understanding the data required

- Demand data is far better than making estimates from activity data
- Don’t make assumptions around consultant availability and leave – does the service really run 52 weeks a year?
- When looking at current core capacity don’t count over-bookings ad-hoc or out-sourced activity
Understanding the outputs

• How much capacity does the service need?
  • plan to meet the variation in demand
  • use the 65th to 85th percentile
  • refine this with knowledge of the service (favourable/unfavourable factors)
• Review the variation in your demand by using the SPC chart
  • Understand seasonal patterns e.g. winter ‘v’
• Backlog clearance rates
  • How long will it take to clear the backlog?
  • How will you clear the backlog?
Sense checking the data

• Compare number of referrals against 1st outpatient seen for last 12 months
• Compare number of additions to the waiting list against actual admissions
• Can major differences in the above be explained by changes in the waiting lists? e.g. growth?
• Is there a logical explanation for high ROTT rates e.g.
  • High 1st outpatient waiting list ROTT driven by rejection of referrals that do not meet clinical thresholds (e.g. breast augmentation for cosmetic reasons)
  • High admitted waiting list ROTT driven by patient drop-out at pre-assessment (e.g. degenerative spinal surgery)
Pitfalls to avoid

• Data challenges:
  • Inability to extract referral data
  • Using activity as a proxy for demand
  • Using activity as a proxy for capacity

• Poorly evidenced growth assumptions:
  • Planned increases in capacity that do not stand up to external scrutiny

• Lack of holistic planning:
  • Planned increases in outpatient capacity with no supporting theatre sessions (in surgical specialties)

• Poor data collection and booking processes:
  • High ROTT rates (without a reasonable clinical explanation)
Getting the most from process 1

1. Involve clinicians right from the start of the process
2. Ensure appropriate senior management awareness of the modelling work – you’ll need support re: timescales, escalations, finances and commissioner negotiations as appropriate
3. Recognise that demand and capacity modelling is an operational task not an information team responsibility
4. BUT modelling is a collaborative exercise between managers, clinicians and information staff
Getting the most from process 2

5. Avoid delays and multiple ad-hoc information requests by agreeing the common data requests based on the inputs upfront
6. Decide what’s in and what’s out - compare apples with apples
7. Plan capacity to meet demand – not contracted volumes
8. Review demand and capacity on a rolling basis
9. Monitor trends in demand and revise capacity plans as required
10. Share plans with commissioners
Intensive Support
Team Contacts

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