

The Peninsula Collaboration for Health Operational Research & Development

Application of simulation and queuing theory to scheduling community mental health assessment

Summary:

Devon Partnership Trust, who run mental health services across most of Devon, planned to implement a “choose and book” telephone booking system for mental health assessment. PenCHORD were asked to advise on how many appointment slots were needed in each team to meet waiting time targets. Simulation was used to assess the choose and book system and to demonstrate the principle of queue sharing, where waiting times may be reduced by allowing teams to share work when appropriate. The result is that the trust has significantly reduced waiting times for mental health assessment.

Context:

Devon Partnership Trust, planned to implement a centralised “choose and book” telephone booking system for mental health assessment. This would book patients into available diary slots for the appropriate local team. As this system was new, the trust requested help in forecasting the number of appointment slots to schedule into the diary to provide good waiting times for patients but without allocating excessive spare capacity in the system. A simulation-based approach also allowed for the examination of sharing work between teams, especially to avoid breaching waiting time targets.

Pooling matrix

Patients initially referred in this teams region (below)	Patients may be seen by these teams										
	East Devon - Exmouth	East Devon - Honiton	Exeter	Mid Devon - Crediton	Mid Devon - Tiverton	North Devon - Tawside	North Devon - Torrington	South Hams	Teignbridge	Torbay	West Devon
East Devon - Exmouth	1	1	1	0	0	0	0	0	0	0	0
East Devon - Honiton	1	1	1	0	0	0	0	0	0	0	0
Exeter	1	1	1	1	0	0	0	0	0	0	0
Mid Devon - Crediton	0	0	0	1	1	1	0	0	0	0	0
Mid Devon - Tiverton	0	0	0	1	1	1	0	0	0	0	0
North Devon - Tawside	0	0	0	1	1	1	1	0	0	0	0
North Devon - Torrington	0	0	0	0	0	1	1	0	0	0	0
South Hams	0	0	0	0	0	0	1	1	1	1	1
Teignbridge	0	0	1	0	0	0	1	1	1	0	0
Torbay	0	0	0	0	0	0	0	1	1	1	0
West Devon	0	0	0	0	0	0	1	0	0	0	1

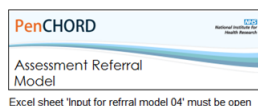
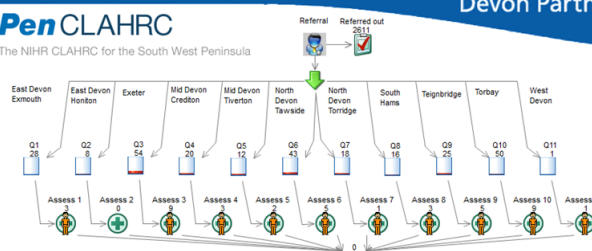
Prefer home team?	No
Allow emergency booking for high priority patients?	No
Allow emergency booking for low priority patients?	No

Mental Health and Learning Disability Services for Devon

Devon Partnership NHS Trust

PenCLAHRC

The NIHR CLAHR for the South West Peninsula



Excel sheet 'Input for referral model 04' must be open

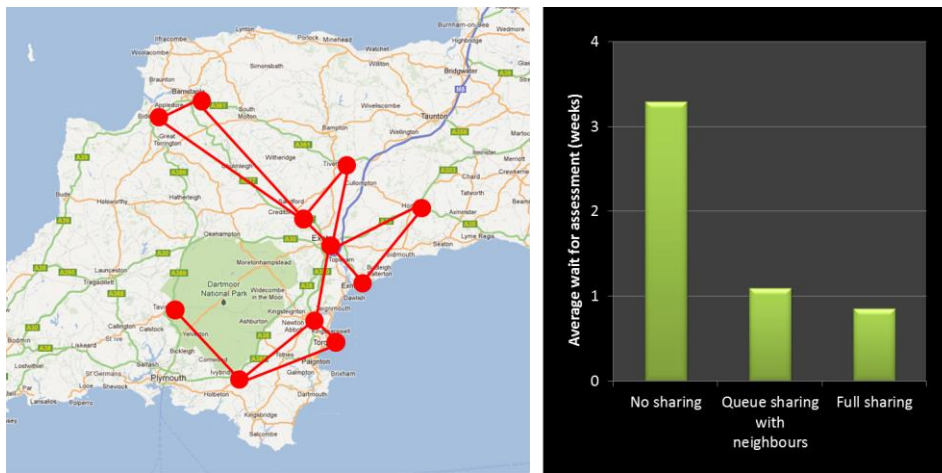
Current Run Results (Days:Working Days)	
Number complete (excluding DNA)	3701
Number DNA	1180
Number emergency slots created	0
Average number waiting	405
Average waiting time [All]	10
Average waiting time [High priority]	4.7
Average waiting time [Low priority]	10.9
Percent high priority on target	50
Percent low priority on target	100
Percent seen by home team	40

Method:

A simulation model was developed in Simul8. Patients arrive at random and in proportion to the demand in each team region. Patients may be seen by any team as identified in a “pooling matrix” – this may be used to limit patients being seen only by their local team or by being seen by close neighbouring teams (or a hypothetical model may be tested when any patient may be seen by any team – to understand the maximum beneficial effect of queue sharing). The simulation model contains a virtual diary of appointment slots available for each team; patients are then allocated to these diary slots.

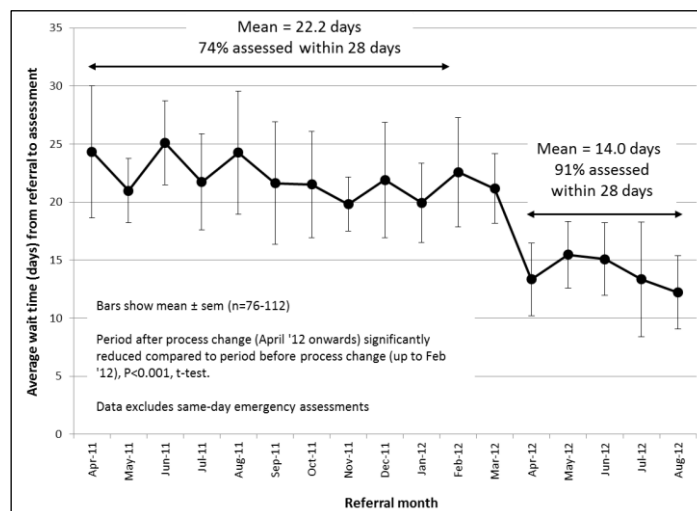
Outputs:

Scenarios were tested with varying capacity within each team and also with varying strategies of sharing of work. The example below shows one example of queue-sharing between teams and demonstrates how most of the potential benefits of queue sharing can be obtained with local sharing between neighbouring teams.



Implementation and Impact:

The choose and book system has been implemented with local queue sharing; appointment slots within the target time and within the local area are available for booking by the patient. The chart below shows waiting times reduced by almost half following roll-out of the system in the first area (with sharing between two teams as necessary). The system is now being rolled out across Devon.



Contact and more information:

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