PenCHORD

NHS National Institute for Health Research

The Peninsula Collaboration for Health Operational Research & Development

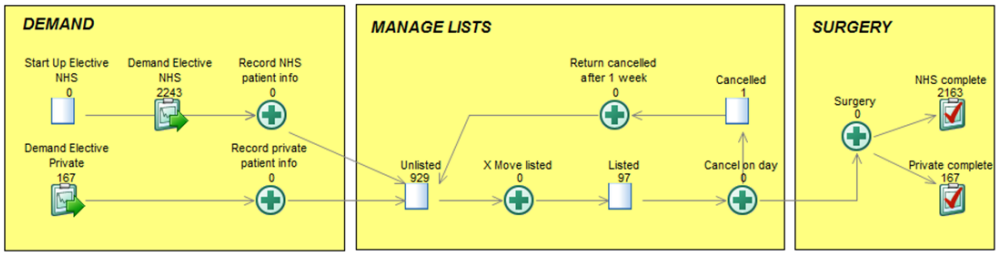
Planning theatre time to achieve 18 week elective targets

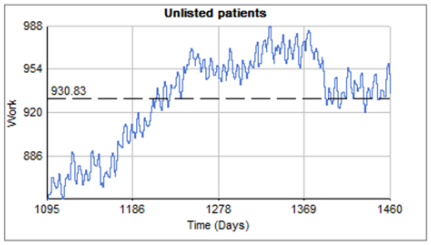
Summary:

Simulation modelling was used to forecast waiting time for elective orthopaedic procedures using different theatre schedules and different rules for allocating patients to surgeons. Spare theatre time is required to absorb fluctuations in demand; waiting time in the model increased rapidly above 85% theatre utilisation. Waiting time could be reduced by using pooled waiting lists, where a patient could be placed on the waiting list of the surgeon with the shortest waiting time. Nearly all the benefits of pooling could be achieved if ~40% of patients were suitable for joining the pooled list. A balance may therefore be struck where most patients can be allocated to a specific specialist surgeon but with others allocated to any surgeon.

Context:

Yeovil District Hospital were planning theatre schedules for new commissioned contracts. They had various possible scenarios and wished to check whether the planned scenarios could cope with the new contracted workloads, whilst achieving 18 week referral to treatment targets.





NHS waiting time [weeks]	18.8
NHS % complete in 12 weeks	55

Code	Procedures	Theatre time	Simulation proc ID	Sub specialist	StDev Theatre time	Changeover mean	Changeover SD
A031	1	176	1	1	56	37	21
A608	1	57	2	1	18	37	21
A611	3	63	3	0	6	16	12
A648	1	165	4	0	53	16	12
A651	159	29	5	0	22	16	12
A661	1	125	6	0	40	16	12
A678	1	69	7	1	22	37	21
A683	11	78	8	0	5	16	12
A688	1	278	9	1	89	37	21
A692	2	30	10	0	1	16	12
A733	19	65	11	0	19	16	12
C866	1	90	13	1	29	37	21
G451	1	123	15	1	39	37	21
L911	1	55	20	1	18	37	21
M421	1	26	24	1	8	37	21
NULL	4	68	25	0	50	16	12
O088	1	172	26	1	55	37	21
O251	1	106	27	1	34	37	21
O271	2	134	28	0	48	37	21
O278	1	149	29	0	48	16	12
O291	160	71	30	0	3	16	12

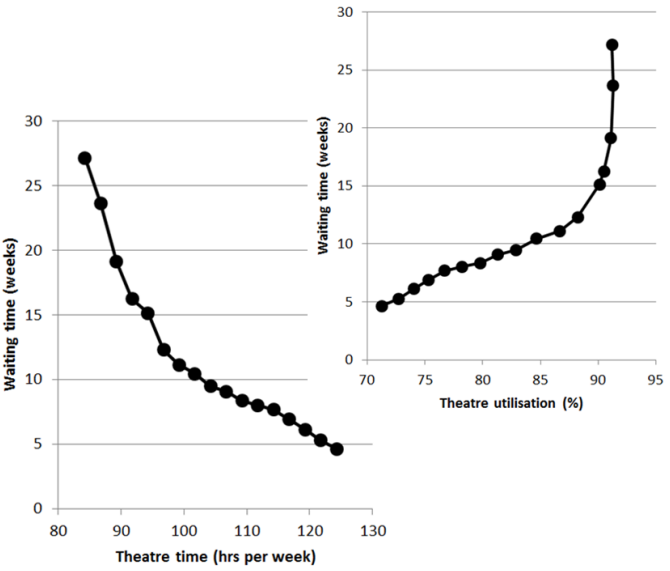
Session ID	Specialty	Sub Specialty	Weekday	Session length	Theatre #	Weekend catch-up
1	14	0	1	210	1	0
2	14	0	2	210	1	0
3	14	0	2	210	1	0
4	14	0	3	210	1	0
5	14	0	3	210	1	0
6	14	1	8	210	1	0
7	14	1	9	210	1	0
8	14	1	9	210	1	0
9	14	1	10	210	1	0
10	14	1	10	210	1	0
11	14	2	2	210	2	0
12	14	2	3	210	2	0
13	14	2	5	210	2	0
14	14	0	8	210	2	0
15	14	0	9	210	2	0

Method:

A simulation was built where patients are referred in proportion to the predicted frequency of required procedures. They were allocated to surgeons waiting lists with any specialist need (e.g. requirement for specialist theatre). Theatre lists were constructed according to priority of patient and time on waiting list. Cancelled procedures re-join the waiting list with a higher priority.

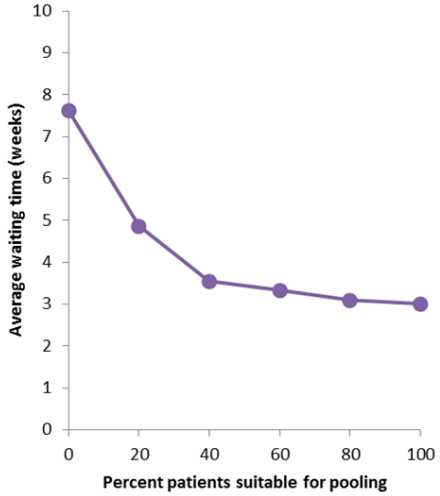
Outputs:

As the number of scheduled theatre hours increases waiting times reduce but unused theatre time also increases. It is predicted that an average 10 weeks wait (from time of listing) can be achieved with ~85% theatre utilisation. Waiting times increase rapidly as theatre utilisation increases above 85%. These results were based on patients being allocated to one of five surgeons' lists.



If patient pooling was introduced the waiting time could be reduced. In this case patients suitable for pooling were allocated to the surgeon whose waiting time was lowest. In the model the maximum beneficial effect of pooling was achieved if ~40% of the patients were suitable for pooling.

Discussion:



Base Case

Patients allocated to one of five surgeons for initial consultation. Patient then joins that surgeon's waiting list for procedure.

Pooling

Some patients, after initial consultation, join the waiting list of the surgeon with the shortest current waiting list.

There is frequently a pressure to maximise theatre utilisation, as it is one of the most costly resources in a hospital. Complete utilisation can only be achieved when there is a guarantee that all lists can be filled with suitable patients and there is a good range of procedures such that theatre times can be filled (e.g. after a long procedure there may only be time for one short procedure in order to fill theatre time). These conditions can only be met when there is a large pool of patients to draw from, which will necessarily be associated with long waiting time. A compromise therefore must exist between waiting time and theatre utilisation targets. Our modelling suggested this was likely to be at about 85% theatre utilisation.

Waiting times in the model reduced when patients could be pooled between surgeons. Importantly this benefit did not require an "any patient may be seen by any orthopaedic surgeon" model. Even a small amount of pooling improved waiting times and near-maximum benefit was achieved with 40% of patients being suitable for pooling.

Implementation

Yeovil are currently implementing a new theatre schedule backed, in part, by this simulation modelling; *"Your work was pivotal to the changes in our service which is about to commence".*

Contact and more information:

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