

Situation Report - Elective care - long waiters modelling (Inpatient)

v1.0.1

WWL DAA: Data Science

2023-04-18

Executive summary

Add text here. To be added in v1.1

Methodology

The subsequent work was produced by creating four separate forecasting algorithms, each of which produce models forecasting a horizon period of 365 days, using the last six months of waiting list size data (start and end dates of the training period are described below).

Subsequently the average of these four models was calculated to produce a *combinatorial* model. Combinatorial models reliably perform better than individual forecasts in many situations, particularly for long forecast horizons.

The final combinatorial model was then *positively biased* to the most recent month training data. This bias is a simple weighting calculation: using the last 30 days mean values for *demand*, *capacity*, and *error (ROTT - removals over than treatment)*, the combinatorial model is adjusted to reflect these characteristics. In addition, this calculation includes an exponent function that reduces the positive bias the further into the future we are predicting, producing a more realistic forecast.

Overall forecasts were produced by firstly running the model individually for each speciality, and each waiting list; the outputs of these models were simulated 50 times and 80% prediction intervals calculated from these results. Lists were grouped together and then specialities were concatenated and summed to produce the overall figures. Additionally, any individual forecast that was predicted to reach a forecast list size of 0 at any horizon day was adjusted to ensure that all subsequent horizon days were given a list size of 0.

For the long waiter tables, the variable “Date list cleared” is the *first date the lower boundary of the 80% prediction interval touches 0 waiters*. Thus, these dates are the “best case scenario” of expected list clearance date. In contrast, the long waiter list graphs show the median forecast position *and* the 80% prediction intervals - as such, a more conservative forecast is displayed.

- AI Training period is from 2022-10-02 to 2023-03-31.
- Positive weighting estimated from 2023-03-01 to 2023-03-31
- Figures horizon lines depict median predicted list size
- Figures shaded regions depict 80% prediction interval

How these results should be interpreted

Add text here. To be added in v1.1

Long waiters forecast clearance dates

- If a speciality has “Date list cleared” field = NA then this means the list does not reach zero by the horizon end date.
- “Difference from [date]” field = negligible is assigned to specialities with ≤ 10 in field “List size at [date]”.
- See Methodology for determining the “Date list cleared”

Over 52 week waiters

Speciality	Date list cleared	List size at 2024-03-29	Difference from 2023-03-31
ENT	NA	97	+21.25 %
Colorectal Surgery	NA	22	+10 %
General Surgery	NA	34	+6.25 %
Trauma & Orthopaedics	NA	248	+2.06 %
Gynaecology	NA	25	+0 %
Urology	NA	42	+0 %
Gastroenterology	NA	44	-4.35 %
Breast Surgery	2023-04-14	0	negligible
Cardiology	2023-05-07	0	negligible
Ophthalmology	2024-02-19	0	negligible
Oral Surgery	2023-11-19	0	negligible
Paediatric Dentistry	2023-04-11	0	negligible
Pain Management	2023-06-24	0	negligible
Plastic Surgery	2023-07-06	0	negligible
Thoracic Medicine	2023-09-06	0	negligible
Vascular Surgery	2023-09-12	0	negligible

Table 1.

Over 65 week waiters

Speciality	Date list cleared	List size at 2024-03-29	Difference from 2023-03-31
Trauma & Orthopaedics	NA	128	+9.4 %
Gastroenterology	NA	33	+3.12 %
Thoracic Medicine	NA	10	negligible
Breast Surgery	2023-03-31	0	negligible
Cardiology	2024-02-20	0	negligible
Colorectal Surgery	2024-02-04	0	negligible
ENT	2023-08-24	0	negligible
General Medicine	2023-03-31	0	negligible
General Surgery	2023-04-19	0	negligible
Gynaecology	2023-12-09	0	negligible
Haematology	2022-12-06	0	negligible
Ophthalmology	2023-04-08	0	negligible
Oral Surgery	2023-03-31	0	negligible
Paediatric Dentistry	2023-04-23	0	negligible
Pain Management	2024-01-29	0	negligible
Plastic Surgery	2023-03-31	0	negligible
Rheumatology	2023-04-15	0	negligible
Urology	2023-11-24	0	negligible

Table 2.

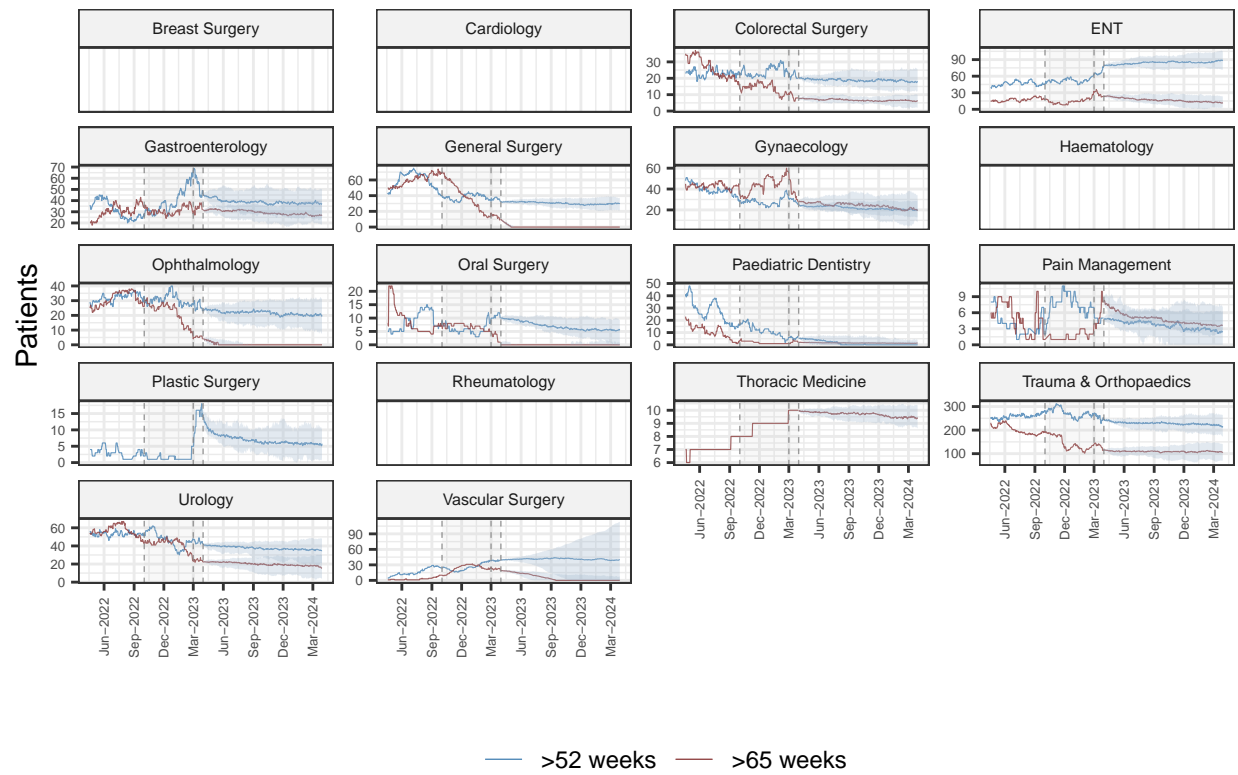


Figure 1. Long waiters forecast.
Specialties shown are those that have >5 long waiters at horizon start date

Overall inpatient elective lists forecast

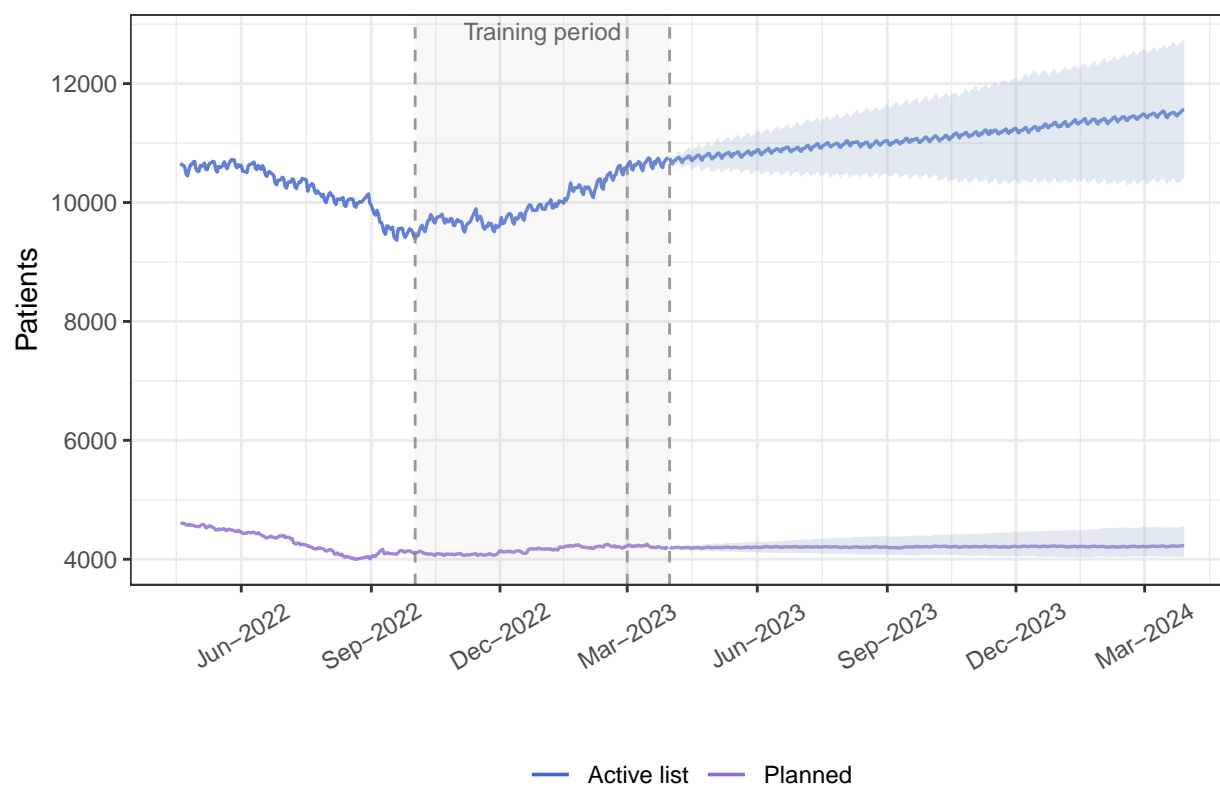


Figure 2

Planned updates for later SitRep versions:

- *Add section on how this work should be used or interpreted*
- *Improve sense and readability of methodology*
- *Add outpatient and diagnostic lists*
- *Add the completed non-elective bed modelling demand work*