The Strategy Unit.

Developing a System Dynamics Model to support Waiting List Recovery

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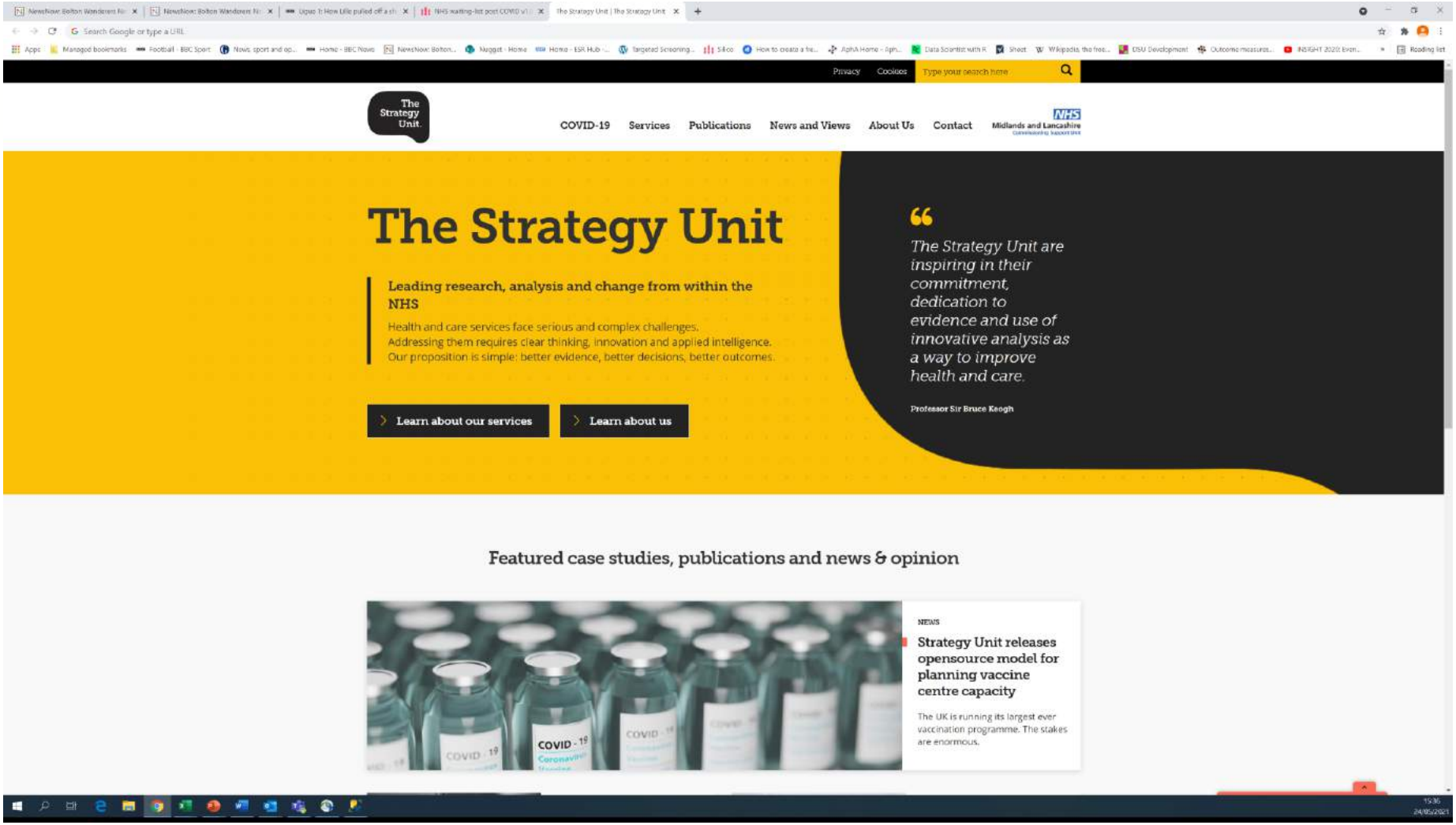
Hi, I'm Mike

- Analytics Manager at the Strategy Unit
- 25 years experience across health and care analytics
- Have been involved in modelling the impact of innovation and policy changes, including new hospital modelling
- New to System Dynamics
- See SD as a useful method to apply to health and care systems

I work for the Strategy Unit



Project Background

- Project was developed to support the response to the Covid Pandemic
- Part of a wider programme of work commissioned by NHS England
- System Dynamics was a useful method to apply to waiting list modelling
- No previous experience of developing System Dynamics models
- Had a good understanding of waiting lists and waiting list data
- Kim Warren at Strategy Dynamics provided technical support and mentoring
- Silico was used to develop the model

The Problem

- Waiting lists have been increasing
- The dynamics were widely understood
- Models of future activity broadly worked
- Covid removed this certainty
  - Referrals and activity reduced significantly at the start of the pandemic
  - Behaviour changed significantly
  - Recovery was slow
  - New models of working were required to manage the Covid risk
  - New models of care were being considered to support the recovery

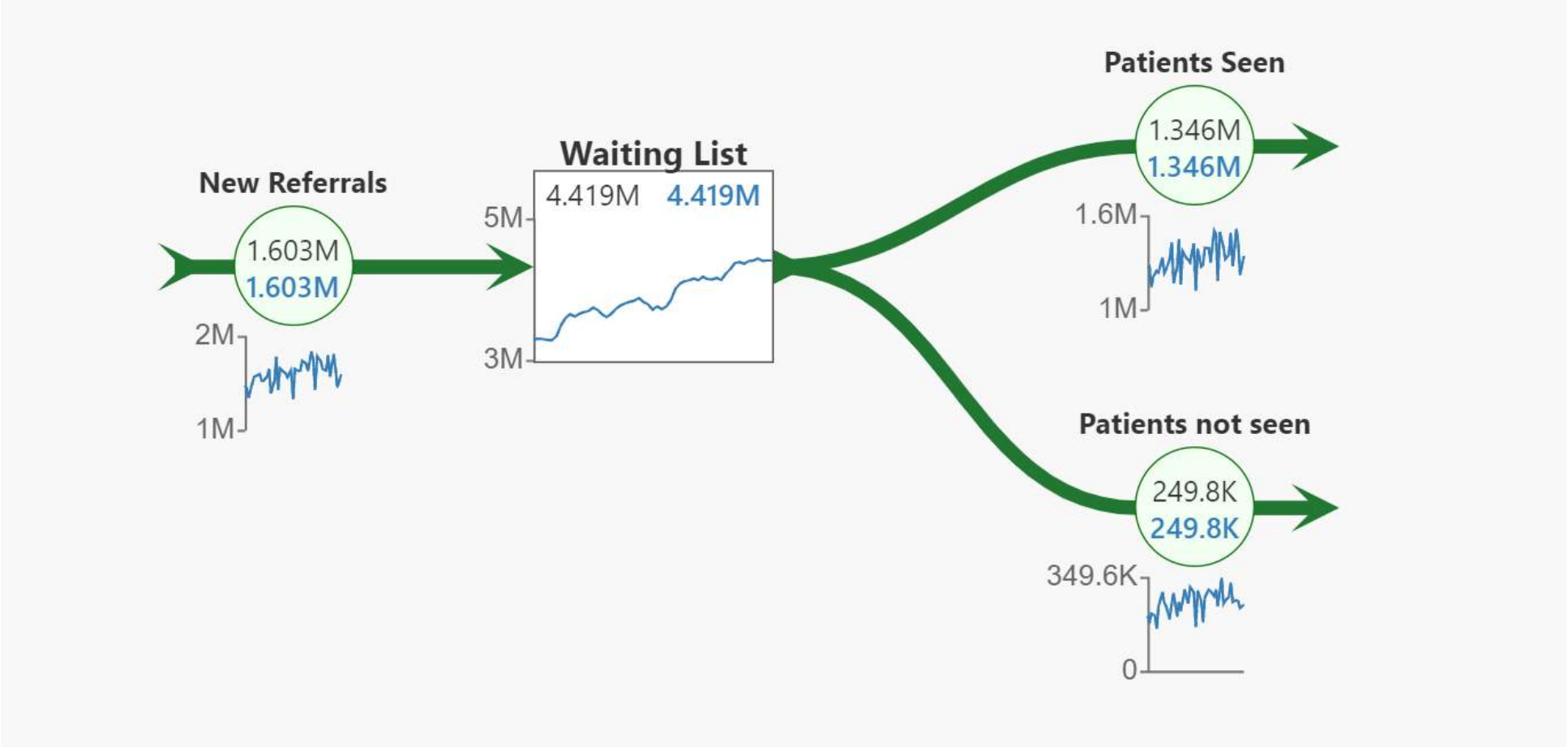
Our Approach

- Developed a simple monthly model to explain the current waiting list
- Converted the model and data to weekly
- Iterative approach in consultation with managers and analysts
- Mainly concentrated on the waiting list rather than waiting times
- Expanded the model to understand what might happen to referrals
- Added capacity constraints to impact admitted and non-admitted pathways
- Model developed to work at trust and specialty level
- Can never answer all the questions of national and local decision makers
- Developed to help others test their own assumptions
- Multiple scenarios were developed

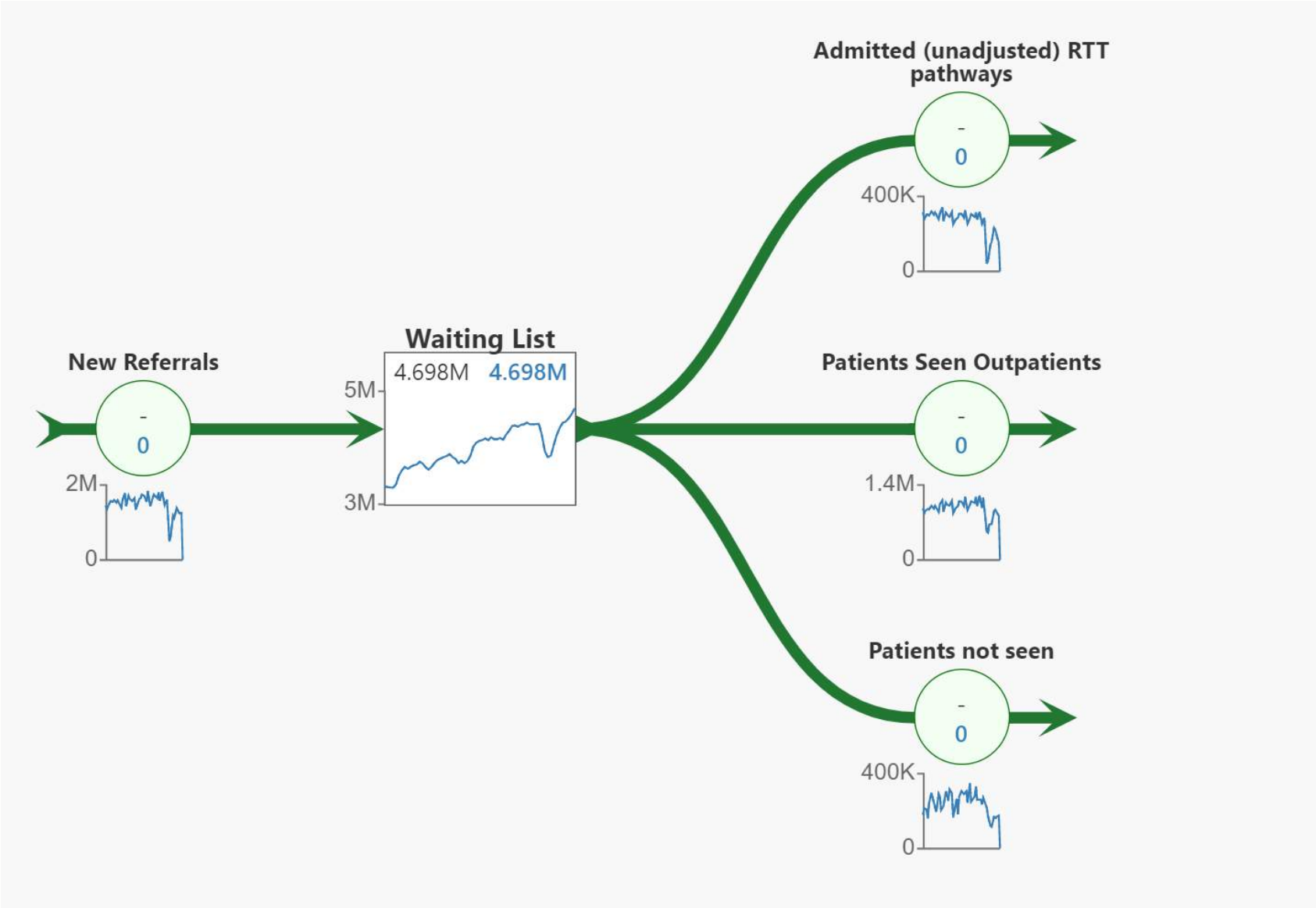
Uses for the Model

1. As a point of reference
2. As a source of assumptions
3. As a source of data (or data wrangling code)
4. To run specific scenarios supported by the model
5. As a starting point to develop a more complex model

Where we started



Where we started



Our Main Assumptions

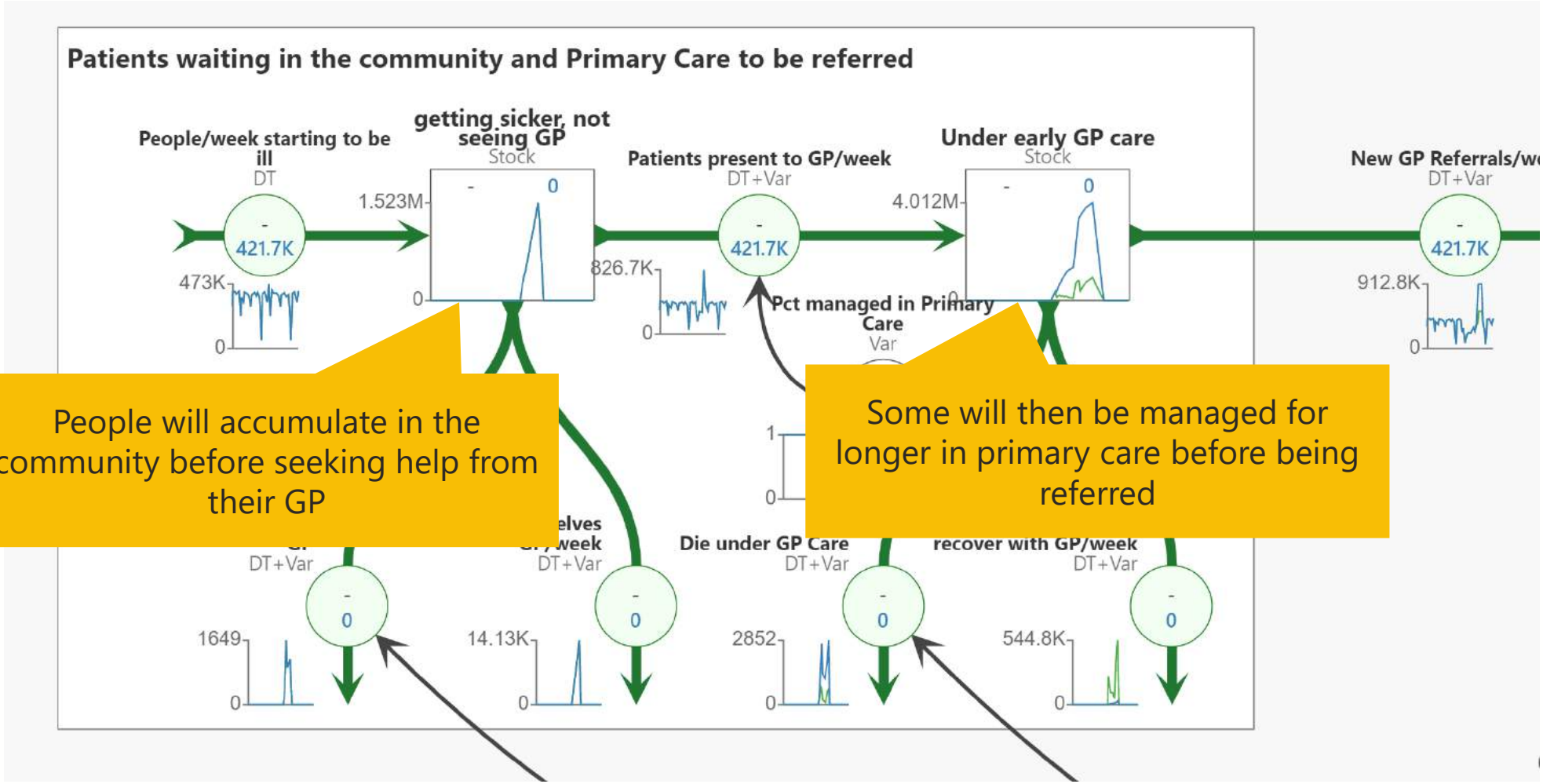
- Background need for elective care has not been changed by Covid
- Patient and GP behaviour will have changed and this will impact on the number referred
- A referral backlog will accumulate
- Not everyone will wait to be referred
- Referrals will return to historic rates by December 2020
- The referral backlog will manifest following the first wave
- Activity is constrained by the number and productivity of resources available
- Activity will return to historic rates by March 2021

Data was sourced from…

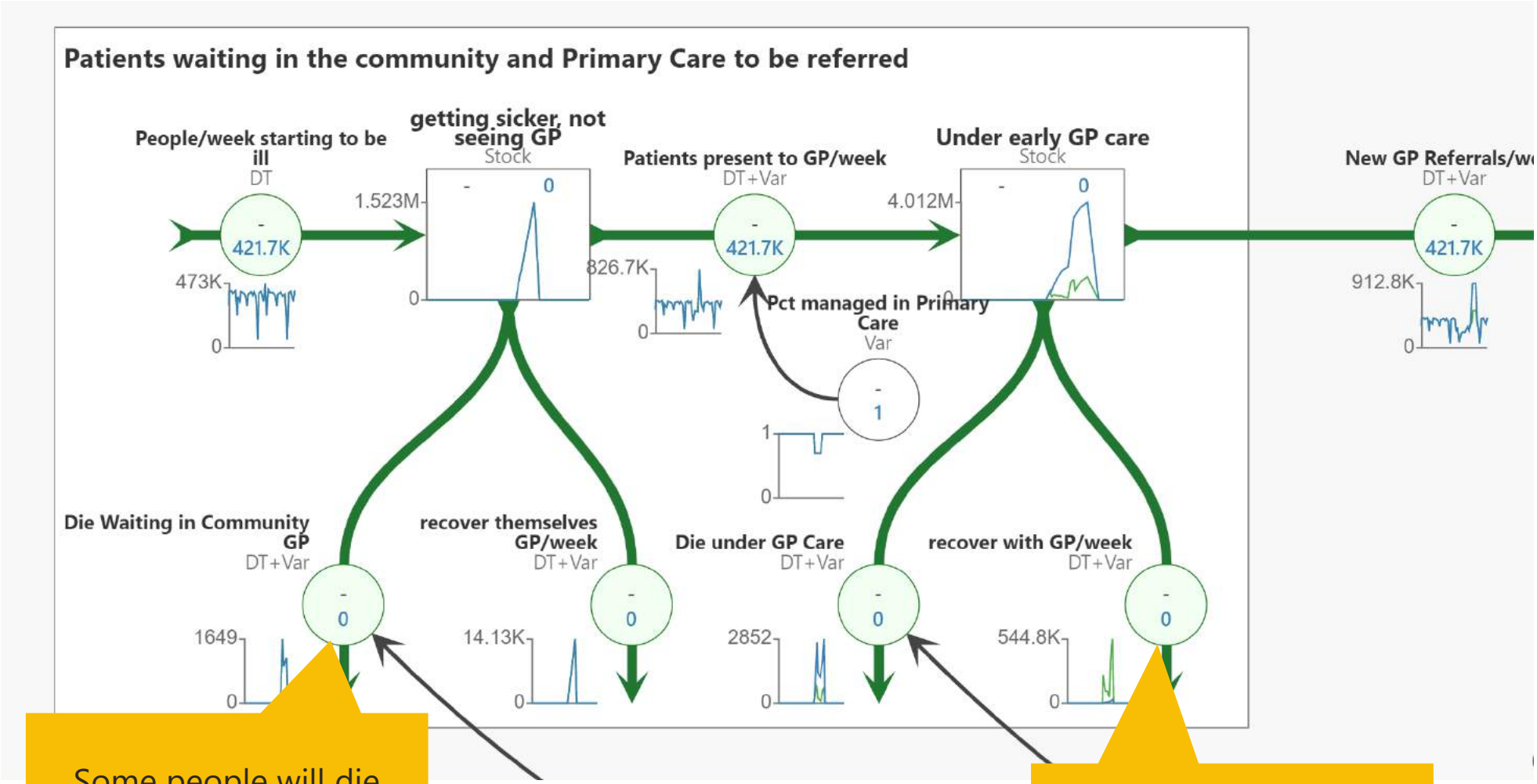
- Consultant-led Referral To Treatment (RTT) waiting times
- e-Referral System
- Secondary Uses Service (SUS)
- NHS England Bed Availability and Occupancy
- NHS Workforce data
- NHS England Supporting Services data
- NHS England Diagnostic Activity Data

The model

Covid has created a backlog that was not previously measured



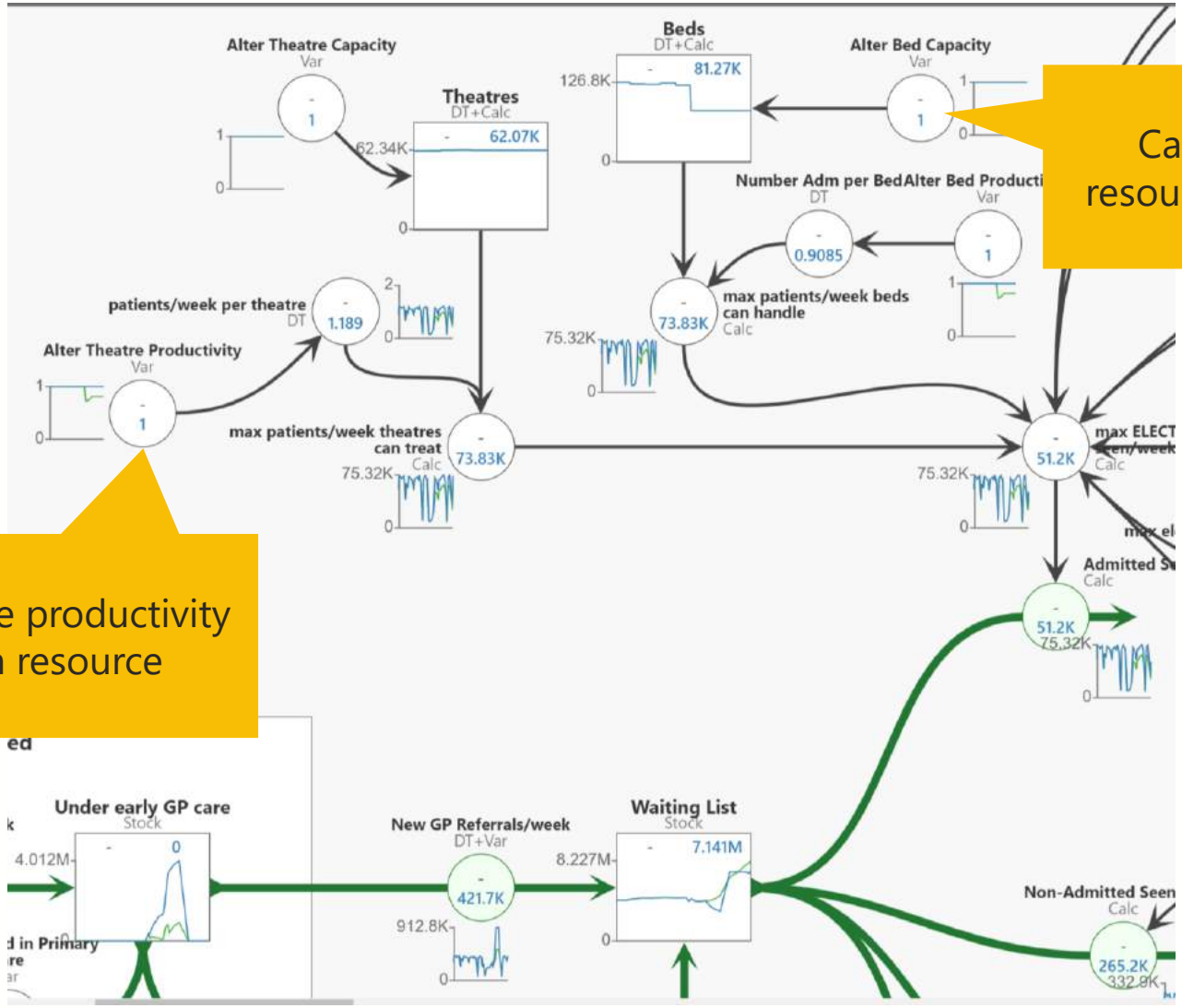
Not all the backlog will be referred



Some people will die before they are referred

Others will recover or choose to not be referred

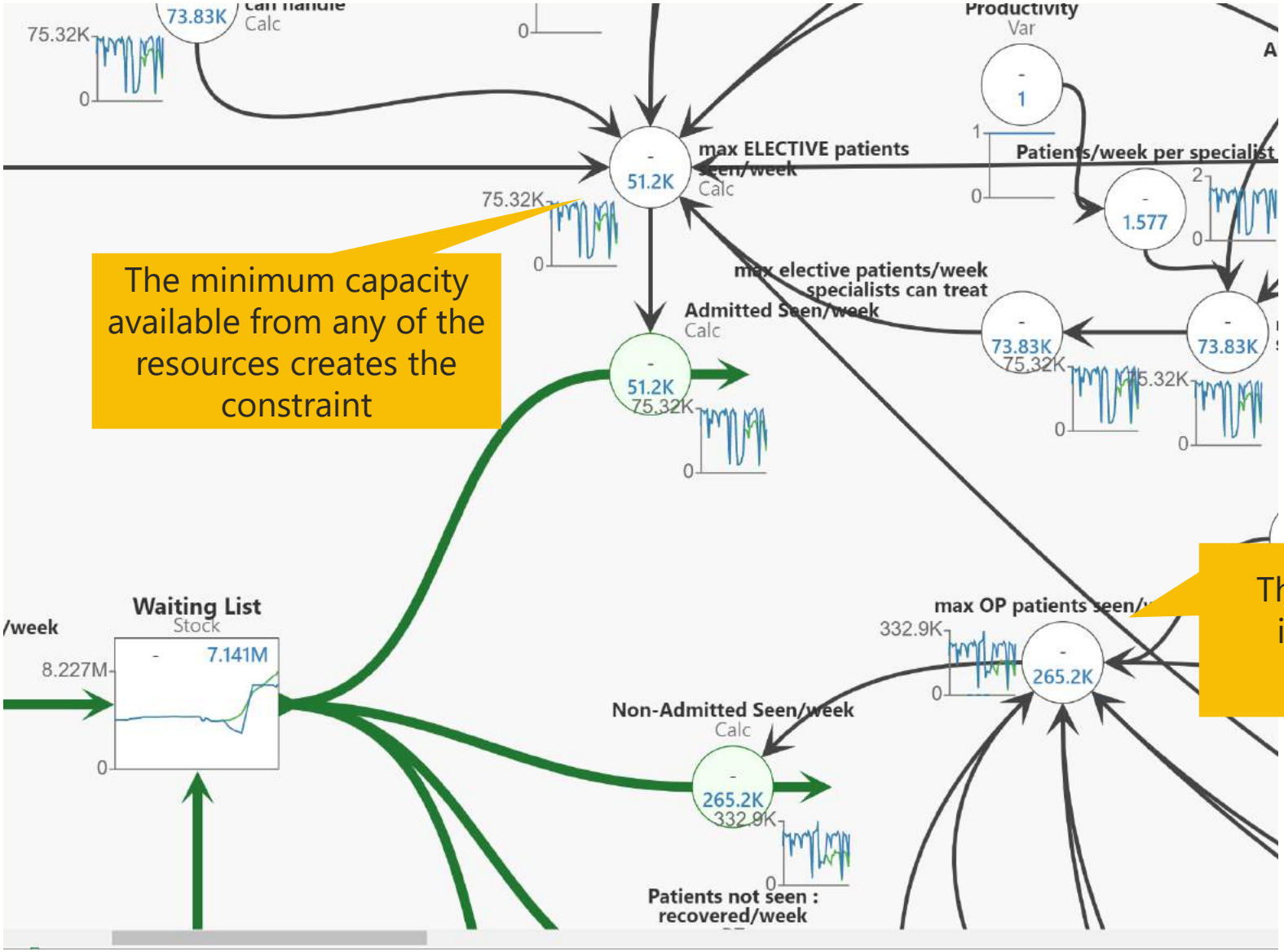
Constraints are applied to a set of resources



Capacity of each resource can be varied

...as can the productivity of each resource

The number of people seen is based on the minimum capacity available from any of the resource constraints



The resources included are…

Inpatients

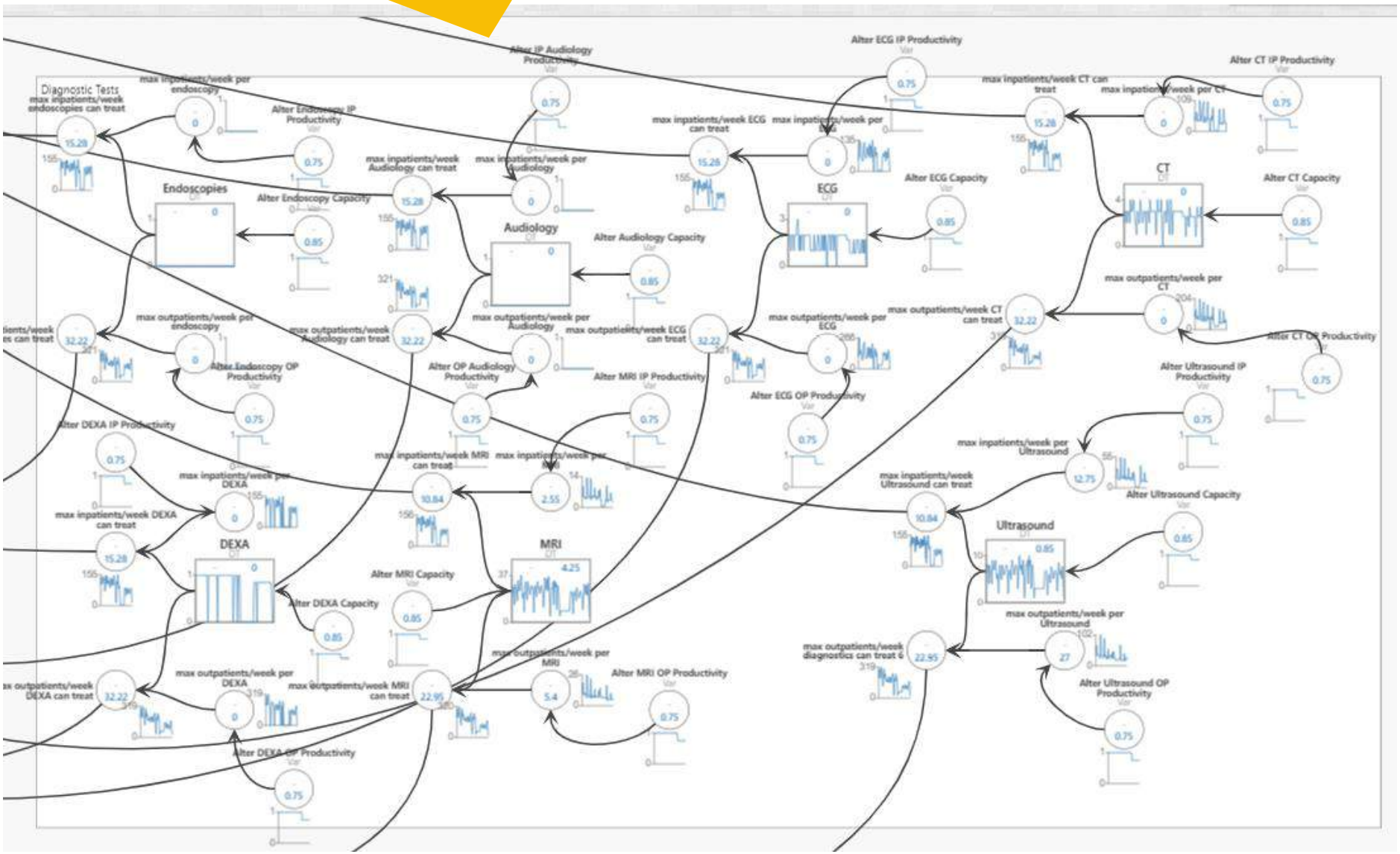
- Beds
- Theatres
- Staff
- Diagnostic Tests
  - Endoscopies
  - Audiology
  - CT Scans
  - ECG
  - Ultrasound
  - MRI
  - DEXA

Outpatients

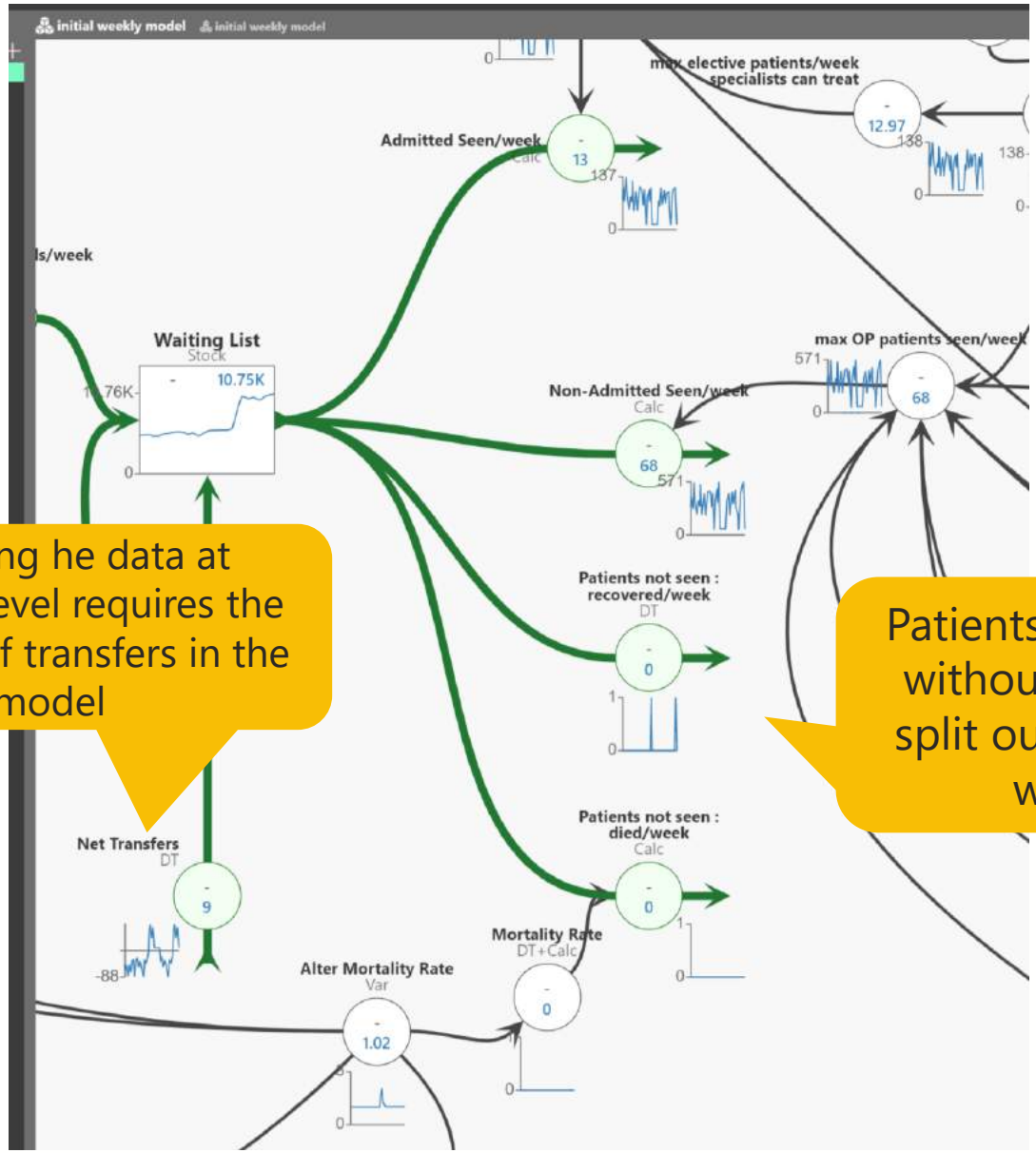
- Staff
- Diagnostic Tests
  - Endoscopies
  - Audiology
  - CT Scans
  - ECG
  - Ultrasound
  - MRI
  - DEXA

Waiting List Model – Diagnostic Constraints

Additional Constraints are applied for each of the diagnostic tests



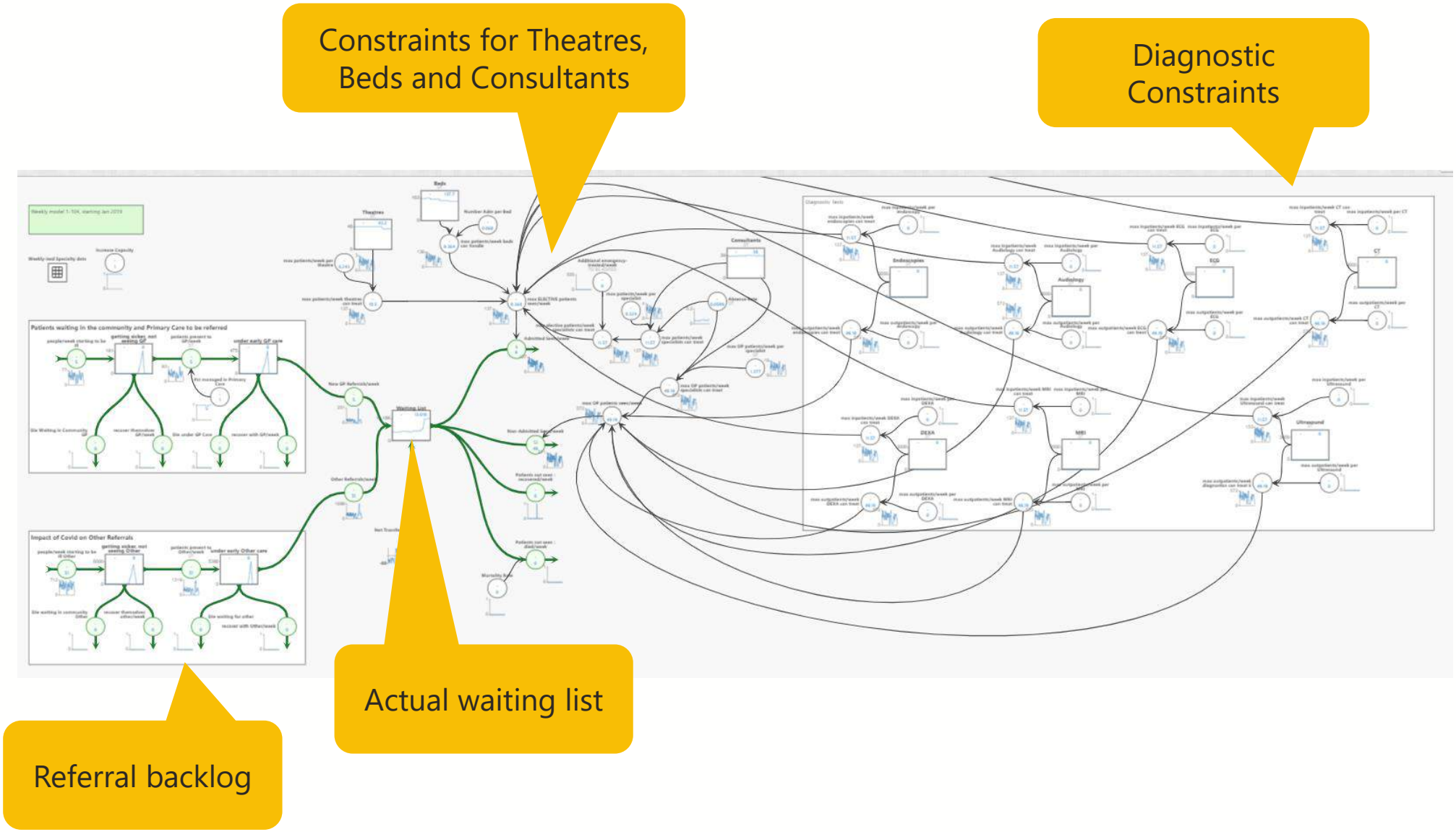
Some patients leave the waiting list without being seen



Analysing he data at specialty level requires the inclusion of transfers in the model

Patients who left the waiting list without being seen have been split out from people who died without being seen

Waiting List Model

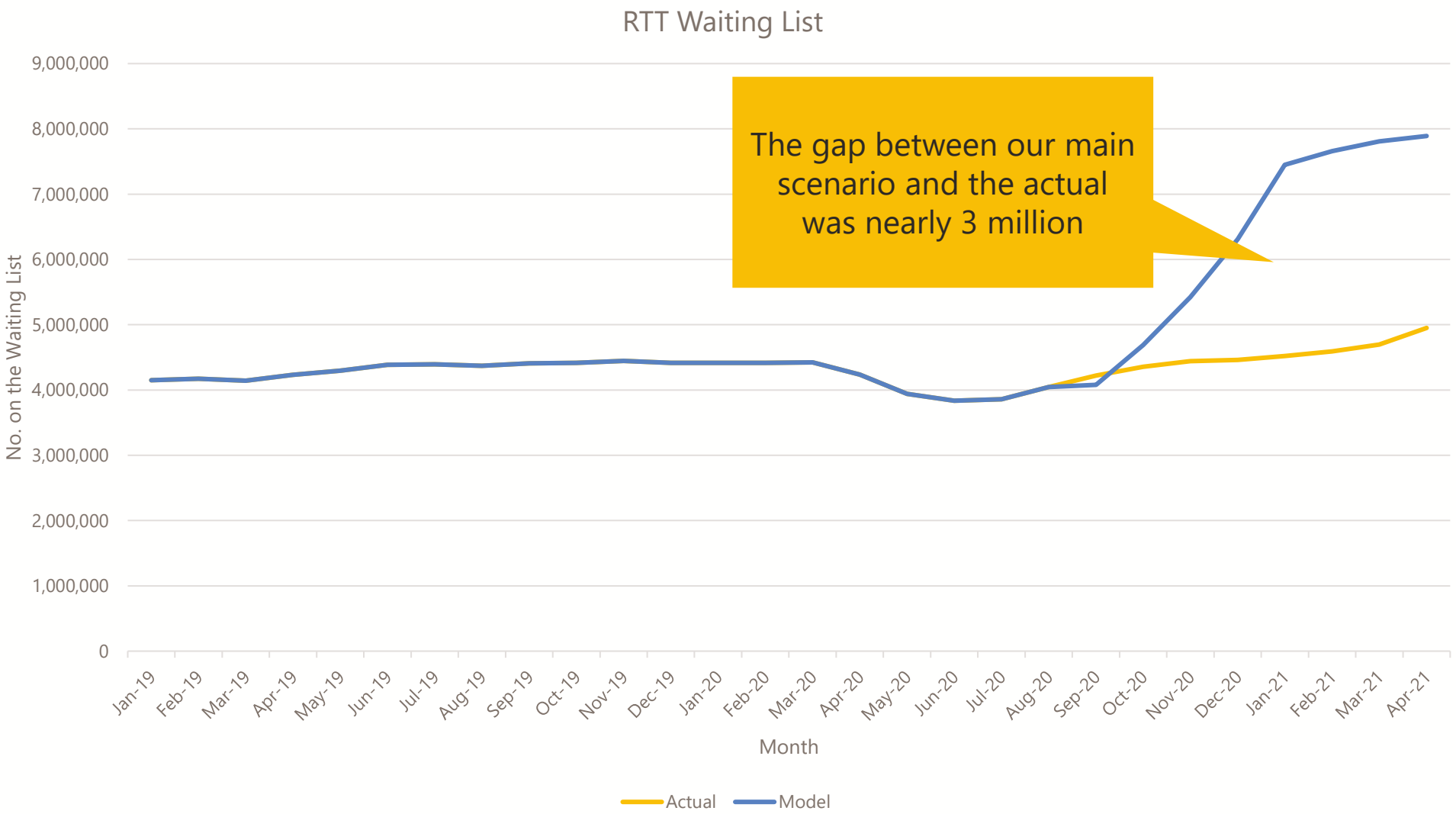


The model was made available with….

- A description of all pre-set assumptions
- Detailed guidance, including videos
- Access to the model and the code to create the dataset
- A series of webinars
- A blog describing how it can be used

How did the model perform?

The waiting list is currently much lower than we predicted



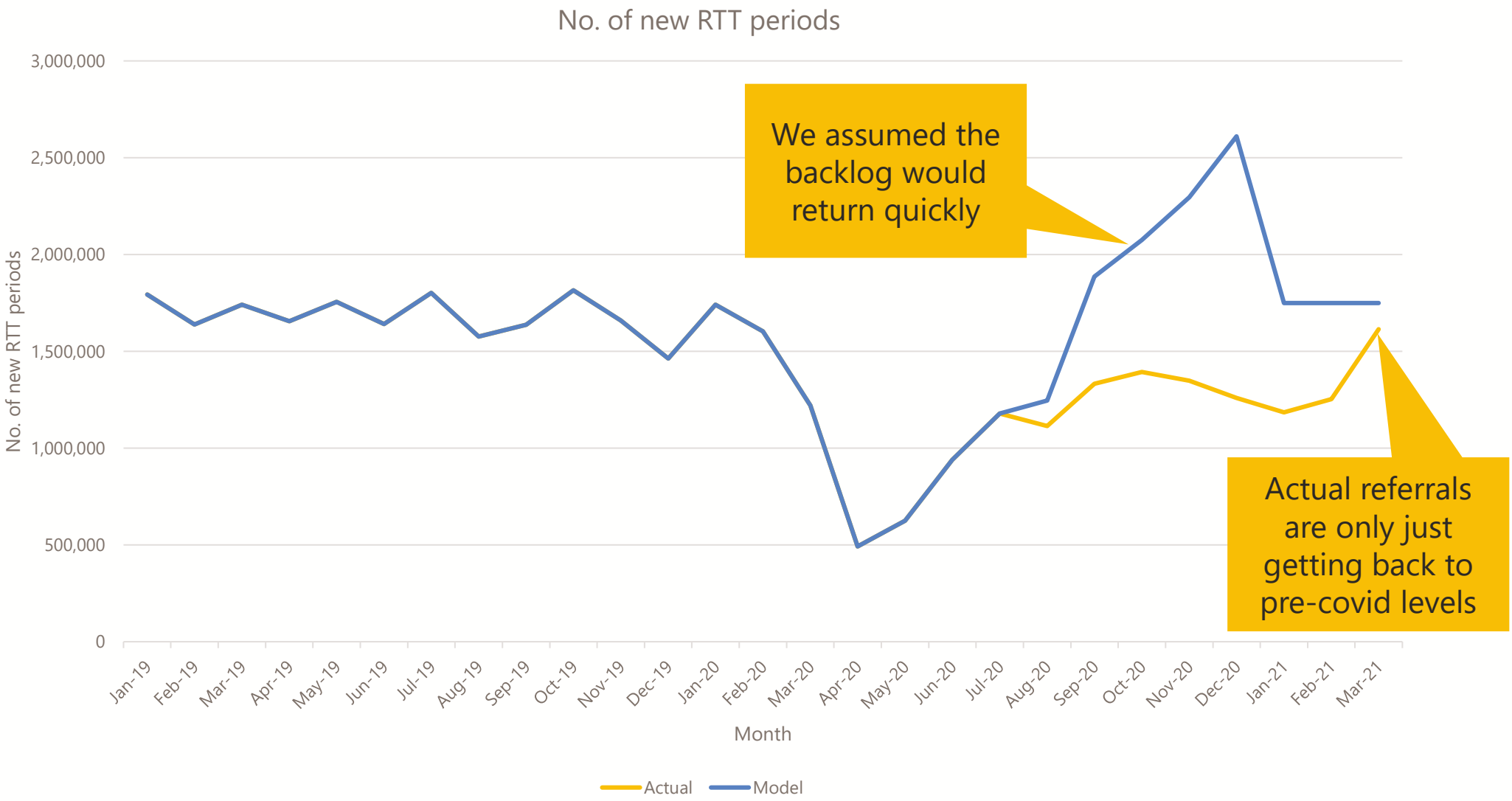
We weren't the only ones that got this wrong

EXPERT BRIEFINGS

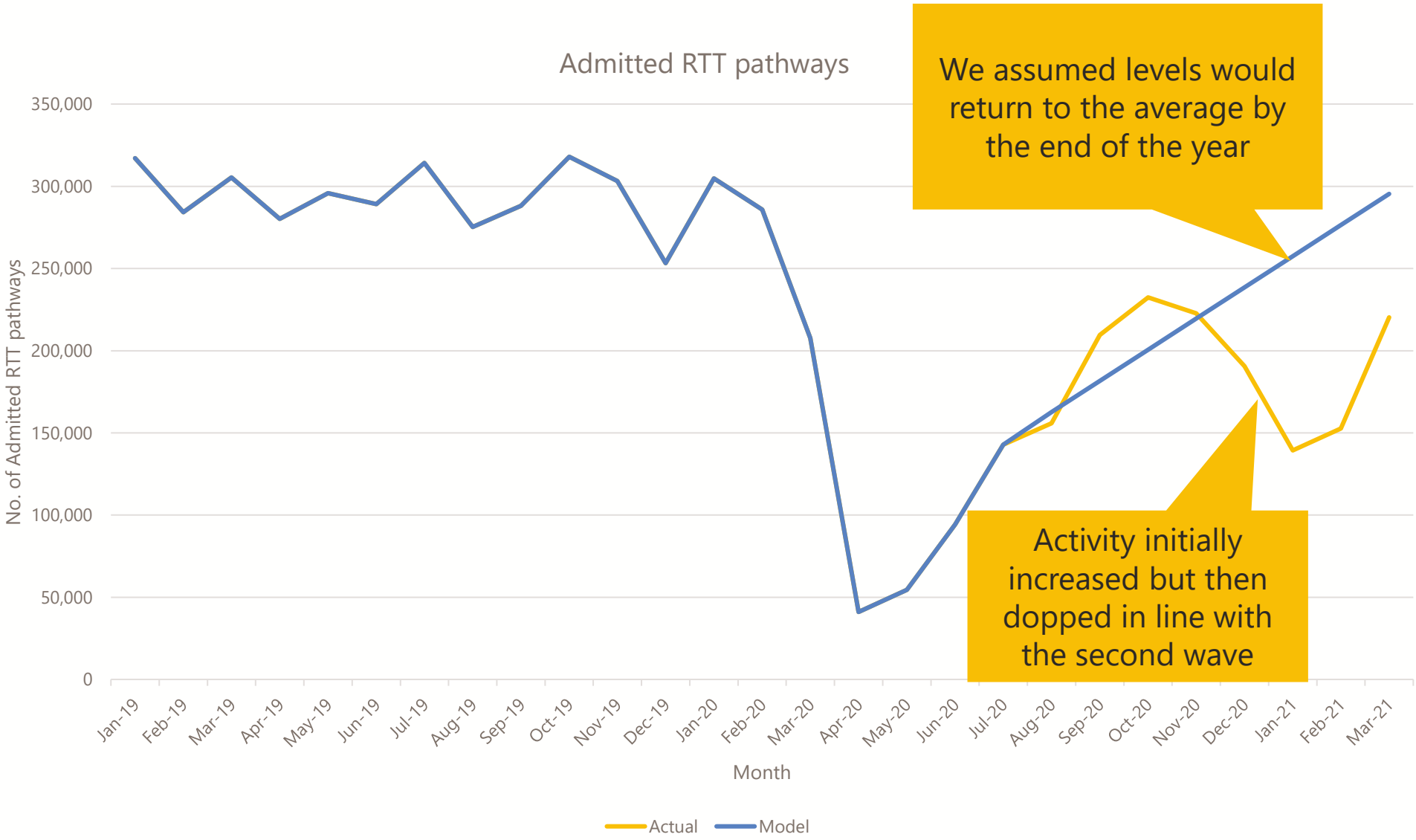
Recovery Watch: The waiting list won't be 10 million by April — but it will take years to fix

By James Illman | 17 February 2021

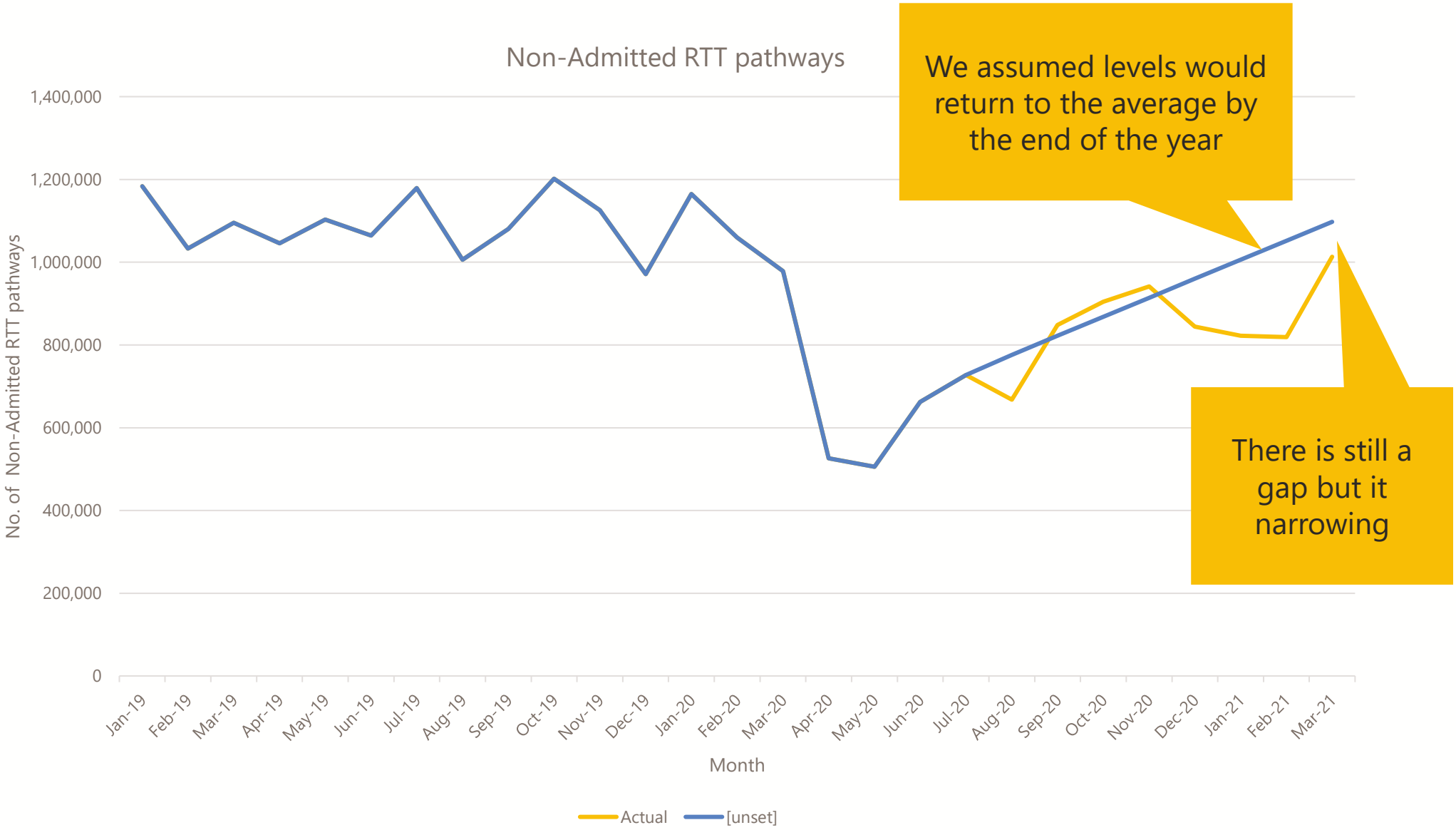
It is mainly due to referrals not returning to pre-Covid level



Our predictions of admitted care were closer…



…and closer still for non-admitted care



What next?

What Next?

- The model assumptions can be updated
- Additional functionality can be added to split out <18 weeks, 18 to 52 weeks and 52+ weeks
- Additional research on the patient and clinician behaviour has started to develop
- Strategies to improve productivity and create system resilience are developing
- We are running an Action Learning Set to embed SD skills in the NHS

Any questions?