Supplementary file 2. Formal variable definitions

Most variables in our models are defined in terms of one or both of the dimensions, priority group and time, defined in the manuscript. Subscripts g and t are used to index these dimensions in equations.

\( \Delta t \) represents the time step of the time dimension. It has the value 1 day in our models.

**Input variables**

Registrations,

\[ R_{g,t} = \text{sum of cases with waiting limit } \in g \text{ and registration time } \in t. \]

Start of care,

\[ S_{g,t} = \text{sum of cases with waiting limit } \in g \text{ and start time } \in t. \]

Capacity, sum of start care over all groups at time t:

\[ C_t = \sum_g S_{g,t} \]

Initial waiting list,

\[ L_{g,0} = \text{initial number of patients registered but not yet served}. \]

**Outcome variables**

Waiting list size; initial list size plus integral of net flows over time:

\[ L_{g,T} = L_{g,0} + \sum_{t=0}^{T} (R_{g,t} - S_{g,t}) \Delta t \]

Cumulative waiting; integral of waiting list size over time:

\[ \sum W_{g,T} = \sum_{t=0}^{T} L_{g,t} \Delta t \]
Cumulative unused capacity; integral of capacity minus production over time:

$$\sum U_T = \sum_{t=t_0}^{T} \left( C_t - \sum_g S_{g,t} \right) \Delta t$$

Average waiting time in steady state (where L, R and S are constant):

$$\overline{W}_g = \frac{L_g}{S_g}$$

Distribution of patients; percentage of patients in each priority group:

$$D_g = \frac{\sum R_g}{\sum R}$$

**Shortest waiting list that fully utilizes capacity**

Static model without prioritisation:

$$L_{\text{NOPRI min}} = R \text{ day}$$

Static model with prioritisation:

$$L_{\text{PRI min}} = R \sum_g \overline{W}_g D_g$$

Dynamic model including fluctuation, without prioritisation:

$$L_{\text{NOPRI ideal}} = \text{determined by simulation starting from empty waiting list}$$

Dynamic model including fluctuation, with prioritisation:

$$L_{\text{PRI ideal}} = \text{determined by simulation starting from empty waiting list}$$