Let $\mathscr{C}, \mathscr{P}, \mathscr{T}$ and $\mathscr{E}$ be the set of caregivers, patients, time-slots and equipment respectively. For every $e \in \mathscr{E}$, let $\mathscr{C}_e$ be the set of caregivers that can use equipment e.
For every $e \in \mathscr{E}$ and every $c \in \mathscr{C}_e, p \in \mathscr{P}, t \in \mathscr{T}$ let x_{cpt} be a binary variable ($x_{ctp} = 1 \iff$ caregiver c cares for patient p at time-slot t with equipment e).
If a patient p has to schedule k_p appointments, k_p^e with every piece equipment $e \in \mathscr{E}$; We introduce binary variables $\{\, y^p_{t,\ldots,t+k_p-1} \mid t_{min} \leq t \leq t_{max-(k_p-1)} \,\}$.

We want to maximize

$$\sum_{e \in \mathscr{E}} \sum_{\substack{c \in \mathscr{C}_e \\ p \in \mathscr{P} \\ t \in \mathscr{T}}} x_{c,p,t}$$

under the following constrains:

(i). every caregiver c ever cares for at most one patient at any given time-slot t using any piece of equipment e.

(ii). every patient p ever attends one appoitment at given time-slot t.

(iii). If a patient p has numerous appointments in the same day, they should all be scheduled one after the other.

(iv). Every patient p and caregiver c have a time window $\mathscr{T}_c, \mathscr{T}_p \subseteq \mathscr{T}$, only in which they are available.

(v). Every patient p should be scheduled the amount of appointments with required equipment decided by the caregiver.

This in turn becomes:

(i). every caregiver c ever cares for at most one patient at any given time-slot t using any piece of equipment e:

$$\sum_{\substack{p \in \mathscr{P} \\ t \in T}} x_{c,p,t} \leq 1 \quad \forall c \in \mathscr{C} \tag{1}$$

(ii). every patient p ever attends one appoitment at given time-slot t:

$$\sum_{c \in \mathscr{C}} x_{c,p,t} \leq 1 \quad \forall p \in \mathscr{P}, t \in T \tag{2}$$

(iii). If a patient p has numerous appointments in the same day, say k, they should all be scheduled one after the other:

$$\sum_{\substack{c\in\mathscr{C}\\0\leq i\leq k_p-1}} x_{c,p,t+i} \geq k_p \cdot y^p_{t,t+1,\dots,t+k_p-1} \quad \forall p \in \mathscr{P}, t \in T, t_{min} \leq t \leq t_{max-(k_p-1)} \tag{3}$$

$$\sum_{t\in\mathscr{T}} y^p_{t,t+1,\dots,t+k_p-1} = 1 \quad \forall p \in P \tag{4}$$

(iv). Every patient p and caregiver c have a time window $\mathscr{T}' \subseteq \mathscr{T}$, only in which they are available:

$$x_{c,p,t} = 0 \quad \forall c \in \mathscr{C}, t \in \mathscr{T} \setminus \mathscr{T}_c \tag{5}$$

$$x_{c,p,t} = 0 \quad \forall p \in \mathscr{P}, t \in \mathscr{T} \setminus \mathscr{T}_p \tag{6}$$

(v). Every patient p should be scheduled the amount of appointments with required equipment decided by the caregiver:

$$\sum_{\substack{c\in\mathscr{C}_e\\t\in\mathscr{T}}} x_{c,p,t} \geq k^e_p \quad \forall p \in \mathscr{P}, e \in \mathscr{E} \tag{7}$$