### Weight Management Program

**Purpose**
- Promote weight reduction
- Support behavior change with physical activity
- Improve patient overall health

**Design**
- Regimented recurrent Physician and Dietitian visits anchored by 1st program visit
- Strict visit schedule for effectiveness
- Intensive weekly visits at program start

**Challenge**
- Inefficient scheduling process
- Long wait time for patients to enter program
- Insufficient capacity for patients to be seen according to schedule

**Improvement Opportunities**
- Ensure timely access
- Provide adequate capacity for program adherence

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### Current State

**Example: Provider Capacity Into the Future**

- Full
- Start to free up after 5th week
- Open after 12th week

**Patients cancel appointments at the last minute**

**How long before an appointment are cancellations made?**

- Over 50% of cancellations were made within 1 week before appointment

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### Solution Approach

**GAME: Visualization with an interactive spreadsheet**

**Patient scheduling as an integer program**

**Sets and Parameters**
- $P$: Set of patients
- $W$: Set of weeks in planning horizon
- $W^s \subseteq W$: Set of weeks patients can start program
- $V_p \subseteq W$: Set of weeks patients who started in week $s$ are expected to visit

**Decision Variables**
- $x_{ps} \in \{0,1\}$: 1 if patient $p$ starts in week $s$, $\forall p \in P, s \in W^s$
- 0 otherwise

**Usage of capacity, $\forall w \in W^s$**
- $u_w$: Max no. of appointment across planning horizon

**Constraints**
- Every patient starts once
  $$ \sum_{s \in W^s} x_{ps} = 1 \quad \forall p \in P $$
- Usage of capacity
  $$ \sum_{s \in W^s, w \in W} x_{ps} = u_w \quad \forall w \in W $$
- Max no. of appointments
  $$ u_w \leq z \quad \forall w \in W $$

**Objective**

$$ \min z $$

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### Implementation

**Classic Scheduling Process**

- Start patient in the program
- Maintain no future appointments
- Schedule next appointment at each visit
- No available time slots to schedule next appointment
- Suitable for unknown appointment intervals
- Difficult to predict clinic utilization

**Proposed Scheduling Process: Chelsea Health Center**

- Prioritize time-sensitive patient scheduling
- Improve patient adherence to the program
- Early identification of patient schedule conflict
- Suitable for predetermined appointment intervals

**Future Work:**
- Stochastic programming model incorporating withdrawal rates
- Optimization-based recommendations (How many patients should start per week?)

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