AN APPOINTMENT ORDER OUTPATIENT SCHEDULING SYSTEM THAT IMPROVES OUTPATIENT EXPERIENCE

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Learning Objectives

1. Understand the fundamental reasons and shortcomings of the current scheduling systems.
2. Define an effective patient central scheduling model that meets the clinic policies.
3. Develop and extend the proposed model considering ancillary services.
4. Learn and evaluate the implementation of the proposed model.
5. Develop a overbooking policy to reduce the negative impact of no-shows.
Introduction

- Shift inpatient care to outpatient facilities to reduce cost
- Competition increases
- Currently focus more on the efficiency of provider time
- Lack of implemented model
Learning Objective 1

Unrealistic Estimations of Treatment Time

- Physician centric solution to the problem of wait time
  - Underestimating visit times
  - Overbooking or double booking
- Physician’s perception

Patient Arrival Time vs. Patient Appointment Time

- Often blurred in practice
- Physician idling may compounds patient wait time
Learning Objective 1
Impact of Inaccurate Estimated of Treatment Time

Even "One Minute" on average will make a significant difference.
Learning Objective 1

Literature Limitation

- Most studies are either theoretical or case-specific.
- Appointment rules have not been adopted and implemented successfully in reality due to the lack of understanding and cooperation of the medical staff.
- No real case study supports these appointment rules.
Learning Objective 1

Literature Limitation

- The *variability* of the physician treatment time has not been addressed from the patients’ standpoint.

**Major Problem** $\min. \overline{W} \times c_W + \overline{P} \times c_P$ (cost ratio)

- The *probability of a patient delay* at any given time has never been studied to the point that the patients of each type should be treated equally at any given time in the pre-determined template (slots).

- There isn’t a clear distinguish between the *physician’s schedule* and the *patients’ schedule*.
Appointment Rules

1. Single-block
   \( n = N \)
   no \( a_i \)

2. Individual-block/Fixed-interval
   \( n_i = 1 \) for all \( i = 1, 2, 3, \ldots, N \)
   \( a_i \) constant

3. Individual-block/Fixed-interval with an initial block
   \( n_0 > 1; n_i = 1 \) for all \( i = 1, 2, 3, \ldots, N \)
   \( a_i \) constant

4. Multiple-block/Fixed-interval (m-at-a-time)
   \( n_i = m > 1 \) for all \( i = 1, 2, 3, \ldots, N \)
   \( a_i \) constant

5. Multiple-block/Fixed-interval with an initial block
   \( n_0 > m; n_i = m > 1 \) for \( i = 2, 3, \ldots, N \)
   \( a_i \) constant

6. Variable-block/Fixed-interval
   \( n_i \) variable for \( i = 1, 2, 3, \ldots, N \)
   \( a_i \) constant

7. Individual-block/Variable-interval
   \( n_i = 1 \) for all \( i = 1, 2, 3, \ldots, N \)
   \( a_i \) variable

---

\( a_i \) = appointment interval, \( t_b \) = time begin session, \( t_e \) = time end session, \( n_i \) = block size for \( i^{th} \) block, \( n_0 \) = initial block
General Modeling

Definitions and Formulations

\[ T_i = \text{Physician’s service time to treat patient } i \text{ where } i = 1, 2, 3, \ldots, n, \text{ and } T_i \sim D(\mu, \sigma^2) \]

\[ n = \text{The number of patients scheduled per session} \]

\[ X = \text{The scheduled time interval for a patient in minutes} \]

\[ S_i = \text{The scheduled time to start patient } i \text{ where } i = 1, 2, 3, \ldots, n, \quad S_1 = 0 \]

\[ \text{and } S_i = S_{i-1} + X = (i-1)X \]

\[ F_i = \text{The finish time for patient } i \text{ where } i = 1, 2, 3, \ldots, n \]
General Modeling
Definitions and Formulations

\( A_i = \) The actual time to start patient \( i \) where \( i = 1, 2, 3, \ldots, n \)

\[
F_i = A_i + T_i \\
A_i = \begin{cases} 
S_i & \text{if } F_{i-1} < S_i \\
F_{i-1} & \text{Otherwise}
\end{cases}
\]

\( W_i = \) The wait time for patient \( i \) in minutes where \( i = 1, 2, 3, \ldots, n \)

\[
W_i = A_i - S_i
\]

\( P_i = \) The physician idle time waiting for patient \( i \) where \( i = 1, 2, 3, \ldots, n \)

\[
P_i = A_i - F_{i-1}
\]
General Modeling
Definitions and Formulations

\[ W_1 = A_1 - S_1 = 0 \quad W_2 = A_2 - S_2 = 0 \quad W_3 = A_3 - S_3 \quad W_4 = A_4 - S_4 \quad W_5 = A_5 - S_5 = 0 \]
\[ P_1 = A_1 - F_1 \quad P_2 = A_2 - F_1 \quad P_3 = A_3 - F_2 = 0 \quad P_4 = A_4 - F_3 = 0 \quad P_5 = A_5 - F_4 \]
\[ \overline{W} = \text{The average patient wait time} \]
\[ \overline{W} = \frac{\sum_{i=1}^{n} W_i}{n} \]

\[ \overline{P} = \text{The average physician idle time} \]
\[ \overline{P} = \frac{\sum_{i=1}^{n} P_i}{n} \]
Learning Objective 2

Wait Ratio

\[ d = \text{Number of standard deviation away from } \mu \]

\[ X = \mu + d\sigma \]

\[ R = \text{The wait ratio, which is the degree to which patient wait time exceeds } R \text{ physician idle time} \]

\[ \frac{\bar{W}}{\bar{P}} = R \Rightarrow \bar{P} \times R = \bar{W} \rightarrow d^* \rightarrow X^* = \mu + d^* \sigma \]
Learning Objective 2

Wait Ratio

Example:

\[ T_i \sim Gamma \left( \mu = 15, \, \sigma = 4 \right) \]

for Return Visit patients, a simulation run.

\[ n = 32, \, 32 \text{ patients a day} \]

\[ R = 3, \, \text{Wait Ratio is equal to 3} \]
Learning Objective 2

Wait Ratio Example
Learning Objective 2

Wait Ratio Example

The simulation found $d^* = 0.63$. Therefore, the $X^*$ is calculated as:

$$X^* = \mu + d^* \sigma = 15 + 0.63 \times 4 = 17.5 \text{ min}$$
Learning Objective 2
Determine the best wait ratio - Underlying Constraints

Let \( X \) be the Scheduled Time Interval, the \( i \) th patient wait time “in general” is:

\[
W_i \text{ consists of } W_{i-1} \text{ and } (T_{i-1} - X)
\]

In order not to generate additional waiting, the \((T_{i-1} - X)\) term is preferred to be less than “0”. Therefore, given \( T_i \sim D(\mu, \sigma^2) \) and best time interval \( \overline{X^*} \), we can only hope:

\[
\Pr(T_i \leq \overline{X^*}) \geq 0.5
\]
Learning Objective 2
Determine the best wait ratio - Clinical Constraints

- Clinic or session finish time
- Time of last appointment
- Number of patients to be seen in a given session
- Average patient wait time
- Maximum patient wait time
- Average physician Idle time
- Maximum physician Idle time
**Learning Objective 2**

Example – Orthopedic Surgery Clinic

<table>
<thead>
<tr>
<th>Patient Type</th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP</td>
<td>10.6</td>
<td>4.5</td>
</tr>
<tr>
<td>FU</td>
<td>7.3</td>
<td>4.0</td>
</tr>
<tr>
<td>XR</td>
<td>5.5</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Unit: minutes

NP: new patients
FU: follow-up patients
XR: patients need x-ray before being seen
Learning Objective 2
Orthopedic Surgery Clinic

<table>
<thead>
<tr>
<th>Wait Ratio</th>
<th>Best Scheduled Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FU</td>
</tr>
<tr>
<td>1:1</td>
<td>9.2</td>
</tr>
<tr>
<td>2:1</td>
<td>8.6</td>
</tr>
<tr>
<td>3:1</td>
<td>8.4</td>
</tr>
<tr>
<td>4:1</td>
<td>8.2</td>
</tr>
<tr>
<td>5:1</td>
<td>8.0</td>
</tr>
<tr>
<td>6:1</td>
<td>7.9</td>
</tr>
<tr>
<td>7:1</td>
<td>7.8</td>
</tr>
<tr>
<td>8:1</td>
<td>7.8</td>
</tr>
<tr>
<td>9:1</td>
<td>7.7</td>
</tr>
<tr>
<td>10:1</td>
<td>7.6</td>
</tr>
<tr>
<td>11:1</td>
<td>7.6</td>
</tr>
<tr>
<td>12:1</td>
<td>7.6</td>
</tr>
<tr>
<td>13:1</td>
<td>7.5</td>
</tr>
<tr>
<td>14:1</td>
<td>7.5</td>
</tr>
<tr>
<td>15:1</td>
<td>7.4</td>
</tr>
<tr>
<td>16:1</td>
<td>7.4</td>
</tr>
<tr>
<td>17:1</td>
<td>7.4</td>
</tr>
<tr>
<td>18:1</td>
<td>7.4</td>
</tr>
<tr>
<td>19:1</td>
<td>7.3</td>
</tr>
<tr>
<td>20:1</td>
<td>7.3</td>
</tr>
</tbody>
</table>
Learning Objective 2

Example – Orthopedic Surgery Clinic

Clinic constraints:

- Session finished by 11:30 a.m. (210 min)
- Last patient scheduled by 11:00 a.m. (180 min)
- 25 patients in a session
Learning Objective 2

Example – Orthopedic Surgery Clinic

Finish Time with Various Wait Ratios

Clinical Constraint Finish Time < 210 minutes (11:30 am)
Learning Objective 2

Example – Orthopedic Surgery Clinic

The wait ratio that satisfies both constraints is 18:1, which

\[ \Pr(T_i \leq X^*) \approx 57\% \]
Learning Objective 2

Provider Schedule – Orthopedic Surgery Clinic

**Provider Schedule**: Once best treatment time intervals for each visit type are determined, the schedule can be set up accordingly. For example: assuming start time is at 8:00 a.m.

<table>
<thead>
<tr>
<th>Visit Type</th>
<th>Best Time Interval (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU</td>
<td>7.4</td>
</tr>
<tr>
<td>NP</td>
<td>10.6</td>
</tr>
<tr>
<td>XR</td>
<td>5.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Visit Type</th>
<th>Physician Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU</td>
<td>8:00</td>
</tr>
<tr>
<td>XR</td>
<td>8:07</td>
</tr>
<tr>
<td>NP</td>
<td>8:13</td>
</tr>
<tr>
<td>FU</td>
<td>8:23</td>
</tr>
<tr>
<td>XR</td>
<td>8:31</td>
</tr>
<tr>
<td>NP</td>
<td>8:36</td>
</tr>
</tbody>
</table>
Learning Objective 3
Patient Arrival Schedule

Patient Arrival Schedule: Once the provider schedule is set up, then patients’ arrival is scheduled accordingly. The determination of “Enough Time” includes:

- Signing in
- Filling out paperwork
- Having vital or x-ray taken
- Moving from room to room
- Being seen by Medical Assistance or Nurse
- Providing a specimen

Goal is to minimize average patient wait time.
Learning Objective 3

Patient Arrival Schedule – Orthopedic Surgery Clinic

X-ray is the main ancillary service that is focused on.

\[ \alpha = 3.32 \]
\[ \beta = 2.11 \]
Learning Objective 3

Patient Arrival Schedule – Orthopedic Surgery Clinic

Let $Y$ be the scheduled time interval of ancillary service $X - ray \sim Gamma\left(6.3, 3.7^2\right)$ \rightarrow \Pr\left(X - ray \leq Y^* \right) = 0.35 \Rightarrow Y^* = 5 \text{ min.}
**Learning Objective 3**

Patient Arrival Schedule – Orthopedic Surgery Clinic

10 minutes for all pre-visit activities and 5 minutes for taking x-ray for XR patients. (Arrival times are rounded to the nearest 5-minute increment)

<table>
<thead>
<tr>
<th>Visit Type</th>
<th>Physician Schedule</th>
<th>Patient Arrival Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU</td>
<td>8:00</td>
<td>7:50 (0 – 10)</td>
</tr>
<tr>
<td>XR</td>
<td>8:07</td>
<td>7:50 (7.4 - 15)</td>
</tr>
<tr>
<td>NP</td>
<td>8:13</td>
<td>8:00 (12.7 - 10)</td>
</tr>
<tr>
<td>FU</td>
<td>8:23</td>
<td>8:15 (23.3 – 10)</td>
</tr>
<tr>
<td>XR</td>
<td>8:31</td>
<td>8:15 (30.7 – 15)</td>
</tr>
<tr>
<td>NP</td>
<td>8:36</td>
<td>8:25 (36 – 10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Learning Objective 3

Patient Arrival Schedule – Orthopedic Surgery Clinic

23% of NP and 21% of FU needs X-ray before seeing physician and are most likely determined by RN or MA.

Existing Rules:

- Patients who have had joint replacement will need to have x-rays at post operation, 3 month check, and 1 year check scheduled under FU patient slots. After a year, if a patient call in and complain of “pain”, they would be scheduled as FU and have an x-ray.

- Patients who have had bone displacement or fracture that was manipulated or operated on in the hospital will need an x-ray and are scheduled as FU.
Learning Objective 3

Patient Arrival Schedule – Orthopedic Surgery Clinic

Existing Rules:

- All new patients will need x-rays if they have not had one done elsewhere. A special case is new patients with an indication of arthritis in their knee; if their x-ray only has two views, then they will need to have x-ray for two additional views.

- Patients who are 60+ years old will need x-rays.
Learning Objective 4

Case Study General Problems

- Patient wait time is very sensitive to the average treatment time yet most clinics collects no data on average treatment times.

- Clinics usually have 15 or 30 minute slots regardless the difference on the practice of individual physician which generates additional wait time either on the patients or the physician.
Learning Objective 4
Case Study General Problems

- There isn’t a clear distinguish between physician schedule and patient arrival schedule. No ancillary services being considered.

- Many clinic schedules are designed to overbook appointments to prevent idle time for physician, which creates unnecessary patient wait time.
Learning Objective 4

Case Study – Orthopedic Surgery Clinic

<table>
<thead>
<tr>
<th>Original (Morning)</th>
<th>Proposed (Morning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Type</td>
<td>Patient Arrival</td>
</tr>
<tr>
<td>XR</td>
<td>8:00</td>
</tr>
<tr>
<td>FU</td>
<td>8:00</td>
</tr>
<tr>
<td>NP</td>
<td>8:05</td>
</tr>
<tr>
<td>FU</td>
<td>8:15</td>
</tr>
<tr>
<td>XR</td>
<td>8:15</td>
</tr>
<tr>
<td>NP</td>
<td>8:20</td>
</tr>
<tr>
<td>XR</td>
<td>8:25</td>
</tr>
<tr>
<td>FU</td>
<td>8:30</td>
</tr>
<tr>
<td>FU</td>
<td>8:30</td>
</tr>
<tr>
<td>NP</td>
<td>8:45</td>
</tr>
<tr>
<td>FU</td>
<td>8:55</td>
</tr>
<tr>
<td>FU</td>
<td>9:00</td>
</tr>
<tr>
<td>FX</td>
<td>9:00</td>
</tr>
<tr>
<td>FU</td>
<td>9:15</td>
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<td>XR</td>
<td>9:15</td>
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<td>FX</td>
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<td>10:30</td>
</tr>
<tr>
<td>FU</td>
<td>10:45</td>
</tr>
<tr>
<td>FU</td>
<td>10:55</td>
</tr>
<tr>
<td>FU</td>
<td>11:04</td>
</tr>
</tbody>
</table>
### Learning Objective 4

#### Case Study Summary

**Case 1 (Orthopedic Surgery):**

<table>
<thead>
<tr>
<th>Visit Type</th>
<th>Current Scheduled Time (min)</th>
<th>Current Wait Ratio</th>
<th>Proposed Scheduled Time (min)</th>
<th>Proposed Wait Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP</td>
<td>10</td>
<td>58:1</td>
<td>10.6</td>
<td>18:1</td>
</tr>
<tr>
<td>FU</td>
<td>5</td>
<td>∞ : 1</td>
<td>7.4</td>
<td>18:1</td>
</tr>
<tr>
<td>XR</td>
<td>none</td>
<td>∞ : 1</td>
<td>5.3</td>
<td>18:1</td>
</tr>
</tbody>
</table>

**Results:**

<table>
<thead>
<tr>
<th></th>
<th>Avg. Patient Wait Time (min)</th>
<th>Est. Avg. Physician Idle Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>27.8</td>
<td>0.2</td>
</tr>
<tr>
<td>After</td>
<td>13.1</td>
<td>0.8</td>
</tr>
<tr>
<td>% Reduction</td>
<td>53%</td>
<td></td>
</tr>
</tbody>
</table>
Learning Objective 4

Case Study Summary

Case 2 (Plastic Surgery):

<table>
<thead>
<tr>
<th>Visit Type</th>
<th>Current</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP</td>
<td>30</td>
<td>33.3</td>
</tr>
<tr>
<td>RV</td>
<td>15</td>
<td>17.5</td>
</tr>
<tr>
<td>POP</td>
<td>15</td>
<td>17.4</td>
</tr>
<tr>
<td>HP</td>
<td>15</td>
<td>20.4</td>
</tr>
</tbody>
</table>

Results:

<table>
<thead>
<tr>
<th></th>
<th>Avg. Patient Wait Time (min)</th>
<th>Est. Avg. Physician Idle Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>15.0</td>
<td>5.4</td>
</tr>
<tr>
<td>After</td>
<td>7.5</td>
<td>5.3</td>
</tr>
<tr>
<td>% Reduction</td>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>
Learning Objective 4
Case Study Summary

Case 3 (Vascular Surgery):

<table>
<thead>
<tr>
<th>Visit Type</th>
<th>Current</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scheduled Time (min)</td>
<td>Wait Ratio</td>
</tr>
<tr>
<td>NP</td>
<td>30</td>
<td>1:9</td>
</tr>
<tr>
<td>RV</td>
<td>15</td>
<td>6:1</td>
</tr>
</tbody>
</table>

Results:

<table>
<thead>
<tr>
<th></th>
<th>Avg. Patient Wait Time (min)</th>
<th>Est. Avg. Physician Idle Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>27.8</td>
<td>2.0</td>
</tr>
<tr>
<td>After</td>
<td>12.4</td>
<td>1.1</td>
</tr>
<tr>
<td>% Reduction</td>
<td>56%</td>
<td></td>
</tr>
</tbody>
</table>
Learning Objective 4
Case Study Summary

Scenarios

Private Clinic → Schedule by Physician

Teaching Clinic

Single Resident → Schedule by Resident
Multiple Residents → Schedule by Physician

Case Study 1: Schedule by Physician
Case Study 2: Schedule by Resident
Case Study 3: Schedule by Physician
Learning Objective 5
Introduction to No-show

• Some of the negative consequences of patient no show are:
  – They create disturbances in the system
  – Reduced provider productivity and clinic efficiency
  – Increased healthcare costs
  – Limited patient access to care
Learning Objective 5
Introduction to No-show

• Issue with Open Access
  – “Doing today’s work today”
  – Burden patients in attempting to get appointments
    – Patients and profit loss
  – Allow overtime to complete
  – High patient wait time
Learning Objective 5

Proposed Overbooking Policy

• Basic steps:
  1. Use a predictive no-show model to estimate individual no-show probabilities
  2. Find the optimal no-show threshold that minimizes the total costs (patient wait time, physician idle time, and overtime)
  3. Overbook slots where the patient’s no-show probability is greater than the threshold

• Slots can be overbooked more than once if the combined no-show rate of patients in any given slot exceeds the threshold
Learning Objective 5

Proposed Overbooking Policy

- Physician service time distribution: Gamma (15, 10^2)
- Number of slots = 32
- Time interval between slots = 15 minutes
- Cost of patient wait time $c_w = 0.25$
- Cost of physician idle time $c_p = 5$
- Cost of clinic overtime $c_o = 7.5$
- Completion time = 480 minutes
- Individual no-show probability distribution: Gamma (0.3, 0.1^2)
# Learning Objective 5

Proposed Overbooking Policy

Given $p^* = 0.28$, $p_{i,j}$ is the predicted no-show rate for patient $j$ at slot $i$.

<table>
<thead>
<tr>
<th>i</th>
<th>Scheduled time slots</th>
<th>$j=1$ First booked patient $1=$Yes $2=$No</th>
<th>$p_{i,1}$</th>
<th>$j=2$ first overbooked patient if $p_{i,1} \geq p^*$</th>
<th>$p_{i,2}$</th>
<th>$p_{i,1} x p_{i,2}$</th>
<th>$j=3$ second overbooked patient if $p_{i,1} x p_{i,2} \geq p^*$</th>
<th>Total overbooked $(j=2)+(j=3)$</th>
<th>Total booked</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8:00</td>
<td>1</td>
<td>0.14</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8:15</td>
<td>1</td>
<td>0.37</td>
<td>1</td>
<td>0.38</td>
<td>0.14</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>8:30</td>
<td>1</td>
<td>0.21</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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**Implementation Steps and Outcomes**

**Overview**

**Step 1:**

**Activities**
- Data for physician and medical staff treatment time
- Data for patient and physician wait time

**Development**
- Understand patient visit time and its variability

**Outcomes**
- Improve physician and staff understanding of time required for different patient types
**Implementation Steps and Outcomes**

**Overview**

**Step 2:**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Development</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Clinic process flow</td>
<td>Build simulation model corresponding to the process flow of the clinic</td>
<td>Develop improved scheduling policies for providers</td>
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<tr>
<td>Clinic constraints</td>
<td>Determine the best treatment time interval for each visit type</td>
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<td></td>
<td>Build physician schedule</td>
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Implementation Steps and Outcomes

Overview

Step 3:

**Activities**

Date for treatment time of ancillary services

**Development**

Build patient arrival schedule

**Outcomes**

Develop improved scheduling practices for patient arrival
**Implementation Steps and Outcomes**

**Overview**

**Step 4:**

**Activities**
- Data for no-show patient characteristics and preferences

**Development**
- Build statistical model to estimate no-show rate
- Incorporate overbooking policy in scheduling system

**Outcomes**
- Improve patient access to care providers and reduce negative impact of no-shows
Implementation Steps and Outcomes

Overview

**Step 5:**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Development</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Date for patient and physician wait time after implementation</td>
<td>Approach implementation in clinics</td>
<td>Enhance patient satisfaction and quality of care</td>
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</tbody>
</table>
Conclusion

Contributions

- Present the impact where the scheduled treatment times are not based on the actual data.
- Understand the benefit and difference of wait ratio concept to the traditional cost ratio.
- Provide step-by-step approach to develop physician and patient arrival schedules.
- Implement the proposed solution for three clinics to further demonstrate the effectiveness and the simplicity of the approach.
5. Conclusion

Contributions

- A cost-effective overbooking policy that accounts for individual patient’s no-show rate.
- Change patients’ perception of long wait in a physician office.
- Provide a better quality service in terms of patients’ waiting.
- Create a much less stressful working environment for the medical staff.
Questions?

Please contact…

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