Physician Schedule Optimization

Using Data Science to
Align Patient, Organization and Physician Interests

For Strategy and Clinical Operations Leaders
**Business Problem:**
Hospitals and healthcare systems are trying to optimize their physician scheduling templates against a series of constraints/considerations. The consumer (and referring physician) are expecting more availability and will de-select based on appointment availability.

**Gap:**
Most organizations are unable to address this problem due to lack of a business case for change, informal scheduling rules, and physician burn-out.

**Product Concept**
An optimization model that assembles and predicts the impact of schedule changes on patient revenue against a series of constraints and variables.

**Client Benefits**
1. Make transparent many of the informal business rules in determining and managing physician utilization
2. Define the optimal scheduling template that will most affect desired volumes
3. Increase patient satisfaction with appointment availability
4. Understand individual and comparative performance across physician groups
5. Create transparency in the distribution of encounter volume
6. Visualize the impact of changes to the schedule template in both utilization and outcomes
7. Utilize a recommendations engine that continues to learn and adjust to physician availability
OPTIMIZING AGAINST CONSTRAINTS
Common Challenges Requiring a Model

Decision Rules

• Overall utilization

• Balance of encounter types (e.g., new patients, hospital-related, treatment visits, follow-ups)

• Payer mix and revenue output

• Throughput/efficiency

• Appointment availability

• Skill-base of physicians

• Physician preference for appointment types

• Appointment timing against operational constraints

Results Seen Today

• Double booking to accommodate patient requests

• Informal rules known only to dedicated schedulers

• Overutilized physicians

• Underutilized physicians

• Physicians doing more of what they don’t want to and less of what they want

• Dissatisfied patients – limited appointment availability

There is a model – utilize your data to improve desired patient revenue while addressing constraints.
TYPICAL WORK PLAN
Transforming Data into a Learning Platform

Optimization Modeling Process

- Whiteboard Session
  - Facilitated session to discuss the problem and context
  - A clear and concise statement of the problem

- Build Hypothesis
  - A diagram of the major variables that comprise "the system"

- Develop Qualitative Model
  - Objective Function
  - Constraints
  - Variables
  - Software engineering practices

- Create Optimization Model
  - The actual computational model built from the blueprint Qualitative Model

- Validate Model
  - Is the model accurate and valid?

- Design for Experiments (DFE) principles
  - Subject Matter Experts (SMEs)
  - Test runs
  - Experiments

- Deploy Model

- Conduct Analysis
  - Running experiments with the working model

- Exploratory Data Analysis (EDA)
  - Correlation
  - Stepwise regression
  - Logistic regression
  - Factor analysis
  - Cluster analysis (segmentation)
  - Pattern detection

- Collect, Format, and Cleanse Data
  - Data to inform the model

- Transform/Prep Data
  - Schematic

- Build Enclosing Web App
Determine the extent to which optimal schedule can increase desired volume.

**Our Objective**

**HYPOTHESIS**
What are current assumptions, hypotheses and constraints?

**DATA INVENTORY**
What data will drive the model?

**MODEL DEVELOPMENT**
What does the data tell us about current performance?

**EXPERIMENTATION**
What actions can we take now to better meet patient needs while optimizing against constraints?

**MONITOR**
A reporting tool and recommendations engine to evaluate progress toward goal.
These activities will focus on background discussions, document review and data gathering. While these activities will engage the clinical operations team extensively, it is recommended to include those who have ownership of other data sources to ensure a shared understanding of our goals and needs.

We use workshops to review our shared objectives, confirm areas/practices of focus, finalize key questions you’d like answered, crystalize the hypotheses to test, and outline our project plan.

Our discussions will focus on creating alignment regarding the various factors to include in the modeling:

- Objective function (e.g., maximize revenue over time period to be scheduled)
- Constraints (e.g., available hours, kinds of patients, physician burn-out, contractual terms, etc.)
- Variables (i.e., the actual schedule of physicians in time slots over the course of the scheduling period)

We will also utilize this step to review contracts, discuss systemic errors (e.g., time constraints, patient types, payer types, etc.).

Ultimately, we will confirm that there IS something you can do to optimize the system and create potential levers.

**STEP 1 – HYPOTHESIS/QUALITATIVE MODEL**

What are current assumptions, hypotheses and constraints?

**Create a Shared Understanding**

**Deliverables Include**

- Kick off and project alignment meeting
- Clearly defined desired outcomes
- Business plan/goals review
- KPI development – current vs. future
- Confirmation of the hypothesis (e.g., the system is not performing at its optimal capacity)
- 1:1 interviews with key physicians (optional)
- Definition for Objectives, Constraints, and Functions

**Deliverable: Initial Design for the Pilot Qualitative Model**
Our discussions will also include an alignment exercise to illustrate (with a qualitative model) your current definitions of revenue, patient needs, physician needs and measured outcomes. This will serve as a lasting foundation for future analysis.

Some examples of what we hope to achieve with the qualitative modeling:

- Need to define the asset level – physician, practice or service line?
- Defining capacity – does this include adding physicians? Subtracting physicians?
- Scenarios to apply that demonstrate the flow (use blinded physician schedules) – current state
- What are the skill sets of each asset (physician/NP)?
- Physician contract / performance evaluation template – what happens when not met?
- Service line goals by types of patients/payer mix

We will circle back with your team for outstanding data needs as needed, which may include:

- Effort reporting - why are we suboptimal today?
- What do physicians control – template/informal/actual?
- Data regarding patients who present/don’t
- Overutilization – certain threshold for physician burnout

Deliverables Include:

- Initial data definitions and sources diagram
- Determine commitments for data formatting accountability and deadlines
- Data call checklist
- Data definitions and sources diagram
- Effort report review
- Internal information review
- Internal data formatting instructions
- KPI diagnostic – how well you’re doing today (optional)

Deliverable: Final Qualitative Model and Data Inventory
Our team constructs the quantitative (pilot) model from the qualitative model as a guide. This “offline” work will include a series of requests for data and potential data cleansing. Ideally, you will provide the data requested in the proper format. If not the ideal, we will work toward cleansing the data and transforming it into a useable format for the quantitative modeling.

Please note that it is with this step that most projects will be delayed. It is imperative that you provide a project manager who will gather, review and assemble data for our use.

As this phase continues, we will work extensively to confirm the validity of the model with Subject Matter Experts (SMEs). These are our colleagues but should include some who have direct experience in developing operational strategy and/or schedule templates within your organization.

Deliverables Include

- Data definitions and sources
- Internal information review
- Data cleansing
- Software development
- Validation

Deliverable: Working quantitative model

Optional: Gaming Activity – Physician-Created Schedule and Impacts
STEP 4 – EXPERIMENTATION
What actions can we take now to better meet patient needs while optimizing against constraints?

Analyze the Data

Once into this step, we will ask for commitment by stakeholders to the final model.

The key questions to answer at this checkpoint:

• Is the model valid?
• Does it adequately address constraints that may vary by practice/physician?
• What does the model suggest as the most important lever on outcome?
• Answer key questions with the model:
  • Identify lag times in the data and outcomes
  • Decision to schedule next patient
  • Decision to add capacity
• Deliver the final model (e.g., drill downs – service line, practice, physician, etc.)
• We will also provide recommendations, as dictated by the data, including:
  • Effort reporting - are you suboptimal today?
  • Physician control – template/informal/actual?

Deliverables Include

• Buy-in meetings
• Decision to add capacity
• Internal review
• Scenario planning/experimentation

Deliverable: Final Quantitative Model

Optional: Real-time Recommendations Engine for Daily Scheduling (recommend after pilot to include other services)
Strategic What-if Simulations

Tactical Scheduling Recommendations Engine

APPLICATIONS
Potential Approaches to Guide Decision Making with Data
ABOUT US

Our Qualifications
ENDEAVOR ANALYTICS
Scope of Services

Project Phase

Planning

Data Fusion

Visualization

Modeling

Automation

Determine what's really needed to drive consensus and make high-impact decisions.
We assemble and organize disparate data from your internal and other external sources for maximum insight.
A picture says a thousand words. We utilize our dashboards to properly draw out meaningful relationships across time series data to paint the picture of the current state to draw conclusions and focus efforts on what matters most.
Once we help you develop several candidate solutions to your problem, we guide you through the development of an appropriate analysis to thoroughly understand the opportunity costs and tradeoffs among the solutions. When this process is complete, you will know how best to execute your project, the range of value and risk you face, and how to improve the likelihood of your success.
Our technology platform provides the ability to integrate business intelligence with workflow automation to make better decisions faster.

Internal Process

Business Model Canvas
Model Hypothesis
Qualitative Modeling
Data Readiness Assessment
Development Options Matrix
Data Acquisition Strategy

Benchmarking Data
Market Data
Sales and Marketing Data
Operations Data
Market Research Data
Data Cleansing

Klipsic Dashboard
SPDC Dashboard
Python Dashboard
Endeavor Proprietary Dashboard

SPSS
Workflow Automation
CRM Customization
Recommendations Engine
Artificial Intelligence
ENDEAVOR ANALYTICS
Real-time Integration of Disparate Data

Take Big Data to Big Impact
Leveraging our history of over 60 years in marketing research, we have created technology-enabled tools to help capture voice of the market, customer and employee. Our Insights360 solution will allow you to place listening posts at high priority touchpoints providing you with a 360 degree view of your key stakeholders and influencers. Built on the Salesforce.com platform, you can integrate real-time feedback with operational data for reporting insight within the context of the business environment. In addition, you can incorporate CRM to monitor, track and respond to positive and negative feedback all within the same system. Finally, a single platform for capturing feedback, tracking customer service trends, responding/service recovery and measuring your relationship with your customers.

Armed with customer experience insights, Endeavor Analytics leads CRM design teams to develop systems that meet workflow and business reporting needs; all aimed to enhance the customer experience. This includes a careful examination of end-user needs, identification of operationally critical information, workflow enhancements and data schema. Our requirements documentation can be used for your own programming, with other vendors, or for quality control and training.

Take Big Data to Big Impact. Our Insights360 solution will take your program to the next level. Going beyond data integration, we work with you to establish a solid measurement program that is in alignment with your business goals and strategy.

We help you identify what data matters most, streamline the process of data integration, then create visually rich dashboards and data visualizations to help you socialize and share insights with your stakeholders.
OUR FIT
Translating Insights to Action

Industry Expertise
Our team includes those who have had leadership experience within healthcare systems addressing the same challenges you have today.

Deep understanding of the healthcare system environment, from the most complex (academic-community partnerships) to most competitive (regionally-based systems).

Research-Driven Insights
Use of proven research tools and frameworks for brand, experience, culture and operations management across industries.

A 50-year heritage of research innovation to drive strategic decision-making.

We bring best practices specifically designed with national leaders in healthcare.

Practical Strategies
Clear and actionable recommendations using insight-driven scenario development to express multiple options.

Consensus-driven decision making processes to ensure the strategy is embraced.

Engagement processes to maximize the potential for advocacy of the strategy, both internally and externally.

We appreciate the unique needs of academic medical centers. With much more at stake in every single interaction with referring physicians understanding their decision factors and aligning your experience to it is paramount. We hope to co-design a research plan and resultant strategy that will elevate service excellence to a level comparable to your clinical and scientific excellence.

Through our decades of experience, we have continually expanded our capabilities to provide the best business value to our clients. We have the capabilities to gather the functional and emotional needs of referrers; refine outreach processes against best practices; and deploy systems to manage that experience. Our objective is to create real business value from this work together.
Since the early 90s, Endeavor has been using our experience mapping approach to organize insight development, design engagement strategies, align operations and culture, and monitor the outcomes. Learn More...

**Patient Experience Management**
- Physician Experience Management
- Donor Experience Management
- Real-Time Dashboards

**Healthcare Growth Playbook**
- Healthcare Brand Management
- Digital Insights and Dashboards
- Strategic Planning
- Destination Medicine

**Cultural Transformation**
- Financial Analysis
- Revenue Cycle Improvement
- Quality and Patient Safety
- Executive Transition
- Insights360 Performance Dashboards
- Healthcare Expert Advisory Group
Healthcare market leaders and challengers turn to Endeavor (formerly Gelb Consulting) to advance their strategic objectives. We work collaboratively with our clients to merge market insights and industry expertise to design and implement practical strategies. Our clients keep coming back to us not only for a near-term game plan, but as a long-term trusted partner.

**Understanding the What and the Why**
Our approach yields direction for our clients to drive advocacy – customers willing to go out of their way to recommend you. This is formed by the alignment of your brand’s promise, your delivery of services and how they are delivered. These create the ideal experience.

We believe that market leadership is based on a keen understanding of the underlying drivers of your customers – whether they be patients, families, referring physicians, donors or employees. Since our founding in 1965, we have continued to innovate identifying industry-leading best practices and deploying the latest research techniques to support our clients’ success.

**Making the How a Reality**
This is where our experience comes in. Our clients include many of the most recognized and well-regarded healthcare organizations in the country, with a focus the most complex - academic medical centers. We bring best practices and success to the table.

In addition, our seasoned consultants have been in your shoes, having decades of experience serving in leadership positions within healthcare organizations. We understand the challenges of navigating the most challenging of situations – from competitive environments to resource constraints. We work with you to implement practical strategies to accelerate business performance at a pace that’s manageable for your organization.
THANK YOU

We look forward to working with you

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