Predictive Healthcare Modeling He
Effectiveness of a New Medicat

Healthcare

Problem:

A pharmaceutical company needed to prove how a new medication would impact emergency department operations before launching it. They hired Sterling Simulation to quantify operational gains and trade-offs versus standard care and a competitor

treatments using the same one-year patient stream. Performance was evaluated with metrics like length of stay, waiting time, LWBS, admissions, and resource utilization.

Results:

- Reduced overall emergency department length of stay by ~10%.
- Improved admission outcomes and reduced bed utilization versus standard care.
- Demonstrated that the competitor treatment showed weaker operational gains and a higher “leave without being seen” tendency.
- Delivered a decision-support tool for sales teams to quantify benefits vs higher treatment cost.

Problem

A pharmaceutical company wanted to introduce a new medication treatment, which would help emergency departments (ED) improve their operational performance, in terms of efficiency and time. To evaluate the impact of their new treatment on ED operations, the client hired Sterling Simulation, a consulting company, to conduct a pharmaceutical simulation.

The client’s goal was to assess various pharmaceutical marketing strategies. They wanted to find out what

agent-based simulation approaches in the model. The company chose simulation, as it allowed them to see how the new system would perform before implementing changes and making appropriate adjustments.

Solution

Sterling Simulation modeled the process of how the patients were treated, comparing three different treatments.

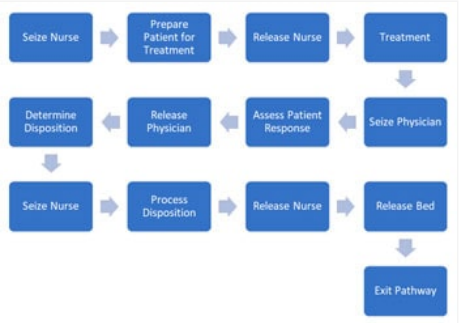
The model included three parts:

1. **Patients** — They moved through the process.
2. **Resources** — They represented what the patients needed to move through the process: registration clerks, triage nurses, ED nurses, physicians, ED beds, and observation unit beds.
3. **Process** — It represented the treatment process in the model.

In this pharmaceutical simulation model, the patients had three major parameters: whether they were sick, acute, or willing to leave without being seen.

When it came to the process flow, there were three major subunits:

- A patient was created.
- The pretreatment process, where a decision was made about whether a patient needed the



Pharmaceutical marketing model scenario (click to enlarge)

After the patient was given a condition status, it was decided if the patient was either acute or not. Acute patients would get a bed immediately and wouldn't go through registration and triage. Once patients were assigned a bed, they would no longer be able to leave before they had been treated. The treatment process itself was split into two parts, depending on whether or not a patient had a condition. Patients without a condition were sent through a generic treatment block.

Pharmaceutical simulation model statistics (click to enlarge)

With the help of pharmaceutical simulation modeling, the development team tested and analyzed three treatment options, which were different in several aspects:

- The standard of care treatment
- Client's treatment
- Competitor's treatment

In the model, the standard of care had low cost, moderate treatment time, but could lead to hospital admittance or the need for extra observation time. The client's treatment had high cost, short treatment time, and always led to discharge. Finally, a competitor's treatment had moderate cost, long treatment time, and was also assumed to lead to discharge.

To gather the data to answer their business questions,

- Total patients treated
- Total length of stay
- Total waiting time
- Leave without being seen rate
- Admission to hospital rate
- Resource utilizations

Results

When analyzing the pharmaceutical simulation model, the team found the total number of patients treated did not change, no matter the treatment applied. This seemed strange, because the length of stay for the patients with a condition dropped dramatically, even though the actual number of patients that went into the model didn't change. This led to the development of the throughput rate (throughput vs. total length of stay) metric, which normalized the number of patients who left the model.

The model developers discovered that providing the client's treatment to the patients with positive condition status offered several benefits:

- Reduced all patients' length of stay in the ED by approximately 10%
- Improved admission rates to the hospital
- Reduced bed utilizations

This treatment had one disadvantage – it was much higher in terms of cost than the standard of care. Although the client's treatment was more expensive than the other two options, it enormously improved ED

treatment offered. Also, people in the model with this treatment tended to leave without being seen.

With the help of simulation modeling and AnyLogic, Sterling Simulation built a pharmaceutical decision support tool for their sales team. EDs, on their end, could decide which metrics considered in the model were sensitive to them and decide on the adoption of the client's treatment. For example, if an ED suffered from crowding, the competitor's treatment would not be the best option, according to the model. Thus, the sales team, while promoting pharmaceutical products and supporting pharmaceutical marketing strategies, could demonstrate the model to their potential customer, showing how their treatment would improve the operational performance of the ED.

Project presentation by Scott Hebert, Vice President of Sterling Simulations:

Similar case studies

MORE CASE STUDIES

download free simulation software

AnyLogic Cloud

anyLogistix supply chain software

blog

use of simulation

agent-based simulation

discrete event simulation

system dynamics

material handling library

manufacturing optimization

manufacturing capacity planning

epidemiology simulation

predictive modeling in healthcare

pharmaceutical simulation

optimizing airport processes