Enhancing Sterile Services Planning: A Case Study of Belimed's Simulation Modelling Application

Introduction

A large health system in Europe, like many healthcare systems globally, relies heavily on efficient and reliable sterile services to ensure patient safety and maintain operational effectiveness. Central Sterile Service Departments (CSSD), responsible for the sterilization of medical instruments, are critical components of this network, supporting surgical procedures and other essential healthcare services. However, tremendous growth in surgical demand, has challenged sterile services teams around the world in how to support this growth while maintaining quality in a cost-effective manner. This white paper examines how this health system partnered with Belimed to leverage its industry leading simulation modeling services to create a data driven solution on how best to support future surgical demand.

Problem Statement

The health system's sterile services network, like most health systems, are experience an ever-increasing demand on surgical operations to support growing and aging demographics. The health system, being a proactive organization, wanted to quantify this future demand and using state-of-the-art simulation modeling highlight localized capacity issues as well as test a potential solution to support future growth across the regional Boards.

Solution: Leveraging Belimed's Simulation Modeling

In response to these challenges, the health system partnered with Belimed, a global leader in sterile processing solutions, to develop a sophisticated simulation model that could accurately replicate real-world CSSD operations across the system. The aim was to use this model to understand existing potential capacities within the sterile services network and to develop data-driven mitigation strategies to enhance service capacities and minimize risk.

Belimed's proprietary simulation model, developed using BigBear.AI's software, offers a powerful tool for analyzing the complex dynamics of sterile processing. Unlike traditional planning methodologies, this model utilizes a time-based discrete event simulation approach with stochastic properties, allowing for the consideration of variability and randomness inherent in real-world processes.

The model's capabilities extend beyond basic capacity and throughput calculations. It can predict work-in-process queues, staff and equipment utilization, and turnaround times for products, providing a holistic view of the sterile processing system. To ensure the model's accuracy and reliability, it was rigorously validated against real-world data collected from two Health system sites.

System-Wide Sterile Services Model

With the model validated, Belimed and the health system proceeded to develop a system-level model that could simulate the impact of CSSD shutdowns and surgical growth on a larger scale. This model

encompasses the operating rooms and CSSDs of five hospitals and is designed to test system performance under various scenarios.

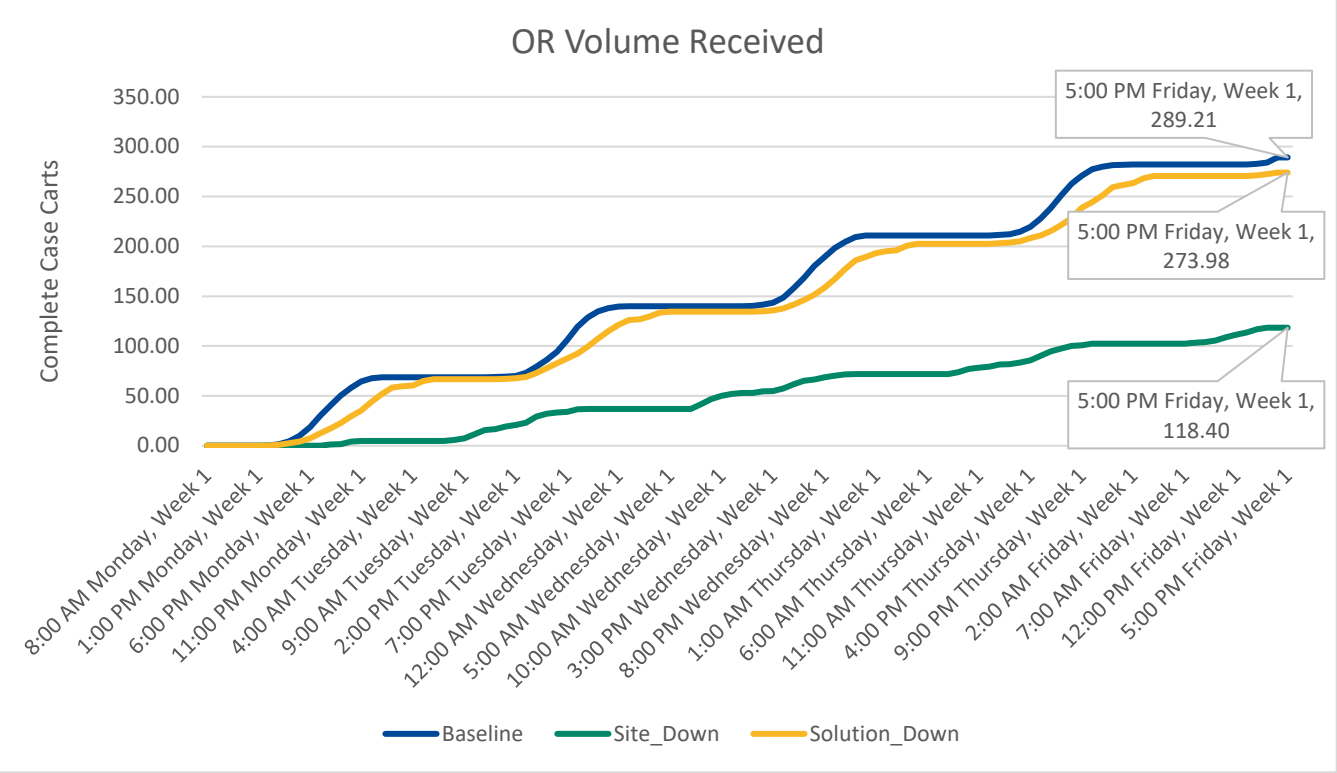
The initial focus was on simulating the shutdown of three key CSSDs separately, analyzing the ripple effects on the entire network. The model incorporates real transport times between facilities and uses actual case volumes as inputs, ensuring a realistic representation of the system's response to disruptions.

Key performance indicators are being tracked to evaluate the impact of shutdowns on:

- Operating room working time, comparing performance against a baseline scenario with no downtime
- Surgical case volume supply, assessing the potential impact on procedures
- Supporting CSSD performance, evaluating the capacity and efficiency of other facilities in absorbing the workload of the shutdown CSSD

The insights gained from these simulations will inform the development and evaluation of mitigation strategies.

All major shutdown scenarios showed an unacceptable impact to patient care. From this, the team decided to build an additional CSSD facility central to the two largest hospitals to support surgical volume growth across the system.



This new solution showed a 131% improvement to patient care from the worst-case shutdown scenario and a 38.6% improvement to total system capacity!

Conclusion

The proactive approach taken by the health system to address the needs of its sterile services network demonstrates a commitment to continuous improvement and patient safety. By embracing Belimed's simulation modeling technology, the health system has gained valuable insights into the complex dynamics of its sterile processing system, identifying vulnerabilities, and developing data-driven solutions to enhance service capacity.

The ongoing refinement and expansion of the model, coupled with the development of targeted improvement strategies, will contribute to a more robust and reliable sterile services network. This investment in simulation modeling and data-driven decision-making positions the health system as a leader in healthcare system optimization, ensuring the consistent delivery of high-quality healthcare services across the nation.

About Belimed

Belimed is a global leader in providing medical and surgical instrument sterilization, disinfection, and cleaning products and services. They are dedicated to instilling confidence in their customers, empowering them to advance medical care and protect the lives of patients and staff.
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