

Ensuring the feasibility of a **\$31 million** OR expansion project

Memorial Health System utilizes healthcare simulation to contribute to excellence in patient care and performance.

Memorial Health System (MHS), a leading Illinois healthcare provider, is a community-based, not-for-profit corporation, dedicated to improving the health of the communities it has served since 1897.

Utilizing results from SIMUL8's powerful and intuitive simulation software, MHS has delivered substantial improvements to emergency department patient flow, visit duration and satisfaction.

As well as improvements to existing processes, simulation has ensured the long-term feasibility of a \$31 million operating room expansion project by optimizing the flow of patient traffic and identifying costly bottlenecks ahead of construction.


In turn, such results have cemented MHS's position as a national leader for excellence in patient care and performance.

Memorial Health System's achievements using SIMUL8:

- ✓ 16% improvement in overall emergency department length of stay
- ✓ 27% reduction in length of stay for non-admitted patients in the emergency department
- ✓ 53% reduction in patients leaving emergency department without treatment
- ✓ Improved emergency department patient satisfaction from the 57th to 99th percentile
- ✓ Ensured the long-term feasibility of a \$31 million OR expansion project

Acknowledgements to:

Todd S. Roberts MBA, System Director of Operations Improvement,
Memorial Health System (Springfield, Illinois)



Meeting the challenge of optimizing healthcare processes through simulation

Efficiently managing resource capacity and patient flow are **fundamental issues** for every healthcare provider.

However, with such complex interactions between resource, process and risk factors, even small changes to these can result in a butterfly effect; **creating larger, potentially unforeseen consequences**.

This is why discrete event simulation is routinely used by healthcare organizations, as it enables them to **understand** and **pinpoint** intricate cause and effect relationships.

Using powerful, visual software to emulate real world conditions, healthcare providers can **rigorously test, analyze, validate and optimize their business processes and systems** in a **risk-free** environment.

Todd Roberts, Administrator of Quality and Safety at Memorial Health System, used SIMUL8's discrete simulation modeling to overcome common issues faced by healthcare organizations; **optimizing emergency department waiting times** and **ensuring that new, costly facilities operate efficiently**.

Did you know?

Studies have shown that a 1-hour reduction in ED boarding time could result in over **\$9,000** of additional revenue through reduced ambulance diversions and volumes of patients leaving hospital without being seen.

Objective one: Optimizing emergency department processes without risk

Memorial Health System's Level-1 trauma centre, based within a 500 bed tertiary, urban, academic medical centre receives over 70,000 annual emergency department (ED) visits each year.

In such a large and complex facility, implementing new ideas or improvements **without impacting on patient well-being** is a valid concern.

Using SIMUL8, Todd Roberts applied discrete simulation modeling to analyze MHS's emergency department floor design and throughput for a new Rapid Clinical Examination provider model.

The results

By making incremental changes to patient journeys and resource planning, and identifying where such modifications would have wider-reaching enhancements, Todd and his team were able to **confidently** and **efficiently** implement the validated improvements, leading to impressive results.

Memorial Health System has reduced length to stay for non-admitted patients in the emergency department **by 27%**, reduced percentage of patients leaving by without treatment **by 50%**, and released admit hold time **by 37%** while improving patient satisfaction from the **57th to 99th percentile**.

Through simulation analysis and results, Todd successfully identified:

- ✓ The primary macrofactors affecting length of stay for patients.
- ✓ The most efficient model for routing patients through the system and the number of provider resources necessary for staffing based upon patient distribution.
- ✓ The process constraints, bottlenecks and factors contributing to increased patient wait time, as well as patients leaving without treatment.

*"We don't want to go in - in the case of the ED - and just make trial and error changes to the real world process that could **really affect patient satisfaction and even safety if we're not doing it in a thoughtful way.**"*

Todd S. Roberts, System Director of Operations Improvement, Memorial Health System



“We developed the simulation using the floor layout schematic.

*I like to do that with our simulations because when you take it to the stakeholders, when you take it to the physicians, when you take it to administration, they can look at that and say, **“This is real. I experience this every day. It’s not an abstract concept.”***

**Todd S. Roberts, System Director of Operations Improvement,
Memorial Health System**

Objective two: Planning for future capacity - simulating an OR expansion

As well as optimizing existing department processes, MHS have also utilized SIMUL8 to determine an optimal facilities layout for its \$31 million operating room (OR) renovation project.

With such a large investment at stake, ensuring the new facilities could handle patient volumes **for the next 20 years** was crucial to the project’s validity and success.

Working with proposed architectural design plans and existing OR process flows, Todd created a simulation within just 60 hours, quickly identifying an issue with the initial schematics.

The results

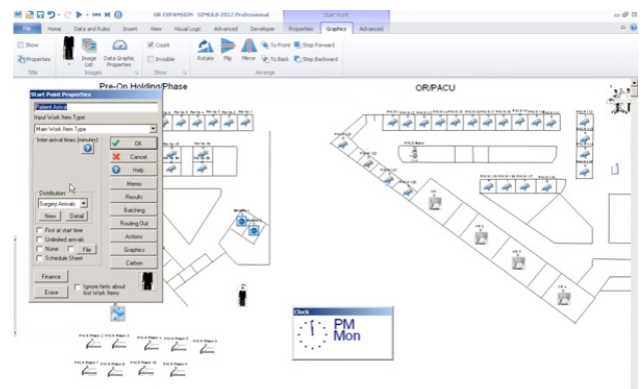
Analyzing patient flow between pre-op admission, transport to OR, OR time, and post-anesthesia care units (PACU) for admitted and outpatient surgery, Todd’s simulation detected a bottleneck from inefficient elevator capacity. By adding a third elevator to the simulation, there was **an overall reduction of 30 minutes per patient** in wasted movement and waiting.

With running costs of \$54 per minute in operating costs and wait times, along with high volumes and continuous demand for operating rooms, a 30 minute difference per case **led to significant cost savings for MHS** – with the additional cost of adding an extra elevator breaking even in just one week.

*“The ROI as you can see really can, depending on the process like the OR with our increased capacity it really could run into **millions of dollars a year.***

*So to have a black belt or someone trained in this area is not that heavy of an investment **for the benefits that you can get out of it.***

As a result of this simulation, MHS’s executive leadership were able to make quick, confident decisions, adding extra elevator capacity to the architectural plans. In turn, this ensured the project could accommodate patient volumes for the foreseeable future.



“Simulation has helped us to create a shared visual understanding of the process.

We can show executive leaderships, show architects, show anybody that we need to how the process runs and how we can vet it to make sure that everybody's on the same page and it matches our real-world and what we're seeing.”

**Todd S. Roberts, System Director of Operations Improvement,
Memorial Health System**

How can I get started with healthcare simulation?

If you're unsure where to start with using simulation in your organization, Memorial Health System's Todd Roberts recommends:

*“My advice I would give is probably model something that currently exists first, **even if it's a fairly simple process.** You can really gain buy-in by showing how you can match the real-world by developing a current state process.*

And then when you show it to the stakeholders, work with them, have them give you plenty of feedback - say they're looking at the different parts of the simulation - have them verify its validity. That's going to get you a lot of buy-in.

It doesn't have to be a big complex emergency department environment but you may just look at a throughput process. One of the things that we looked at was our time with the CT scanner and just how long people are waiting to get out of a pretty linear process.

You don't have to be a computer programmer. You can be, that's the neat thing. You can use Visual Logic, but with the SIMUL8 software, **there's a lot of drag and drop as well.** And so if you have an understanding of your processes, you can quickly start to build your simulations.”

About Todd Roberts

Todd S. Roberts, MBA, currently serves as the System Director of Operations Improvement with the Memorial Health System in Springfield, Illinois. In his role with MHS, he has designed and implemented the health system's Lean Six Sigma infrastructure, along with delivering organizational training in Lean and DMAIC methodology at the White Belt, Green Belt, Black Belt, and Physician and Executive Sponsor levels. MHS's Six Sigma program has yielded over 80 projects in 3 years representing significant gains in patient satisfaction scores, core measure and other quality indicators, and operating income.

Todd has 15 years of experience in healthcare performance improvement and medical device/ pharmaceutical research, development and manufacturing management. He is a certified Lean Six Sigma Master Black Belt and has conducted Lean Six Sigma training for the Illinois Hospital Association, spoken at numerous national conferences on operations improvement in healthcare, and served on the Board of Examiners for Illinois Performance Excellence.

For more information how SIMUL8's powerful simulation software can be used to deliver results for your organization, visit

SIMUL8Healthcare.com