Doubling the billable tests in the same lab space

Using a lean Industrial Engineering approach to meet growth challenges through efficiency and improvements.

THE CHALLENGE

In 2012, Carolinas Health System's (CHS) core lab experienced a dramatic increase in testing volume due to the overall system growth, as well as the success of the Laboratory Outreach program. The 50% growth over the past five years, while welcome, created numerous operational challenges:

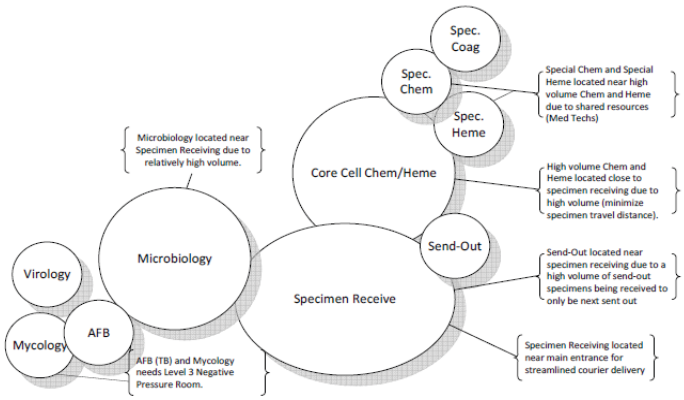
- The volume of routine tests from physician offices reached a level where the acute care needs of the campus were being adversely affected.
- Growth also resulted in testing being spread across five locations, presenting challenges to quality and efficiency.
- Lab functions at the acute hospitals were rapidly outgrowing their facilities.

THE PROCESS

Boulder Associates' Michael Oswald, then a lean master at CHS, was part of an initiative to design a new core lab using lean design principles that becomes the national benchmark for laboratory design and operations. A core team comprised of architects, project managers, Lean/IE team, SVP of Laboratory, VP of laboratory services and the CMO, was convened to assess the options for consolidation and develop process improvements that would be designed into a new facility, and also could be implemented at existing labs.

The team conducted a lean and industrial engineering assessment of the current state of lab operations at CHS. They then visited lab facilities at the nation's best labs to set benchmarks and record learnings and practices to inform their vision for the project. Guiding principles for the project were developed, which became the framework for the design work.

The first design event included the leadership team, PhD's over each section of the lab and one front-line person for each area. The team created an affinity diagram to define adjacencies.



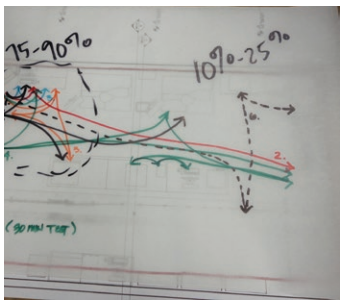
Identify shared services and close relationships

Nine distinct 3P events were conducted to define how the lab would operate in a lean operating system. These events involved 75% of front-line team members, who spent a week working with full-size cardboard models of spaces, simulating work processes and flows to determine the ideal layout of spaces, equipment, and paths of travel to maximize operational efficiency.

The results of the 3P events not only informed operations, but also the physical design of the new facility. The leadership team implemented the new processes into the existing locations to start improving and conducting "Plan–Do–Check–Act" (PDCA) immediately, allowing return on the investment in the initiative for CHS to start immediately.

Full participation of frontline staff

Mock-ups for hands -on simulation



Flow analysis

Flow	Before (feet)	After (feet)	Improved
High Vol Chem/Heme	1189	210	82%
Low Vol Chem/Heme	1081	265	75%
Micro - Urine	1619	260	84%
Micro - Gram Stain	1008	205	80%
Molecular - CF	2652	327	88%
Immunology – PRA	2338	293	87%
Cytogenetics – Bone Marrow	2800	339	88%

Outcome of optimized specimen flow analysis

In addition, the team developed a new system for materials management that took into account on-site inventory, product lead times, visual management fundamentals, and a robust process for handling QC-required items. They worked with suppliers and implemented new internal processes, including defining roles within the organization, providing training, and developing leadership principles, which improved the overall lab process immensely.

THE OUTCOME

The new core lab was 9% under budget, opened on time, and CHS was able to fully return their investment in the project by the third year of operation. This was in no small part due to the operational efficiencies uncovered throughout the entire lean approach of the team. The success of this lay in the planned capacity of the new lab. **Within the same 28,400 s.f., the lab was projected to be able to handle 8.8 million billable tests in 2021, more than double the 4.3 million tests for 2015.** This meant that the facility would be able to handle a potential 355 billable tests per square-foot in 2021, up from the 150 per of the 2015 volume. These benchmarks are significantly higher than that of current equivalent labs, which ranged from 78-94 tests per square-foot.

Before: 700 Specimens Waiting

After: No bottlenecks

OPERATIONAL EXCELLENCE AT BOULDER ASSOCIATES

Operational Excellence is a catalyst for improvement and innovation.

Our expertise comes from more than two decades of using process-driven design to deliver healthcare facilities. In that time, the ideas of optimizing flow, reducing inefficiencies, and operational assessments have informed the design services we provided. From our years of full engagement with the concept of lean, we have now established Boulder Associates Operational Excellence as a consultancy that provides a range of services from training to assessments to custom data visualizations to clients in various sectors worldwide.

We believe that being a lean organization is an advantage in the marketplace. We teach lean, but we also act lean. When we provide coaching, we anchor our work in the real world solutions that have benefited us in our design practice. While we are quite comfortable working with our clients at a strategic level, we are at our best when we join our clients and team members in the trenches, rolling up our sleeves and collaborating on tactical solutions that add value.

CONTACT US AT OPEX@BOULDERASSOCIATES.COM
800.499.7796