

Evaluation of automation and lean methodologies on the urine workflow in a microbiology laboratory

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Objective: Urinalysis remains one of the three major in vitro diagnostic screening tests after serum chemistry profiles and complete blood counts. When it comes to improving efficiency, the greatest benefits often come from revamping high-volume manual processes. Traditional, manual urine screening methods are time-consuming, outmoded and inefficient and open to significant errors that negatively impact patient care and drive up costs. Inaccurate microscopy results may also lead to unnecessary cultures and a subsequent cost. Estimates have shown that 25 percent of urine cultures are unnecessary, which not only waste resources, but delays other results. A “top to bottom” assessment of urinalysis testing, that is, pre-analytical, analytical, and post-analytical work processes and outcomes were evaluated and addressed, using Lean Six Sigma methods and automation.

Methods: A baseline measure of turnaround time (TAT) defined as time of booking in to time the report is released and staff productivity was established. This was compared to TAT performance and staff productivity after implementing Lean process modifications, included the creation of a urine work cell, automation for the analytical and post-analytical stages. Five LEAN principles were applied to the urine work-flow:

Results:

- Average time required for a technician to process a urinalysis specimen was reduced by 50 percent, from 150 seconds to 75 seconds. This was predominately due to elimination of non-value steps in the process.
- Prior to Lean Six Sigma and automation average turnaround times were 36.77 hrs and post it improved dramatically to 0.72 hrs (Fig. 1). This equates to a 5000% improvement.
- Staffing mix on the urine bench changed substantially. This enabled the redeployment of more skilled staff, improving overall lab performance.

Conclusion: Implementation of Lean Six Sigma methodologies in the urine work flow of a microbiology lab resulted in significant improvements in both productivity and TAT. This was accompanied by more accurate results, reduction in the number of enquires regarding specimen status and an enhanced ability in the lab to meet peaks in demand. Implementation of automation and Lean demonstrated synergy between the two. Lean improved the processed while automation standardized the process. Lean eliminated the waste while automation automated the processes that helped reduce the waste. Ultimately the two significantly helped improve patient care pathways.

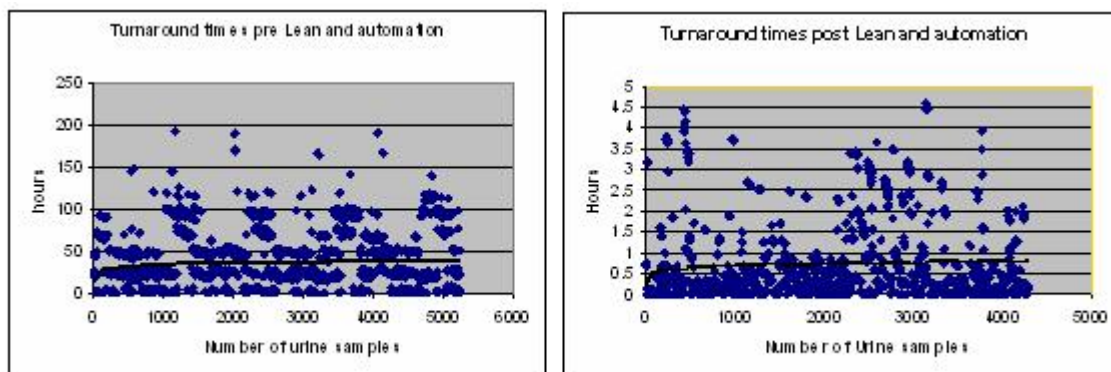


Fig 1: Turnaround times pre & post Lean Six Sigma & Automation