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ePoster Viewing

Molecular bacteriology

The emergence of Lean Six Sigma process optimization and multiplex PCR technology in the routine microbiology enteric laboratory

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Objective:

To optimize process flow and improve patient outcomes utilizing Lean Six Sigma Methodologies and technology in the enteric laboratory. This article analyses the traditional routine enteric process and interpretative pathways, implements improvements, and gives a review of results obtained by deployment of Lean Six Sigma and advanced technology (BD MAX™ System). The traditionally Define-Measure-Analyze-Improve-Control methodology along with Lean tools was utilized.

Methods:

The traditional enteric laboratory utilizes a process that applies standard culture methods. These include a number of non-value-added activities namely: they are time and labour intensive, have poor sensitivity and specificity and have a number of opportunities for errors. As a result, a dual approach of Lean Six Sigma methodologies and multiplex polymerase chain reaction (PCR) technology (BD MAX™ System) was assessed in the enteric laboratory as a means of reducing errors, improving process flow and improving compliance with key performance indicators. The BD MAX™ Enteric Bacterial panel (Product reference: 442963) was utilized as per product insert guidelines. The approach is reliant on facts and data (PathManager by CliniSyS® utilized as data engine and MiniTab® 17 as the statistical package) and conceptually attempts to create a mathematical model of the process. The statistical software was utilized to analyze the data and help identify the root cause of any variation. Initial turnaround time was base-lined utilizing data prior to process improvement and compared to data post improvement phase. Normality and capability analysis was performed on pre and post improvement data. Value stream mapping was utilized to identify non-value activities within the process and remove waste.

Results:

A number of deliverables were achieved through the projects most notably a reduced turnaround time (TAT) from a mean of 4216 hours to 269 hours, decrease process variation, increased detection rates, reduction in non-value-added steps, an improvement of defects per million opportunities (DPMO) from 211 782 to 142 and cost-reduction. The individual moving range chart clearly demonstrates the vast improvement in the process (Fig. 1).

Conclusion:

The success of the project clearly demonstrated that Lean and Six Sigma coupled with the right technology are the two most powerful strategies for achieving operational and service excellence in any organization today. It is important to have solid baseline data from which to demonstrate the improvement which creates the belief in the new process and minimizes apathy. The Lean Six Sigma approach and automated technology helped identify inefficiencies, uncover opportunities to free capacity, reduce turnaround time, lower costs, respond to accreditation requirement and most importantly provide a rapid, high-quality result. The core value of any laboratory testing is a faster more accurate turnaround time which was achieved improving the process sigma from 2.2 to 5.1.