Laralex Hospital Case Study

Yixuan Chen

Arohit Talari

Junhao Wang

Yuyang Zeng

Yangyuechen Zhao

Administrative Sciences, Boston University MET

Prof. John Maleyeff

11/20/2024

Executive Summary

Laralex Hospital's performance compared to industry benchmarks was reviewed using P charts and confidence intervals, showing both strengths and areas needing improvement. Hospital-acquired infections were below the 0.48% benchmark, reflecting strong infection prevention practices. However, instability in cesarean sections and patients leaving the ED before treatment points to inefficiencies and inconsistent practices. Issues with discrepant X-rays and unplanned readmissions highlight areas for improvement and strengths, respectively. These findings offer clear steps to stabilize processes, improve reliability, and meet accreditation standards, supporting Laralex Hospital's mission to deliver high-quality, patient-focused care.

Introduction

Recent reports at Laralex Hospital showed increased rate in hospital-acquired infections, discrepant X-rays, and readmissions, causing concerns about quality. However, using P Charts and Shewhart rules, it was found that many changes were just random and did not have actual meaning. This highlights the need for a quality system that focuses on processes and uses tools like P Charts to spot real trends and make real improvements, aligning with accreditation goals and boosting care quality.

Utilizing P Charts to Track and Improve Quality at Laralex Hospital

A P Chart is a tool used to track the proportion of adverse events or outcomes in a process over time, helping to differentiate between inherent random fluctuations and significant process changes. At Laralex Hospital, it monitors metrics like infections, X-ray discrepancies, and readmissions, helping leadership address genuine issues while avoiding unnecessary responses to normal variation.

The Importance of P Charts for Laralex Hospital

P Charts are crucial for Laralex Hospital, distinguishing random variations from process changes in metrics like infections and readmissions. They reveal genuine issues, such as rising ED departures and declining C-section rates. This enables leadership to concentrate on addressing real problems, optimize resource use, and enhance overall performance while avoiding unnecessary responses to normal fluctuations.

Applying Shewhart Rules to Identify Process Stability at Laralex Hospital

Shewhart rules help identify patterns in data that show if a process is working as it should or if there's a problem that needs fixing. These patterns can include points that fall significantly outside expected limits, consistent clustering near the control limits, or prolonged runs of data points on one side of the centerline. The processes in the Cesarean section chart(Figure1) and Patient Who Leave the ED to Treatment(Figure 5) are unstable, with the Cesarean section chart showing 8 consecutive points and 10 of 11 points below the centerline, while Figure 5 shows 4 of 5 points between 1 and 3 sigma limits and 10 of 11 points above the centerline, indicating
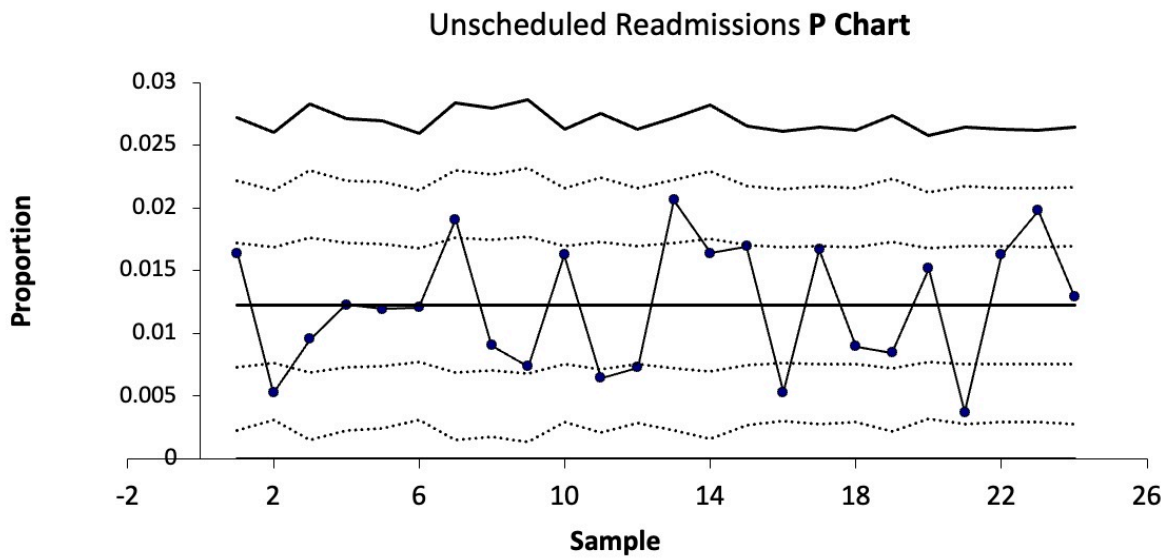
systematic shifts. It helps Laralex Hospital ensure leadership can act on real issues posed while avoiding unnecessary interventions for random fluctuations.

Cesarean Section Procedures P Chart
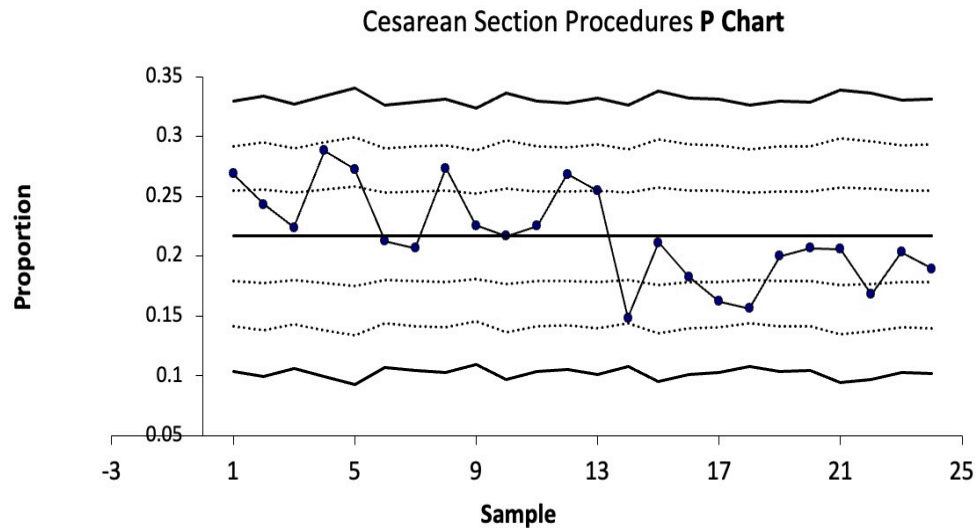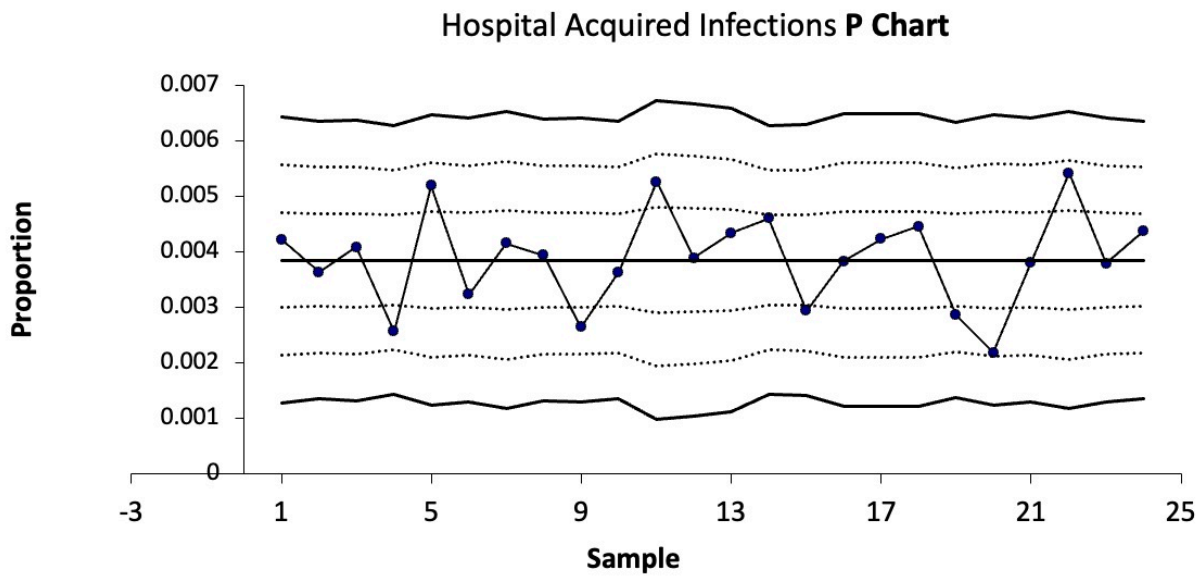

Figure 1: Cesarean Section Procedures P Chart
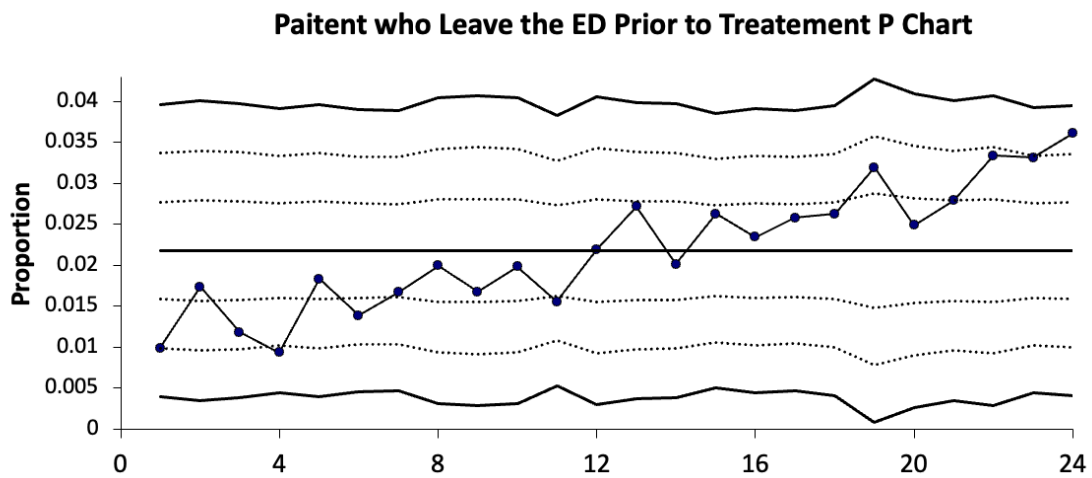
Discrepant X-Rays P Chart
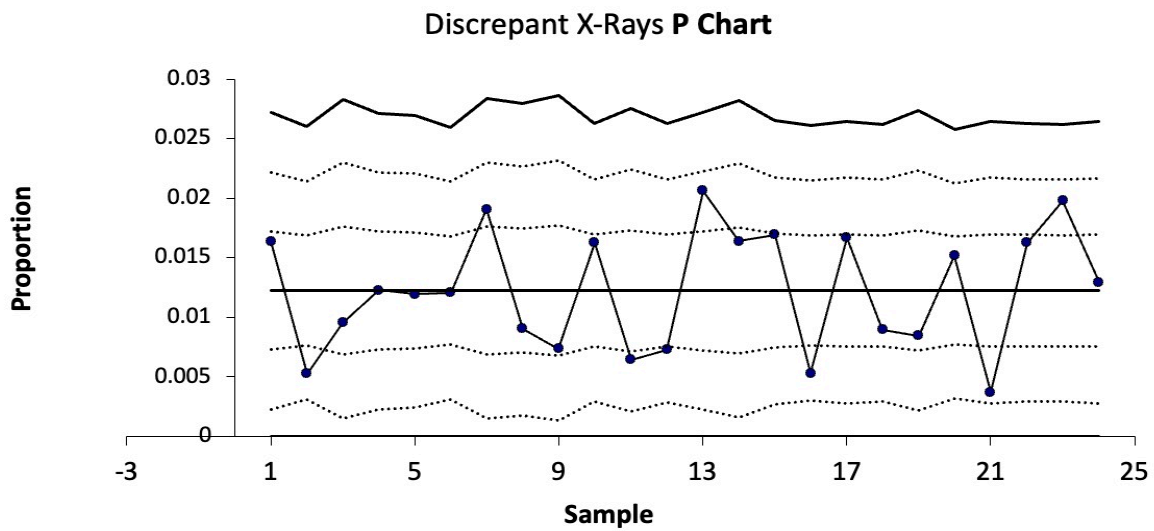
Figure 2: Discrepant X-ray P Chart

Figure 3: Unscheduled Readmissions P Chart

Figure 4: Hospital Acquired Infections P Chart

Figure5: Patient Who Leave the ED to Treatment P Chart

Performance Comparison with Benchmarks

The confidence interval approach defines a range where a process parameter, such as the "true" likelihood of success, is expected to lie based on stable data (Maleyeff, 2024).

Table 1 shows that the rate of hospital-acquired infections is below the benchmark of 0.48%. This reflects Laralex's strong infection prevention practices. Good hygiene and monitoring likely helped lower the infection rates.

Process Capability Analysis Template
(Enter Values in Shaded Areas)

Calculations are ONLY VALID when the process is in <u>stable</u>.

Estimate of Proportion "Success"	0.003847
Sample Size That Determined Estimate	124527
Enter Benchmark Outcome (if any)	0.48%
Degree of Confidence	95%
Confidence Interval (Low):	0.003503
Confidence Interval (High):	0.004190
Conclusion to Capability Analysis:	**Performance Lower than Benchmark**

Table 1: Hospital-Acquired Infections Confidence Interval Analysis

Calculations are ONLY VALID when the process is in <u>stable</u>.

Estimate of Proportion "Success"	0.012237
Sample Size That Determined Estimate	12258
Enter Benchmark Outcome (if any)	0.013
Degree of Confidence	95%
Confidence Interval (Low):	0.010291
Confidence Interval (High):	0.014183
Conclusion to Capability Analysis:	**Performance Consistent with Benchmark**

Table 2: Discrepant X-rays Confidence Interval Analysis

Calculations are ONLY VALID when the process is in stable.

Estimate of Proportion "Success"	0.031494
Sample Size That Determined Estimate	7049
Enter Benchmark Outcome (if any)	2.20%
Degree of Confidence	95%
Confidence Interval (Low):	0.027417
Confidence Interval (High):	0.035571
Conclusion to Capability Analysis:	**Performance Exceeds Benchmark**

Table 3: Unscheduled Readmissions Confidence Interval Analysis

For Discrepant X-rays (**Table 2**), the benchmark is 1.13%, which falls within the 95% confidence interval (1.03%–1.42%), indicating alignment with peer hospitals but highlighting room for improvement. For Unscheduled Readmissions (**Table 3**), the benchmark is 2.2%, above the 95% confidence interval (2.74%–3.56%), showing Laralex outperforms peers in this area, reflecting effective discharge protocols and readmission management.

The industry benchmarks for Cesarean sections and patients leaving the ED before treatment are 19.2% and 3.3%, both were found to be unstable based on the P Chart. For Cesarean sections, this may be caused by inconsistent decisions or different delivery practices, leading to changing rates. For patients leaving the ED, it could be due to long waits, not enough staff, or other issues. These problems need to be fixed to make performance more reliable and closer to the benchmarks.

A Process-Oriented Approach to Meeting Joint Commission Accreditation Requirements
Based on the Joint Commission requirements specified in **Joint Commission accreditation**, the ORYX performance initiative incorporates a standard set of performance metrics, which enable hospitals to evaluate their performance both internally (tracking changes over time) and externally (comparing performance with other hospitals).

The initial performance evaluation was based on percentile rankings. However, after an in-depth study of Six Sigma, I realized this approach was fundamentally flawed. The outcomes of a process will change, even when the process remains the same. These variations in outcomes are random variables. As a result, it does not meet Joint Commission requirements.

The new quality system will implement P charts and statistical process control methods to monitor performance over time and provide a statistically valid mechanism for peer hospital comparisons. Specifically, through the application of process thinking and Shewhart rules, P charts will be utilized to assess process stability. When a process is determined to be stable, its likelihood of occurrence remains the same over a defined time period. Accreditation for most types of organizations is a three-year award and intermediate reporting is required within each accreditation period. Thus the new system fits well with that requirement. Once we know the process is stable, the confidence interval method can be applied to compare performance with outside benchmarks or other hospitals. The implementation of P charts and other statistical process control methods ensures that random variations will not compromise the analysis, unlike the previous percentile ranking approach. This system satisfies Joint Commission requirements for performance metrics to be evaluated both internally and externally.

The specific requirements for performance data analysis are somewhat flexible, as long as they are objective and can help organizations "measure, assess, and improve performance." which is also aligned with Six Sigma and Lean, such as "define, measure,analyze,improve and control."

Challenges Laralex Administrators Forsee
Control charting, coupled with Lean Six Sigma at Laralex Hospital requires overcoming three key challenges:

1. **Cultural Resistance**: A significant challenge is posed due to a reluctance by staff to report errors, catalyzed by the firing of the pharmacy manager after a prescription error review. This creates distress, as admitting to mistakes could lead to consequential actions. A principle of Lean Six Sigma requires reporting to be transparent, in order identify and address root causes of problems. To promote trust, Laralex leadership must create a culture which doesn't punish mistakes, recommended "To build trust, Laralex needs to remove the fear." Clear communication will in turn improve output rather than resulting in job losses, gaining staff cooperation.
2. **Unionized Workforce Concerns**: The Amalgamated Nurse Union has a notorious reputation of contentious negotiations, proving there to be a challenge within staff buy-in. Unionized staff members' perspectives regarding process changes may be viewed as burdensome, misaligned with the priorities of patient care. Timely engagement with the ANU is essential to best address this challenge. For instance, creating solutions to solve ED wait items (seen as an unstable process, Figure 5), benefits both patients and staff aligning with the notion of "communicating the vision to all stakeholders".
3. **Lack of Statistical Background & Proficiency**: While the staff at Laralex is highly, technically skilled, many lack a background with statistics, hindering the overall effectiveness and utilization of control charts. Our gatherings synthesized a high emphasis on the importance of maintaining a robust, consistent methodology, with easily

accessible training. By offering tools like just-in-time training and P Charts, staff can better understand how to apply methods without feeling overwhelmed by complexity.

Addressing these challenges fosters the foundation of trust as well as tailoring response and training at Laralex Hospital, promoting an improvement program which includes stakeholders to promote sustainable change.

Conclusion

Laralex Hospital has made good progress by using tools (P charts and confidence intervals) to identify and address important performance issues. The hospital's success in reducing infection rates shows that its prevention measures are working well and that its operations are managed effectively. However, unstable performance in cesarean sections and emergency procedures needs attention to make these processes more consistent and efficient. Problems such as inconsistent X-ray results and unplanned readmissions also highlight areas where the hospital can improve.

To tackle these challenges, Laralex Hospital needs to ensure its operations meet industry standards and accreditation requirements. Creating a culture where staff feel comfortable being open, involving stakeholders, and teaching staff basic statistical skills are important steps toward improvement. By doing this, Laralex can provide better services, offer patient-focused care, and stay committed to high-quality performance.

Reference

Maleyeff, J. (2024). *Business Process Management Week 10: Process Quality Analysis*. Lecture.