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Lean six sigma for health care: multiple case studies in Latin America

PROBLEM

Health-care organisations face many challenges in delivering safe, high-quality services while experiencing significant pressure to increase productivity and reduce costs.

AIM OF THE STUDY

This study aims to explore the application of LSS in three different non-profit Ecuadorian hospitals to comprehend the effectiveness of the methodology under this context.

RQ1. How does the implementation of LSS impact performance in non-profit Ecuadorian hospitals?

RQ2. What LSS tools and techniques are commonly used for LSS implementation in non-profit Ecuadorian hospitals?

RQ3. What challenges are faced when implementing LSS in non-profit Ecuadorian hospitals?

METHODOLOGY

A multiple-case analysis was performed in four phases: selecting the cases, defining a data collection protocol, performing a within-case analysis of each case and performing a cross-case analysis.

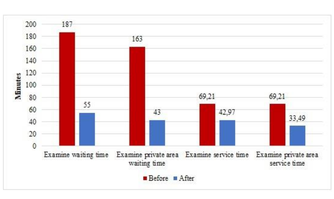
Table III. LSS tools used in each DMAIC phase of every case

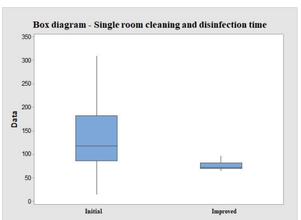
Case	Define	Measure	Analyse	Improve	Control
A1	SIPOC, VOC, 3W+2H, and project charter	VSM	Brainstorming, cause-effect diagram, cause verification plan, Gemba walk, and five-why analysis	Effort-impact matrix, 5S, visual control, process and layout redesign	Wilcoxon test, paired two-sample t-test, box plot, and bar chart
A2	SIPOC and project charter	Process mapping, VSM, Pareto chart, stability and capability analysis, and box plot	Brainstorming, cause-and-effect diagram, Gemba walk, and five-why analysis	Effort-impact matrix, 5S, visual control, process redesign, and work standardisation	Paired two-sample t-test, box plot, control chart, and checklist
A3	SIPOC and project charter	Data collection plan, brainstorming, process mapping, stability and capability analysis, repeatability and reproducibility analysis	Cause-and-effect diagram, cause verification plan, ANOVA, Kruskal-Wallis, Mann-Whitney, Pearson correlation, scatter plot, box plot, regression analysis, and five-why analysis	Effort-impact matrix, binary logistic regression, and optimisation technique	Visual control, operational procedure, and paired two-sample t-test
B1	Process mapping, SIPOC, and categorical histogram	Data collection plan, time-motion study, and VSM	Gemba walk and five-why analysis	Effort-impact matrix, process redesign, and work standardisation	Control plan, paired two-sample t-test, job instruction, and process audit
C1	VOC, CTQ tree, 3W+2H, SIPOC, and Pareto chart	Data collection plan and VSM	Cause-and-effect diagram, cause verification plan, Gemba walk, five-why analysis	Effort-impact matrix, process redesign, visual control, and work standardisation	Paired two-proportion Z test and checklist
C2	SIPOC, VOC and 3W+2H	Cross-functional process map, data collection plan, time series, Pareto chart, and VSM	Cause-and-effect diagram, Failure mode effect analysis, prioritisation matrix, cause verification plan, Gemba walk, and five-why analysis	Effort-impact matrix, visual control, process redesign and simulation model	Paired two-proportion Z test and checklist

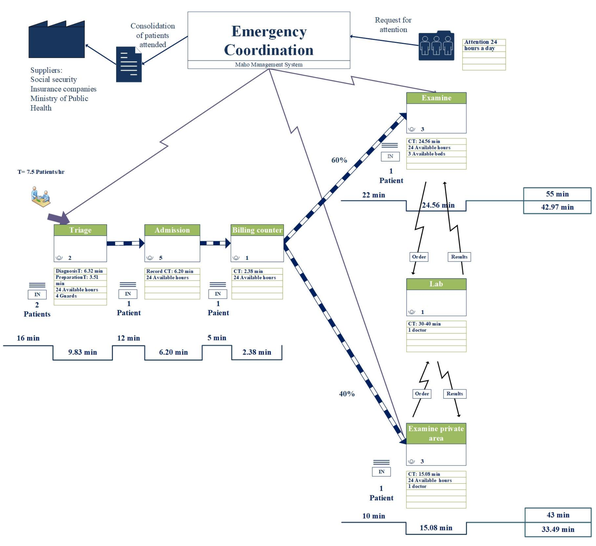
RESULTS

Our research revealed that in five out of the six scrutinised cases, LSS was applied to reduce service time in emergency departments, hospitalisation, imaging and radiology departments and post-surgical units.

Challenges: At the beginning of LSS implementation in Case A1, the administrative and medical staff showed resistance to sharing information about the potential causes of problems







CONCLUSIONS

- By conducting within-case and cross-case analyses with six case studies across three different non-profit Ecuadorian hospitals, we identified the positive impact on hospital performance, the most commonly used tools and the challenges faced during its implementation.
- Despite the cases being in different areas and types of hospitals, we found some commonalities. The intuitive and easy-to-follow tools used, such as VSM, SIPOC diagram, cause-and-effect diagram, five-why analysis, and Gemba walk, were prevalent across the cases.