

## Abstract

This study applied Lean Six Sigma methodologies to enhance the operational efficiency of the emergency department (ED) at Dar Al-Shifaa Hospital in Benghazi. The objectives were to identify bottlenecks, optimize patient flow, and improve resource utilization.

**Methods:** A mixed-methods approach included semi-structured interviews with ED staff to identify challenges and quantitative analysis to measure the impact of process improvements on patient flow times.

**Results:** The Lean Six Sigma interventions led to significant improvements across various ED processes. Registration and first assessment times decreased by 41.7%, increasing the sigma level from -0.42 to 2.7. Medication delivery time improved by 46.7%, raising the sigma level from -0.64 to 0.99. Total patient waiting time in ED was reduced by 54.7 with a corresponding increase in the sigma level from -0.65 to 2.25. Additionally, the implementation of the 5S methodology enhanced workplace organization, increasing Standard Operating Procedures (SOP) adherence from 22.5% to 57.5%. Despite these improvements, new challenges emerged post-intervention, such as an increase in walking distances within the department and security concerns.

**Conclusion:** Lean Six Sigma improved operational efficiency and patient flow in the ED at Dar Al-Shifaa Hospital. Despite its success, further efforts are needed to address new post-intervention challenges. Overall, the methodology effectively streamlined processes and enhanced key performance metrics.

**Keywords:** Lean Six Sigma, emergency department, process improvement, patient flow, operational efficiency.