

## **Application of Systems Engineering Tools and Methods to Improve Healthcare Delivery Inside the Emergency Department of a Mid-Size Hospital**

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**Abstract :** Emergency department (ED) is considered as a complex system of interacting entities: patients, human resources, software and hardware systems, interfaces, and other systems. This paper represents a research for implementing a detailed Systems Engineering (SE) approach in a mid-size hospital in central Indiana. This methodology will be applied by "The Initiative for Product Lifecycle Innovation (IPLI)" institution at Indiana University to study and solve the crowding problem with the aim of increasing throughput of patients and enhance their treatment experience; therefore, the nature of crowding problem needs to be investigated with all other problems that leads to it. The presented SE methods are workflow analysis and systems modeling where SE tools such as Microsoft Visio are used to construct a group of system-level diagrams that demonstrate: patient's workflow, documentation and communication flow, data systems, human resources workflow and requirements, leadership involved, and integration between ER different systems. Finally, the ultimate goal will be managing the process through implementation of an executable model using commercialized software tools, which will identify bottlenecks, improve documentation flow, and help make the process faster.

**Keywords :** systems modeling, ED operation, workflow modeling, systems analysis

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