

# Integrated Simulation Based Framework: Lean Application in Emergency Department



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## 1. INTRODUCTION

In Ireland, there has been an increase in demand for Emergency Department (ED) services with more than 1.2 million patients attending the Health Service Executive (HSE) ED's annually. More than 30 percent of the patients attending ED are waiting more than 6 hours as per HSE records. 'Lean practice' is widely used within the manufacturing industry to provide timely delivery of product and ultimately to offer value for the consumer using the least resources. This idea is now being extrapolated to fit the healthcare service industry model. Simulation modelling is a flexible tool that can be used for evaluating various solutions and interactions within and between system components.

## 2. EMERGENCY DEPARTMENT CHALLENGES

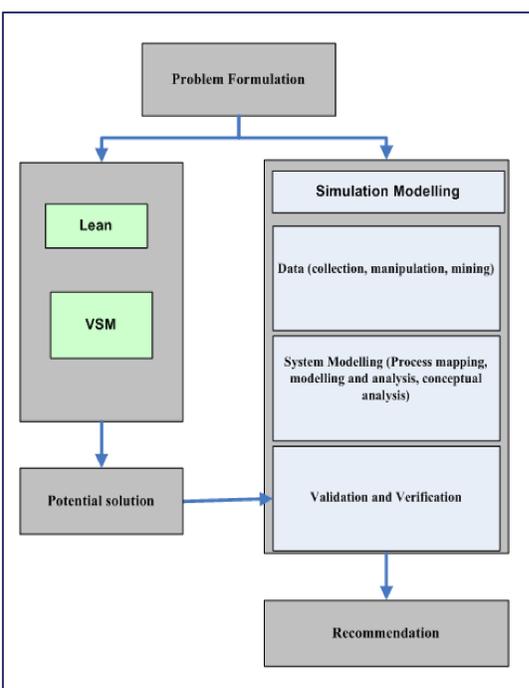
### ED Challenges:

- Increasing cost of patients treatment
- System dynamics and uncertainties
- Prolonged waiting times
- Increasing patient's expectation and demand
- Patients overcrowding
- Hospitals fund cuts including ED
- Resources distribution

### Consequences:

- Inefficient ED process
- Delay treatment
- High mortality rates
- Increase medical errors
- Prolong pain and suffering
- Overburden working staff

## 3. INTEGRATED FRAMEWORK



## 4. CASE STUDY

### I. HOSPITAL DESCRIPTION

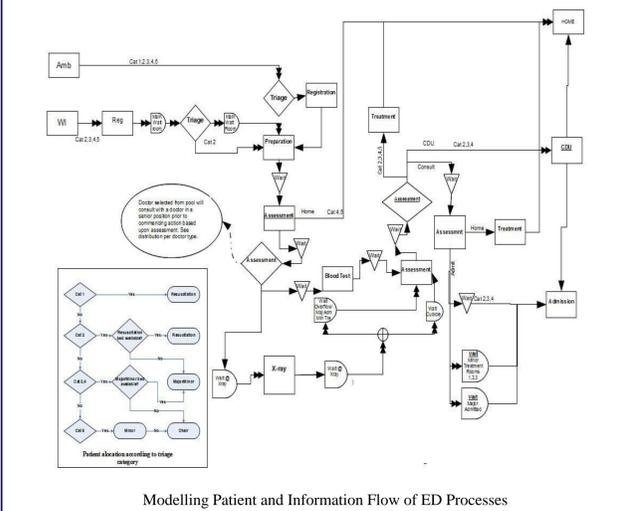
Tallaght university hospital (625 Beds) in south Dublin that handle almost 220,000 patients annually. It has an Emergency Department that treats over 45,000 patients a year. The ED has 1 triage room, 4 Resuscitation beds, 9 Major beds (Zone 1), 4 Minor Injury beds (Zone 2), 2 X-ray rooms. It has also a Clinical Decision Unit, which is designated for patients who are still under ED physicians.

### III. METHODS OF DATA COLLECTION

#### Data Collection Methods

- Interviews (Staff and Managers)
- Observation
- Hospital informatics system

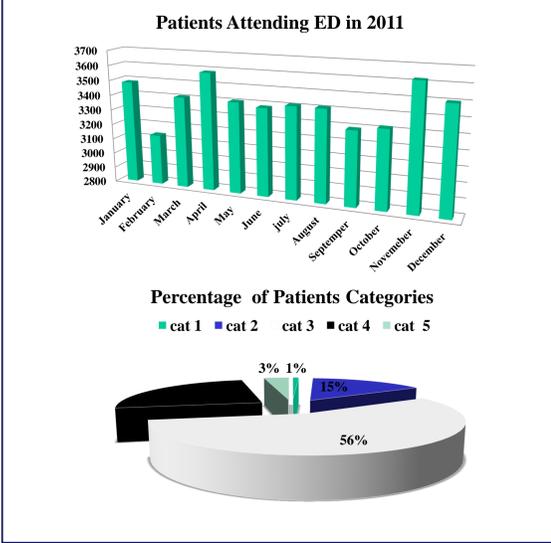
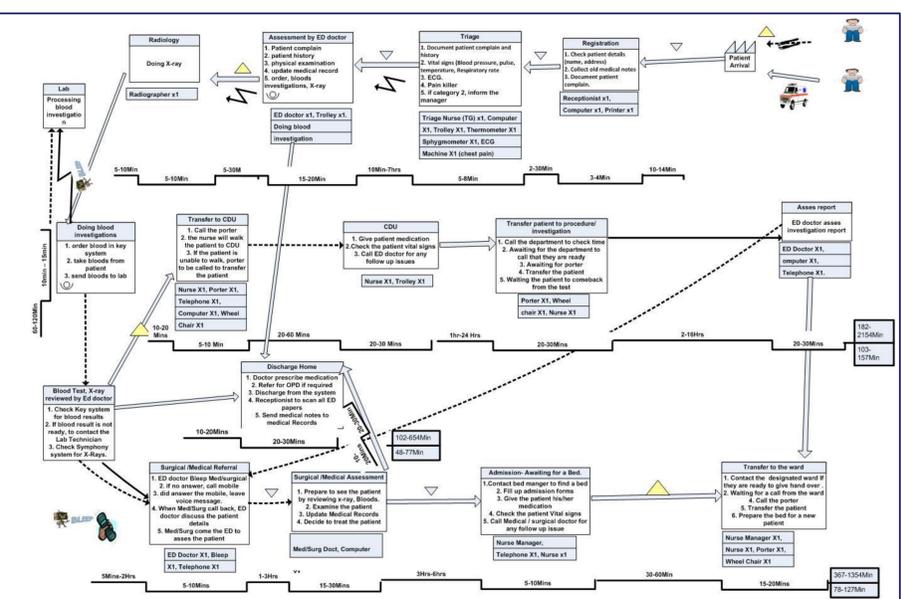
### IV. CONCEPTUAL MODEL



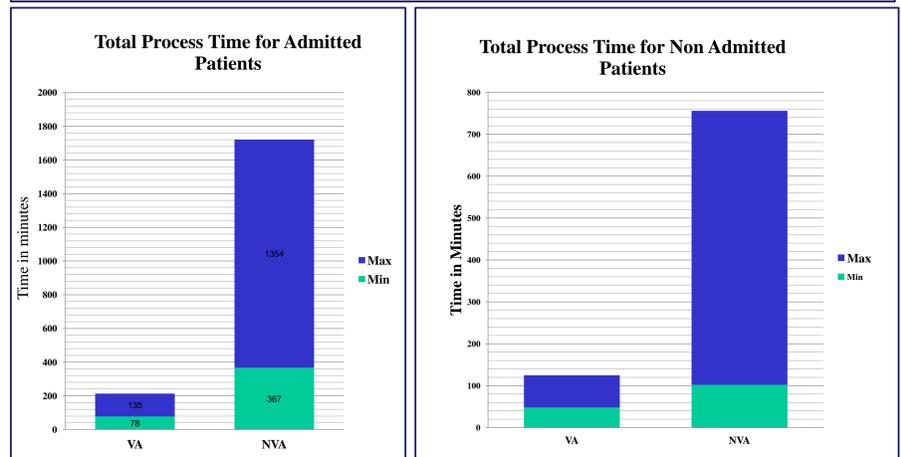
### II. ED LAYOUT



### V. VALUE STREAM MAPPING



## VI. RESULTS



## 5. CONCLUSION

- Value stream Mapping (VSM) is a key tool in identifying the non value added activities (NVA) activities which have a great impact on improving the patients waiting times.
- Results of the VSM show significant events and conflicts that contribute to non-value added time.
- VSM shows potential improvements in the processes within the major areas of ED department.
- Applying rational Lean transformation process have a great potential in reducing the NVA practices and improving the patients waiting times in ED

## 6. FUTURE WORK

- Next Phase:**
- Developing patient experience survey to identify the areas of ED that need to be improved and to establish future VSM.
  - Applying lean transformation process to reduce patients waiting times and improve patients experience
  - The simulation model will be used to explore the impact of potential improvements based on lean practices using the systems key performance.