



# Emergency Department Simulation



# Agenda

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# Abstract

01

In Emergency departments (EDs), crowding causes a series of negative effects, e.g. medical errors, poor patient treatment, long length of patient stay, and general patient dissatisfaction.

One road for ER departments to perform its functions optimally, is a proper management of resources and personnel as best appropriate for each incident.

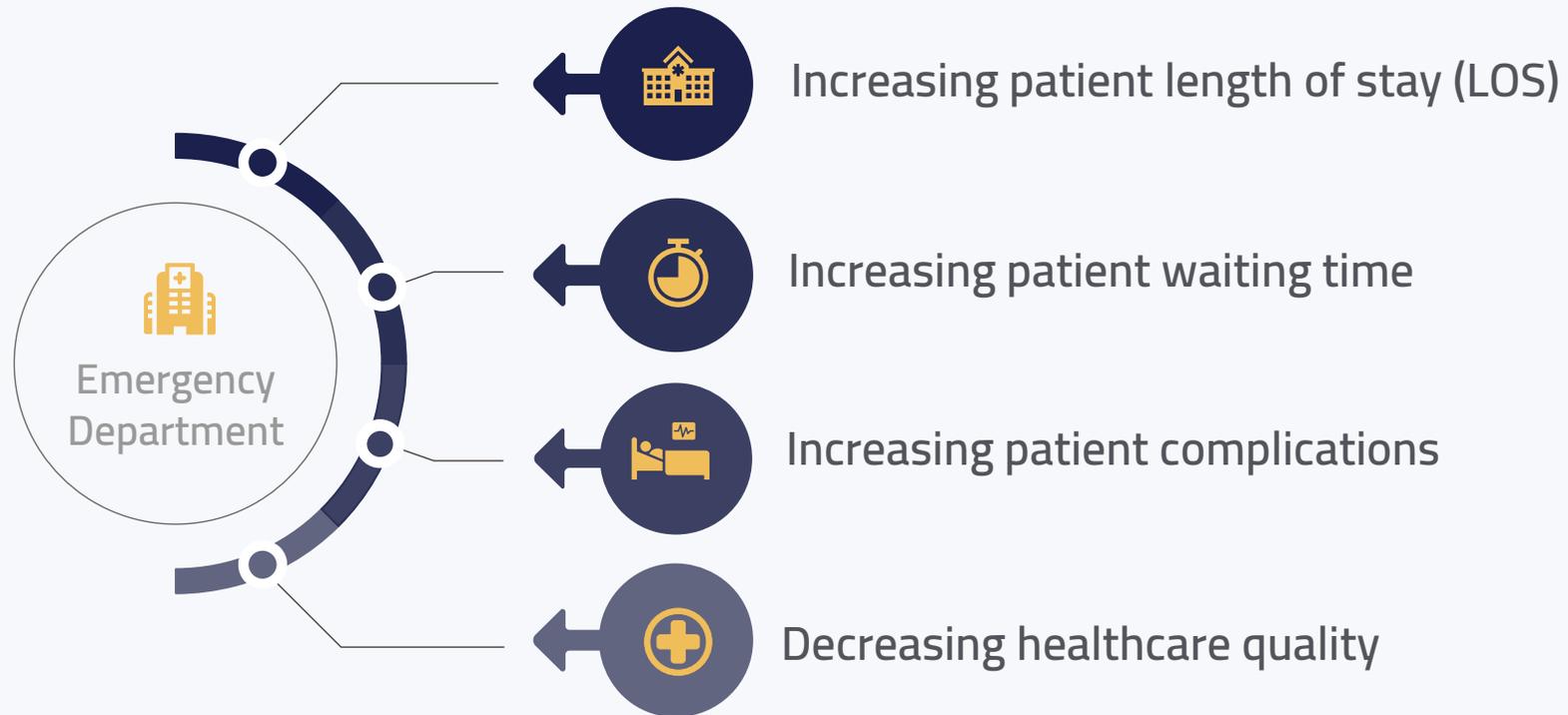
A simulation model using Discrete-Event paradigm has been developed to enable intelligent management of resources and lead to a smooth patient flow and lower length of patient stay.



# Problem

02

Overcrowding in emergency departments causes several issues:





# Simulation Outcomes

03

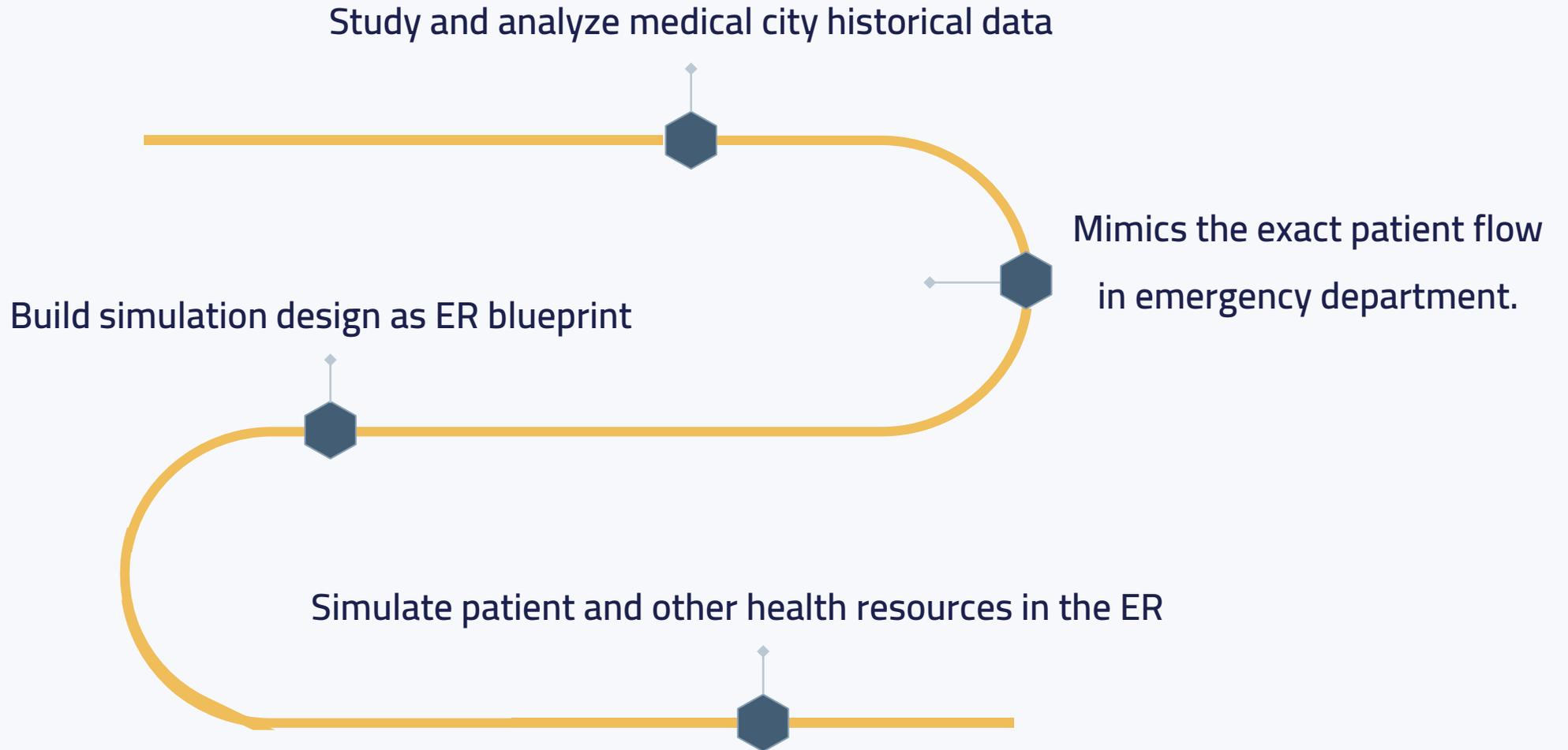


- Assisting emergency department managers and decision makers to make decisions by analyzing and evaluating different scenarios before implementing them in real life.
- Identifying the full capacity limit in emergency departments
- Identifying root cause of ER department problems
- Identifying areas of improvement
- Decreasing patient waiting time
- Understanding and raising resources utilization
- Support in managing health resources



# Building ER Simulation Flow

04

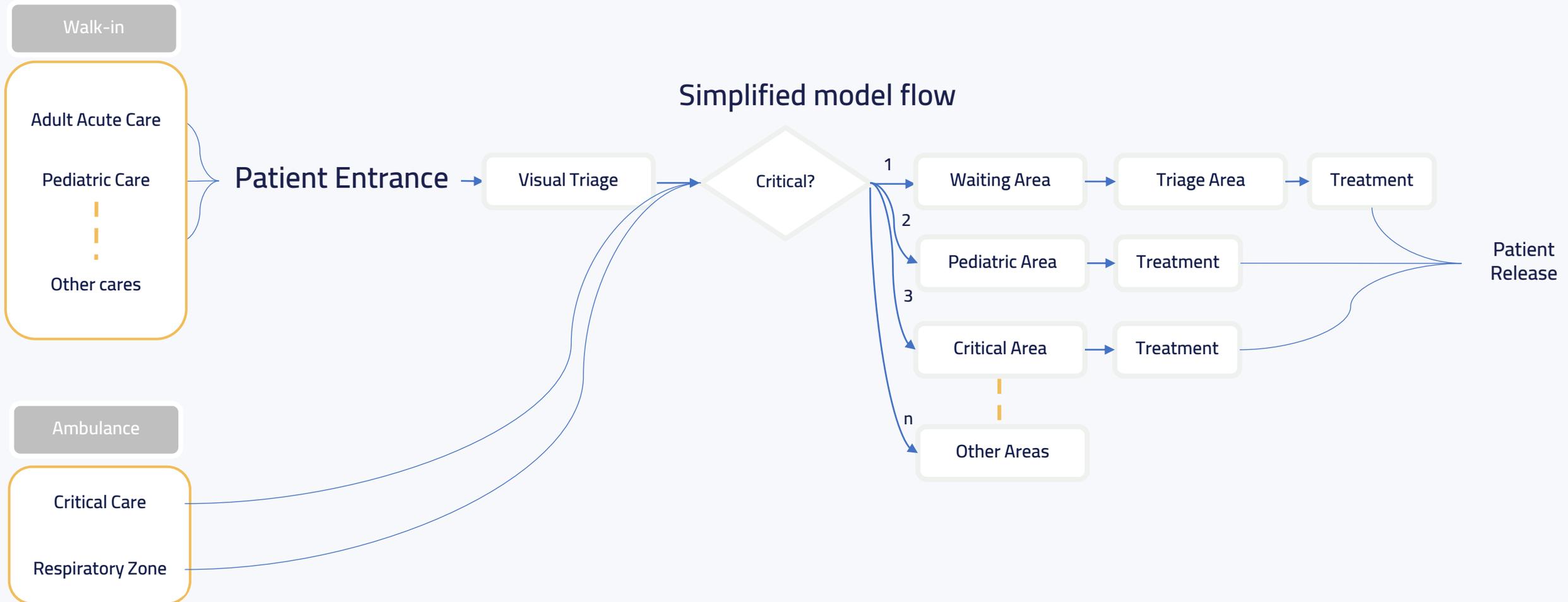




# ER Simulation

05

ER Simulation model has been implemented using Discrete-Event Paradigm for modeling the operation of emergency department and modeling patient flows.





# ER Simulation Scenarios

07

ER Simulation model provide some what-if scenarios to see the changes that when applied, the operation of the ER Department will be affected.

The screenshot shows a software interface for an ER simulation. At the top, there is a navigation bar with four tabs: '3D View', '2D View', 'Dashboard', and 'What If Scenarios' (which is currently selected). To the right of the tabs is a timer showing '00:00:17'. Below the navigation bar is a main control area containing a 3x4 grid of scenario options, each with a checkbox or a slider. The scenarios are:

- Use Urgent Care Clinic at Peak Times (checkbox)
- Install Virtual Clinic to Perform Initial Check up (checkbox)
- Transfer Patients who do not Need Urgent Care to the PHC (checkbox)
- Number of Patients Per Hour (slider)
- In Case of Readmission, Do not Perform Triage (checkbox)
- Transfer Triage to a Waiting Area 2 (checkbox)
- Use Extension beds in case of Full capacity in Fast Track (checkbox)
- Do Not Perform Triage if Transferred from Respiratory (checkbox)
- Let Acute Doctors Reassess Patients in Waiting Area (checkbox)
- Limit Access to ER Patients Only (checkbox)
- Provide Patients Access to Doors (checkbox)
- Scenario Name (text input field)

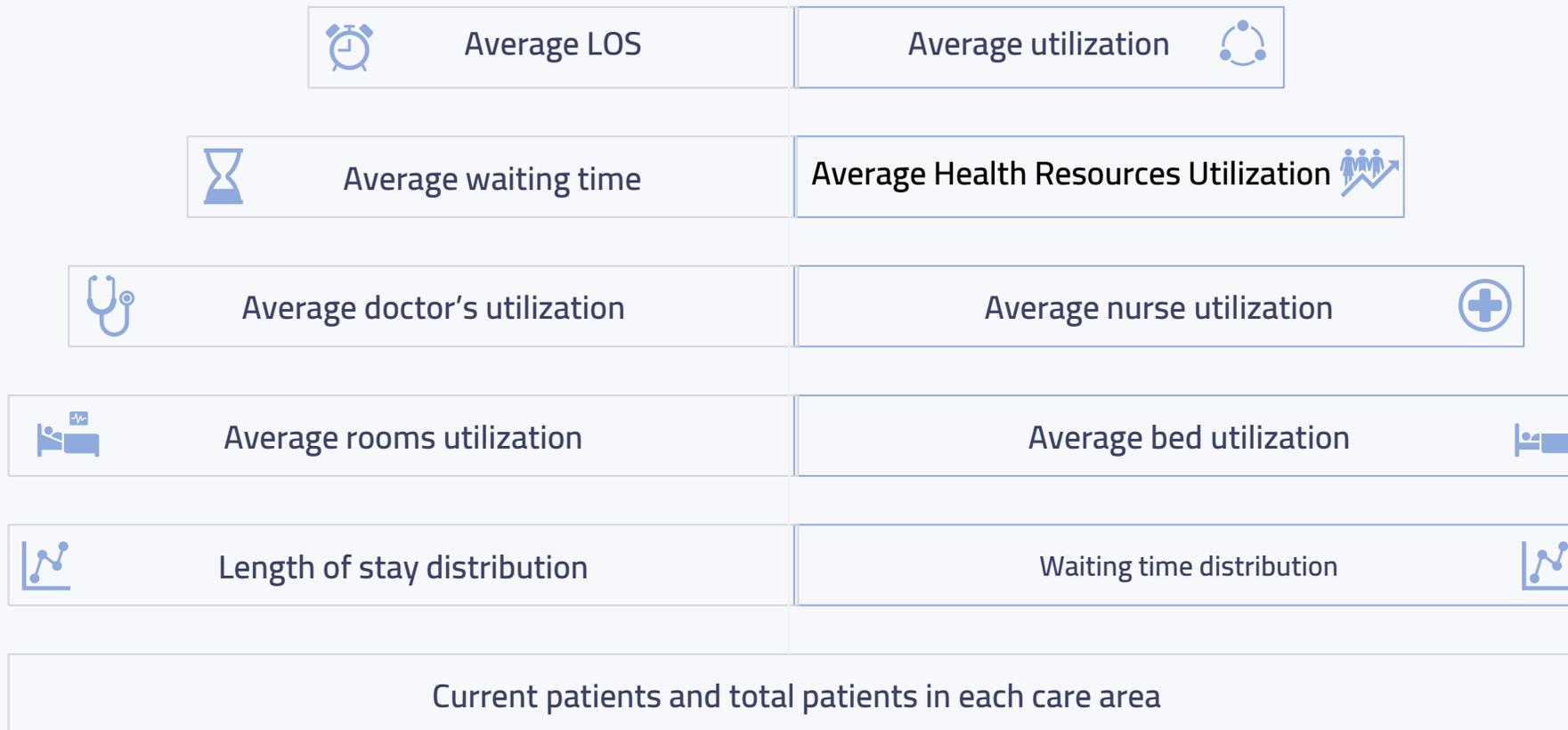
At the bottom of the interface is a transformation rule configuration section with four fields: 'Resource' (containing 'Nurse'), 'From' (containing 'Adult Acute Care'), 'To' (containing 'Adult Acute Care'), and 'Transform' (containing 'Confirm').



# ER Simulation Indicators

08

The simulation model will provide some insightful indicators, as it simulates six different areas in emergency department, for each area the simulation will provide:





# Simulation Features

10



## Friendly interface and Expert mode

A well-designed user interface, in a 2D and 3D views, to show the operation of the emergency department and the exact patient flow within the emergency department and run multiple and adjustable scenarios with expert mode capability.



## Adoptability

The model can accommodate situations in ER Departments

