SIMULATION OF THE CLINICAL INTERACTIONS AMONG COPD PATIENTS AND HEALTHCARE STAFF IN THE EMERGENCY DEPARTMENT

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INTRODUCTION

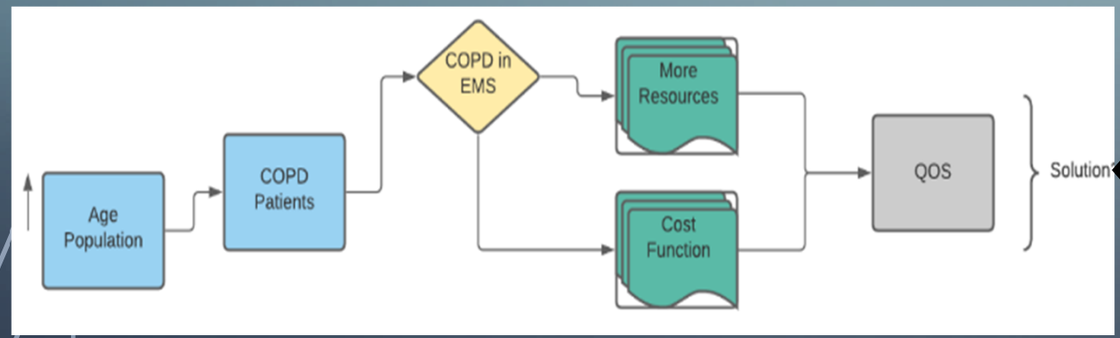
- CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IS A CRITICAL AND MAJOR SOCIAL HEALTH PROBLEM.
- COPD IS AN IMPORTANT CAUSE OF MORBIDITY AND MORTALITY IN SPAIN, WITH A HIGH HEALTH, ECONOMIC AND SOCIAL IMPACT.
- IN USUAL CLINICAL PRACTICE, THE DIAGNOSIS OF COPD IS BASED ON THE (ENVIRONMENTAL FACTOR AND GENETIC)
- *IBERPOC* (RESEARCH GROUP), ESTIMATED THAT IN SPAIN 1,228,000 PEOPLE BETWEEN 40 AND 69 YEARS OLD SUFFERED FROM COPD.
- THE RESULTS OF *EDADES* (RESEARCH GROUP), SHOWS THE NUMBER OF SMOKERS IN SPAIN INCREASED FROM 20.6% IN 2015 TO 25.4% IN 2017 AND 34% IN 2018, AND APPROXIMATELY 38% IN 2020.

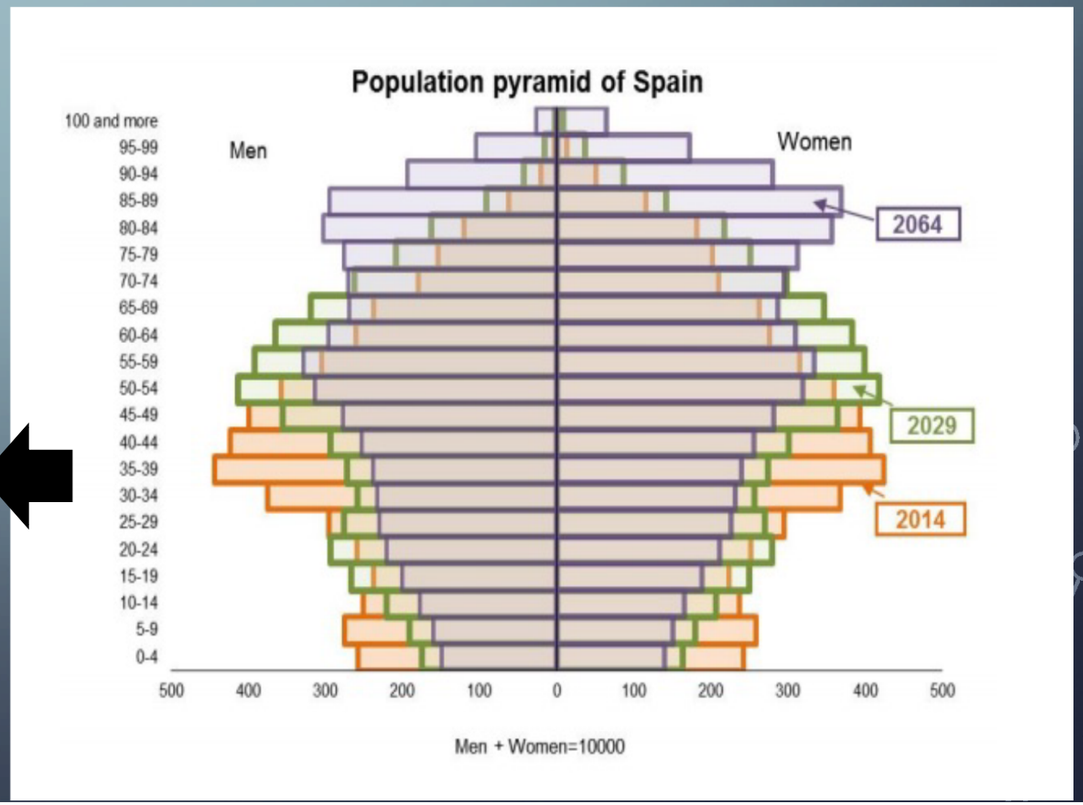
INTRODUCTION

REGARDING THE EXACERBATION COPD PATIENT, THE EMERGENCY DEPARTMENT (ED) AND EMERGENCY MEDICAL SERVICE (EMS) RESPONSIBILITY IS MANAGING, DECISION MAKING, TREATING THE INITIAL RESPONSE TO THE COPD PATIENT

PROBLEMS:

1. TIME LESS SITUATION
2. STRESSFUL LOCATION
3. IMMEDIATE DECISION MAKING



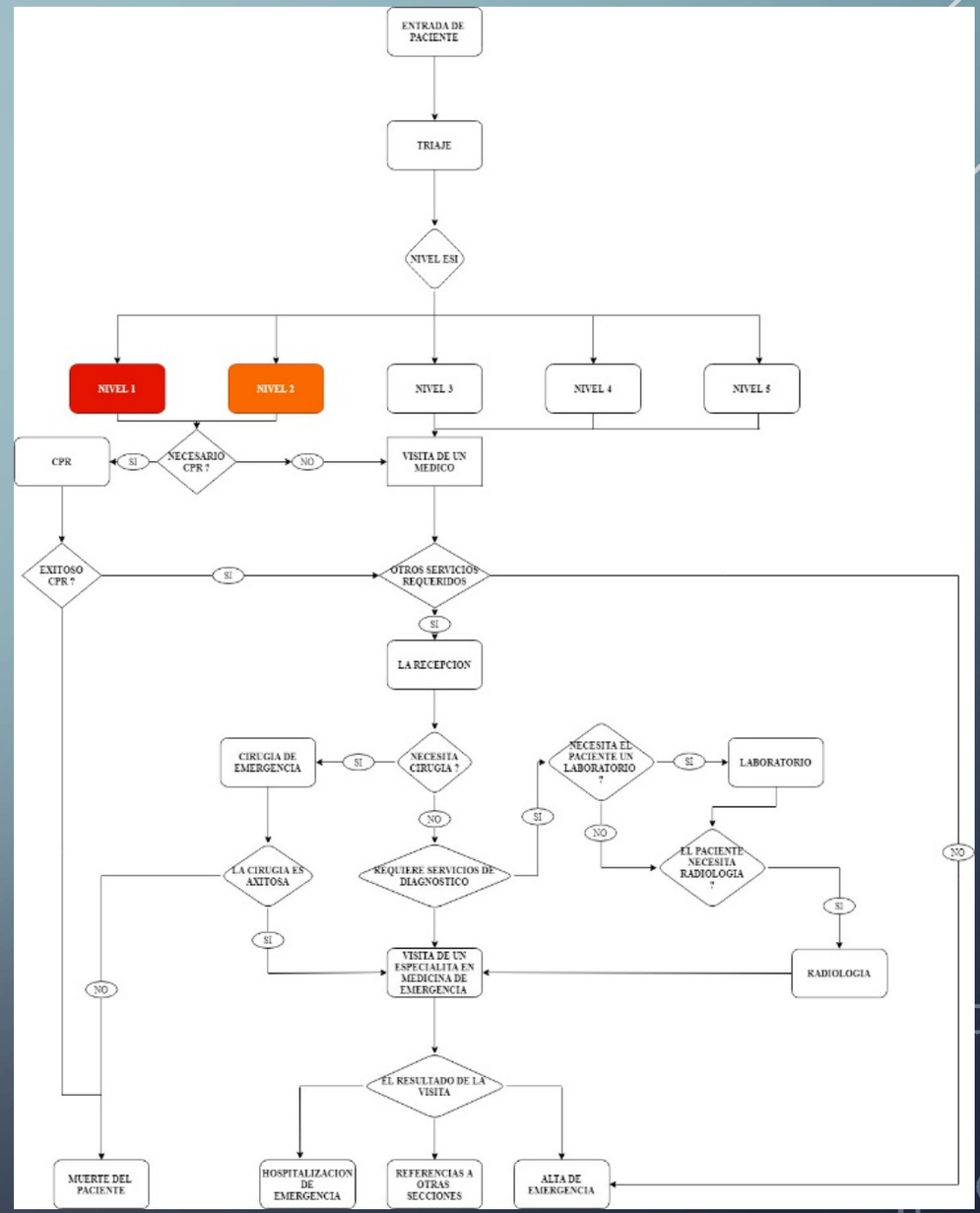


EMERGENCY DECISION MAKING (EDM)

- WHEN AN ENVIRONMENTAL/ACCIDENTAL EMERGENCY OCCURS, EDM PLAYS A KEY ROLE IN MITIGATING THE LOSS OF LIFE AND PROPERTY FACING TWO CRITICAL FACTORS: LACK OF INFORMATION AND TIME PRESSURE.

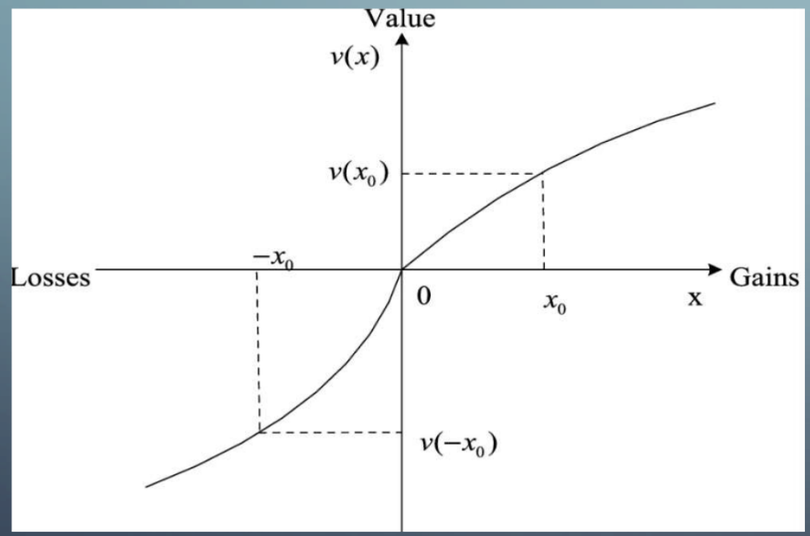
LEVEL OF EMERGENCY SEVERITY INDEX (ESI)

LEVEL 1: IMMEDIATELY
LEVEL 2 : 2<=>5 MIN
LEVEL 3: <= 30 MIN
LEVEL 4 :<=45 MIN
LEVEL 5 :<=60 MIN



EMERGENCY DECISION MAKING (EDM)

EDM PROBLEMS ARE USUALLY CHARACTERIZED BY HIGH RISK AND UNCERTAINLY.



X≥=0 ⇨ GAINS

X<=0 ⇨ LOSSES

$$v(x) = \begin{cases} x^{a}, & x \geq 0 \\ -\lambda(-x)^{\beta}, & x < 0 \end{cases}$$

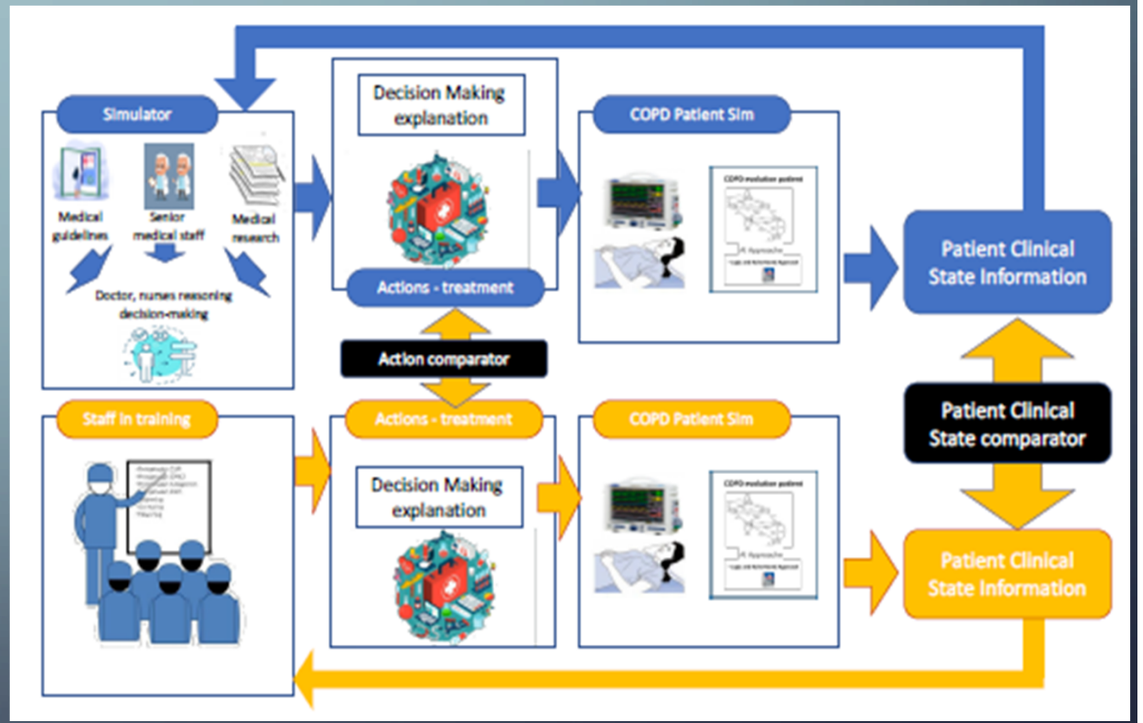
RESEARCH OBJECTIVE

THERE ARE TWO OBJECTIVES IN THIS RESEARCH (CONCEPTUAL AND COMPUTATIONAL MODEL)

1. FIRST MODELING OF COPD EVOLUTION PATIENT(CONCEPTUAL MODEL): IMPLEMENT A TRAINING SIMULATOR THAT REFLECTS, THE EVOLUTIONARY CONCEPTUAL MODEL BEHAVIOR OF COPD

- MODELING OF COPD EVOLUTION PATIENT (VARIABLES FOR THE STATE OF THE PATIENTS AND EXACERBATION OF COPD PATIENT

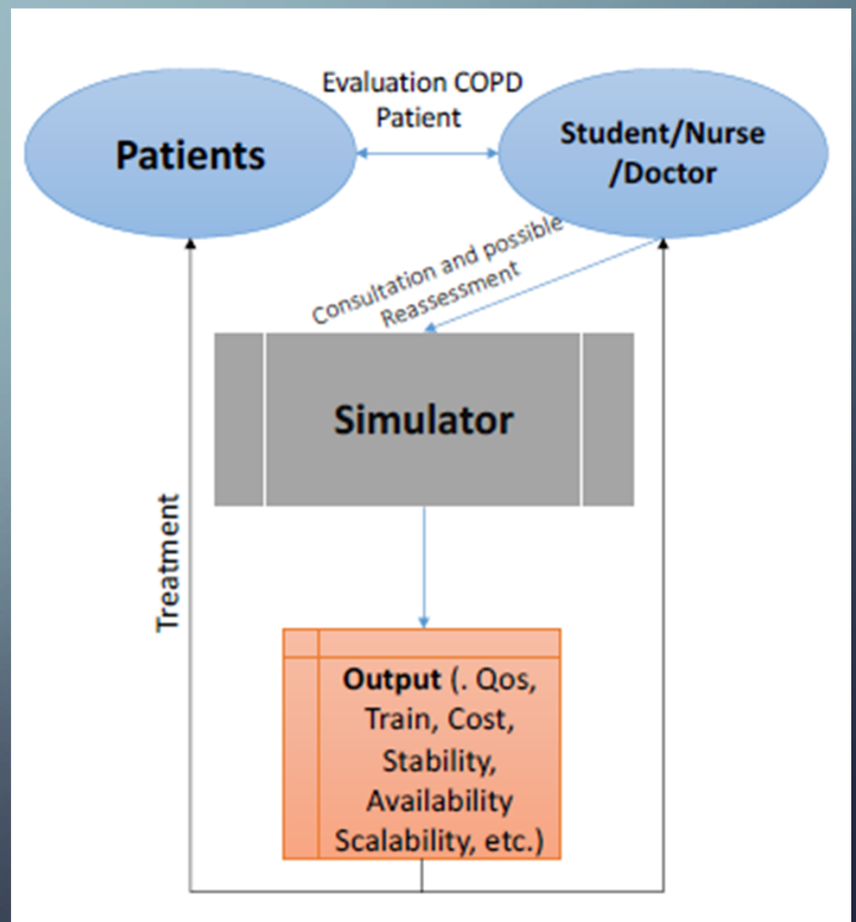
2. BEHAVIOR OF COPD IN THE FACE OF INTERVENTIONS DECISION-MAKING (COMPUTATIONAL MODEL): THE AIM IS FOR TRAINING/IMPROVING THE NURSE/STUDENT KNOWLEDGE IN A CRITICAL SITUATION SUCH AS EMERGENCY BOX, REAL PATIENT ANALYSIS FEEDBACK FORM SIMULATOR, IMPROVE THE



DECISION MAKING SUPPORT SYSTEM IN ED

- THE OBJECTIVE OF THE PROPOSED" DECISION-MAKING SUPPORT SYSTEM" IS TO SIMULATE THE TECHNICAL BEHAVIOR OF THE EXPERIENCED (HIGHLY-TRAINED) HEALTHCARE STAFF OF THE EMERGENCY DEPARTMENT (DOCTORS/NURSES), FOR THE DIAGNOSIS AND TREATMENT OF COPD PATIENTS.

- OUR INTELLIGENT SYSTEM CAN BE ADOPTED TO ALL THESE PATHOLOGIES AND THE CONDITION OF THE HEALTHCARE ARTIFICIAL SYSTEM REQUIREMENTS. AND REGARDING THE OTHER PATHOLOGIES AS FUTURE RESEARCH WORK.

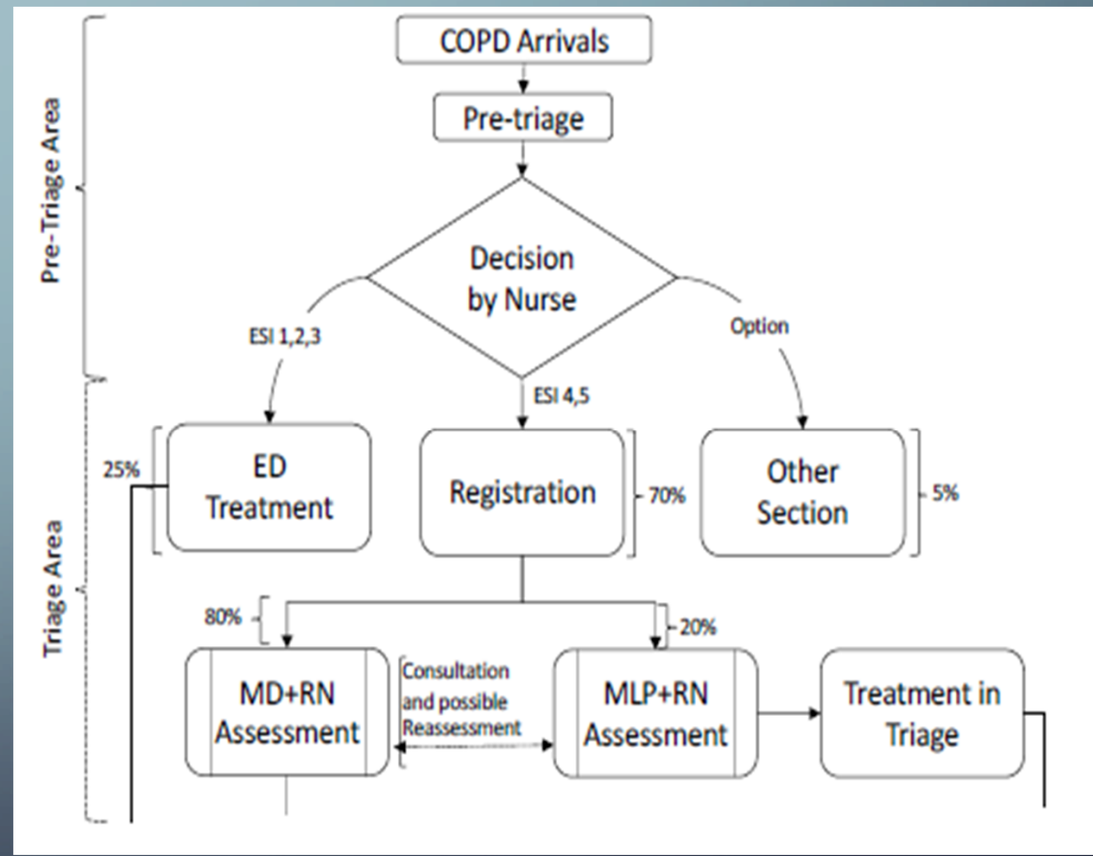


PROPOSED METHOD AND SIMULATION

I PROPOSED THERE STAGE IN SIMULATION IN THIS RESEARCH 1. PRE TRIAGE AND TRIAGE AREA. 2.SIMULATION AREA AND 3. TREATMENT AREA

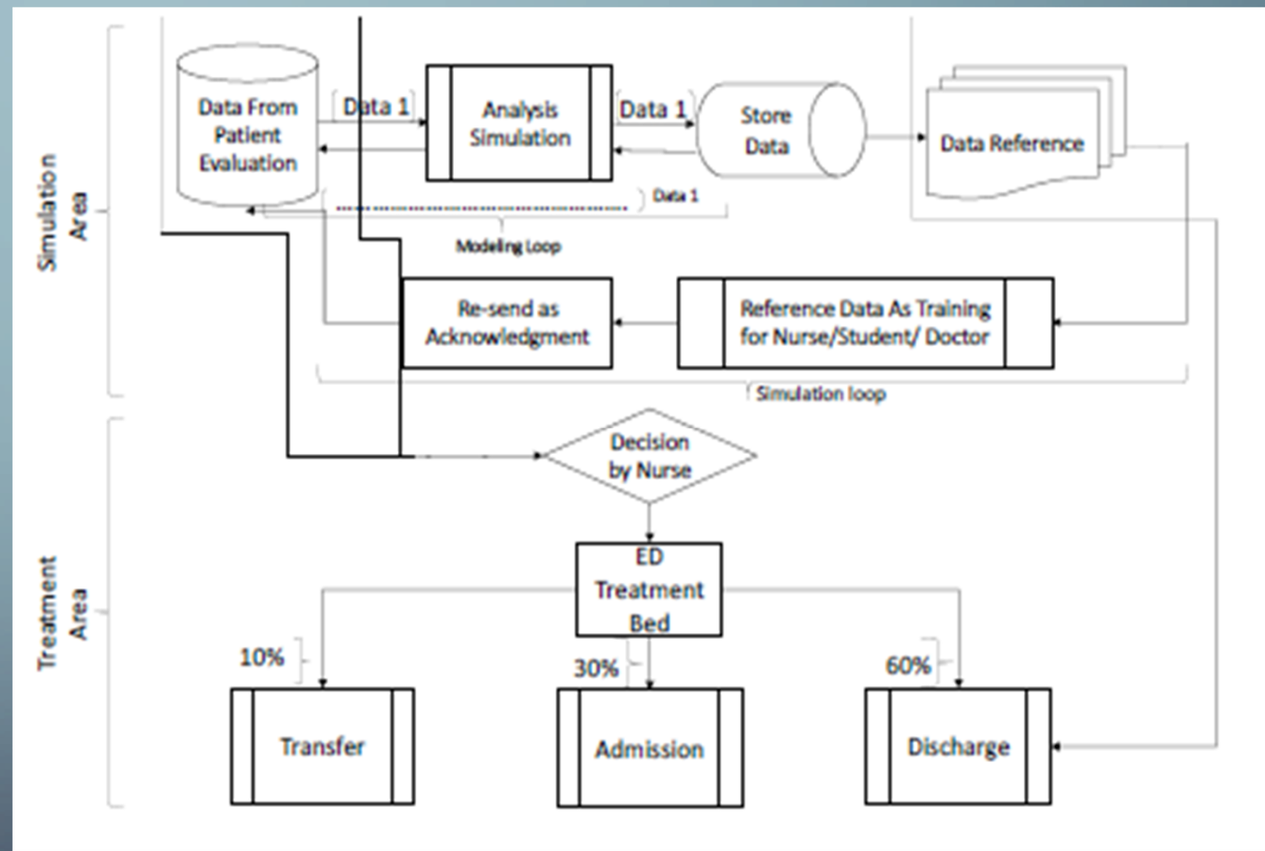
COPD PATIENT SIMULATOR:

- INPUT: STATE OF THE PATIENT / ACTIONS – TREATMENT
- OUTPUT: STATE OF THE PATIENT AFTER ACTIONS – TREATMENT
- OPERATION: EVOLUTION OF THE STATE OF THE PATIENT.



PROPOSED METHOD AND SIMULATION

- THE SIMULATION IS BASED ON THE “DELPHI METHOD” FOR “INTEGRATING” THE EXPERT’S KNOWLEDGE.
- WE PROPOSE USING A RULE BASED APPROACH FOR MODELING THE PATIENT’S CONDITION ANALYSIS AND THE DECISION PROCESS FOR THE TREATMENT



CONCLUSION AND FUTURE WORK

1. AS INITIAL WORK, AND TO GUARANTEE THE SUGGESTED MODEL RUNS WELL, IMPLEMENTING A COMPUTATIONAL MODEL IN THE NEAR FUTURE. IN ADDITION TO THIS, WE WOULD IMPLEMENT THE CONCEPTUAL MODEL IN ORDER TO GENERATE A MODEL AS COMPLEX AND AS REALISTIC AS POSSIBLE
2. IN A LONG TERM PROFESSIONAL PERIOD, WE WOULD USE SUCH A SIMULATOR TO HELP AND IMPROVE THE QUALITY OF THE MEDICAL SERVICES, IN ORDER TO ENHANCE STUDENT/NURSE KNOWLEDGE.
3. THIS RESEARCH COULD HAVE AN INTERESTING POTENTIAL IN GATHERING/CONNECTING SOME PATHOLOGIES RELEVANT TO COPD AND TESTING BY HEALTHCARE PROFESSIONALS FOR STABILITY, SCALABILITY AND RELIABILITY OF THE SYSTEM.

THANK YOU FOR YOUR VALUABLE ATTENTION