

Pilot 1: Comorbidities - Main goals and technological development

Main goals

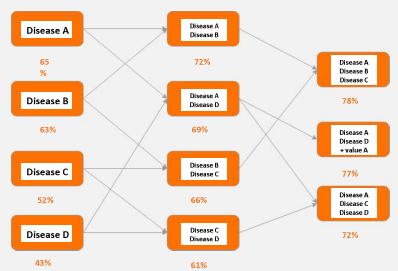
Understand how chronic diseases influence each other and **provide a more accurate mortality and hospitalization risks** for a specific patient. Our main data source are around **4 million EHRs** of the Valencian Region population over a timespan of 5 years. Using this data, we have identified **clusters of diseases**, i.e., patients that share similar diagnosis of relevant chronic diseases and conditions. The impact of the clusters of diseases with additional influential variables in each patient will provide useful information to physicians for intensifying controls and therapies to reduce the impact of chronic diseases.

Pilot overview

<p>1. Retrospective analysis</p> <p>Big data infrastructure Design & Deploy a BigData Infrastructure to anonymize, store and process 4 million EHR from the Valencian Region.</p> <p>Mathematical-Statistical Analysis Clean, prepare and study EHR data in order to find how patients are grouped by a set of candidate diseases (Comorbidities)</p>	<p>2. App and tools development</p> <p>We will develop an app to take an informed decision related to cluster of chronic disease</p>	<p>3. Prospective analysis</p> <p>Pilot deployment We will involve primary care physicians from a Valencia health department in order to test the app developed</p> <p>KPI assessment The pilot partners will assess the evolution of KPI across the pilot</p>
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Clustering methodology

The groups of diseases are obtained by means of a **hierarchic graph** where each node in a level represents a more refined group of comorbidities from the immediately upper node it belongs to. These groups of comorbidities are formed only if there is a statistical difference between the target with the comorbidities group in study and the previous upper and more general group. This groups are formed by using **statistical inference techniques** that help us to discover statistical differences between groups.



Analytics workflow

EHR Data → **Model Building** → **KPIs Analysis**

Model Building includes: Test Models, Create Clusters, Validation with experts to select potential clusters and features.

KPIs Analysis includes: Mortality, Hospitalization.

Percentage of hospitalization	Number of patients
55	3000
60	2500
65	2000
70	1500
75	1000
80	500
85	200

App development. Visualization

App Development Interface:

- Select gender: Male (selected)
- Select age: 50 (selected)
- Select diseases: ARRYTHMIA, BRONCHITIS, HEART ATTACK, HYPERTENSION, LEUKEMIA, LEUKOCYTOSIS, LEUKOPENIA, PNEUMONIA, PULMONARY EDEMA, PULMONARY EMBOLUS, THROMBOCYTOSIS
- Button: SHOW RESULTS

Results Visualization:

RISK OF HOSPITALIZATION	GENERAL	CALCULATED
	12%	62.57%

RISK OF DEATH	GENERAL	CALCULATED
	9%	53.44%

Buttons: RESTART

