# Prediction of surgical site infection risk in patients undergoing bariatric surgery

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## Background

This research represents an experiment on surgical site infection (SSI) in patients undergoing **bariatric surgery procedures** in hospitals in Belo Horizonte,

**Period:** between July 2016 and June 2018.

**Objectives:**
1 - Statistically evaluate SSI incidences
2 - Enable a study of the prediction power of SSI of pattern recognition algorithms based in Multilayer Perceptron (MLP).
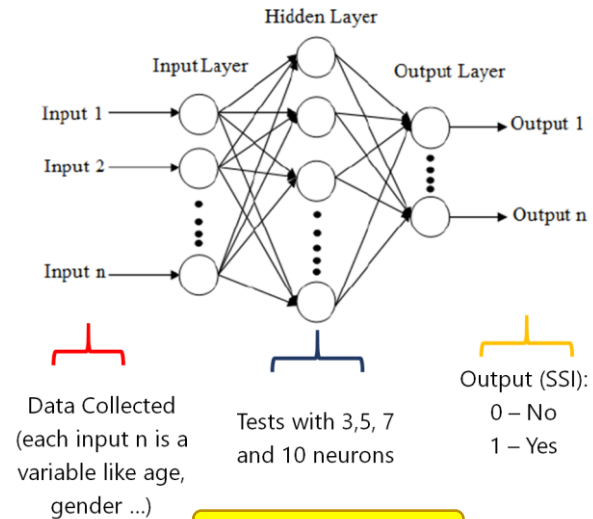
## Methods

Data were collected on SSI in **two hospitals.**

The **Hospital Infection Control Committees (CCIH)** of the hospitals involved collected all data used in the analysis during their routine SSI surveillance procedures and sent the information to the **Nosocomial Infection Study Project (NOIS)** through the **Software Automated Hospital Infection Control System (SACIH)** to collect data from a sample of hospitals.
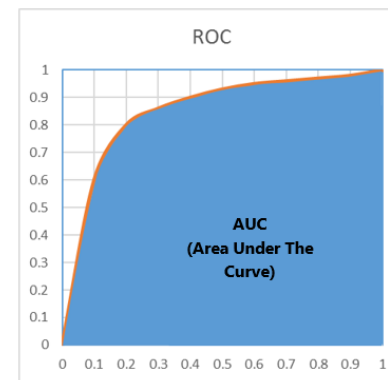
Three procedures were performed:
1 - A treatment of the database collected for use of intact samples;
2 - A statistical analysis on the profile of the hospitals collected
3 - An assessment of the predictive power of **five types of MLP** (Backpropagation Standard, Momentum, Resilient Propagation, Weight Decay, and Quick Propagation) for SSI prediction. They were compared by measuring AUC (Area Under the Curve - ranging from 0 to 1) presented for each of the configurations.

## MLP



Hidden Layer

Input Layer · Output Layer

Input 1 · Input 2 · Input n → Output 1 · Output n

Data Collected (each input n is a variable like age, gender ...)

Tests with 3,5, 7 and 10 neurons

Output (SSI):
0 – No
1 – Yes

## AUC



ROC

AUC
(Area Under The Curve)

## Results

From **3473** initial data, only **2491** were intact for analysis.

Statistically, it was found that:
- The average age of the patients was **39 years** (**ranging from 16 to 65**);
- The average duration of surgery was **138 minutes;**
- **0.8%** of patients had SSI.

Regarding the predictive power of SSI, the experiments have a **minimum value of 0.350** and **a maximum of 0.756.**

## Conclusion

Despite the considerable loss rate of almost **30% of the database** samples due to the presence of noise, it was possible to have a relevant sampling for the profile evaluation of Belo Horizonte hospitals.

Moreover, for the predictive process, although some configurations have results that **reached 0.755**, which makes promising the use of the structure for automated SSI monitoring for patients undergoing bariatric surgery.

To optimize data collection and enable other hospitals to use the SSI prediction tool (available in www.sacihweb.com ), two mobile application were developed:
1 - for monitoring the patient in the hospital
2 - for monitoring after hospital discharge.