Occurrence's Prediction of Surgical Site Infection in Limb Amputation Surgery

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Background

This research represents an experiment on surgical site infection (SSI) in patients undergoing **limb amputation surgery procedure** 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).

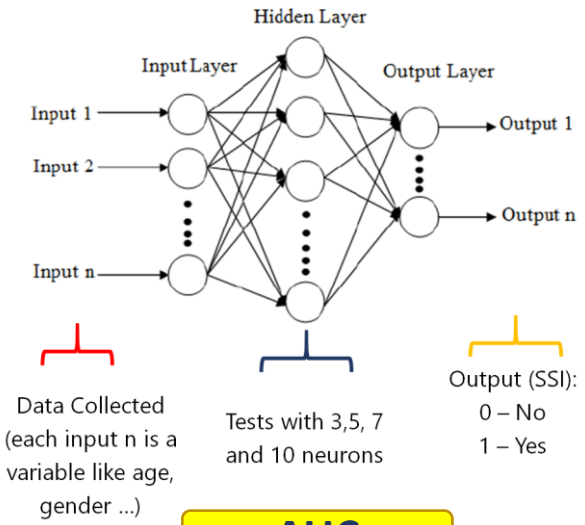
Methods

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

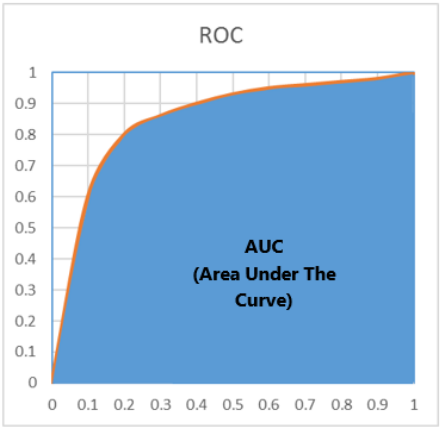
The **Hospital Infection Control Committees (CCIH)** of the hospitals involved collected all data used in the analysis during their routine SSI surveillance procedures and sent the information to the **Nosocomial Infection Study Project (NOIS)** through the **Software Automated Hospital Infection Control 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



AUC



Results

From **969 data**, only **507** were intact for analysis. Statistically:

- In **12.45% there was an incidence of global infection** and that in **10.67%** of the cases were SSI (**among which, 94.6% had to be hospitalized for more than 10 days**);
- Patients were hospitalized on average **21 days** (from 0 to 141 days);
- The average duration is **78 minutes** (maximum 360 minutes);
- **53 deaths** (a 16.98% death rate in case of SSI).

Regarding the prediction power, a **maximum prediction power of 0.688** was found.

Conclusion

Despite the considerable loss rate **of almost 40%** of the database samples due to the presence of noise, it was possible to have a relevant sampling to evaluate the profile of hospitals in Belo Horizonte.
For the predictive process, although some configurations **reached 0.688**, which makes promising the use of the automated SSI monitoring framework for patients undergoing limb amputation 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.

IDWeek Chasing the Sun 24 hours of COVID-19 followed by IDWeek

unibh

Grupo NOIS Nosocomial Infection Study