Chapter 9

A Predictive Analytic Model for Maternal Morbidity

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ABSTRACT

This chapter presents a predictive analytic model for preventing neonatal morbidity through the analysis of patterns of risky behavior regarding morbidity in newborns. The chapter presents the design and implementation of a forecasting model of Neonatal morbidity. The model developed is based on artificial intelligence using Bayesian Networks, Influence Diagrams and principles of traditional statistics. The model research is based on a repository of 10,000 medical records at a hospital in Peru. The model aims to identify the factors that are causes of morbidity in newborns, is based on data mining techniques and developed using the CRISP-DM methodology.

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INTRODUCTION

The World Health Organization (WHO) defines maternal morbidity as “Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes” (OMS, UNICEF, UNFPA, & Banco Mundial, 2005).

Morbidity in the pregnancy period is one of the leading causes of death in women: WHO mentions that around 800 women die every day from complications related to pregnancy or childbirth. For instance, 287,000 women died in 2010 before, during and after the pregnancy and childbirth (OMS, 2014).

A key problem encountered in maternity consultations or emergencies, is the complexity of identifying risk factors of morbidity in order to minimize or eliminate them through a timely and accurate diagnosis (Say L, Pattinson RC, & Am G., 2004). Therefore, hospitals and clinics require adequate processes starting with collecting necessary data to create assertive knowledge about the patient and therefore offer an adequate treatment.

Our research aimed to create knowledge related to medical diagnosis. To analyze data from this database Influence Diagrams and Bayesian probabilities will be used to create a model for the detection of morbidity patterns and risk factors in the pregnant mothers during consultations or in intensive care units (ICU).

This research work was carried out with the collaboration of the National Teaching-Hospital Mother-Child “San Bartolomé” (HNDSB) in Lima (Peru) whose most important activities are maternal education, monitoring of pregnant women, delivery care and care of the newborns.

This chapter presents the empirical context and the project phases for the development of the predictive analytic model with examples of diagnosis scenarios developed using this predictive model and the knowledge repository available for research purposes.

RELATED STUDIES

Bulegon et al. (Bulegon, Bortoleto, & Roman, 2009) discuss the creation of data models in the context of health. They propose an entity-relationship model that includes cardiovascular risks, tests, exams, risks and other considerations that allow monitoring of the patient’s conditions and they suggest some specific data mining techniques to explore the data.
Pharmacy Technology to Better Public Health: An Exploration of New Models of Supply and Use of Technology – A Regional United Kingdom Quantitative Study
www.igi-global.com/article/pharmacy-technology-to-better-public-health/218865?camid=4v1a

Identification of Associations between Clinical Signs and Hosts to Monitor the Web for Detection of Animal Disease Outbreaks
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