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Predicting the prolonged length of stay of general surgery patients: a supervised learning approach. (English) Zbl 1382.92158

Summary: Determining the likelihood of a prolonged length of stay (LOS) for surgery patients can improve medical resource management. This study was aimed at developing predictive models for determining whether patient LOS is within the standard LOS after surgery. This study analyzed the complete historical medical records and lab data of 896 clinical cases involving surgeries performed by general surgery physicians. The cases were divided into urgent operation (UO) and non-UO groups to develop a prolonged LOS prediction model using several supervised learning techniques. Several critical factors for the two groups were identified using the gain ratio technique. The results indicated that the random forest method yielded the most accurate and stable prediction model. Additionally, comorbidity, body temperature, blood sugar, and creatinine were the most influential variables for prolonged LOS in the UO group, whereas blood transfusion, blood pressure, comorbidity, and the number of ICU admissions were the most influential variables in the non-UO group. This study shows that supervised learning techniques are suitable for analyzing patient medical records in accurately predicting a prolonged LOS; thus, the clinical decision support system developed based on the prediction models may serve as reference tools for communicating with patients before surgery. The system may also assist physicians when making decisions regarding whether patients require more clinical care, thereby improving patient safety.

MSC:
92C50 Medical applications (general)
62-07 Data analysis (statistics) (MSC2010)
62H30 Classification and discrimination; cluster analysis (statistical aspects)
68T05 Learning and adaptive systems in artificial intelligence

Keywords:
length of stay; prediction; surgery; physician patient communications; urgent surgery; supervised learning

Software:
MiPred

Full Text: DOI

References:

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