

## Identifying Risk Factors for Readmission Using Decision Tree Analysis

**Authors :** Sıdıka Kaya, Gülay Sain Güven, Seda Karsavuran, Onur Toka

**Abstract :** This study is part of an ongoing research project supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under Project Number 114K404, and participation to this conference was supported by Hacettepe University Scientific Research Coordination Unit under Project Number 10243. Evaluation of hospital readmissions is gaining importance in terms of quality and cost, and is becoming the target of national policies. In Turkey, the topic of hospital readmission is relatively new on agenda and very few studies have been conducted on this topic. The aim of this study was to determine 30-day readmission rates and risk factors for readmission. Whether readmission was planned, related to the prior admission and avoidable or not was also assessed. The study was designed as a 'prospective cohort study.' 472 patients hospitalized in internal medicine departments of a university hospital in Turkey between February 1, 2015 and April 30, 2015 were followed up. Analyses were conducted using IBM SPSS Statistics version 22.0 and SPSS Modeler 16.0. Average age of the patients was 56 and 56% of the patients were female. Among these patients 95 were readmitted. Overall readmission rate was calculated as 20% (95/472). However, only 31 readmissions were unplanned. Unplanned readmission rate was 6.5% (31/472). Out of 31 unplanned readmission, 24 was related to the prior admission. Only 6 related readmission was avoidable. To determine risk factors for readmission we constructed Chi-square automatic interaction detector (CHAID) decision tree algorithm. CHAID decision trees are nonparametric procedures that make no assumptions of the underlying data. This algorithm determines how independent variables best combine to predict a binary outcome based on 'if-then' logic by portioning each independent variable into mutually exclusive subsets based on homogeneity of the data. Independent variables we included in the analysis were: clinic of the department, occupied beds/total number of beds in the clinic at the time of discharge, age, gender, marital status, educational level, distance to residence (km), number of people living with the patient, any person to help his/her care at home after discharge (yes/no), regular source (physician) of care (yes/no), day of discharge, length of stay, ICU utilization (yes/no), total comorbidity score, means for each 3 dimensions of Readiness for Hospital Discharge Scale (patient's personal status, patient's knowledge, and patient's coping ability) and number of daycare admissions within 30 days of discharge. In the analysis, we included all 95 readmitted patients (46.12%), but only 111 (53.88%) non-readmitted patients, although we had 377 non-readmitted patients, to balance data. The risk factors for readmission were found as total comorbidity score, gender, patient's coping ability, and patient's knowledge. The strongest identifying factor for readmission was comorbidity score. If patients' comorbidity score was higher than 1, the risk for readmission increased. The results of this study needs to be validated by other data-sets with more patients. However, we believe that this study will guide further studies of readmission and CHAID is a useful tool for identifying risk factors for readmission.

**Keywords :** decision tree, hospital, internal medicine, readmission

**Conference Title :** ICHQM 2016 : International Conference on Healthcare Quality Management

**Conference Location :** London, United Kingdom

**Conference Dates :** May 23-24, 2016