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Development of a frailty score based on hospital discharge data linked to cohort data

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Introduction

Frailty is strongly associated with adverse health outcomes and health care costs in elders. However, we have almost no idea of the prevalence of frail older inpatients in Swiss hospitals. Hospital discharge data could contribute to predicting frailty in these patients, and eventually improving SwissDRGs system or casemix-adjustment.

Objectives and Approach

The HFrailty project aimed to develop a predictive model of Fried's Frailty Phenotype (FFP) based on hospital discharge data. We linked Lausanne University Hospital (CHUV) discharge data to clinical data from the Lausanne cohort study (Lc65+) over the period 2004-2015. The Lc65+ is a longitudinal population-based cohort comprising three random samples of approximately 1500 Lausanne residents aged 65 to 70, born respectively before, during and after World War II. With stepwise and lasso penalized logistic regression, random forest and neural networks, we identified the best-performing model for predicting FFP using CHUV's data recorded within 12 months prior to frailty assessments.

Results

Among Lc65+ participants, 1649 were assessed for frailty and hospitalized at least once during the follow-up period, resulting in 3499 FFP assessments of which 544 were preceded by at least one hospitalization within 12 months. In total, 45.7% of the participants were men and 9.4% were frail (FFP score $\geq$3). As expected, prevalence of frailty increased with age from 4.1% in the 66-70 age group, to 5.3% and 10.5% in the 71-75 and 76-80 groups, respectively. Logistic regression with lasso penalty was finally the best model regarding both performance and complexity. It had an area under receiver operating curve of 0.67 to predict FFP based on detailed diagnosis and procedure codes.

Conclusion/Implications

Hospital discharge data may be used to identify frail and non-frail individuals and estimate their prevalence in the Swiss non-institutionalized population. Our predictive model showed limited performance and could be improved. We are currently testing groups of diagnosis and procedure codes, as predictors, instead of detailed ones.

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