

TITLE: Case-mix classification for Dutch homecare payment: Developing a case-mix model

Introduction

Case-mix based prospective homecare payment is being implemented in several countries to achieve high-quality, efficient, client-centered care. In previous studies, a case-mix model was developed for the Dutch homecare sector based on data from the Case-Mix Short Form (CM-SF) questionnaire. This model explained 21% of the variance in homecare utilization and mostly included characteristics on daily functioning.

Therefore, new characteristics were added to the CM-SF that provide a more holistic view of the client. The second version of the CM-SF contains fifteen characteristics, i.e. on daily functioning (n=5), physical health status (n=1), mental health status and behaviour (n=4), health literacy (n=1), social environment and network (n=2) and other (n=2). In this study, we aim to identify which characteristics are relevant cost predictors and develop an improved case-mix model for homecare in the Netherlands.

Methods

The study is designed as a cross-sectional cohort study including clients of six homecare providers operating in various regions of the Netherlands. The data collection of the study is conducted between November 2021 and April 2022. The dependent variable in the analyses is the cost of homecare utilization weighted by the relative wage rates of the professionals involved, for an episode of care (i.e. 4 weeks). An 'episode of care' starts when a client receives a needs (re)assessment for homecare by a registered nurse. The CM-SF is completed by a registered nurse directly after each needs (re)assessment of a client. The independent variables originate from the CM-SF questionnaire and client demographics. The analyses consist of both a data-driven and a expertise-driven approach. For the data-driven approach, relevant cost predictors are identified using random forest algorithm and regression tree models. The case-mix model will consist of the leaves of the regression tree. The regression tree models are pruned using cost complexity pruning, either for optimal prediction accuracy or to a predefined number of case-mix clusters. Internal validation is addressed by using cross validation at various stages of the modelling pathways. For the expertise-driven approach, the registered nurses involved in the study will construct a case-mix model using the CM-SF items based on their professional insights and we will let the data act as a check.

Results

The data collection has resulted in a sample size of approximately 20,000 clients. The analyses will lead to several case-mix models that will vary on multiple dimensions, such as the number and type of cost predictors included, the number of case-mix clusters, relevance to daily practice and prediction accuracy.

Conclusions

The derived case-mix models will be compared on the dimensions mentioned. The trade-off between model complexity, relevance to daily practice and prediction accuracy will be discussed to facilitate policy choices on the implementation a new payment system for homecare in the Netherlands.