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CONFERENCE ABSTRACT

Prediction Models for Future High-Need High-Cost Healthcare Use as Part of Case-Finding for Care-Management: a Systematic Review

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Introduction: Various care-management programs have been developed for High-Need High-Cost (HNHC) patients to improve both quality of care and cost-effectiveness. Such programs often encompass structured clinical follow-up by an interdisciplinary care team, whether or not in combination with self-management support, pharmaceutical care and patient and caregiver education. Results vary, but a positive impact has been shown on quality of care, patient satisfaction and healthcare use. Early identification of patients at risk of becoming HNHC (i.e. case-finding) is crucial to a program's success. Prediction models may aid in case-finding.

Aims and methods: We aimed to identify prediction models predicting future HNHC healthcare use in adults, describe their predictive performance and assess their applicability. Five databases were systematically searched from inception through January 31st, 2021. Predictors were categorized according to Andersen's Behavioural Model of Healthcare Utilization into 'Predisposing' (i.e. predisposing to healthcare use), 'Enabling' (i.e. facilitating or inhibiting healthcare use) and 'Need' (i.e. assessment whether illness requires care). Model performance was evaluated using measures of discrimination and calibration. Risk of bias and quality assessment was performed through Prediction model Risk Of Bias ASsessment Tool (PROBAST). Applicability for clinical use was assessed by exploring model performance against expected performance in new patients.

Results: Of 5,890 studies, 60 met the inclusion criteria. Within these studies, 313 unique models were presented using a median development cohort of 20,248 patients (IQR 5,601 – 174,242). Categorizing predictors according to Andersen's Model showed all studies used 'Predisposing', 23 studies (38%) used 'Enabling' and 53 studies (88%) used 'Need' predictors. Most studies (n=36; 60%) estimated patients' risk to become part of some top percentage of the cost-distribution (top-1-20%) within a mean time horizon of 16 months (range 12 – 60). Five studies (8%) predicted HNHC persistence over multiple years. Model validation was performed in 45 studies (76%). Model performance in terms of both calibration and discrimination was reported in 14 studies (23%). Overall risk of bias was rated as 'high' in 40 studies (67%). Assessment of applicability for clinical use among models with a prediction timespan beyond 12 months, showed two models with a good discriminative ability but with a risk of overfitting and an unclear risk of bias.

Conclusions: Most models estimate patients' risk to become part of some top percentage of the cost-distribution in the subsequent year. However, case-finding strategies for HNHC care-management programs are better informed by a model predicting HNHC persistence. Predictive performance varies while evidence on clinical usefulness (i.e. decision-curve analysis) is lacking.

Implications and limitations: We provide practical guidance on choosing between available models as part of a case-finding strategy for HNHC care-management. Meta-analysis was not possible. Future research should focus on validating and extending existing models, develop models that predict HNHC persistence and assess clinical usefulness to improve quality of care for HNHC patients.