Leiden University Medical Center

Health Campus Den Haag

Hotspotters: Identifying Complex Patients in Primary Care in The Netherlands

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Goal PhD Research

To validate the *Adjusted Clinical Groups (ACG)*
as risk stratification tool in Dutch Primary Care

- *Future hospitalization prediction*
- *Future high health costs (top 5%)*
- *Identification of Hotspotters*

acg
JOHNS HOPKINS

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Identifying Complex Patients Using Adjusted Clinical Groups Risk Stratification Tool

Shelley-Ann M. Girwar, MSc; Jozefine C. Verloop, MD; Marta Fiocco, PhD; Stephen P. Sutch, DrPH; Mattijs E. Numans, PhD; and Marc A. Bruijnzeels, PhD

As populations age and the presence of multimorbid and complex patients becomes the norm, the pressure on health systems in terms of workload and costs is immense.[1] Single-disease management approaches are no longer sufficient to meet the needs of an increasing number of complex patient groups who need care oriented toward their overall health.[2] In addition, strategies distinguishing different levels of complexity within a population are desirable. Population health management (PHM) approaches aim to allocate available health resources to the appropriate patient groups within the population. Risk stratification tools, such as the widely used Johns Hopkins ACG (formerly Adjusted Clinical Groups) System, play an important role in the identification of specific patient groups for PHM, aiming to identify subgroups in whom avoidable adverse health events could be prevented

ABSTRACT

OBJECTIVES: To produce an efficient and practically implementable method, based on primary care data exclusively, to identify patients with complex care needs who have problems in several health domains and are experiencing a mismatch of care. The Johns Hopkins ACG System was explored as a tool for identification, using its Aggregated Diagnosis Group (ADG) categories.

STUDY DESIGN: Retrospective cross-sectional study using general practitioners' electronic health records combined with hospital data.

METHODS: A prediction model for patients with complex care needs was developed using a primary care population

Girwar, S. M., Verloop, J. C., Fiocco, M., Sutch, S. P., Numans, M. E., & Bruijnzeels, M. A. (2022). Identifying complex patients using Adjusted Clinical Groups risk stratification tool. The American Journal for Managed Care, 28(4), e140-e145.

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Complex patients – *'Hotspotters'*

- *Patients with* ***complex care needs*** *who have problems in several* ***health domains*** *&* ***experience a mismatch of care***

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  - ✓Health domains
    - Physical (chronic)
    - Mental
    - Social

Complex patients – *'Hotspotters'*

- *Patients with **complex care needs** who have problems in several **health domains** & **experience a mismatch of care**:*

✓Health domains
- Physical (chronic)
- Mental
- Social

✓ > 2 acute care visits

Identification Method

Johns Hopkins ACG System

– *Aggregated Diagnosis Group (ADG) categories*

Background – *Dutch Health Care System*

✓Mandatory insurance

✓Everyone enlisted with a GP

✓GP is gatekeeper for specialist care

✓GPs use EHR: *ICPC-1 coding*

Methods – *Data*

Input data

ACG output

↓

Aggregated Diagnosis Groups

(current utilization)

GP data:

- *Age*
- *Gender*
- *# GP visits*
- *Diagnosis codes (ICPC)*
- *Medication codes (ATC)*

Determine predictive value (regression analyses)

Primary & secondary care data

Methods – *Analyses*

- Predictive model using **ADGs**
  - Aggregated Diagnoses Groups
  - Healthcare utilization predictors

- Assessment of **model performance**
  - Discriminatory ability → AUC values
  - Calibrating ability → Calibration plot

Results – *Population Characteristics*

	Population 1 (N= 105 345)	Population 2 (N= 30 793)	p
Age (mean)	40.8	40.6	<0.001
Sex (% women)	51.4	50.1	<0.001
Hotspotter prevalence	0.9	0.8	0.072
Acute care visits (mean number)	0.16	0.10	<0.001
≥2 acute care visits (%)	2.7	1.6	<0.001
Health domains			
Somatic chronical	39.8	46.8	<0.001
Social	10.9	20.2	<0.001
Psychiatric	26.6	40.6	<0.001
Common conditions			
Depression	8.5	10.3	<0.001
Diabetes	6.7	5.9	<0.001
Hypertension	20.1	20.3	0.422
Ischeamic heart disease	2.5	3.6	<0.001
Asthma	11.5	13.5	<0.001
Chronic Obstructive Pulmonary Disease	3.1	2.8	0.003

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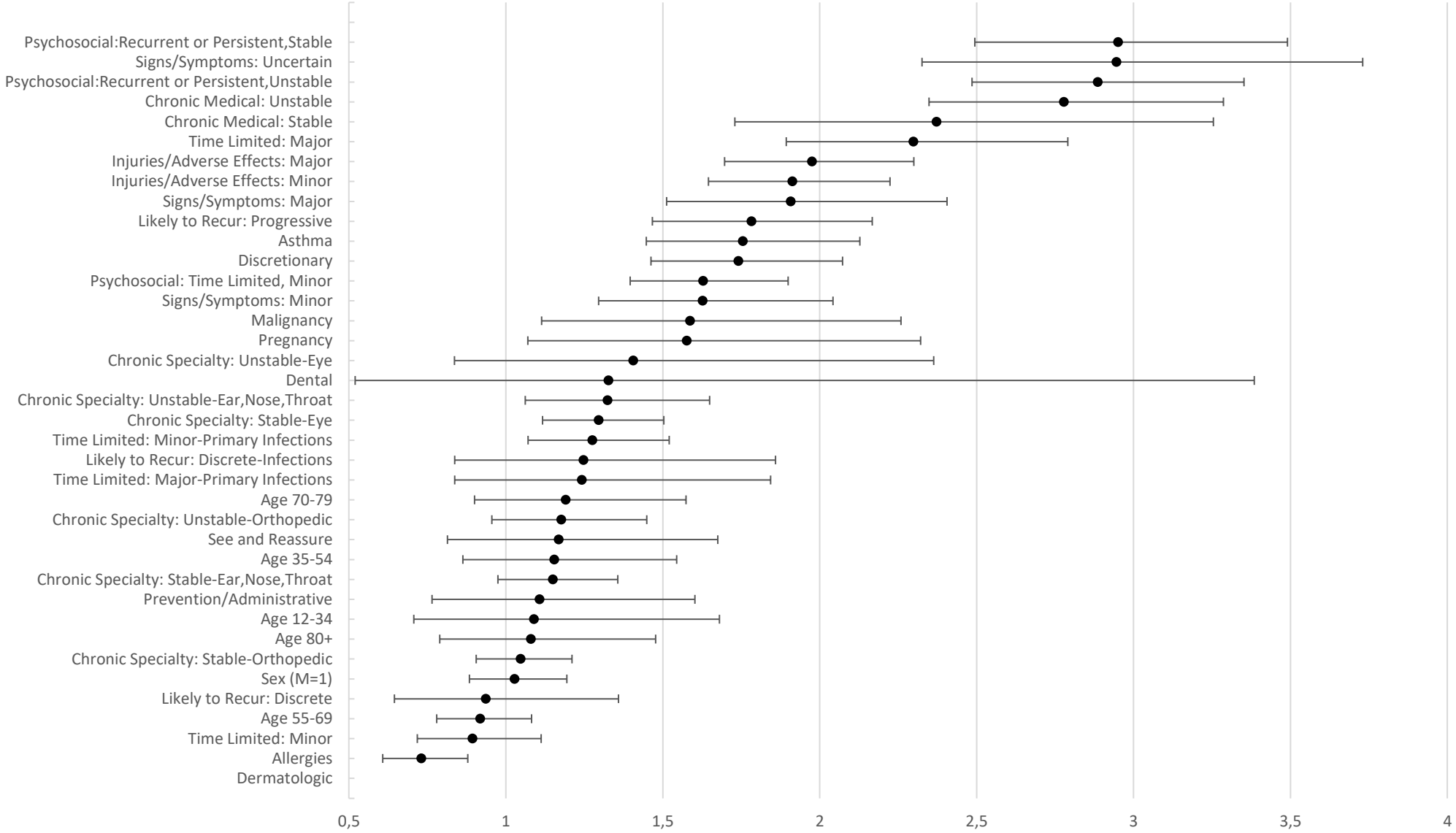
Results – *Predictors (odds ratios)*



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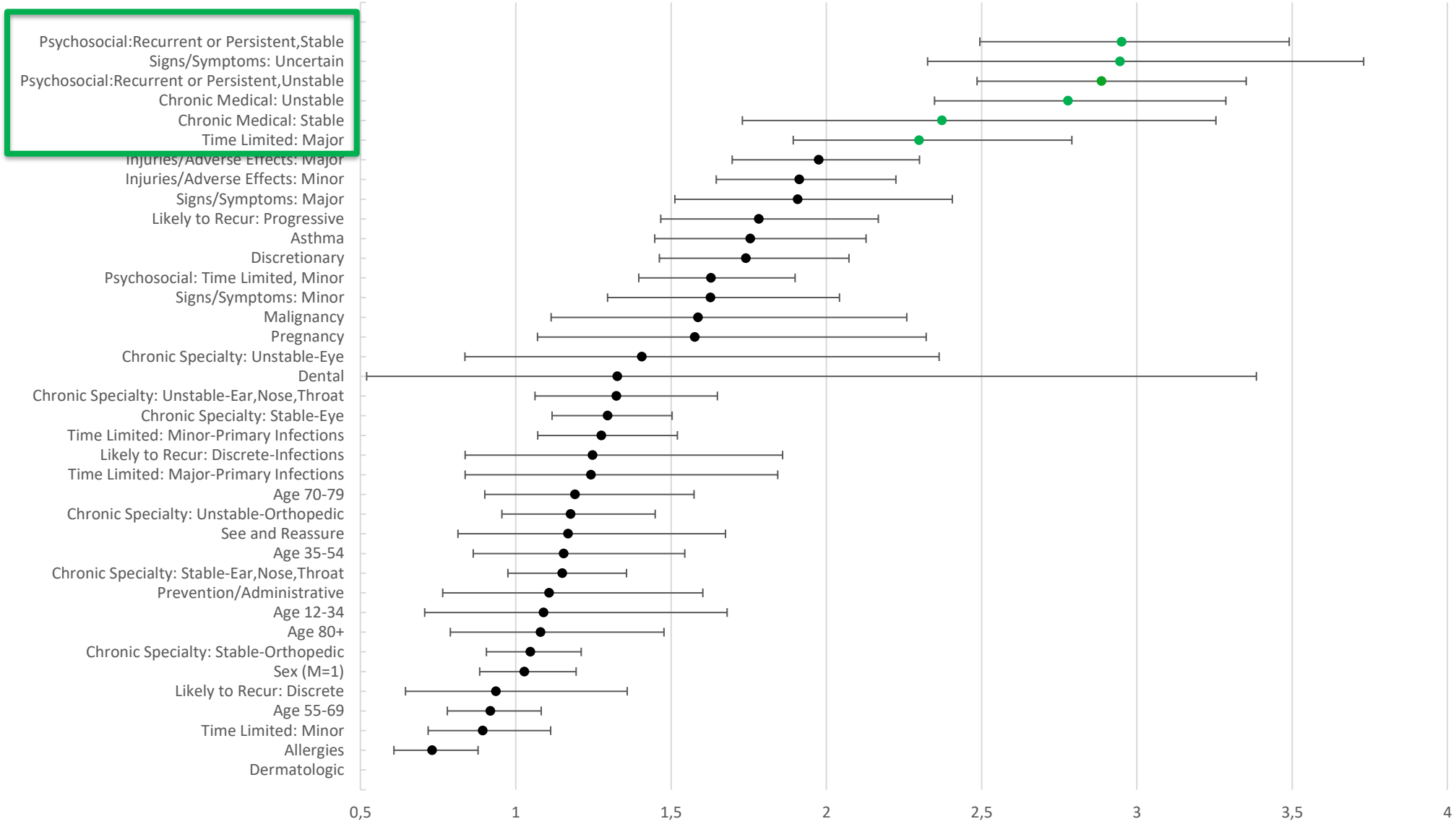

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Results Model Performance – *Discriminating Ability*

TABLE 2. Performance of Prediction Model for Being a Complex Patient

	C statistic	95% CI
Training data set	0.913	0.905-0.920
Validation data set	0.899	0.882-0.915

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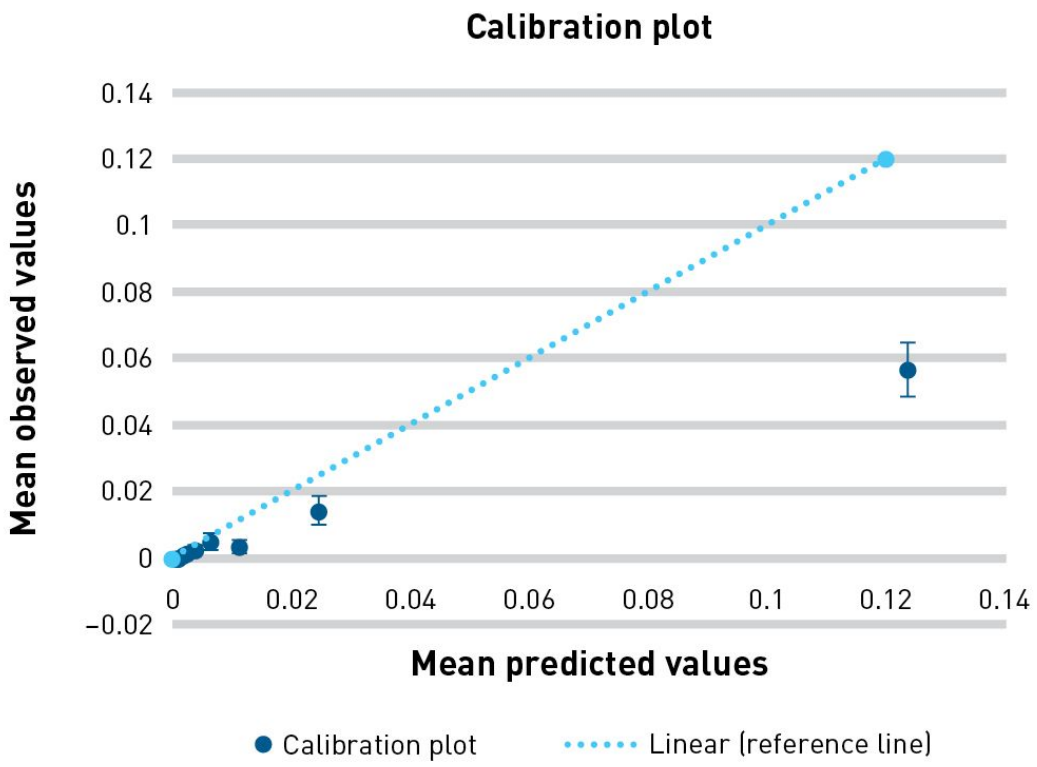
Results Model Performance – *Calibrating Ability*

FIGURE 2. Calibration Plot: Observed vs Predicted Values (estimated by the prediction model for being a complex patient)



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Conclusion

- *ADGs can be used to identify **complex patients / 'hotspotters'***
  - High discriminatory model performance → AUC ~ *0.9*
  - Calibrating ability poor
    - Over-estimation
    - Possibly due to outcome being a rare event (> 1% of the population)
    - In implementation:

      →*In addition to using the algorithm, involve expert opinion*

New research

- ***'Hotspotter' algorithm*** *is currently used to identify complex patients for care management intervention*
  - *10+ GP Practices involved*
  - *GPs provided with patient 'Hotspotter' scores*
  - *Selection of patients for Positive Health programme*

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