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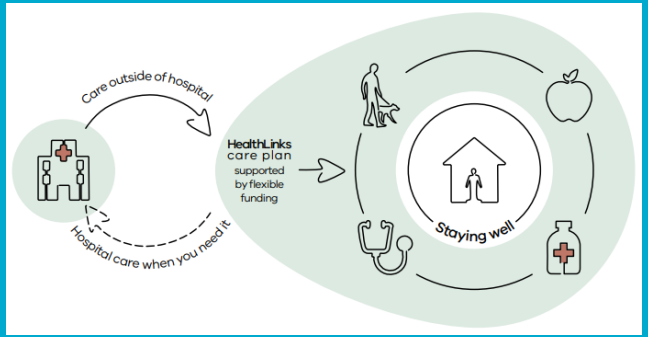
Readmission risk based on debility and psychosocial measures: the Western 9 algorithm

Medinfo 2023, Sydney

Norm Good | 11th July 2023



The Problem

- Readmission risk models are mainly derived from clinical and demographic variables
- Psycho-social determinants of health such as food insecurity, housing instability are important drivers of health outcomes
- Can adding another level of risk stratification improve existing models?

The Context

- Healthlinks Chronic Care was an initiative of the Victorian Department of Health. The department used an algorithm to predict the risk of readmission using health administrative data.
- Western Health partnered with the Silver Chain Group to develop an innovative model of care to support high risk patients with chronic and complex disease “Western Healthlinks”.
- Psycho-social and debility risk factors of readmission were assessed using a set of questions on enrolment (the ‘Western 9’). Patients were risk stratified into either the High, Medium or Low risk care groups depending on their answers.

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The Western 9

Risk level	Score
High	3+
Medium	2
Low	1

Table 1. Debility, psychosocial screening question for Western Health (The Western 9)

Question
1. Does the patient experience difficulty walking (e.g., unable to walk 5 metres in 5 seconds), or had a slip, trip or fall in the past 6-months?
2. Does the patient have memory problems or confusion?
3. Is the patient being treated for anxiety, depression or other mental illness?
4. Will the patient experience any homelessness for the month after they leave the hospital?
5. Does the patient have inadequate food available in their home?
6. Does the patient have inadequate heating and cooling in their home?
7. Will the patient experience difficulty caring for themselves or have inadequate carer support for the 30 days after they leave hospital?
8. Does the patient or carer believe the patient might unexpectedly return back to a hospital bed in the 30 days after they leave the hospital?
9. Do you (Navigator) believe the patient might unexpectedly return back to an inpatient bed in the 30 days after the patient leaves the hospital?

Hypothesis

- Will the social determinants of health as measured by the ‘Western 9’ lead to a more coordinated model of care and improve the predictive accuracy of a readmission risk algorithm?

Methods

- 518 patients were assessed and consisted of 175 High risk, 146 Medium risk and 197 Low risk.
- Patients were linked to their enrolment admission the Victorian Admitted Episode Dataset
- Patients risk levels were included in a logistic regression to predict 30-day readmission risk

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Model

$$Readmission\ in\ 30\ days, binomial(0,1) \sim \boldsymbol{Risk\ group} + Age + Sex + Number\ of\ diagnoses + SEIFA\ decile + Smoking\ status + Marital\ status$$

- Age was included as a natural spline with 5, 10, 20, 40, 60, 80, 90 and 95% quantiles, Sex, Number of diagnoses at admission (as a cubic spline with three degrees of freedom), SEIFA IRSAD decile (Index of Relative Socio-Economic Advantage and Disadvantage), Smoking status and Marital status.
- Model performance was assessed by comparing calibration curves with models with and without Risk group included.

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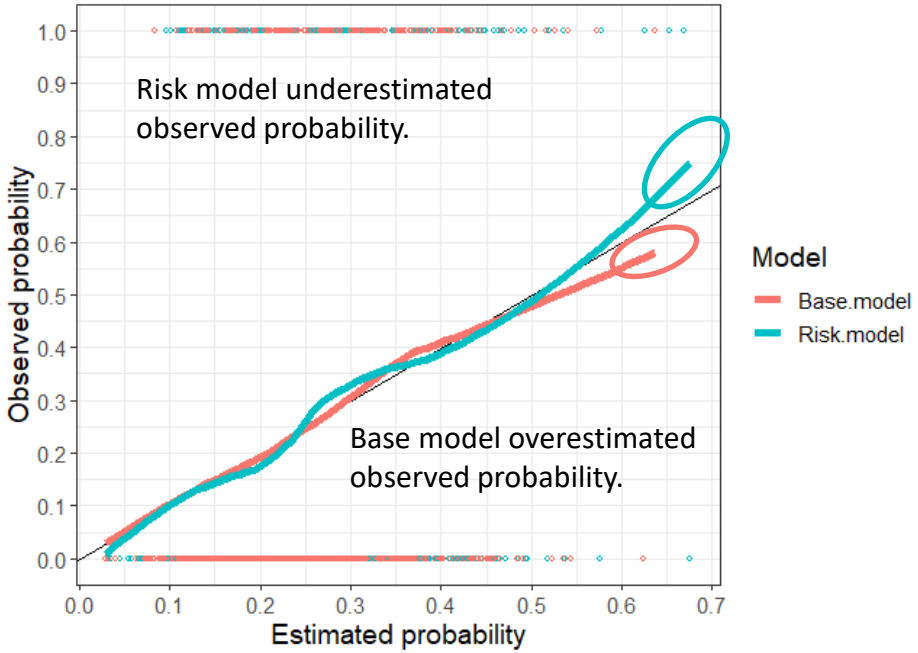
Results

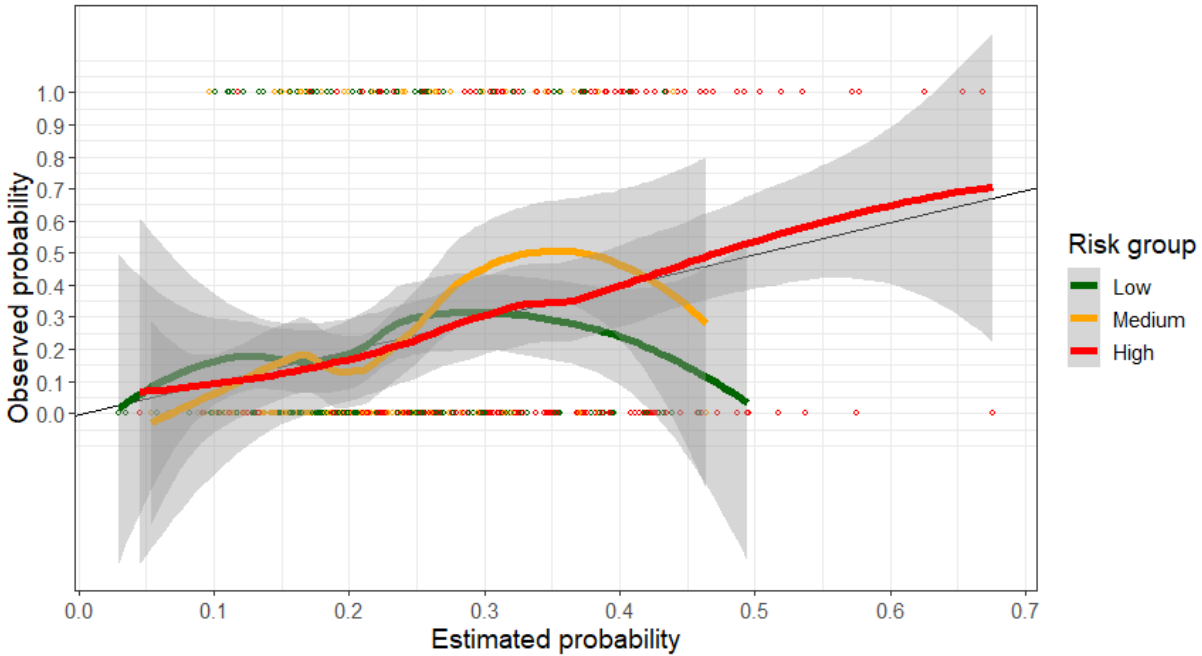
Risk Group	OR (95% CI)
Low	1 (reference)
Medium	0.8 (0.5 - 1.4)
High	**1.7 (1.0 - 2.7)***

* p<0.02



Results

The High risk group performed better than Low and Medium risk groups



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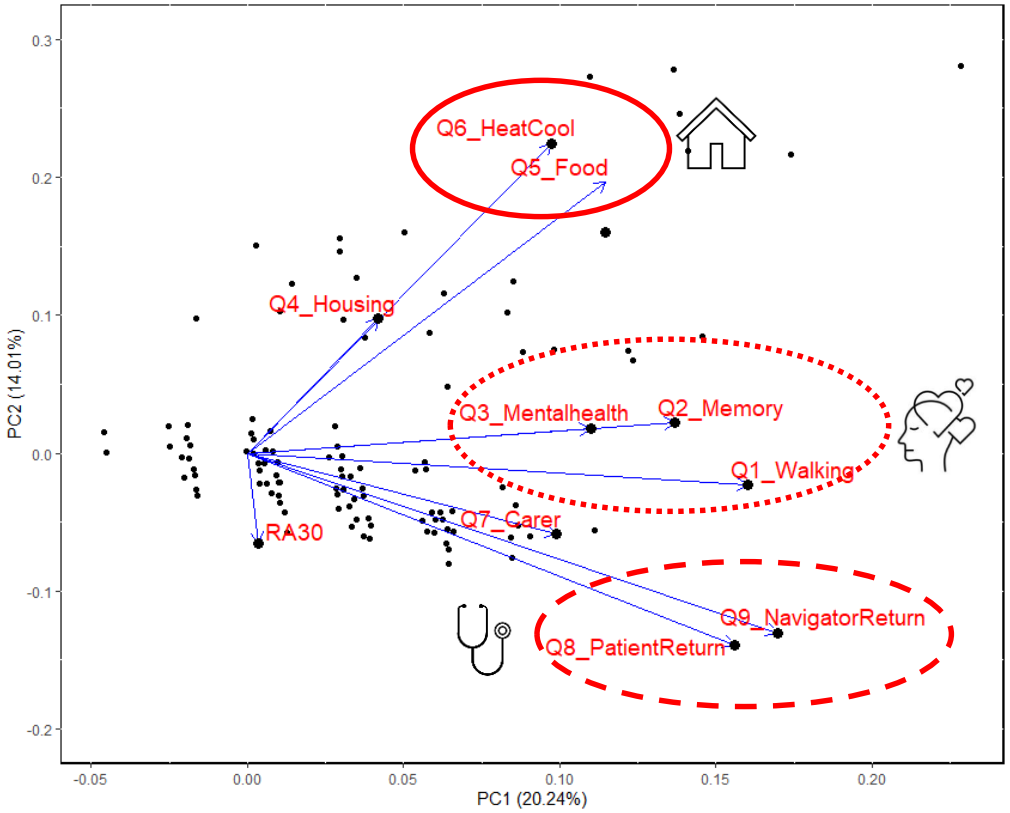
Results

Questions 8 and 9, patient return and navigator return respectively were more associated with readmission risk (also assigned a High risk level)



Discussion

- The addition of psychosocial and debility measures increased the discriminative ability of risk models especially when associated with higher risk groupings
- Carer and nurse navigator perceptions of returning to hospital were more associated with readmission risk than other measures
- Potential to develop an aggregate score from weighted principal component scores

Limitations

- Observational study not an RCT
- Assigned risk levels have not been validated
- Intervention intensity based on risk group may dilute the hypothesised effect

A parallel study which includes a blinded observational group with no intervention will further test the validity of the Western 9.

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Thank you

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