The Association Between Patient-Reported Outcomes and a Heart Failure Risk Predication Tool in the Emergency Department

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Background

- In United States (US), heart failure (HF) is a leading cause of emergency department (ED) visits.
- HF risk stratification tools, such as Emergency Heart Failure Mortality Risk Grade (EHMRG) have been developed, but are not widely used.
- The EHMRG includes the following clinical characteristics: age, systolic blood pressure, oxygen saturation, heart rate, Metolazone at home, active cancer, acute ischemic changes on ECG, creatinine, potassium, troponin I or T and transported by EMS.
- However, the EHMRG does not include patient-reported outcomes that may be associated with adverse outcomes.
- Patient-Reported Outcomes Measurement Information System® measures (PROMIS) are known to predict morbidity and mortality, and are not present in the EHMRG tool.
- The association between patient reported outcomes and HF risk prediction tool EHMRG is unknown.

Objective

- To evaluate the association of the PROMIS measures of Depression, Anxiety, Physical Function, Cognitive Function, and Emotional, Informational, and Instrumental Support with the EHMRG score in patients with HF.
- We hypothesized that those with high EHMRG scores would have worse PROMIS scores.

Methods

Study Population

- Individuals with HF from a prior Heart Failure Risk Prediction Tools Feasibility Study in the Emergency Department.

Participant Categorization

- From the total participants enrolled (n=30), 23 had a calculated EHMRG score.
- Participants with an EHMRG score (n=23) were stratified into a non-high EHMRG and high EHMRG group. High EHMRG is defined as a score > 18.

Study assessments

- Fixed-length short PROMIS form for Depression, Anxiety, Physical Function, Cognitive Function, and Emotional, Informational and Instrumental Support.
- EHMRG score.

Statistical Analysis

- We calculated the mean and 95% confidence interval of the non-high EHMRG and high EHMRG groups.
- We considered no overlap in the confidence intervals of the two groups to be meaningful.

Results

Table 1. Participant characteristics for the Heart Failure Risk Prediction Tools Feasibility study with EHMRG score (n=23)

	Overall
Characteristic	**N (%) or mean ± SD**
Age, years	60.5 ± 11.3
Female, n (%)	5 (21.7)
Black, n (%)	9 (39.1)
BMI in the ED (n=7)	38.9 ± 11.2
Self-reported weight, lbs (n=21)	255.1 ± 85.0
SBP on ED arrival, mm Hg	137.5 ± 31.1
Living along, n (%)	9 (39.1)
Smoking, n (%)	
Never	9 (39.1)
Current	5 (21.7)
Former	9 (39.1)
EHMRG	–16.2 ± 75.8

BMI: Body Mass Index, SBP: systolic blood pressure; 1 person excluded due to technical issues

Figure 1. Relationship of PROMIS Anxiety T-score with EHMRG score

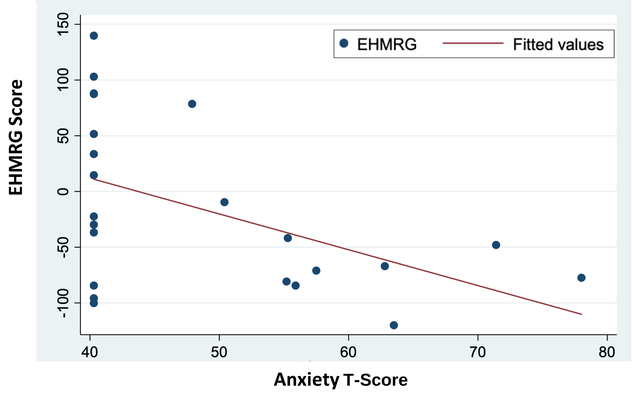

Table 3. Mean and 95% Confidence Intervals of PROMIS measures by High and Non-High EHMRG score

	Non-High EHMRG (n=16)	High EHMRG (n=7)
PROMIS measure (T score)	**Mean (95% CI)**	**Mean (95% CI)**
Cognitive Function	55.2 (48.7, 61.6)	56.4 (48.9, 63.9)
Physical Function	34.9 (29.4, 40.4)	37.0 (29.7, 44.4)
Depression	51.1 (46.3, 55.8)	43.6 (39.4, 47.8)
Anxiety	**52.0 (45.4, 58.6)**	**41.4 (38.7, 44.0)**
Informational Support	61.6 (56.5, 66.7)	59.9 (52.7, 67.1)
Instrumental Support	59.7 (55.9, 63.5)	57.3 (47.7, 67.0)
Emotional Support	58.8 (54.4, 63.2)	59.9 (54.8, 65.0)

CI: confidence interval; high EHMRG defined as a score >18 (Lee et al.); higher values for anxiety and depression indicate worse performance; lower values for cognitive function, informational support, instrumental support, emotional support, and physical function indicate worse performance

Table 2. Participant-reported PROMIS measures (n=23)

	Overall
PROMIS measure	**mean ± SD**
Cognition function, T Score	55.5 ± 10.9
Cognition function categories, n (%)	
Normal	15 (65.2)
Mild	4 (17.4)
Moderate	3 (13.0)
Severe	1 (4.4)
Anxiety, T score	48.8 ± 11.5
Anxiety categories, n (%)	
Normal	15 (65.2)
Mild	4 (17.4)
Moderate	2 (8.7)
Severe	2 (8.7)
Depression, T score	48.8 ± 8.5
Depression categories, n (%)	
Normal	16 (69.6)
Mild	5 (21.7)
Moderate	2 (8.7)
Emotional support, T score	58.1 ± 7.4
Emotional support categories, n (%)	
High	19 (82.6)
Average	3 (13.0)
Low	1 (4.4)
Informational support, T score	61.1 ± 8.9
Informational support categories, n (%)	
High	17 (73.9)
Average	5 (21.7)
Low	1 (4.4)
Instrumental support, T score	59.0 ± 8.1
Instrumental support categories, n(%)	
High	17 (73.9)
Average	5 (21.7)
Low	1 (4.4)
Physical function, T score	35.5 ± 9.5
Physical function categories, n(%)	
Normal	2 (8.7)
Mild	3 (13.0)
Moderate	11 (47.8)
Severe	7 (30.4)

PROMIS measures: Neuro-QOL Cognition Function Short Form; Emotional Distress-Anxiety and Depression Short Forms 4a; Emotional, Informational, and Instrumental Support Short Forms 4a; Physical Function Short Form 4a

Summary of Results

- The participants had an average age of 60.5 years old, weight of 255.1 pounds, 9% were living alone, 21.7% were female, and 39.1 were black (Table 1).
- The mean EHMRG was -16.2 with a standard deviation of 75.8 (Table 1).
- The mean t-score for anxiety and depression was the same (48.8). With these measures, a higher score indicates worse performance (Table 2).
- Amongst the other PROMIS measures, a higher score indicatives better performance. Physical function had the lowest performance (average t-score of 35.5; Table 2).
- Informational support had the highest mean t-score of 61.1 (Table 2).
- Those with a higher anxiety score had a low EHMRG score (Figure 1).
- There was overlap in the confidence intervals in the non-high and high EHMRG groups for all PROMIS measures, except anxiety (Table 3).
- The mean and 95% CI for anxiety in the non-high vs. high EHMRG group was 52.0 (45.4, 58.6) and 41.4 (38.7, 44.0), respectively (Table 3).

Conclusions

- The anxiety PROMIS scores were higher, indicating worse performance, in the lower risk (non-high) EHMRG group in comparison to the high risk (high) EHMRG group.
- Anxiety PROMIS measure and EHMRG are associated, but in the opposite direction of what we expected.
- Thus, the EHMRG tool may not capture patient-reported outcomes associated with morbidity and mortality.
- The predictive value of adding patient-reported outcomes to HF risk prediction tools should be evaluated.

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