Comparison of the psychometric properties of the Cambridge Pulmonary Hypertension Outcome Review (CAMPHOR) and the SF-36 in patients with Pulmonary Hypertension

Twiss J[1], Ganderton L[2,3,4,5], Jenkins S[3,4,6], Ben-L'amri M[1], Gain K[2,4,7], Fowler R[2,3,4], Gabbay E[2,3,4,7,8], McKenna SP[1]

1. Galen Research, Manchester, United Kingdom; 2. Royal Perth Hospital, Perth, Australia; 3. Lung Institute of Western Australia, Centre for Asthma, Allergy and Respiratory Research, University of Western Australia, Australia; 4. School of Physiotherapy and Curtin Health Innovation Research Institute, Curtin University, Perth, Australia; 5. Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney, Australia; 6. Sir Charles Gairdner Hospital, Perth, Australia; 7. School of Medicine and Pharmacology, University of Western Australia, Perth, Australia; 8. School of Medicine, University of Notre Dame, Fremantle, Australia.

Objectives

- The Cambridge Pulmonary Hypertension Outcome Review (CAMPHOR) [1] and the Medical Outcomes Study Short Form 36 (SF-36) [2] are widely used to assess outcome in pulmonary hypertension (PH) patients.
- Despite the wide use of the SF-36 limited information is available regarding the psychometric properties of the measure in a PH population.
- The CAMPHOR is a PH-specific measure and comprises three scales assessing impairments (symptoms), activity limitations (functioning) and quality of life (QoL). The content for the measure was derived directly from patient interviews and embodies issues important to patients with PH.
- Although the psychometric properties of the CAMPHOR are promising, direct comparisons with other measures are lacking.

Aim

The aim of this study was to conduct a direct comparison of the psychometric properties of the CAMPHOR and the SF-36 in a single population of PH patients in order to determine the suitability of each as an outcome measure

Methods

Patients

Participants were recruited from six specialist PH centres in Australia and New Zealand. Participants were over the age of 18 and had a clinical diagnosis of PH.

Outcome measures

The CAMPHOR was developed in the UK [1] and adapted for use in Australia and New Zealand [3]. It consists of three scales; Symptom Scale (score range 0-25), Activities scale (score range 0-30) and QoL Scale (score range 0-25). High scores indicate worse health/ QoL.

The SF-36 is a generic health status questionnaire consisting of eight domains. Raw domain scores are transformed to a scale of 0-100 with high scores indicating better health status.

Procedure

The study was conducted via postal survey. Participants completed the SF-36 and CAMPHOR at two time-points, two weeks apart. They also provided demographic and disease information (age, gender, WHO class and PH type). Participants completed the SF-36 immediately followed by the CAMPHOR at each time point (Time 1 [T1] and Time 2 [T2]).

Statistical Analysis

The questionnaires were assessed for:

- Distributional properties (% scoring minimum and % scoring maximum): This provides an indication of the targeting of the questionnaire to the patient group.
- Internal consistency (Cronbach's alpha): A low alpha (below 0.7) indicates insufficient relations between the items to form a scale [4].
- Test-retest reliability (minimum required correlation coefficient = 0.85): A correlation coefficient greater than or equal to 0.85 is required [5]. % of explained variance in scores is also provided.
- Known group validity (CAMPHOR scores by WHO functional classification): A p value of <0.05 was considered statistically significant (Mann-Whitney U-test).

Results

Descriptive statistics

Demographic and disease information for the sample is shown in Table 1.

Table 1: Demographic and disease information

Gender	Male (%)	14 (21.5)
Age	Mean (SD) years	57.2 (14.5)
WHO class	I	3 (4.6)
	II	18 (27.7)
	III	40 (61.5)
	IV	4 (6.2)
PH Type	Idiopathic PAH (%)	37 (5.9)
	Familial PAH (%)	1 (1.5)
	Associated PAH (%)	23 (35.4)
	Chronic thromboembolic PH (%)	2 (3.1)
	PH associated with lung diseases (%)	2 (3.1)

Distributional properties

SF-36: High levels of ceiling effects (% scoring maximum) for the bodily pain (T1=9.8%; T2=13.3), social functioning (T1=21.3; T2=20.0) and role-emotional (T1=25.0; T2=24.6) domains.

CAMPHOR: Minimal levels of floor and ceiling effects were observed for the three scales.

Internal consistency

Internal consistency was adequate for all SF-36 domains and CAMPHOR scales.

Test-retest reliability

Test retest reliability is shown in Figure 1.

- SF-36 Test-retest reliability was good for the SF-36 physical functioning and general health domains.
- Test-retest correlations were below the required level for all other SF-36 domains.
- These scales also had unacceptable levels of measurement error as shown in Figure 1.
- CAMPHOR Test-retest coefficients were good for all CAMPHOR scales with low levels of random measurement error.

Known group validity

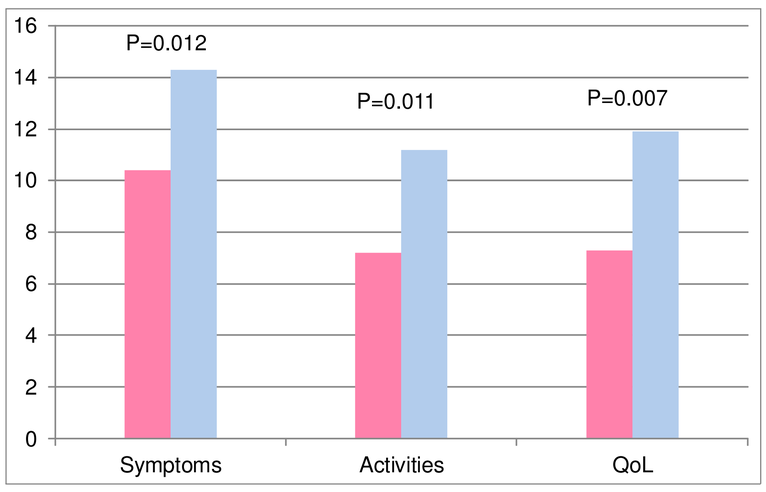
SF-36

- Several of the SF-36 domains distinguished between participants based on their WHO functional classification (WHO classes I and II vs. classes III and IV).
- However, the bodily pain and mental health domains did not discriminate between groups.
- Although the social functioning scale distinguished between groups the differences in scores failed to reach the threshold published for the MID for this patient group [6].

CAMPHOR

- Known group validity for the CAMPHOR is shown in Figure 2.
- All three scales clearly distinguished between patients based on WHO class.

Figure 2: CAMPHOR scores by WHO class



Conclusions

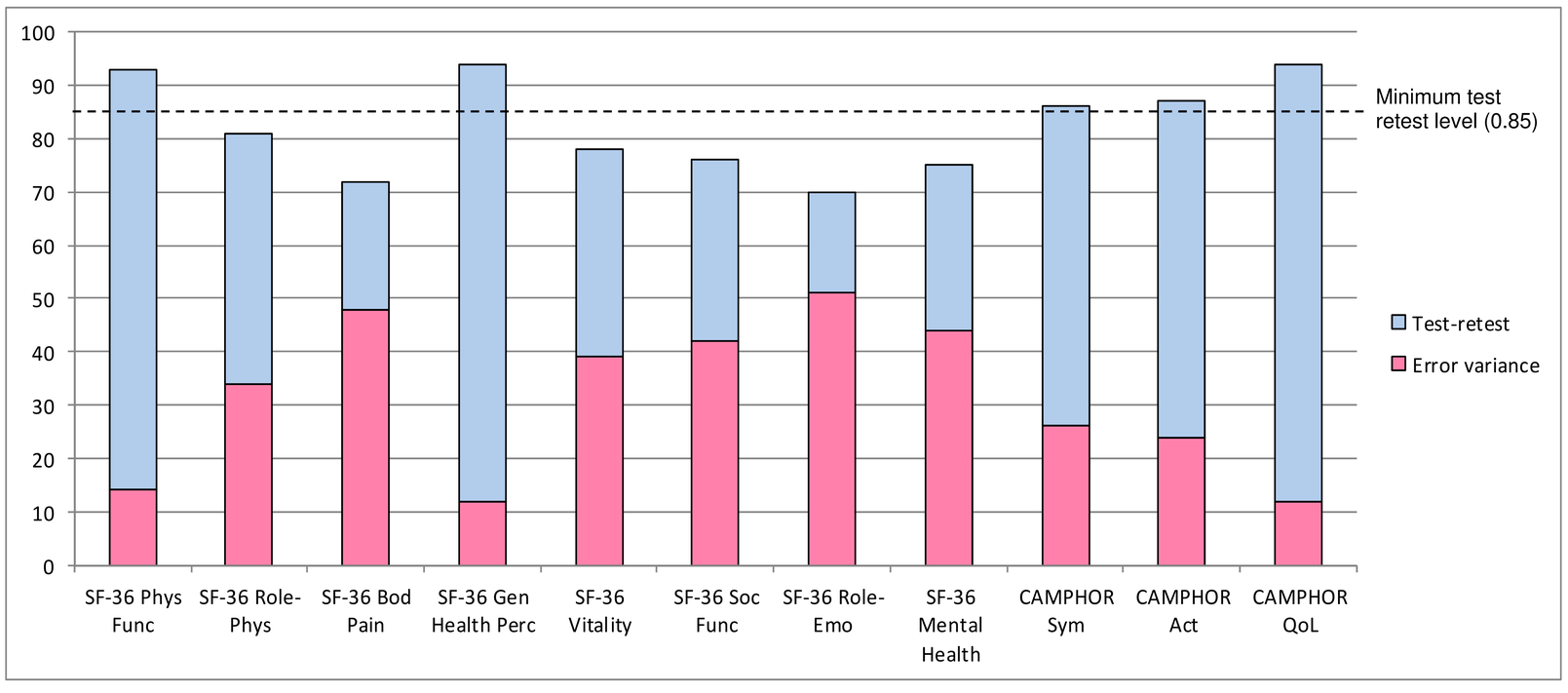
Only the SF-36 physical functioning and general health perceptions domains met adequate psychometric criteria for use in research in individuals with PH.

The general health perceptions section of the SF-36 is concerned with perceptions of health and illness beliefs rather than being an outcome and the physical functioning scale concerns functioning rather than QoL. These outcomes measure only a limited aspect of patients' experience with PH.

The results of this study demonstrate that the CAMPHOR is a more complete tool for assessing the impact of PH from the patients' perspective.

The CAMPHOR has superior psychometric properties, compared with the SF-36, in the assessment of PH patient-reported outcome.

Figure 1: Test retest reliability of the CAMPHOR and SF-36



Contact details

James Twiss, Senior Research Associate, Galen Research Ltd, Enterprise House, Manchester Science Park, Lloyd Street North, Manchester, M15 6SE, UK.
Tel: **+44 (0)161 226 4446**
Email: **jtwiss@galen-research.com**

References

1. McKenna SP, Doughty N, Meads DM, Doward LC, Pepke-Zaba J. The Cambridge Pulmonary Hypertension Outcome Review (CAMPHOR): a measure of health-related quality of life and quality of life for patients with pulmonary hypertension. Qual Life Res 2006; 15(1): 103-15. **2.** Ware JE, Kosinski M, Dewey JE. How to Score Version Two of the SF-36 Health Survey. Lincoln, RI: QualityMetric, Incorporated, 2000. **3.** Ganderton L, Jenkins S, McKenna SP, et al. Validation of the Cambridge Pulmonary Hypertension Outcome Review (CAMPHOR) in Australian and New Zealand populations. Respirology 2011; 16: 1235-1240. **4.** Streiner D, Norman G. Health measurement scales. Oxford: Oxford University Press; 1989. **5.** Weiner EA, Stewart BJ. Assessing individuals. Little Brown, Boston; 1984. **6.** Gilbert C, Brown MC, Cappelleri JC, Carlsson M, McKenna SP. Estimating a minimally important difference in pulmonary arterial hypertension following treatment with sildenafil. Chest 2009; 135(1): 137-42.