



Prognostic value of 6-minute walk test and cardiopulmonary exercise test in acute heart failure (from the ESCAPE trial)

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Objectives

Heart failure (HF) is common and is associated with high rates of morbidity and mortality. Previous studies recognized that functional capacity is an important predictor of morbidity and mortality in HF. Functional capacity in HF can be measured via the 6-minute walk test (6MWT) and cardiopulmonary exercise testing (CPET). Maximal oxygen uptake (VO₂max) is considered as the gold standard of functional status, while the 6MWT is more widely available, easier to perform, less expensive, and mimics daily activity. The aim of this study was to determine the utility of the 6MWT and CPET in patients with acute systolic HF in predicting post-discharge all-cause mortality and rehospitalization.

Study methods

There was a retrospective review of data from the ESCAPE trial originally published in 1997. In this study, 433 patients with acute HF ejection fraction <30% and NYHA classification IV were included. Included patients had 3 months of symptoms despite treatment and systolic blood pressure <125 mmHg. Six-minute walk distance (6MWD) and CPET variables were measured at admission and after discharge at 3 months. End points included all-cause rehospitalization and mortality at 6 months follow-up.

Results

The average 6MWD recorded in patients on admission and discharge was 597 and 765 ft. (182 and 233 m), respectively. Compared with non-survivors, survivors had significantly higher 6MWD on admission (624 vs. 463 ft. [190 vs. 141 m], $p = 0.006$) and discharge (789 vs. 636 ft. [241 vs. 194 m], $p = 0.006$). The combination of optimal 6MWD cutoff values of >288 ft. (87 m) on admission and >320 ft. (98 m) on discharge was associated with significantly lower mortality (11.1% vs. 28.3%, Odds Ratio [OR] 0.316, $p = 0.002$). Admission ($p = 0.009$) and discharge 6MWD ($p = 0.016$) were independent mortality determinants after adjustment for confounding variables on admission. CPET-derived variables did not predict mortality or rehospitalization in severe HF patients.

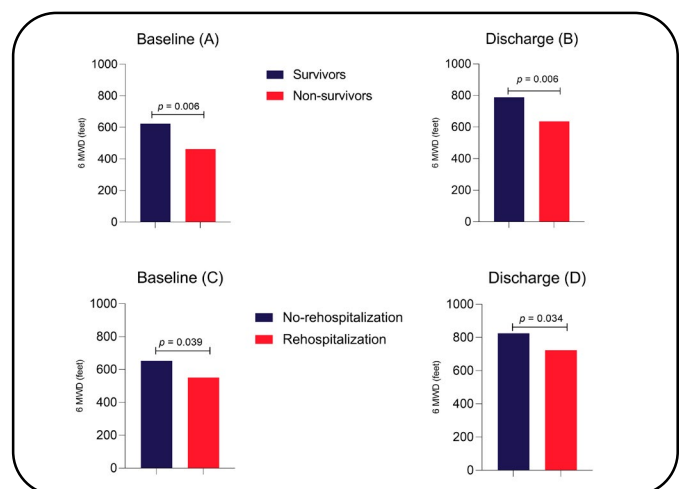


Figure 1 Mean of baseline and discharge 6MWD in survivors and non-survivors (A,B) and those who rehospitalized or non-rehospitalized at 6 months (C,D)

What is cardiopulmonary exercise testing?

Cardiopulmonary exercise testing (CPET) provides assessment of pulmonary and cardiovascular system functionality by measuring the response of these systems to both submaximal and peak effort during exercise. Often using either a cycle ergometer or a treadmill, the subject breathes into the CPET device which measures oxygen consumption and carbon dioxide production, along with highly accurate standard spirometric function such as minute ventilation and tidal volume. CPET is frequently used to evaluate unexplained dyspnea and may be valuable in identifying the cause of dyspnea and exercise intolerance in these patients.

What is the six-minute walking test?

The six-minute walking test (6MWT) was developed by the American Thoracic Society and it was officially introduced in 2002. The 6MWT is a (sub)-maximal exercise test used to assess functional status. The distance covered over a time of 6 minutes is used as the outcome by which to compare changes in performance capacity.



Figure 2 Vyntus™ CPX is an example of a CPET measuring device*

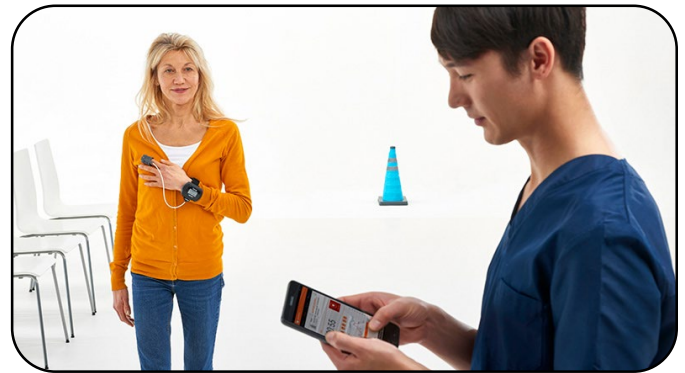


Figure 3 Vyntus™ WALK is an example of a 6MWT measuring device*

Take home message

- The 6MWT is simple, ideal as follow-up, and close to daily life activity, while CPET is more comprehensive and ideal for providing a physiological explanation of functional limitations.
- 6MWD is an independent mortality determinant in advanced systolic HF.
- CPET may be more useful in determination of risk of death or rehospitalization in patients with less severe HF.
- Many patients such as those included in the ESCAPE trial (only able to accomplish 6MWD of 288 ft. [88 m.]) show such a low functional status that CPET is not possible.
- In patients with acutely decompensated HF, even rest or minimal activity may be the equivalent of maximal exercise.
- CPET is more useful for risk stratification in patients with less severe HF.

*No endorsement of any specific measuring devices in this paper

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