PRM89

Approaches to modelling the cost-effectiveness of interventions for heart failure: a systematic review

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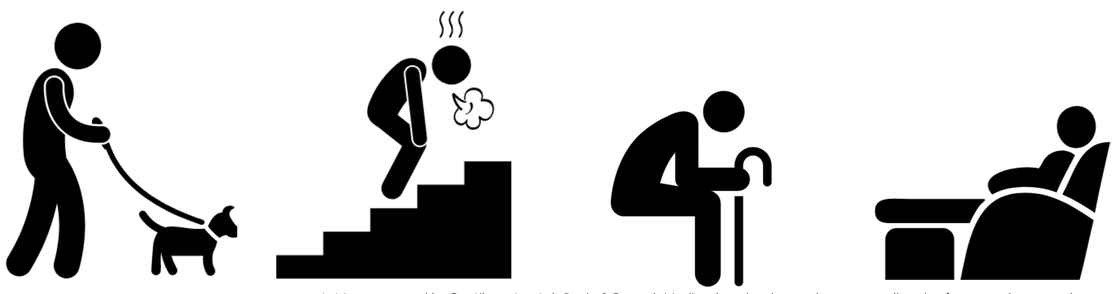
New York Heart Association (NYHA) functional classification of heart failure



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Class I	Class II	Class III	Class IV
Mild No fatigue with ordinary physical activity	Mild Ordinary physical activity results in fatigue, palpitations, shortness of breath	Moderate Less than ordinary physical activity results in fatigue, palpitations, shortness of breath	Severe Any physical activity results in fatigue, palpitations, shortness of breath

Figure 1 Illustration of the NYHA functional classification of heart failure

Introduction

The aim of the review was to identify and assess modelling approaches used to date in cost-effectiveness analyses of interventions for heart failure (HF), updating a previous review published by Goehler *et al.* in 2011[1].

Methods

A systematic search was carried out of the literature with studies published up to September 2016 across Medline, Embase, Cochrane Library, EconLit and CINAHL databases. We included studies that reported a model-based evaluation, including both costs and health impacts, of an HF intervention where they were available in full text in English. Studies reporting only cost-effectiveness analyses alongside a clinical trial were excluded.

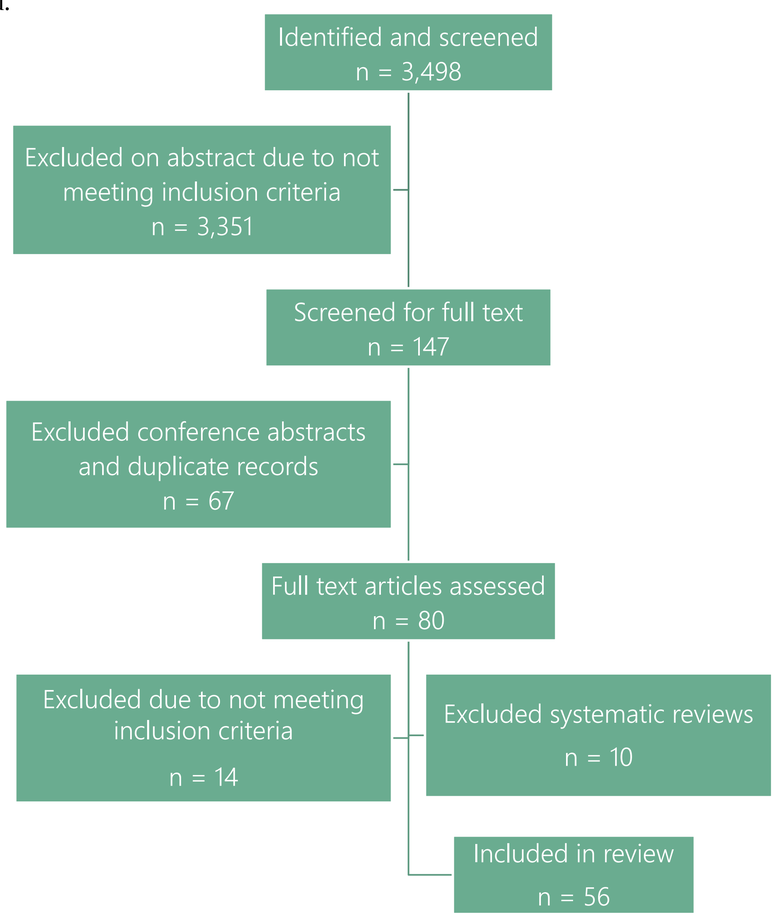

Figure 2 Flow chart summarising the systematic review process

Acknowledgements

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Results

Figure 2 illustrates the screening process, which identified 56 papers describing 54 different modelling studies. The studies assessed a range of interventions including surgical (e.g. implanted devices), medical (pharmaceutical), service-level (e.g. multi-disciplinary teams), screening or monitoring (e.g. for biomarkers) or disease management programmes as summarised in Figure 3 (a). Markov cohort modelling was the most commonly used methodology as shown in Figure 3 (b). There was a range of complexity levels within the Markov modelling studies. Some studies used very simple two-state models with cohorts partitioned into either 'alive' or 'dead' states, whereas others allowed for disease progression. Disease progression was generally modelled with reference to New York Heart Association (NYHA) functional classifications (see Figure 1). In additional to functional classification, several models included additional health states for hospitalisation events, since acute episodes in HF have both an immediate effect on patient health-related quality of life (HRQoL) as well as an impact on the future risk of both death and additional hospitalisation events.

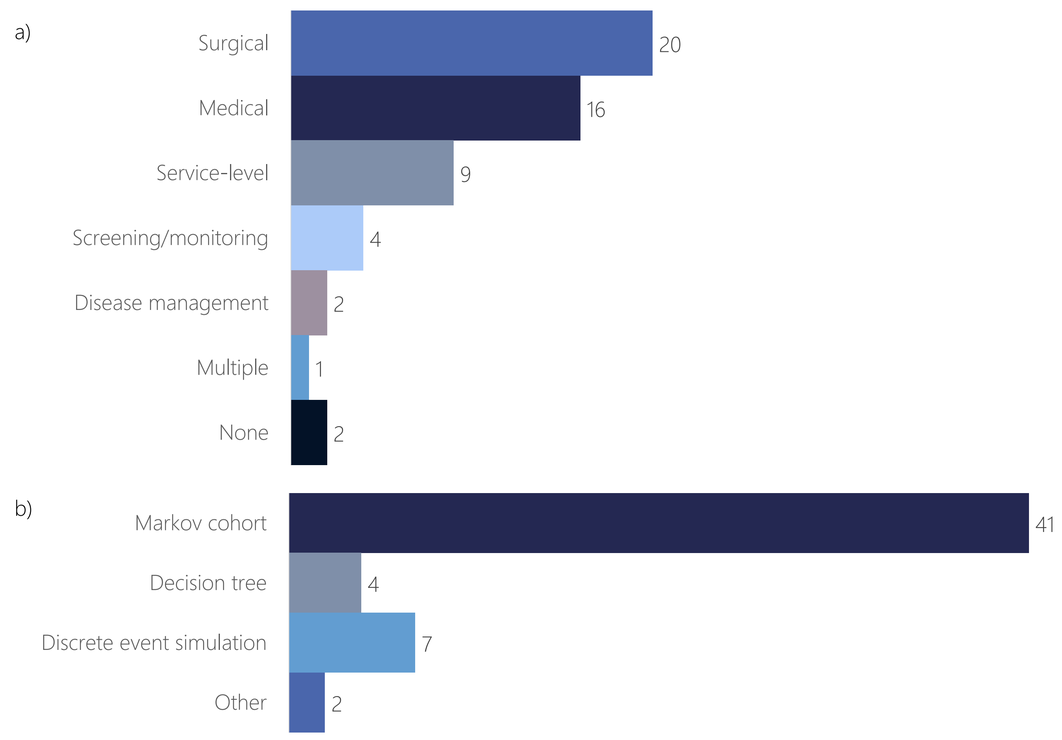

Figure 3 Summary of the characteristics of identified models including a) type of intervention being assessed and b) type of model used

Conclusions

The simple Markov cohort approach appears appropriate for estimating cost effectiveness in most cases. Efforts to model the natural history of HF progression have to date centred on the use of NYHA functional classification, which is based on a subjective rating rather than a physiological measure and has been shown to have high interoperator variability in assignment[2]. Despite this, there is evidence that HRQoL does vary by NYHA class[3] and therefore this measure may be considered a useful proxy for progression in terms of capturing HRQoL effects.

Future modelling may further consider the modelling of natural history using health states informed by health outcome measures commonly used in HF.

References

1. Goehler A, Geisler BP, Manne JM, Jahn B, Conrads-Frank A, Schnell-Inderst P, Gazelle GS, Siebert U. Decision-analytic models to simulate health outcomes and costs in heart failure: a systematic review. Pharmacoeconomics. 2011 Sep;29(9):753-69.
2. Raphael C, Briscoe C, Davies J, Whinnett ZI, Manisty C, Sutton R, Mayet J, and Francis DP Limitations of the New York Heart Association functional classification system and self-reported walking distances in chronic heart failure. Heart. 2007 Apr; 93(4): 476–482.
3. Borer JS, Bohm M, Ford I, Komajda M, Tavazzi L, Sendon JL, Alings M, Lopez-de-Sa E, Swedberg K. Effect of ivabradine on recurrent hospitalization for worsening heart failure in patients with chronic systolic heart failure: the SHIFT Study Eur Heart J. 2012 Nov;33(22):2813-20.