Patient Self-management in Chronic Heart Failure – Establishing Concordance Between Guidelines and Practice

Samia R Toukhsati^{1,2}, Andrea Driscoll^{2,3} and David L Hare^{1,2}

1 Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Parkville, Australia; 2 Department of Cardiology, Austin Health, Heidelberg, Australia; 3 School of Nursing and Midwifery, Faculty of Health, Deakin University, Burwood, Australia

Abstract

Chronic heart failure (CHF) is a progressive and debilitating disease with a broad symptom profile, intermittently marked by periods of acute decompensation. CHF patients are encouraged to self-manage their illness, such as adhering to medical regimens and monitoring symptoms, to optimise health outcomes and quality of life. In so doing, patients are asked to collaborate with their health service providers with regard to their care. However, patients generally do not self-manage well, even with specialist support. Moreover, self-management interventions are yet to demonstrate morbidity or mortality benefits. Social network approaches to self-management consider the availability and mobilisation of all resources, beyond those of only the patient and healthcare providers. Used in conjunction with e-health platforms, social network approaches may offer a means by which to optimise self-management programmes of the future.

Keywords

Chronic heart failure; self-management; clinical outcomes; e-health; social networks

Disclosure: The authors have no conflicts of interest to declare.

Received: 24 July 2015 **Accepted:** 12 September 2015 **Citation:** *Cardiac Failure Review*, 2015;1(2):128–31

Correspondence: Samia R Toukhsati, Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Parkville, Vic 3010, Australia.

E: samia.toukhsati@austin.org.au

ESC Guidelines for Patient Self-management in Chronic Heart Failure

The gold-standard of patient self-management in chronic heart failure (CHF) can be defined as “daily activities that maintain clinical stability”.¹ This requires that patients monitor their symptoms, adhere to their medication, diet and exercise regimens and manage symptoms by recognising changes and responding by either adapting behaviours or by seeking appropriate assistance.² Patient self-management is linked to reduced mortality risk and fewer hospital admissions; however, there is less certainty with regard to the benefits of some aspects of self-care, such as lifestyle choices and fluid restriction.² According to the European Society of Cardiology Guidelines for the diagnosis and treatment of acute and chronic heart failure,³ self-management is integral to achieving best patient outcomes: to reduce mortality and improve quality of life.

Self-management in CHF usually involves behavioural adaptation. Patients may need to learn new behaviours, such as learning how to monitor and manage symptoms and complex medical regimens. Patients may also need to abstain (e.g. cease smoking), adapt (e.g. restrict their sodium, cholesterol and fluid intake) and maintain (e.g. exercise regularly) other behaviours. While targets have been recommended for best CHF management practice (such as to restrict fluid to 1.5 litres per day and to monitor weight changes > 2 kgs over three days), these need to be individualised according to the patient symptom and disease status profile and reset regularly. From the patient perspective, this increases the complexity of self-management and intensifies the cognitive, behavioural and motivational demands

of self-care. However, for most patients the empowerment rendered by self-care results in a sense of control and achievement, rather than a feeling of passivity and helplessness. This applies to the partners of patients, as well as to the patients themselves. Within the general framework of the management strategy, the patient must experience some sense of control. For example, the patient needs to control the diuretics – the diuretics should not control the patient. Thus flexibility of dosage timing needs to fit in with the sociological constraints of the patient’s day-to-day life.

It is also important to stress that self-care can only work satisfactorily when there is partnership with – and trust in – the healthcare professional team. For example, even in the absence of cognitive impairment, a patient cannot safely alter their own diuretic doses (as a response to their weight and fluid status) unless the parameters are regularly reviewed and reset at a clinic visit. Changes in adipose tissue and muscle mass can render previous “target weights” incorrect, resulting in either heart failure decompensation on the one hand or dehydration on the other, especially for relatively unstable patients. Therefore re-setting of weight targets is very important – but takes considerable clinical skill. Evaluation of volume status includes clinical assessment of symptoms suggestive of either hyper- or hypo-volaemia; measurement of blood pressure, both recumbent and standing; evaluation of jugular venous pressure with patient propped up at 45 degrees, as well as lying flat (ensuring that the veins fill appropriately); rise or fall of serum creatinine and estimation of B-natriuretic peptide. The target weight for the patient self-management can then be reset.

Self-management Interventions in CHF: Do They Work?

Patient self-management is proposed to be a cornerstone of CHF outcomes,³ although evidence to support this is limited.⁴ Nonetheless, poor patient adherence is linked to hospital readmissions.^{5,6} Patient disability, disease burden and decompensation undermine adherence to recommended self-management behaviours.^{7,8} Non-adherence to recommended treatment plans is common in CHF,^{6,9} with reports that up to 60 % of patients do not adhere to their medication regimens as prescribed and up to 80 % do not adhere to lifestyle recommendations.^{5,10} Van der Waal et al⁶ also found that patients tend to tolerate exacerbations in their CHF symptoms and delay seeking assistance.

Health literacy has also been linked to a patient's ability to self-manage.⁹ Low health literacy has been shown to be an independent predictor of mortality¹¹ and hospitalisations.^{12,13} It is unknown as to whether poor health literacy is a primary cause of poor health outcomes or whether it is an underlying problem of other issues, such as low socioeconomic status, inadequate access to health services or a low trust in healthcare providers. Nevertheless, low health literacy needs to be addressed in an effort to improve knowledge and self-management skills.

A variety of strategies has been proposed to support patient self-management, such as early and targeted screening of patients to identify and resolve capacity deficits (e.g. limited literacy, cognitive and physical impairment) and psychosocial obstacles (e.g. depression and anxiety) that may undermine self-care. For example, whole system informing self-management engagement (WISE) training involves an assessment of patient needs, motivation and capacity, shared decision making and agreement on a management plan to support patient self-care; WISE training has produced improvements in patient outcomes in several chronic disease settings,¹⁴ but is untested in CHF.

Both depression and anxiety are associated with poor adherence to medical regimens,¹⁵ this in turn having a marked effect on patient self-management. The management of depression in cardiac patients therefore is extremely important if patients are to become engaged in self-management.¹⁶ The importance of a relevant professional relationship, with continuity over time, cannot be over-emphasised for the maintenance of patient engagement, collaboration and appropriate self-management.

Specialist programmes were introduced to address the individual and complex care requirements in CHF and to encourage patient self-management. The HART trial¹⁷ targeted patient capacity and willingness to self-care through group education and counselling to optimise "self-monitoring, environmental restructuring, elicitation of support from family and friends, cognitive restructuring and the relaxation response" (p. 1333). A total of 902 CHF patients were randomised to an education and counselling programme or to education alone (enhanced standard care). Outcomes were assessed after 12 months; the study did not show a benefit of self-management counselling on mortality or hospital readmissions compared to education alone. Shao et al¹⁸ found that CHF patients who were randomised to a 12-week nurse-led self-management programme, which emphasised patient self-efficacy to control sodium and fluid intake (SeSFC), showed significantly better symptom control and management than usual care patients, but that both groups had similar health service utilisation. In the TEHAF study, Boyne et al¹⁹ randomised CHF patients

Table 1: Summary of European Society of Cardiology recommendations for chronic heart failure patient self-management^{2,3}

Chronic heart failure patients should:

- Monitor and identify changes in symptoms (e.g. daily weighing)
- Manage symptom changes (e.g. > 2 kg over 3 days) by adapting behaviour (e.g. see their primary care physician)
- Adhere to medication, diet and exercise regimens
- Restrict sodium, fat, cholesterol, alcohol. Limit fluid intake to (1.5–2 l/day)
- Abstain from cigarette smoking
- Report mental health disturbance (e.g. depression, anxiety) to their healthcare professional

Table 2: Randomised controlled trials of chronic heart failure patient self-management interventions

Trial	N	Intervention	Hospital admissions/mortality
HART ¹⁷	902	Group education and counselling versus education (enhanced usual care)	No benefit
SeSFC ¹⁸	93	Nurse-led self management versus usual care	No benefit
TEHAF ¹⁹	382	Tailored tele-monitoring education and self-management versus usual care	No benefit
SEMAPHFOR ²⁰	260	Nurse-led versus patient-led cognitive behavioural self-management programme	No benefit
COACH ²²	1023	Nurse-led self-management support (basic or intensive) versus usual care	No benefit

to a tailored tele-monitoring education and self-care programme or to usual care. No significant differences in hospital admissions or length of stay in hospital were observed between groups over a 12-month period. Smeulders et al²⁰ found that the self-care benefits of a 6-week nurse-led CHF self-management programme were no longer evident six months post-treatment compared with patients who had been randomised to usual care. The SEMAPHFOR trial²¹ found no difference in hospital admissions/readmissions, self-care, or quality of life between CHF patients randomised to either a nurse-led or patient-led cognitive behavioural self-management programme.

Self-management interventions are often embedded within theoretical frameworks, such as Bandura's social cognitive theory, that emphasise patient self-efficacy (i.e. perceived capacity to meet behavioural challenges) as fundamental to behaviour change. Research evidence to support a pivotal role for self-efficacy in the clinical outcomes of CHF self-management is, however, limited. The COACH trial²² randomised 10 CHF patients²³ to one of two specialist CHF nurse support programmes (basic or intensive) or to usual care. CHF nurses were trained to optimise patient self-efficacy and patients were engaged in behavioural modification strategies. The study failed to identify a benefit of treatment on mortality or hospital readmission compared with usual care.

Taken together, these findings suggest that interventions designed to support patient self-management may improve symptom monitoring and compliance,⁶ but fall short of reducing mortality risk or hospital

admissions. While it is possible that such symptoms may not be adequate markers of CHF exacerbation,²³ poor patient engagement in self-management interventions probably explains at least some of the limited efficacy of such programmes. To our knowledge, the extent to which patient engagement may have been undermined by known psychosocial confounders, such as depression, has not been reported and would be a useful addition to future research.

Nevertheless, there will always be some inherent limitations. Symptom and weight changes are generally the results of fluid retention and volume overload. However, volume changes tend to be consequent to pressures changes and therefore could be a relatively late indicator for mandating management changes, such as changes in diuretic dosage. A new approach has been to use implanted devices for measuring pressure change. Examples include devices that can directly measure left atrial pressure or pulmonary artery pressure. Monitoring of pulmonary pressure, for example, provides important information at least a couple of days before changes in patient weight are apparent. Thus, a change in diuretic dosage can be instituted earlier and this has been demonstrated to be effective in significantly reducing heart failure hospital admissions.²³ This kind of direct monitoring still involves some degree of patient collaboration and self-monitoring, with the patient being given instructions based on the measured pressures. However, in the future, devices are only likely to be used in selected individual patients.

Recommendations to Promote Patient Self-management: a Social Network Approach

There is no evidence to suggest a benefit of self-management interventions on clinical endpoints in CHF at the present time and the composition of such programmes is empirically unsubstantiated.^{6,24} Specialist CHF outpatient programmes have yet to demonstrate an improvement in patient adherence compared to rates achieved in primary care.²⁵ A small number of studies have observed benefits of group self-management interventions in other chronic disease settings, such as diabetes;^{26,27} however, the active component/s driving success of these programmes is unknown.^{14,28} We do know that patient education is not sufficient to engender self-care,^{1,29} but that it may be useful when embedded in e-health programmes.³⁰

Lainscak et al² suggest that patient self-management may be improved through “comprehensive CHF education and counselling that is not only focused on knowledge, but also on skills and behaviour” (p.21). The extent to which health professionals are equipped to enact such strategies, such as to provide a “non-threatening climate and an inspiring learning atmosphere” (p.3), is varied³¹ and requires specialist education and training.³² Kennedy et al¹⁴ suggest that, even after having participated in training, healthcare staff may be resistant to engaging in interventions designed to optimise patient self-management. They recommend a systems approach to self-management that integrates support for patients, practitioners and service providers; however, evidence of efficacy and the training and resource requirements to implement such programmes are needed.

Wingham et al³³ suggest that self-management “is dependent on a range of factors including social and personal influences in conjunction with healthcare systems and health professionals” (p.150). Indeed, research suggests that the link between patient confidence and self-care^{1,34} may depend on the quality of the patient–health professional relationship.³⁵ However, problematic patient–physician interactions

continue to be among the most commonly reported barriers to patient self-management,³⁶ e-health strategies will likely form a pivotal role in addressing these shortfalls. Trials in progress, such as PROMETHUS37, BEAT-HF³⁸ and CHF-CePPORT³⁹ will examine whether e-health platforms can overcome patient barriers, such as cognitive impairment, to improve self-management in CHF. Related work points to the potential for e-health to be integrated into patient social networks to optimise self-management.

Health-promoting, social support may improve patient self-management behaviours.^{7,40,41} Vassilev et al⁴² recommend a shift in the way we conceptualise patient self-management “from individualised, behaviour-based interventions to community and network-centred approaches” (p. 73); i.e. from patient self-efficacy towards collective efficacy.⁴³ Peer-support programmes have shown improvements in patient self-management in some chronic diseases settings, such as diabetes. For example, the ROMEO trial²⁷ showed a significant benefit of group education sessions for diabetes patients, scheduled quarterly over a period of two years, on knowledge, health behaviours and quality of life outcomes compared with usual care. Reeves et al⁴⁴ found that self-management was associated with social connectedness and that the support offered by social networks was responsive to the changing needs of heart disease and diabetes patients. Although Heisler et al⁴⁵ found no benefit of a CHF peer-support programme compared to usual care on hospital readmissions or mortality, most of the participants did not engage with the programme. Poor engagement in self-management interventions, whether at the level of the patient or practitioner, is common; e-health strategies may offer a means by which to more seamlessly integrate programmes into existing systems of care, patient lifestyles, and their social networks.⁴⁶

E-health self-management interventions may improve symptom control and monitoring in chronic disease;^{28,47,48} however, the long-term benefits (such as reduction in hospital admissions and mortality risk) are not yet clear. Nonetheless, there is potential to harness social networks via social media platforms to enhance self-management⁴⁹ and some evidence to support this approach in diabetes patients.⁵⁰ The Internet Chronic Disease Self-Management Program (ICDSMP) is a web-based programme with links to self-management tools and resources and social discussion forums to explore “problem solving, action planning, difficult emotions, and celebrations”.⁵¹ From baseline to 6 months post-enrolment in the ICDSMP, the authors reported a significant reduction in hospital emergency attendances, with a non-significant trend at 12 months ($P=0.049$); a randomised trial is needed to confirm these benefits. Other approaches, such as the PLANS initiative, use e-health platforms to tailor access to community resources as a means by which to support self-management as it is contextualised in everyday life.⁵² Future investment in randomised controlled trials will enable us to evaluate the clinical, quality of life, and economic benefits of these interventions.

Conclusions and Future Directions

Self-management is considered a cornerstone of CHF outcomes; however, poor patient adherence is common. Patients and their partners may be empowered to self-care through a supportive relationship with their healthcare professional, but can be limited by the complex demands of maintaining their regimen. Strategies designed to optimise patient self-management have shown some success in improving symptom monitoring, but these have not translated to

reduced hospital admissions or mortality risk. There is high-level evidence to support patient medication adherence, exercise training and smoking cessation to reduce hospital admissions and mortality risk.³ Conversely, evidence to support a morbidity and survival benefit of other patient self-care behaviours (such as symptom monitoring, restricted fluid, sodium and diet, and optimised mental health) is less conclusive. The Patient Care Committee of the Heart Failure Association of the European Society of Cardiology² provides a good summary of the evidence – and evidence gaps – supporting patient self-management. Future research that systematically evaluates programme components to identify drivers of positive outcomes is needed to develop this evidence base.

New work in this field that adopts e-health technologies, such as the PROMETHEUS,³⁷ BEAT-HF³⁸ and CHF-CePPORT³⁹ trials, will undoubtedly inform future practice. Recent developments point to a role for social networks in self-management support,⁴² although efficacy is not yet well-established. Vassilev et al⁴³ suggest that social networks may effect change in self-management by improving awareness and access to network resources, adjusting social roles, relationships and communication in response to needs and through collective efficacy to achieve behavioural goals. Future research that harnesses a social network perspective to enlist and mobilise collective resources through e-health interventions may improve self-management in chronic disease settings. ■

- McGreal MH, Hogan MJ, Walsh-Irwin C, et al. Heart failure self-care interventions to reduce clinical events and symptom burden. *Research Reports in Clinical Cardiology* 2014;**5**:243–57.
- Lainscak M, Blue L, Clark AL, et al. Self-care management of heart failure: practical recommendations from the Patient Care Committee of the Heart Failure Association of the ESC *Eur J Heart Fail* 2011;**13**:115–26.
- McMurray JJ, Adamopoulos S, Anker SD, et al. ESC Committee for Practice Guidelines. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. *Eur Heart J* 2012;**33**:1787–847.
- Lee CS, Tkacs NC, Riegel B. The influence of heart failure self-care on health outcomes: hypothetical cardioprotective mechanisms. *J Cardiovasc Nurs* 2009;**24**:179–87.
- Davis EM, Packard KA, Jacevicius CA. The pharmacist role in predicting and improving medication adherence in heart failure patients. *J Manag Care Spec Pharm* 2014;**20**(7):741–55.
- van der Wal MH, Jaarsma T, van Veldhuisen DJ. Non-compliance in patients with heart failure; how can we manage it? *Eur J Heart Fail* 2005;**7**:5–17.
- Graven LJ, Grant JS. Social support and self-care behaviors in individuals with heart failure: An integrative review. *Int J Nurs Stud* 2014;**51**:320–33.
- Lowrie R, Johansson L, Forsyth P, et al. Experiences of a community pharmacy service to support adherence and self-management in chronic heart failure. *Int J Clin Pharm* 2014;**36**:154–62.
- van der Wal MH, Jaarsma T, Moser DK, et al. Compliance in heart failure patients: the importance of knowledge and beliefs. *Eur Heart J* 2006;**27**:434–40.
- van der Wal MHL, Jaarsma T. Adherence in heart failure in the elderly: problem and possible solutions. *Int J Cardiol* 2008;**125**:203–8.
- Sudore RL, Yaffe K, Satterfield S, et al. Limited literacy and mortality in the elderly: the health, aging, and body composition study. *J Gen Intern Med* 2006;**21**:806–12.
- DeWalt DA, Berkman ND, Sheridan S, et al. Literacy and health outcomes: a systematic review of the literature. *J Gen Intern Med* 2004;**19**:1228–39.
- Baker DW, Gazmararian JA, Williams MV, et al. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. *Am J Public Health* 2002;**92**:1278–83.
- Kennedy A, Bower P, Reeves D, V, Morris R, et al. Salford National Institute for Health Research Gastrointestinal programme Grant Research Group. Implementation of self management support for long-term conditions in routine primary care settings: cluster randomised controlled trial. *BMJ* 2013;**346**:f2882.
- DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* 2000;**160**:2101–7.
- Hare DL, Toukhsati SR, Johansson P, Jaarsma T. Depression and cardiovascular disease: a clinical review. *Eur Heart J* 2014;**35**:1365–72.
- Powell LH, Calvin JE, Richardson D, et al. HART Investigators. Self-management counseling in patients with heart failure: the heart failure adherence and retention randomized behavioral trial. *JAMA* 2010;**304**:1331–8.
- Shao JH, Chang AM, Edwards H, et al. A randomized controlled trial of self-management programme improves health-related outcomes of older people with heart failure. *J Adv Nurs* 2013;**69**:2458–69.
- Boyne JJ, Vrijhoef HJ, Crijns HJ, et al. TEHAF investigators. Tailored telemonitoring in patients with heart failure: results of a multicentre randomized controlled trial. *Eur J Heart Fail* 2012;**14**:791–801.
- Smeulders ES, van Haastregt JC, Ambergen T, et al. Nurse-led self-management group programme for patients with congestive heart failure: randomized controlled trial. *J Adv Nurs* 2010;**66**:1487–99.
- Cockayne S, Pattenden J, Worthy G, et al. Nurse-facilitated self-management support for people with heart failure and their family carers (SEMAPHORE): a randomised controlled trial. *Int J Nurs Stud* 2014;**51**:1207–13.
- Jaarsma T, van der Wal MH, Lesman-Leegte I, et al. Coordinating Study Evaluating Outcomes of Advising and Counseling in Heart Failure (COACH) Investigators. Effect of moderate or intensive disease management program on outcome in patients with heart failure: Coordinating Study Evaluating Outcomes of Advising and Counseling in Heart Failure (COACH). *Arch Intern Med* 2008;**168**:316–24.
- Abraham WT, Adamson PB, Bourge RC, et al. CHAMPION Trial Study Group. Wireless pulmonary artery haemodynamic monitoring in chronic heart failure: a randomised controlled trial. *Lancet* 2011;**377**:658–66.
- Meng K, Muekamp G, Seekatz B, et al. Evaluation of a self-management patient education program for patients with chronic heart failure undergoing inpatient cardiac rehabilitation: study protocol of a cluster randomized controlled trial. *BMC Cardiovasc Disord* 2013;**13**:60.
- Schou M, Gislason G, Videbaek L, et al. NorthStar Investigators. Effect of extended follow-up in a specialized heart failure clinic on adherence to guideline recommended therapy: NorthStar Adherence Study. *Eur J Heart Fail* 2014;**16**:1249–55.
- Hörnsten A, Stenlund H, Lundman B, Sandström H. Improvements in HbA1c remain after five years – a follow up of an educational intervention focusing on patients' personal understandings of type 2 diabetes. *Diabetes Res Clin Pract* 2008;**81**:50–5.
- Trento M, Gamba S, Gentile L, et al. ROMEO Investigators. Rethink Organization to Improve Education and Outcomes (ROMEO) A multicenter randomized trial of lifestyle intervention by group care to manage type 2 diabetes. *Diabetes Care* 2010;**33**:745–7.
- van Vugt M, de Wit M, Cleijne WH, Snoek FJ. Use of behavioral change techniques in web-based self-management programs for type 2 diabetes patients: systematic review. *J Med Internet Res* 2013;**15**:e279.
- Riegel BF, Carlson B. Facilitators and barriers to heart failure self-care. *Patient Educ Couns* 2002;**46**:287–95.
- Delaney C, Apostolidis B, Bartos S, et al. A randomized trial of telemonitoring and self-care education in heart failure patients following home care discharge. *Home Health Care Management & Practice* 2013;**25**:187–95.
- Mahramus TL, Penoyer DA, Sole ML, et al. Clinical nurse specialist assessment of nurses' knowledge of heart failure. *Clin Nurse Spec* 2013;**27**:198–204.
- Mahramus T, Penoyer DA, Frewin S, et al. Assessment of an educational intervention on nurses' knowledge and retention of heart failure self-care principles and the Teach Back method. *Heart Lung* 2014;**43**:204–12.
- Wingham J, Harding G, Britten N, Dalal H. Heart failure patients' attitudes, beliefs, expectations and experiences of self-management strategies: a qualitative synthesis. *Chronic Illn* 2014;**10**:135–54.
- Schweitzer RD, Head K, Dwyer JW. Psychological factors and treatment adherence behavior in patients with chronic heart failure. *J Cardiovasc Nurs* 2007;**22**:76–83.
- Barello S, Graffigna G, Vegni E, et al. 'Engage me in taking care of my heart': a grounded theory study on patient-cardiologist relationship in the hospital management of heart failure. *BMJ Open* 2015 **16**;5:e005582.
- Johnston S, Irving H, Mill K, et al. The patient's voice: an exploratory study of the impact of a group self-management support program. *BMC Fam Pract* 2012;**13**:65.
- Cameron J, Rendell PG, Ski CF, et al. PROSpective MEMory Training to improve Heart Failure Self-care (PROMETHEUS): study protocol for a randomised controlled trial. *Trials* 2015;**16**:196.
- Black JT, Romano PS, Sadeghi B, et al. BEAT-HF Research Group. A remote monitoring and telephone nurse coaching intervention to reduce readmissions among patients with heart failure: study protocol for the Better Effectiveness After Transition - Heart Failure (BEAT-HF) randomized controlled trial. *Trials* 2014;**15**:124.
- Nolan RP, Payne AY, Ross H, et al. An internet-based counseling intervention with email reminders that promotes self-care in adults with chronic heart failure: randomized controlled trial protocol. *JMIR Res Protoc* 2014;**3**:e5.
- Dickson VV, McCarthy MM, Howe A, et al. Sociocultural influences on heart failure self-care among an ethnic minority black population. *J Cardiovasc Nurs* 2013;**28**:111–8.
- Rogers A. Aligning everyday life priorities with people's self-management support networks: an exploration of the work and implementation of a needs-led telephone support system. *BMC Health Serv Res* 2014;**14**:262.
- Vassilev I, Rogers A, Sanders C, et al. Social networks, social capital and chronic illness self-management: a realist review. *Chronic Illn* 2011;**7**:60–86.
- Vassilev I, Rogers A, Kennedy A, Koetsenruijter J. The influence of social networks on self-management support: a metasynthesis. *BMC Public Health* 2014;**14**:719.
- Reeves D, Blickem C, Vassilev I, et al. The contribution of social networks to the health and self-management of patients with long-term conditions: a longitudinal study. *PLoS One* 2014;**9**:e98340.
- Heisler M, Halasyamani L, Cowen ME, et al. Randomized controlled effectiveness trial of reciprocal peer support in heart failure. *Circ Heart Fail* 2013;**6**:246–53.
- Mukhtar H, Ali A, Lee S, Belaid D. Personalized healthcare self-management using social persuasion. In: M. Donnelly et al. (eds.): ICOST 2012, LNCS 7251. Springer-Verlag: Berlin Heidelberg, 2012;66–73.
- Radhakrishnan K, Jacelon C. Impact of telehealth on patient self-management of heart failure: a review of literature. *J Cardiovasc Nurs* 2012;**27**:33–43.
- Williams ED, Bird D, Forbes AW, et al. Randomised controlled trial of an automated, interactive telephone intervention (TLC Diabetes) to improve type 2 diabetes management: baseline findings and six-month outcomes. *BMC Public Health* 2012;**12**:602.
- Oldenburg B, Taylor CB, O'Neil A, et al. Using new technologies to improve the prevention and management of chronic conditions in populations. *Annu Rev Public Health* 2015;**36**:483–505.
- Toma T, Athanasiou T, Harling L, et al. Online social networking services in the management of patients with diabetes mellitus: systematic review and meta-analysis of randomised controlled trials. *Diabetes Res Clin Pract* 2014;**106**:200–11.
- Lorig K, Ritter PL, Plant K, et al. The South Australia health chronic disease self-management internet trial. *Health Educ Behav* 2013;**40**:67–77.
- Blickem C, Kennedy A, Jariwala P, et al. Aligning everyday life priorities with people's self-management support networks: an exploration of the work and implementation of a needs-led telephone support system. *BMC Health Serv Res* 2014;**14**:262.