Effectiveness of telemonitoring on self-care behaviors among community-dwelling adults with heart failure

**Recommendations**

- Telemonitoring should be considered as an intervention to improve self-care behaviors among adults with heart failure in the community. *(Grade A)*
- Healthcare providers can choose from the different modes of telemonitoring interventions, ranging from simple telephone support to advanced remote monitoring devices, based on available resources. *(Grade B)*

*Definition of JBI’s Grades of Recommendation*

**Information Source**

This Best Practice Information Sheet is a summary of evidence derived from a systematic review published in 2021 in JBI Evidence Synthesis.

**Background**

Heart failure (HF) is associated with high morbidity and mortality rates. Patients experience symptoms such as fatigue, dyspnea, poor activity tolerance, and fluid retention. Recommended interventions for HF include those that aim to improve compliance to self-care behaviors, foster patient-provider collaboration, and provide tailored interventions that consider disease progression. Self-care is where patients detect changes, evaluate changes, decide to act, implement strategies, and evaluate response to treatment. Telemonitoring (TM) improves self-care in patients with common chronic conditions. Telemonitoring involves sharing patient health status information with healthcare settings via automated electronic devices or web-based or phone-based data entry. While TM has also been demonstrated to improve HF outcomes in patients with HF, such as by reducing hospitalization and mortality rates, and enhancing the quality of life and HF knowledge, there is a lack of synthesized evidence on the effectiveness of TM on self-care in HF.

There are existing theoretical constructs and validated tools which measure self-care behaviors in adults with HF. For example, the Situation-Specific Theory of Heart Failure Self-Care explains the effects and use of self-care behaviors in HF. It includes three constructs (self-care maintenance, symptom perception, and self-care management), all of which could be influenced by TM. Meanwhile, validated tools which specifically measure self-care behaviors in HF population include the Self-care of Heart Failure Index (SCHFI) and European Heart Failure Self-Care Behaviour Scale (EHFScBS). The SCHFI measures self-care maintenance, management, and confidence. The EHFScBS measures health maintenance behaviors over time and has been revised from a 12-item to 9-item tool, with both versions showing the same validity. The 9-item version includes adherence to regimen and consulting behaviors, while the 12-item additionally included adaptation of behaviors.

**Objectives**

The purpose of this Best Practice Information Sheet is to present a synopsis of the best available evidence regarding the effectiveness of telemonitoring versus usual care on self-care behaviors among community-dwelling adults with HF.

**Types of intervention**

The review included adult participants aged 18 years and above diagnosed with HF and who received TM interventions in the community. The following telemonitoring (TM) interventions were studied: i) structured telephone support, ii) stand-alone TM devices, iii) invasive or implantable remote monitoring systems, and iv) wearable devices. The comparators were standard or usual care, alternative treatments, or absence of intervention. The outcome of interest was self-care behavior, measured either with validated tools or the use of specific self-care behaviors as a proxy for self-care.

**Quality of the research**

Studies were critically appraised by two independent reviewers using JBI critical appraisal tools. Twelve articles of low to moderate risk of bias—nine randomized controlled trials (RCTs) (three high quality, six medium quality) and three quasi-experimental studies (all high quality)—were included. The sample size ranged from 36 to 450, with results not weighted.
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Findings
Studies were conducted in single or multiple sites in Canada, Finland, Germany, Korea, Netherlands, Spain, Sweden, Thailand, the United Kingdom, and/or the USA. Ten studies consisted of predominantly males, while two studies included slightly more females. Mean age ranged from 54 to 75 years. Meta-analyses were not performed due to variations in interventions and follow-up timing. Measurements were done either once (n=9) or at multiple intervals (n=3). The study period ranged from five weeks to 18 months. Most participants were Class II or III according to the New York Heart Association classification.

Telemonitoring modes included telephone or videoconference support and interactive TM devices with or without physiological data collection. Many interventions combined modes. Two studies used telephone consultations as the main mode, combined with either HF educational resources and DVD or a face-to-face session. Nine studies (with eight interventions) used interactive TM devices that collected physiological data automatically, except for one which required manual logging. Data included weight, blood pressure, oxygen saturation, pulse, heart rate, ECG, and/or symptoms. Many also employed teleconferencing for the delivery of feedback from healthcare providers. One employed a TM device without collecting physiological data. Instead, pre-recorded dialogues and prompted responses to symptoms and knowledge questions were used, with automated or real-time feedback via telephone consultation with a healthcare provider.

Of the 12 studies, nine used EHFScBS (n=1687), and three used SCHFI (n=236) to measure self-care behaviors based on self-reports. The EHFScBS could either be scored based on i) a scale of 12 to 60 for the 12-item version and 9 to 45 for the 9-item version with lower scores corresponding to greater self-care behaviors, or ii) a standardized scale of 0 to 100 with higher scores corresponding to greater self-care behaviors. For SCHFI, higher scores corresponded to greater self-care behaviors. Across the heterogeneous study populations, TM was found to be effective in improving self-care in the short term, though long-term effectiveness was unclear. Statistical significance was determined for all TM modes and self-care measures used in the studies reviewed. Ten of the twelve studies showed statistically significant improvements in self-care behavior.

In the six studies using 9-item EHFScBS, all three which interpreted lower scores as greater self-care showed improvements in the intervention group (IG) by 2.4 to 9 points, but little or no improvement in the control group (CG). In the other three studies, one showed significant improvement in percentage score change for self-care, while two showed improvement in IG scores by 4.2 to 7.56 points, with CG showing worsened self-care in one and the other study showing similar improvement with the other IG evaluated. In all three studies using 12-item EHFScBS, IG scores improved by 1.8 to 5.2 points, while CG improved slightly in one study, and CG or the other IG showed similar improvements in the other two.

In the three studies using SCHFI, all IG showed improvements at three months. Self-care maintenance scores improved by 11.5 to 12.2 points, management by 6.4 to 8, and confidence by 7 to 13.7. At six months, self-care maintenance improved by 8.2 to 9.3 points, management by 10.5 to 12, and confidence by 0.3 to 15.5.

In two studies, CG score changes were negligible for self-care maintenance and management while confidence improved at three months. CG scores improved for all subscales in two studies at six months, except for one where self-care maintenance declined.

In addition to statistical significance, clinically meaningful results were assessed. Clinical significance was defined as an SD change of ≥ 0.5 in all studies (except for one where percentage change was used), obtained directly or calculated from statistical parameters. Ten studies showed clinically significant within-group changes in IG. Between-group differences were clinically significant in seven studies but not in two others, while three others did not report CG outcomes.

All three TM modes appeared to be effective in improving self-care behaviors. Statistical and between-group clinical significance were seen in all interventions that used telephone-based consultations or interactive TM without collecting physiological data. In the eight interventions with interactive TM devices that collected physiological data, seven showed statistical significance, while five showed between-group clinical significance.

Conclusions
The review found evidence supporting the use of TM as an effective therapy for improving self-care management in community-dwelling adults with HF. The different modes of TM, ranging from simple telephone support to advanced remote monitoring devices, appear to be effective. As the involvement of patients in their own care enhances disease outcomes, it is useful to determine the effectiveness of TM on improving self-care behaviors, particularly in light of the worldwide prevalence of HF.

Implications for practice
Telemonitoring should be viewed as a valid intervention to improve self-care behavior among HF adults in the community. Professional organizations can use the findings to gather support for TM. Healthcare providers may choose from the different TM modes available.

Policymakers can also use the present findings to inform reimbursement policies and procedures to help sustain TM’s current expanded use and funding amidst the ongoing global pandemic. Telemonitoring can improve health care access and achieve primary care targets to narrow the gap brought about by social determinants of health.

Future research can investigate which TM components are the most important. Also, as the present findings were based on self-report, future studies can employ additional objective measures. With conflicting results shown at 12 months, studies of longer duration can help shed light on the long-term effectiveness of TM.
## Telemonitoring on Self-Care Behaviors Among Community-Dwelling Adults with Heart Failure

### Population
Adults with heart failure in the community

### Intervention
Telemonitorings

### Outcome
Self-care behaviors

### Context
Community

## Types of Interventions

Telemonitoring interventions such as simple telephone support, video conference support, interactive telemonitoring devices improve self-care behavior.

## Recommendations for Practice

### Telemonitoring Should Be Considered

- Telemonitoring should be considered as an intervention to improve self-care behaviors among adults with heart failure in the community.

### Telemonitoring Chosen by Healthcare Providers

- Healthcare providers can choose from the different modes of telemonitoring interventions, ranging from simple telephone support to advanced remote monitoring devices, based on available resources.

(Grade A)

(Grade B)
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References

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