Post-acute telemedical care for patients with heart failure

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Improving patients' quality of life in the digital age

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Despite immense progress in the prevention and treatment of chronic diseases, chronic heart failure is diagnosed with increasing frequency. According to the German Federal Census Bureau, heart failure is the most common single diagnosis of inpatients. The treatment of this disease incurs enormous costs both in inpatient and outpatient settings.

Clinical picture and treatment options

In the case of heart failure, the heart can no longer supply the body with adequate amounts of blood, and therefore, oxygen. The causes of heart failure are diverse and vary from patient to patient. So-called systolic heart failure may, for example, be a sequela of past heart attacks or previous inflammation of the heart muscle (myocarditis). Treatment is usually based on medication that relieves, strengthens, and protects the heart from strain. In addition, however, inadequate relaxation of the heart is almost as frequent, preventing it from drawing sufficient blood into the chambers (diastolic heart failure).

This pattern is quite common in older patients with long-term high blood pressure, and is sometimes difficult to diagnose and even more difficult to treat. Other types of heart failure, such as problems caused by various arrhythmias, are much less common. For example, a heartbeat that is consistently too slow (bradycardiac heart failure) can trigger a pump failure in the same way as a too rapid heartbeat, e.g., an atrial fibrillation (tachycardiac heart failure). Therapy, therefore, aims to eliminate heart actions that are too slow, often with a cardiac pacemaker. Rhythm disorders in which the heart beats too fast are treated with medication or so-called ablation procedures.

Care situation

Usually, heart failure will be diagnosed by the primary care physician. Only a few patients are currently cared for or treated by cardiologists. The partly causal association of this chronic heart disease with several concomitant diseases and varying manifestations often complicate diagnosis and the determination of the severity of the disease. Currently, only 20 percent of affected patients have a correct diagnostic code. However, even if the correct diagnosis has been confirmed, guideline-based management is a challenge in current daily healthcare practice. Only half of the patients with correctly diagnosed heart failure are treated with optimized drug doses that conform with the guidelines. The current crisis in primary care practice, especially in rural areas, with increasing waiting times and long distances, results in an alarming situation for the treatment of chronic cardiac insufficiency in Germany.

Treatment challenges

Patients with chronic heart failure are frequently hospitalized due to the acute deterioration of cardiac output (cardiac decompensation). As part of the inpatient cardiac recompensation, patients usually undergo various diagnostic measures as well as adjustment of their drug therapy, including the prescription of new medication. Up to now, the patient often faced insufficient continuity of treatment upon discharge. The transition from inpatient to home setting is still characterized by ineffective processes, which is ultimately also reflected in the increased risk of renewed hospitalization. Especially the early phase after discharge (up to 60 days) is characterized by an unstable cardiovascular system. The re-admission and mortality rates of patients within the first two months after discharge are currently very high at 30 percent.

Telemedical care program HerzConnect®

The HerzConnect® care program was initiated in 2019 to improve the care of patients with chronic heart failure (see Figure 1). The program is based on a concept that combines new technological solutions for home telemonitoring, data management, and data exchange with the expertise of a telemedical center (TMC) at an interregional center for heart failure management. With this program, patients can avail themselves of the cardiological expertise of a heart center 24/7. Participation in the HerzConnect® program is limited to 24 months, and is carried out in close cooperation with the primary care physician and, if needed, the patient's cardiologist.

Continuous telemonitoring – continuous medical data supervision

In this program, patient care should primarily be provided on an outpatient basis, and in the patient's home and social environment. The primary goal is to avoid hospital admissions for acute decompensated heart failure. In order to implement continuous, non-invasive telemonitoring, the patient is equipped with a telemedical device set, which, in addition to medical measuring devices (a scale, a blood pressure monitor, and a two-channel ECG system), includes a specially configured smartphone with a telemedical app. The vital parameters (blood pressure and body weight) obtained during the daily measurements are transmitted via a Bluetooth connection to the smartphone and from there via the cellular phone network to the telemedical center. They are documented in the electronic patient record, analyzed, and evaluated over time. Routine and needs-based (in the case of abnormalities) physician rounds are the basis for controlling the intensity and content of care, adapting and optimizing medication, and inititating urgent interventions.

Daily measurement of body weight via telemonitoring establishes a routine and is recommended in the German heart failure guideline even for asymptomatic patients. In addition, weight monitoring via automatic data analysis during early detection of incipient cardiac decompensation, together with daily blood pressure measurement, helps control volume and prevent fluid retention.

Heart rate and cardiac rhythm are monitored by regular weekly electrocardiograms recorded by the patients themselves with the two-channel ECG system, which does not require any additional supplies and transmits the data to the TMC via an integrated mobile radio component. This self-monitoring of the patients also serves to assess the course of known and treated arrhythmias, which might be related to heart failure both as cause and sequelae. This also enables early therapeutic response to any cardiac arrhythmia onset.

One essential aspect of telemonitoring is patient compliance with regular measurements. Non-compliance may indicate a lack of motivation to participate in the program and/or inadequate competence for self-management on the part of the patient. The compliance rate and parameter-related notes on "missing values" in the electronic patient record are displayed to the staff in the TMC; they can promptly intervene to counteract any non-compliance.

In addition to telemonitoring, data on quality of life and self-management skills is regularly collected via digital, heart-failure-specific questionnaires during the program. Over time, these data also allow for conclusions to be drawn regarding the success of the program. In the same way, the results of the questionnaire evaluation and the compliance checks help control the content and intensity of care.

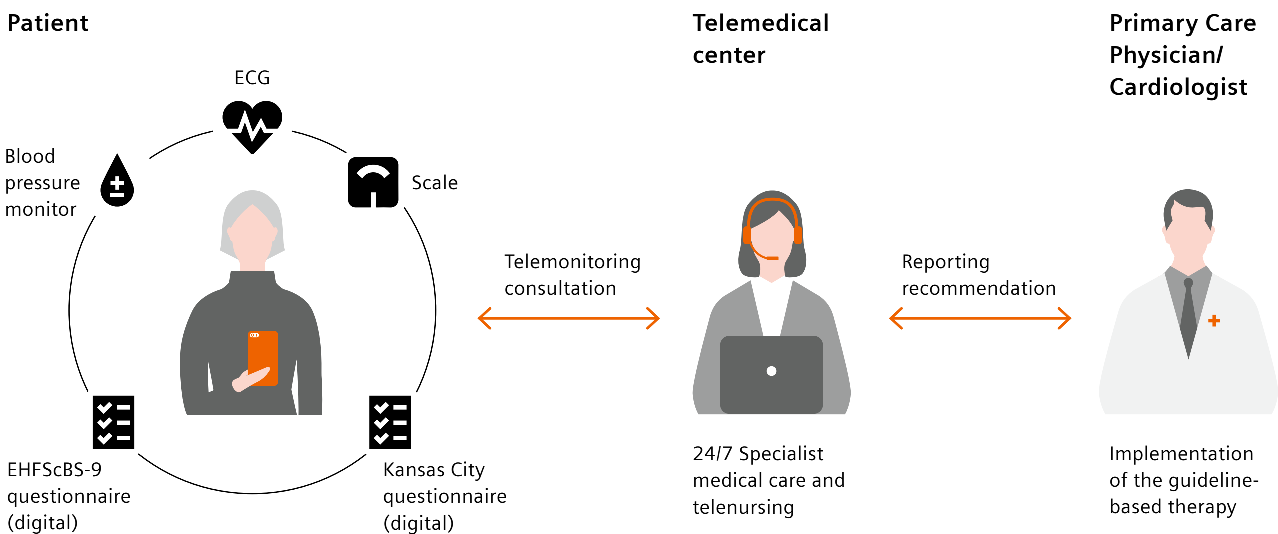

Figure 1: HerzConnect® care structure

What is HerzConnect®?

As part of a technology partnership the Heart and Diabetes Center NRW (HDZ NRW) in Bad Oeynhausen, Germany, and Siemens Healthineers have developed an innovative telemedical care program for patients with cardiovascular disorders. The HerzConnect® program aims to provide patients with care according to guidelines, slow down disease progression considerably by closely-monitored telemedical care, turn these patients into self-managers of their disease through education, and markedly improve their quality of life. The HDZ NRW provides medical care and advice to the patients. Siemens Healthineers is responsible for all technical aspects of the telemedical solution, including logistics. The program was launched in 2019 together with DAK Health (German health insurance provider) within the framework of a contract for special care according to chapter 140a of the German Social Code, Book V.

Communication for patient coaching and care

In addition to telemonitoring, another key component of the HerzConnect® concept is the intensive and systematic (tele) communication with the patient. Within the framework of topic-based coaching, it serves to empower the patient with knowledge about their disease. And by boosting the patient's competence, it helps make them more independent and self-reliant when dealing with their condition. Among other things, the patients learn to recognize and respond to the symptoms of heart failure, learn how to make healthy lifestyle changes, discuss therapeutic and nursing measures, and understand the need for correct and regular medication.

The coaching sessions with the patient usually take the form of scheduled telephone calls and are conducted by specially qualified nursing staff and specialists. Timing and content of the phone appointments are planned according to the needs of the patients and take into account their individual situation (severity, comorbidities, family and social setting). Family members are included in the calls if necessary and feasible. Since the basic objective of coaching is to teach the patient the above skills as quickly and extensively as possible, it starts as soon as the patient is admitted to the program and should cover all topics in the first quarter of care. During the following parts of the program, the topics will be repeated and retrained, if needed. These targeted follow-up training sessions are triggered by the questionnaires on self-management skills and the care phone calls.

In addition to the coaching sessions, the follow-up phone calls are the second scheduled communication method for regular patient contact. They provide a structured record of the current state of health and possible new findings (e.g., lab results, ultrasound), discussion of pathologies and symptoms, medication check, and resolution of patient questions. Here, too, the primary contacts for the patient are the heart failure nurses and specialists. If further advice is required, discussions with doctors at the TMC will be arranged. The doctor-patient conversation then provides the basis for a more detailed discussion of complaints and symptoms, and further planning of clinical diagnostics and treatment. Here, intensified care is instituted through temporary special observation, for example, for the purpose of closer control of parameters in phases of unclear progression (e.g., insidious fluid retention), after the prescription or discontinuation of medication and after hospital stays.

Direct and regular phone calls between the patient and the medical and non-medical staff at the TMC also help establish and maintain a trusting working relationship. Positive and empowering communication between doctors, patients, and nurses is the basis for successfully motivating the patient to participate in the program (including compliance with telemonitoring and medication), change their lifestyle, and take responsibility.

Physician cooperation and medical expertise 24/7

In the HerzConnect® concept, the data collected via telemonitoring and regular patient contact, and their assessment during the course of the program, form the basis for planning and implementing long and short-term therapeutic measures to stabilize patient health.

In particular, this requires comprehensive cooperation between the primary care physicians, the outpatient

cardiologists, and the specialists in the TMC of the Heart Center. Based on the data collected in the program, the primary care physicians are provided with recommendations for optimizing medication. In case of suspicious findings, analyses of the monitoring data are sent to the general practitioner with the recommendations. In addition, they receive regular patient reports even if the program progresses positively without any particular pathologies.

In situations of imminent deterioration, TMC physicians initiate urgent interventions to avert acute decompensated heart failure and a hospital stay that would otherwise be necessary. Direct communication between the TMC physician and the patient also plays a role here, for example, by recommending the intake of medication (e.g., diuretics) previously planned with the primary care physician.
All in all, the active cooperation between the outpatient physicians and the physicians in the TMC should help to optimize drug treatment in line with the German National Heart Failure Treatment Guideline and support more efficient and synergistic patient care.

One essential aspect of medical care in the HerzConnect® concept is the assurance of specialized medical expertise 24-hours a day, seven days a week. The requirements for expertise, well-organized staff, and technical infrastructure for the operation of the HerzConnect® care program are fulfilled through the interaction of a certified TMC at an interregional level heart failure center. Patients enrolled in the program can call a special hot-line anytime day or night and will be referred to a competent physician for individual consultation if necessary. The electronic patient record provides all required data for this consultation, including current parameters.

The HerzConnect® program is not an emergency medical care program and it does not replace the regionally-organized emergency medical service and acute medical care in the hospital. Patients and their family members are trained and prepared through the coaching sessions and follow-up phone calls to recognize signs of medical emergencies and to contact the local emergency services at an early stage.

Summary

The HerzConnect® program presented here is designed to provide better patient care in the home setting while involving all stakeholders. The result is an improvement in quality of life, increased and sustained independence, and the development of self-management skills, so that even after the end of the time-limited enrollment in the program, the patient will have a sustainable improved prognosis. The cooperation of the professionals involved in the provision of care helps prevent recurrent rehospitalizations, and, as a result, costs for inpatient care are reduced.

HerzConnect® represents a modern, technology-driven approach to care that is tailored to medical needs. The concept is scalable to nationwide coverage while still maintaining quality assurance requirements.

Martin Schultz, M.D.
Director
Institute for Applied
Telemedicine (IFAT)
Heart and Diabetes Center NRW

Prof. Philipp Sommer, M.D., Ph.D.
Clinic Director
Interdisciplinary Heart
Failure Center
Heart and Diabetes Center NRW

Heart and Diabetes Center
North Rhine-Westphalia (HDZ NRW),
Bad Oeynhausen, Germany
www.hdz-nrw.de

Dr. Martin Schultz and Prof. Philipp Sommer are leading the Institute of Applied Telemedicine at HDZ NRW. Prof. Sommer is Director of the Clinic for Electrophysiology/Rhytmology and Director of the Interdisciplinary Heart Failure Center. The center is established at HDZ NRW under the joint management of Clinic Directors of the General and Interventional Cardiology/Angiology, the Cardiac Surgery and the Diabetes Center.

The scientific overlay on the title is not that of the individual pictured and is not from a device of Siemens Healthineers. It was modified for better visualization.

Siemens Healthineers Headquarters
Siemens Healthcare GmbH
Henkestr. 127
91052 Erlangen, Germany
Phone: +49 9131 84-0
siemens-healthineers.com

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