THE PATH TO LONG-TERM HEART FAILURE CARE

A practical study of the optimization of the chronic heart failure care path using telemonitoring

November 2014

Effective Cardio

FOREWORD

The title of this report is 'The path to long-term heart failure care' and it is about the Effective Cardio project. In it you will find the results of a practical study of the optimization of the chronic heart failure care path integrated with telemonitoring.

The Effective Cardio project is a unique collaboration between six innovative hospitals, fifteen leading cardiologists and heart failure nurses, four hundred and fourteen heart failure patients, two home care organizations, three large health insurance companies, an independent research bureau and a well-known supplier of healthcare technology.

On the basis of the premise that only full integration of telemonitoring into the care path will result in long-term care, we dealt with the optimization of the heart failure care path, aimed primarily at secondary care (specialist medical care).

After reading this report you will be equipped in practical terms to integrate telemonitoring gradually into heart failure care. We think that you will be inspired by the positive effects that the proposed approach has on patient and care provider satisfaction, on the primary process, on the workload and on healthcare costs.

On behalf of the steering committee I would like to thank the heart failure patients and the heart failure teams at the hospitals whose dedication made this project a success. Particular thanks are due to the project team, who implemented Effective Cardio in a professional manner. Finally I would like to thank Wietse Veenstra for the way in which he inspired many of those involved in the project to start using eHealth.

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ALMOST HALF OF THE COSTS OF HEART FAILURE CARE IN THE NETHERLANDS ARE SPENT ON HOSPITAL CARE

1 INTRODUCTION

1.1 Chronic heart failure

Almost a quarter of all people aged over seventy are faced with chronic heart failure. On 1 January 2011 there were some 141,600 people with heart failure in the Netherlands, 61,500 of which were men and 80,100 women. Owing to population ageing and the close correlation between age and the incidence of heart failure, the absolute number of people suffering from heart failure is expected to reach over 230,000 by 2030. For men this is an increase of 84% compared with 2011, while for women it represents a rise of 50%.[1]*

Heart failure occurs because the heart's pump function is inadequate. The result is that fluid accumulates in the lungs and legs, causing shortness of breath and tiredness. Heart failure is a chronic disease that becomes more serious over time. In many cases this happens gradually, but sometimes there is a sudden sharp deterioration. Heart failure has a poor prognosis. The average five-year survival rate is around 45%. 40% of people admitted to hospital after being diagnosed with heart failure either die[2] or are readmitted to hospital within a year. About half of patients with heart failure die suddenly.

Many hospitals have a heart failure outpatient clinic, where cardiologists and specialist heart failure nurses attempt to detect any deterioration in patients' health situation in good time and to manage it. All patients have their weight, heart rate and blood pressure checked frequently.[3] The remedial tools used by heart failure teams are lifestyle interventions, information and prescribing medication.

Treating patients suffering from chronic heart failure is expensive. In 2011 the total costs amounted to some 940 million euros. This is similar to the costs of treating asthma and COPD. Altogether the costs of heart failure care comprised 11.4% of the costs of cardiovascular disease and 1.1% of the total costs of healthcare in the Netherlands. Almost 50% of the costs of heart failure care are spent on hospital care. Most of the costs are spent on people in the age group between 75 and 90 years old.[4]

To make it possible to continue to offer suitable care to the growing steam of patients suffering from chronic heart failure, the care must be organized in a different way.

* On page 40 you will find a literature list and sources for all the references contained in this report.

WITH TELEMONITORING PATIENTS HAVE MORE CONTROL OVER THEIR OWN HEALTH AND THE DEGREE OF SELF-CARE INCREASES

1.2 Telemonitoring

Telemonitoring is an eHealth instrument that enables care providers to monitor their patients remotely. Telemonitoring is one of the solutions for ensuring that heart failure patients are provided with good care. By using telemonitoring the care provider is able to offer rapid, top-quality and efficient care to a large group of heart failure patients. With telemonitoring the patient himself* measures on a daily basis - in the home situation - a number of vital parameters that are relevant to his health situation, such as blood pressure, heart rate and weight. Where necessary the patient answers (online) some additional questions relating to his health. These parameters are sent automatically to the care provider via an Internet connection.

In the traditional model developed by van Idenburg & van Schaik[5] (Figure 1.1)[5], the frequency with which the heart failure patient's health situation is checked is very low and irregular. A deterioration in the patient's condition only becomes evident when he experiences physical symptoms, is incapacitated or feels unwell. In contrast, we see that when telemonitoring is used the heart failure patient's condition shows a relatively more stable course (Figure 1.2)[5]. Daily monitoring makes it possible to take proactive and preventive measures.[5] In the event of changes in the patient's condition, the cardiologist, the heart failure nurse, the home care nurse and/or the general practitioner can intervene directly.

Traditional model

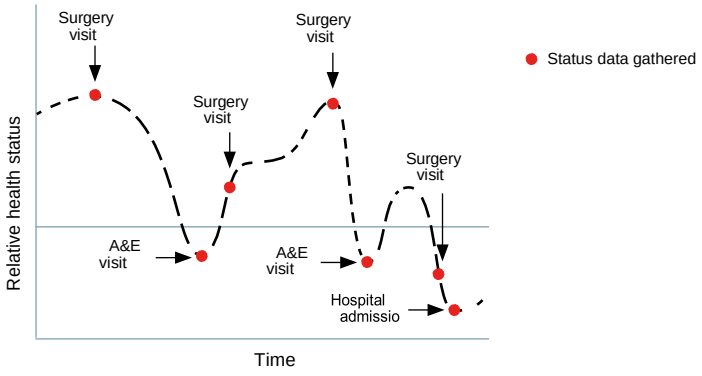


Figure 1.1 The traditional method of monitoring heart failure patients.

* Where 'his', 'him' or 'he' appears in this report, this can of course also be taken to mean 'her' or 'she'.

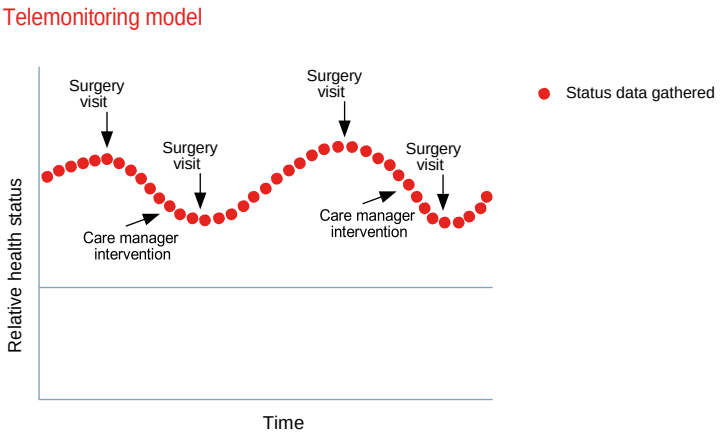


Figure 1.2 Illustration of a more stable health status through early detection using telemonitoring. This makes it possible to respond proactively and prevent a potential acute deterioration of the health situation.

Nurse practitioner Wietse Veenstra, Zorggroep Leveste Middenveld, Scheper Hospital site, Emmen:

"At home the patients have a box which is connected to my computer. Every day this box measures the patient's blood pressure, heart rate and weight and sends the data to the heart failure outpatient clinic. So I can immediately intervene if I see any worrying irregularities. I usually phone a patient to find out whether there is an explanation for such irregularities. If necessary I arrange for the patient to come to the hospital to be examined."

The advantage for the care provider of using telemonitoring is that it gives him a more consistent picture of the patient's health. As a result, he can provide timely management by means of education, lifestyle intervention or simple clinical interventions. There are also telemonitoring systems that enable care providers to show patients several educational videos at home about heart failure and how to deal with it. The care provider can also use the telemonitoring system to send motivational messages to the patient in order to keep his health situation stable or improve it.

Cardiologist Michiel Nagelsmit, Zorggroep Leveste Middenveld, Scheper Hospital site, Emmen:

"Telemonitoring is a good way of providing care rapidly and efficiently to a large group of heart patients. Heart failure is a chronic disease for many people. They need to be constantly monitored. Due to population ageing and the increasing number of treatment options, the number of patients will only continue to grow over the next few years. Telemonitoring is one of the instruments used for keeping the stream of patients at manageable levels."

The advantage for the heart failure patient who uses telemonitoring is that he can take greater control of his own health, since he gains direct insight into the effect of his lifestyle on the vital parameters that reflect his health situation. If the telemonitoring system in question includes educational capabilities, the patient can receive information at home about heart failure and how to deal with it, along with any partner, family and/or anyone else directly involved. As a result, the degree of self-care is automatically increased.

1.3 Reason for Effective Cardio

The potential for self-care provided by telemonitoring is not yet being utilized sufficiently. There is some discussion about the question of whether using telemonitoring makes it possible to provide adequate care in the same available time to a larger number of chronic heart failure patients. The fact that the scale of telemonitoring for heart failure has not increased has been the subject of many projects in recent years. An important project in this area is e-Cardiocare, a partnership between TNO, Achmea and Philips commissioned by the Dutch Ministry of Health, Welfare and Sport. The objections of the various parties involved - such as care providers, patients and health insurance companies - were set out in this project. It was primarily about organizing a clear reimbursement system for using telemonitoring in secondary care. Patient characteristics were also examined in order to facilitate the inclusion of patients for telemonitoring by care providers.

The most important discovery that emerged from the e-Cardiocare project is that the potential for self-care with telemonitoring can only be utilized when telemonitoring is fully integrated in the care process, and to achieve this the care process needs to be optimized. This finding resulted in the Effective Cardio project being set up by Achmea, CZ, Coöperatie VGZ and Philips.

1.4 Objectives and issues of Effective Cardio

The aim of the Effective Cardio project is to show how telemonitoring can be integrated into the care process and what the effects of doing this are. For this project telemonitoring was integrated into the care process as part of an overall process optimization move.

The project has the following objective:

- To obtain information about the optimization of the chronic heart failure care path using telemonitoring so as to measure the effect on the primary process, the workload, patient and care provider satisfaction and the financial outcome in six secondary-care hospitals.

The project deals with the following issues:

- The effect of optimizing the chronic heart failure care path using telemonitoring on the primary process, the workload, patient and care provider satisfaction and the financial outcome in six secondary-care hospitals.

A sub-issue in the survey is: What steps should be taken to optimize the heart failure care path using telemonitoring in secondary care?

A definition of the terms used is given below.

Optimization	Optimization means that the care path will improve and that telemonitoring has been integrated into the care path.
Care path	The care path was mapped out and optimized by using such means as the Care Path Model.[6]
Telemonitoring	All participating hospitals used the Philips telemonitoring system. See Annex 4 for the product description of this telemonitoring system.
Primary process	The primary process comprises the following parameters: • the number of hospital admissions; • the number of nursing days; • the number of visits to an outpatient clinic.
Workload	Workload comprises the following parameters: • the number of exacerbations*; • the number of physical repeat consultations; • the number of phone calls between patient and care provider.
Patient satisfaction	This is the patient's opinion about the heart failure care received.
Care provider satisfaction	This is the care provider's opinion about the heart failure care.
Financial outcome	Financial effect on the health insurance company's burden of claims and on the revenue for hospitals.
Six hospitals	The following hospitals took part in the Effective Cardio project: • Rotterdam Havenziekenhuis Hospital; • St. Anna Hospital, Geldrop; • Sint Lucas Andreas Hospital, Amsterdam; • Wilhelmina Hospital, Assen; • Zaans Medical Center, Zaandam; • Zorggroep Leveste Middenveld, Scheper Hospital site, Emmen.

1.5 Working method

Chapter 2 describes the stepwise plan for achieving an optimized chronic heart failure care path using telemonitoring in secondary care. These steps are based on the experiences gained during the project. Chapter 3 describes the results of an optimized care path using telemonitoring for the primary process, the workload, patient and care provider satisfaction and the financial outcome. Finally, conclusions and recommendations are made for the follow-up.

* Exacerbation - A medical term for an increase in the symptoms of a disease. it is used of chronic diseases that display a varying degree of activity. The term exacerbation is used when a disease becomes more active after having shown little or no activity for some time.

COMPLETE INTEGRATION OF TELEMONITORING INTO THE CARE PROCESS IS NECESSARY

2 OPTIMIZATION OF CHRONIC HEART FAILURE CARE PATH

This chapter describes the optimization process of the chronic heart failure care path in secondary care. The process is described by means of four phases, each containing several steps that must be completed in order to successfully optimize the chronic heart failure care path. The steps to be taken are geared towards heart failure, but in a general sense they can be used for any care path involving an eHealth application.

2.1 Stepwise plan

In order to optimize the heart failure care path using telemonitoring, the following four phases must be completed.

Phase 1 Initiate the care path optimization: steps 1 to 4

Phase 2 Design the processes in the care path: steps 5 to 9

Phase 3 Set up the conditions for implementing the care path: steps 10 and 11

Phase 4 Assure the newly designed care path/measure outcomes: steps 12 and 13

The project group formulated the phases in the care path optimization process on the basis of the knowledge and experience gained in the hospitals that took part in the project. The steps in phases 1, 3 and 4 are in fact crucial to the successful performance of the entire process. Phase 2 describes the actual remodelling of the care path model and is shown schematically at the end of this chapter.

Phase 1 Initiate the care path optimization

Step 1 Formulate crystal-clear objectives
Step 2 Create a sense of urgency
Step 3 Create commitment and leadership
Step 4 Use people from your own organization

The aim of Phase 1 is to lay a successful basis for implementing the optimization process. If the project is not started carefully, this can at any moment in the development process give rise to a decrease in the motivation of those involved or even to withdrawal from the process.

Step 1 Formulate crystal-clear objectives

Set out the objectives of care path optimization in a well structured plan of action and in a sound communication model. A careful evaluation is then important, in which any points for improvement can be put forward. Measure whether the intended objectives as defined beforehand are achieved. Take action over time to assure the results. This is essentially the method described in Deming's PDCA cycle: Plan, Do, Check, Act (re-Act).

Step 2 Create a sense of urgency

Explain what the consequences are if the existing situation (no care path optimization) is maintained. Get the department manager to make clear how important the changes are to all stakeholders. Set out a challenging vision of the future.

Step 3 Create commitment and leadership

Create commitment among all relevant stakeholders to the care path to be newly formulated before starting on the (new) design. Involve the stakeholders in developing the content, the essential conditions and the intended effect of the care path. Ask for direct involvement by the top management in the design, implementation and assurance of the care path.

Step 4 Use people from your own organization

Put together a project group in which at least the following are represented: a cardiologist, a heart failure nurse and the manager of the hospital or outpatient clinic involved in heart failure care, if necessary with the addition of primary chain players and (external) consultants.

Jan Tempels MBA, program project manager, Philips Healthcare:
"Skipping Phase 1 of the care path optimization process is comparable with building a house on quicksand without using piles."

Phase 2 Design the processes in the care path

Step 5 Set up the referrals system from primary to secondary care
Step 6 Organize the diagnostic process
Step 7 Make a treatment plan containing telemonitoring
Step 8 Arrange the information and the up-titration
Step 9 Make a plan for the follow-up and the monitoring policy

Steps 5 to 7 are performed by the cardiologist.

Step 5 Set up the referrals system from primary to secondary care

a. Draw up the criteria for referrals and reverse referrals between the general practitioner (primary care) and the cardiologist (secondary care) and determine what information and data should accompany a (reverse) referral.

Information that the general practitioner sends together with the patient's referral to the cardiologist might include the patient's history and anamnesis, current medication and the results of any (laboratory) tests conducted.

b. Ascertain the maximum lead time from the referral to the first consultancy with the cardiologist.

Step 6 Organize the diagnostic process

a. Ascertain what laboratory data and tests must be available to the cardiologist prior to the first consultation.

b. Choose between the so-called one-stop shop and the two-stop shop systems (see box).

One-stop shop system: following referral by the general practitioner, the missing laboratory data and tests are requested. The consultation with the cardiologist takes place on the day that the patient is given these tests. During this consultation the cardiologist makes the diagnosis and discusses the treatment plan with the patient.
Two-stop shop system: after being referred by the general practitioner the patient goes to the cardiologist for an initial consultation. On the basis of the anamnesis, additional diagnosis is then requested. In the course of a second consultation - a week later - the cardiologist makes the diagnosis and discusses the treatment plan with the patient.

N.B. In both systems the doctor aims not to burden the patient unnecessarily, partly by limiting the number of hospital visits, partly by keeping the number of examinations to a minimum.

IN AN OPTIMUM CHRONIC HEART FAILURE CARE PATH, TELEMONITORING IS A STANDARD PART OF THE TREATMENT PLAN

It is important that the treatment of the heart failure patient begins as quickly as possible, since this makes it possible to keep to a minimum the likelihood of the patient's condition being exacerbated. The project group's advice is therefore to opt for the one-stop shop system when setting up the diagnostic system.

c. Make the diagnosis and determine the seriousness of the chronic heart failure. [7]

It is important to ascertain whether the heart failure is chronic and, if so, whether the condition is: stable, (slowly) progressive or acutely exacerbating. Heart failure is usually chronic. Exacerbation is the term used when an acute deterioration of chronic heart failure occurs.[8]

The classification drawn up by the New York Heart Association (NYHA) is often used to describe the seriousness of heart failure (see Table 2.1). This classification is based on limitations in physical activity. In the case of heart failure class 1 or 2 the patient does not always realize that he is suffering from heart failure. In the case of heart failure class 3 or 4 the patient experiences symptoms during daily activities such as vacuum-cleaning and climbing stairs.

Classes of heart failure	
Class 1	No symptoms
Class 2	Symptoms during strenuous activity
Class 3	Symptoms during moderate activity
Class 4	Symptoms while at rest or during light activity

Table 2.1 Classification of heart failure by the New York Heart Association.

Cardiologist Ramon van der Ven, St. Anna Hospital, Geldrop:

"St. Anna has opted for the NYHA classification as a triage instrument for linking the patient to a patient profile. This classification provides information about the medical complexity and the degree of predictability about the course of the disease."

A few years ago a new classification was also developed by the American Heart Association/American College of Cardiologists[9], which places greater emphasis on prevention. This classification is made up of four chronologically successive stages: A, B, C and D. The latter two stages are regarded as manifest heart failure.

Classification by American Heart Association/American College of Cardiologists	
Stage A	High risk of heart failure due to presence of risk factors such as hypertension, diabetes or coronary artery disease
Stage B	Signs and symptoms of heart failure not present, but there are structural abnormalities of the heart
Stage C	Manifestation of signs and symptoms of heart failure
Stage D	Heart failure no longer responds to treatment (final stage).

Table 2.2 Classification of heart failure by the American Heart Association/American College of Cardiologists.

Step 7 Make a treatment plan containing telemonitoring

a. Determine the starting-points on which to base the treatment.

The aim of treating heart failure is to slow the progress of the disease, reduce hospital admissions, increase the chances of survival and relieve the symptoms, thus improving the quality of life as a whole. Initially the treatment will be directed at removing the cause of the heart failure.
The damage done to the heart muscle is usually irreparable, however. In that case medication and lifestyle recommendations are the basic treatment. In certain situations an ICD (pacemaker) is also implanted. The most important (combination of) medicines are diuretics, which discharge the excess fluid, and medicines that affect the patient's blood pressure and the heart's pumping ability and rhythm.

Nurse practitioner Wietse Veenstra[10], Zorggroep Leveste Middenveld, Scheper Hospital site, Emmen:

"The treatment must be directed at stimulating self-care and making it possible to anticipate quickly in the event of expected exacerbations, by treating patients as much as possible at home and preventing readmissions."

DURING DIAGNOSIS, ASSESS WHETHER TELEMONITORING IS AN OPTION

b. Ascertain the inclusion and exclusion criteria for using telemonitoring.

Inclusion criteria for telemonitoring are:

1. all newly diagnosed patients suffering from chronic heart failure;
2. clinically (acutely) admitted patients suffering from heart failure;
3. heart failure patients who live in care and nursing homes;
4. anxious patients, such as people who are afraid of exacerbating their condition without it being detected.

The inclusion of all newly diagnosed patients suffering from chronic heart failure is supported by the fact that using telemonitoring immediately after chronic heart failure is diagnosed has great value added for care providers. They can quickly and effectively get the medication policy right and through education and the readings help patients to understand their condition and the effect that their lifestyle has on it.

Exclusion criteria for using telemonitoring are:

1. language barrier (inability to read and understand Dutch);
2. no daily informal care;
3. patient not motivated to use telemonitoring.

c. Ascertain who includes heart failure patients for telemonitoring.

In some hospitals the decision to include patients for telemonitoring is made by the cardiologist, whereas telemonitoring actually provides support for adjusting the medication dosage on the basis of vital parameters (up-titration) and for providing information and follow-up to the treatment initiated by the heart failure nurse. It is therefore advisable for the heart failure nurse - possibly in consultation with the cardiologist - to decide which patients are to be included for telemonitoring.

Step 8 Arrange the information and the up-titration

In principle the activities referred to in steps 8 and 9 are performed by the heart failure nurse. The extent of the powers that may be exercised in these steps depends on the heart failure nurse's training qualifications - see step 8d.

a. Draw up the information program for the patient.

The provision of information consists mainly of giving lifestyle advice regarding diet and exercise. The idea is also that the patient gains an understanding of chronic heart failure and of the risk factors and signs of deterioration of his health situation. Information may be given during the consultation with the heart failure nurse (and/or cardiologist) at the hospital.

b. Determine what aspects of the information can be supported with telemonitoring.

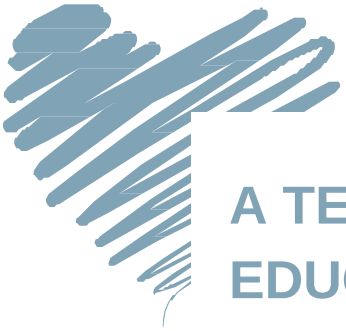
Information can be given, in addition to or instead of the consultation, in the patient's home situation by means of educational videos, which can be provided through the telemonitoring equipment. The videos supply information about heart failure, about dealing with this disorder on a daily basis, its treatment and the signs of deterioration. The telemonitoring equipment also gives the patient an overview of the development of his vital parameters (whether measured at home or elsewhere), such as weight and blood pressure. This gives the patient insight into the effect of his lifestyle on these readings. He can also see whether, and if so how, these parameters are threatening to go beyond the bandwidth determined by the cardiologist or nurse practitioner and whether different medication and/or lifestyle interventions are likely to be necessary. It is up to the care provider to decide whether he wishes to offer the patient education by way of the telemonitoring equipment and also whether he wishes to provide the patient with information about the course of his vital parameter readings.

It is advisable to provide the patient with both the educational component and the daily readings of the vital parameters at the start of the treatment and, on the basis of requirements and the patient's opinion, to reduce the educational component and the frequency of the readings over time.

c. Determine an up-titration protocol.

On the basis of the cardiologist's advice regarding the treatment, the heart failure nurse adjusts the medication and dosage appropriately for the patient. This is done using an up-titration protocol.

In the up-titration protocol attention is given to the type of medication, the dosage and the rate of up-titration. If telemonitoring is not used, heart failure patients have to see the heart failure nurse on average once a month or once every two months during the initial period following the start of the treatment until optimal adjustment of the medication is arrived at. Telemonitoring offers value added to this phase, since the nurse can more quickly arrive at the optimal adjustment of the medication on the basis of the daily visible vital parameters. The nurse can also respond proactively to any imminent deterioration in the patient's condition.



A TELEMONITORING SYSTEM WITH AN EDUCATIONAL MODULE SUPPORTS THE PATIENT WITH SELF-CARE

d. Record agreements about the cardiologist's and the heart failure nurse's tasks and powers as regards up-titration.

The heart failure nurse's powers to perform the up-titration depend on his level of knowledge and training. A heart failure nurse is either a specialist nurse or a nurse practitioner. A specialist nurse has one or more fields of expertise, one of which is heart failure. He has no legal powers to make needs assessments independently and is not allowed to prescribe medication. A nurse practitioner independently shapes the care process of a defined group of patients and enters into an independent treatment relationship with them. The job of nurse practitioner focuses on clinical (medical) work. The nurse practitioner has authority under the law to prescribe medication independently and to modify its dosage.

The project group's advice is for a nurse practitioner to be trained or appointed who is authorized to deal with cases immediately, without the cardiologist being involved. If there is no nurse practitioner available, make clear process agreements about how the tasks are to be divided between the cardiologist and the specialist nurse.

e. Ascertain what laboratory information is needed and how often.

It is important to look critically at the necessary blood tests and at tests for the monitoring consultations with the heart failure nurses. A large variation in the tests requested was observed in the participating hospitals. In a number of hospitals, for instance, an electrocardiogram (ECG) is performed for every consultation. It is advisable to apply the relevant guidelines issued by the Nederlandse Vereniging voor Cardiologie (NVVC - Dutch Association for Cardiology) and the Landelijke Huisartsenvereniging (LHV - National Association of General Practitioners) and to look critically at how they are embedded in the care path.

f. When using telemonitoring equipment, determine what the bandwidths are within which individual patients' vital parameters (measured at home) must remain.

g. Determine how often the patient must measure his vital parameters.

It is advisable to measure the vital parameters on a daily basis. This creates an ongoing picture of the patient's health situation. On the basis of both the care provider's and the patient's opinions regarding this situation, but also on the basis of the patient's situation, this frequency may be reduced to one or more weekly measurements.

h. Determine which care provider, and how often, is responsible for evaluating the readings and following up the ones that fall outside the permitted bandwidth.

Usually it is the heart failure nurses who are tasked with monitoring the incoming daily readings. In practice we see that they evaluate the abnormalities flagged up by the system. The bandwidth set for the patient is the determining factor in this.
The heart failure nurse also bases his evaluation on his interpretation of the development of the readings and on discussions with the patient about how he is experiencing his health situation. On the basis of the evaluation the lifestyle recommendations may be made stricter and the medication may be changed and/or the dosage of the existing medication may be up-titrated.

Step 9 Make a plan for the follow-up and the monitoring policy

a. Ascertain for every patient or patient category how often monitoring consultations are to be held.

The monitoring regime depends on:
• the seriousness of the heart failure;
• the symptoms and limitations experienced by the patient;
• the possibilities for using telemonitoring;
• the degree to which the patient understands his disorder;
• the degree to which the patient is capable of applying the recommended self-care.

In addition, the current guidelines (NVVC/LHV) help determine the details of the monitoring regime and the decision as to the number of consultations required. The basic principle for this should be that consultations only occur if there is a good reason for them.

b. Make agreements about how long telemonitoring is to be used.

The decision about how long telemonitoring is to be used must be made at the individual level. In several hospitals that took part in the Effective Cardio project patients were initially connected to telemonitoring for six months. If during this period any exacerbation occurred, three further months of telemonitoring were added following these six months. If during the first six months no exacerbation occurred, the value added for the individual patient's quality of life was the crucial factor for the care provider in deciding whether to continue with telemonitoring. Such value added might for instance be removing the stress of a physical consultation at the hospital or creating a safe feeling.

THE SPEED AND LENGTH OF STABILIZATION AND THE PATIENT'S LEVEL OF KNOWLEDGE OF THE DISEASE DETERMINE THE LENGTH AND USAGE OF TELEMONITORING

c. Set up an annual evaluation date to check whether the patient is still following the correct monitoring regime.

In practice we see that in the first year following diagnosis and up-titration three evaluations are made regarding whether the patient is still on the right care path. From the second year following the diagnosis this evaluation is made once a year. On the basis of this evaluation the decision may be made to continue with the current monitoring regime or to change to a more intensive or a lighter monitoring regime. The possibility of reverse referral to primary care must also be included.

d. Make agreements with the general practitioner regarding annual feedback and possible reverse referral.

Because of the high degree of comorbidity and the frequent occurrence of complications in people with heart failure[11], several care providers from primary and secondary care are involved with heart failure patients. It is therefore important that the general practitioner gets periodic feedback about the treatment and follow-up taking place with regard to those of his patients who are suffering from heart failure.

Phase 3 Set up the conditions for implementing the care path

Step 10 Optimize the ICT support
Step 11 Consider using a Medical Service Center

As soon as the care path is in place, the support needed to ensure that it functions optimally must be specified.

Step 10 Optimize the information and communications technology (ICT) so that the care path functions as well as possible

Applications in information and communications technology (ICT) make it possible to arrange information transfer, decision-making rules and the logistics of the care path. To do this it is important to first specify what information needs to be shared during the various process steps and between which actors, both inside and outside the hospital (patient, general practitioner, home care organization and pharmacist). Discuss with the hospital's ICT department what the options are for performing the necessary information transfer.

It is particularly important that historical and current overviews of a patient's vital parameters can be exchanged between the patient and the cardiologist and/or the heart failure nurse. It is also important for all of the care providers involved with the patient - both inside and outside the hospital - that a reliable and up-to-date medication overview can be exchanged.

In today's market situation telemonitoring systems form a separate ('stand alone') application. In practice this means that while relevant readings relating to the patient's health condition - measured in the home situation - are available to the heart failure nurse through the telemonitoring system's application, the nurse has to enter them manually into the existing Hospital Information System (HIS).

The heart failure nurse also has to enter the prescribed medication manually so as to provide the patient, his informal carers and any other care providers involved with an up-to-date medication overview via the telemonitoring system.
It is essential to organize safe information exchange with existing Hospital, GP and Pharmacy Information Systems (HIS, GPIS and PIS respectively) not only for telemonitoring systems, but also for the entire range of eHealth systems so as to guarantee efficient care.

At the national level care provider organizations, patient organizations and health insurance companies are jointly developing ways to bring about this data exchange.

Step 11 Consider using a Medical Service Center

Some hospitals have opted to subcontract some or all of the activities that are part of the telemonitoring service to a so-called Medical Service Center. With this system nurses at a call center outside the hospital take over one or more of the following tasks from the heart failure nurse:

- technical support, such as calling patients when readings are missing and providing assistance with any technical problems the patient is having with the equipment;
- medical support in evaluating any abnormalities detected by the system;
- in consultation with the cardiologist, adjusting (the dosage of) the medication.

At the moment most hospitals opt for technical support only. An occasional hospital opts for medical support if the heart failure nurse is absent during holidays, on part-time days and during maternity leave.

Support by a Medical Service Center can reduce the workload and ensures the continuity of the reaction to new cases.

Phase 4 Assure the newly designed care path / measure outcomes

Step 12 Develop reports on the process and the outcomes
Step 13 Benchmark the process and outcome data

Step 12 Develop reports on the process and the outcomes

The care path was developed with a particular objective. It is important to measure the outcomes in order to determine whether this objective is actually achieved. This makes it possible to adjust the care path depending on the results obtained. The progress reports on these readings may relate to the process or to the outcomes. In the case of the outcomes a distinction is often made between the output from the process and the effect of the treatment. Applicable guidelines and national indicators can provide input for this.

Outcome indicators	Process indicators
Number of heart-failure-related hospital admissions per patient per year	Lead time from referral to diagnosis
Number of hospitalization days per hospital admission per year	Percentage of patients who received patient education about health-promoting behavior during one or more visits
Number of visits to outpatient clinic per patient per year	Percentage of patients for whom creatinine, potassium and sodium has been indicated every three or six months
Number of exacerbations per patient per year	Symptoms while at rest or during light activity
Number of heart-failure-related deaths per year	
Patient's quality of life or patient satisfaction	

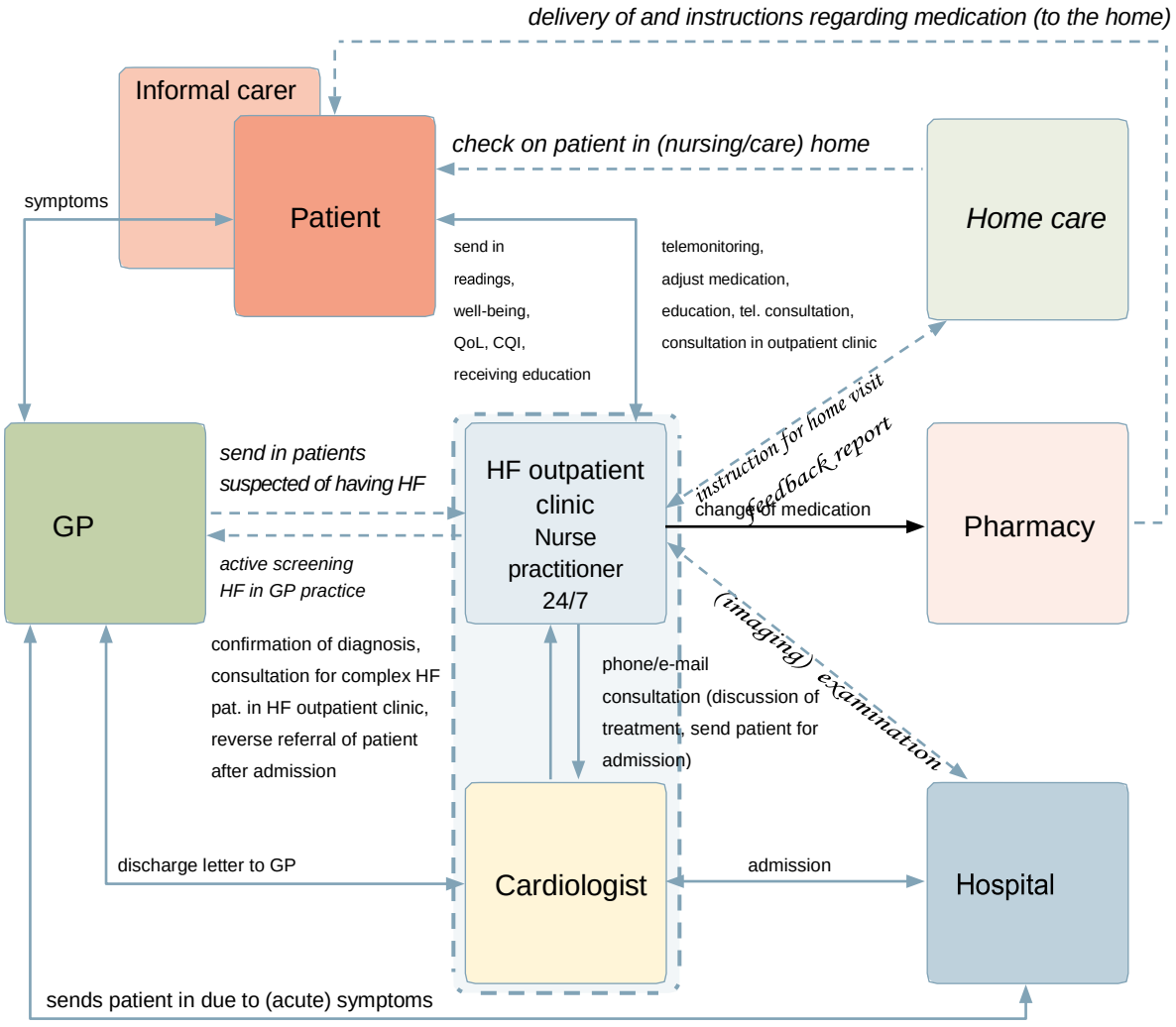
Table 2.3 Overview of possible outcome and process indicators for the heart failure care path.

Step 13 Benchmark the process and outcome data

If the hospital's own results are available, benchmarking them is a valuable addition. This shows how the hospital's absolute performances are related to other hospitals' performances or with respect to the national standard.

We give below an example of a flowchart of secondary chronic heart failure care. A graphic representation is shown in Annex 5.

Secondary chronic heart failure care path



QoL quality of life
HF heart failure
CQI Customer Quality Index
GP General Practitioner

The care activities shown in italics in this diagram are optional.

THE IDEAL SITUATION IS A LINK BETWEEN THE TELEMONITORING SYSTEM AND THE HOSPITAL, GP AND PHARMACY INFORMATION SYSTEMS (HIS, GPIS AND PIS)

3 EFFECT OF OPTIMIZING CHRONIC HEART FAILURE CARE PATH WITH TELEMONITORING

In this chapter you can find out the results of optimizing the chronic heart failure care path with the use of telemonitoring.

3.1 Introduction to results

The independent research bureau Kiwa Carity has conducted an effect survey regarding the optimization of the care path. In it they examined the primary process, the workload and the financial result. The survey was based on the activity profile of the six hospitals taking part in this project.

All six participating hospitals supplied activity data to Kiwa Carity. Altogether information was revealed about 389 heart failure patients for whom the optimized care path that includes telemonitoring was used. Of this total population, Kiwa Carity has available a complete activity profile of 175 patients for at least six months before and at least six months after the start of the optimized heart failure care path using telemonitoring. This means that the survey population consists of 175 heart failure patients and that Kiwa Carity's survey results relate to a period of six months before and six months after the start of telemonitoring in an optimized care path.

The distribution of the patients in this survey population over the participating hospitals as a percentage is as follows:

• Rotterdam Havenziekenhuis Hospital	9%
• Sint Lucas Andreas Hospital, Amsterdam;	29%
• St. Anna Hospital, Geldrop	1%
• Zorggroep Leveste Middenveld, Scheper Hospital site, Emmen	53%
• Wilhelmina Hospital, Assen	1%
• Zaans Medical Center, Zaandam	7%

To get an idea of the degree to which the patient population of the six hospitals in the survey is a representative reflection of the average activity profile of a chronic heart failure patient, Kiwa Carity compared the activity profile of this population with the national activity profile of the chronic heart failure population. This comparison shows that the care consumption of the chronic heart failure population in the project is very similar to that of other hospitals in the Netherlands for the same period (2011) prior to the scaling-up of patients in the optimized care path using telemonitoring. See Figure 3.1.

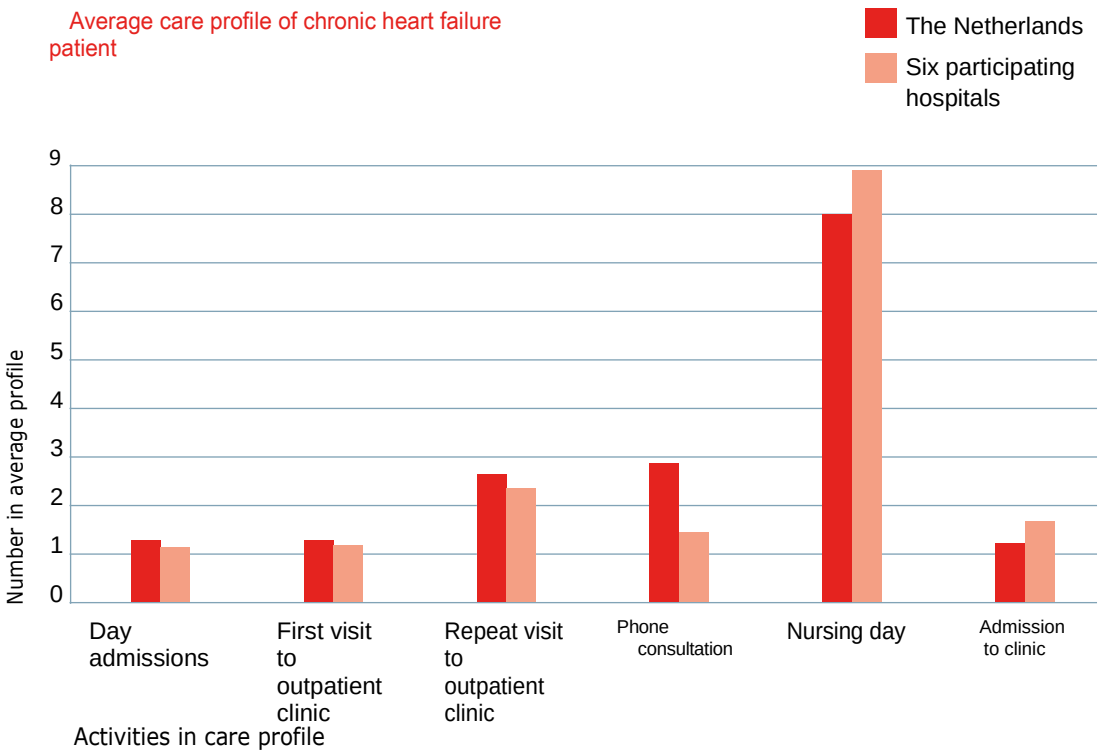


Figure 3.1 The average care profile of a chronic heart failure patient in the six hospitals that took part in the Effective Cardio project compared with that of all the hospitals in the Netherlands.

Further information about the data acquisition, the analysis and the processing of the results can be found in an extensive report which is available online on Kiwa Carity's website.[12]
http://www.kiwacarity.nl/Actueel/Publicaties/rapportehealth/

As a supplement to Kiwa Carity's analyses, the project group conducted a patient and care provider satisfaction survey. 194 patients took part in the patient satisfaction survey and 17 care providers in the care provider satisfaction survey.
The questionnaires used to measure patient and care provider satisfaction are included as Annexes 2 and 3 respectively in this report.

3.2 Results for primary process

The results achieved by using an optimized heart failure care path that includes telemonitoring show a reduction in the number of activities on all measured indicators in the primary process. See Figure 3.2.

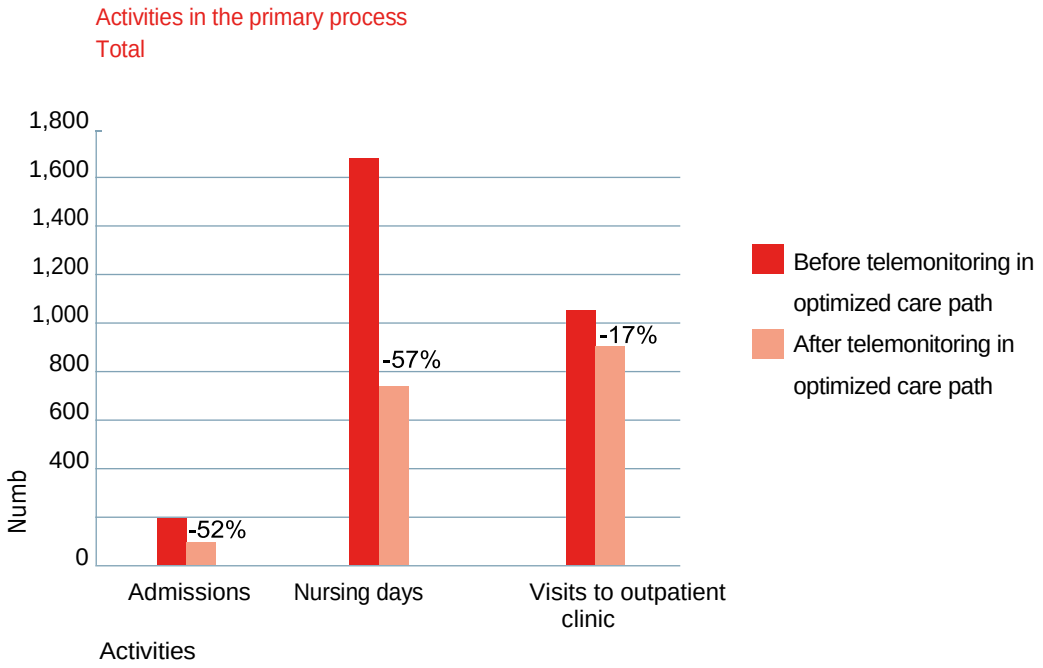


Figure 3.2 The number of activities on measured indicators in the primary process before and after telemonitoring in an optimized care path.

Hospital admissions

- The total number of hospital admissions for the entire survey population fell by 52%.
- A heart failure patient has an average of 1.5 hospital admissions before the use of telemonitoring in an optimized care path and an average of 1.1 admissions afterwards. This is a reduction of 23%.

Nursing days

- The total number of nursing days for the entire survey population fell by 57%.
- The average number of nursing days per admitted patient declined from 12.1 to 8.3 days, a fall of 31%.
- The average nursing period per hospital admission declined from 8.3 to 7.4 days, a fall of 11%.

Visits to outpatient clinic

- The total number of visits to outpatient clinics (first and repeat visits) declined by 17%.
- The average number of visits to outpatient clinics per patient declined from 6.4 to 5.6 visits, a fall of 12%.

3.3 Results for workload

The results achieved by using an optimized heart failure care path that includes telemonitoring show a reduction on all indicators for workload. See Figure 3.3.

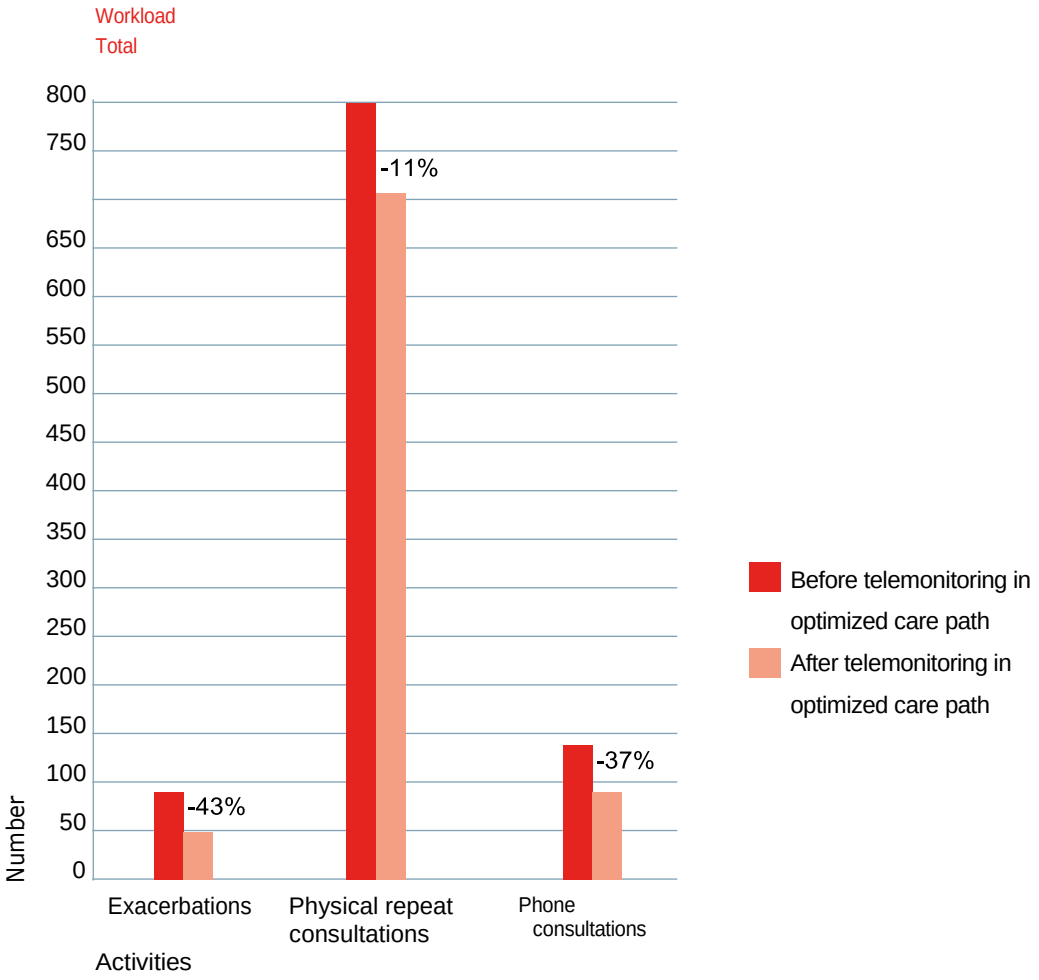


Figure 3.3 Results on measured indicators for workload before and after telemonitoring in an optimized care path.

Exacerbations

- The total number of exacerbations declined by 43%.
- The average number of exacerbations per heart failure patient declined from 0.6 to 0.3, a fall of 49%.

Physical repeat consultations

- The total number of physical repeat contacts with the cardiologist fell by 11%.
- The average number of contacts declined from 4.7 to 4.2 per patient, a fall of 11%.

Telephone contacts

- The total number of registered telephone contacts declined by 37%.
- The average number of telephone contacts declined from 2.2 to 1.5 per patient, a fall of 33%.

3.4 Financial outcome

The results achieved by using an optimized heart failure care path that includes telemonitoring show a reduction on all financial indicators measured: the revenue for the hospital, the revenue from fees for the cardiology partnership and the burden of claims for the health insurance companies. See Figure 3.4.

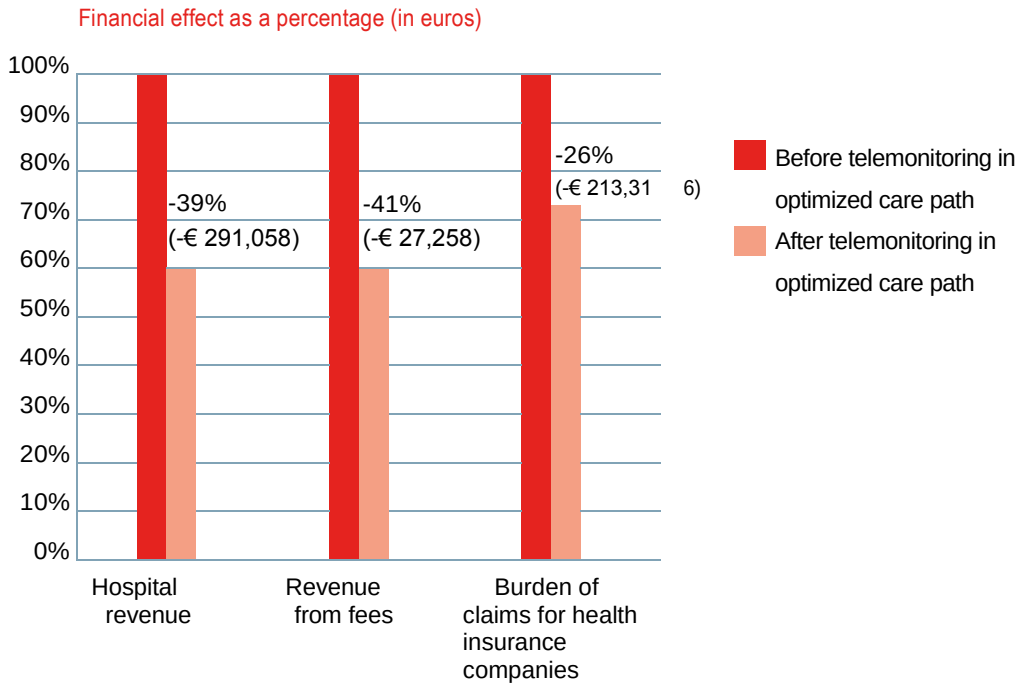


Figure 3.4 Financial effect before and after the use of telemonitoring in an optimized heart failure care path on the revenue for the hospital, on the fees for the cardiology partnership and on the burden of claims for the health insurance company.

Hospital revenue

- The revenue for the hospital declined by € 291,058 for 175 heart failure patients over a period of six months, a fall of 39%.

Revenue from fees for cardiology partnership

- The revenue from fees for the cardiology partnership declined by € 27,258 for 175 heart failure patients over a period of six months, a fall of 41%.

N.B. The fees are part of the price of the activity profile and so form part of the revenue for hospitals. Within the hospitals the portion that is the cardiology partnership's fee is settled as part of the production agreements made.

Burden of claims for health insurance company

- The burden of claims for the health insurance company declined by € 213,316 for 175 heart failure patients over a period of six months, a fall of 26%.

N.B. The costs of using the telemonitoring equipment (including technical service) that the health insurance companies taking part in this project reimbursed to the hospitals have been discounted in these figures.

AN OPTIMIZED CARE PATH WITH TELEMONITORING MAKES POSSIBLE AN ANNUAL SAVING OF OVER 82 MILLION EUROS

3.5 Extrapolation of results to national level

The Kiwa Carity research bureau has indicated that no major deviations are evident for the activity profile over a longer period compared with the six-month period analyzed. So it is reasonable to extrapolate the financial results to a period of one year. This sheds light on the potential national saving arising from having an optimized heart failure care path that includes telemonitoring.

As stated in section 3.4, from a health insurance company's point of view a saving of € 213,316 is possible for 175 heart failure patients over a period of six months (the costs of the telemonitoring equipment have been discounted in this figure). This is a saving of € 1,219 per patient per six months and therefore € 2,438 per year. It is known that in 2012 68,600 unique heart failure activity profiles were opened in the hospitals in the Netherlands.[13] This means that at that moment there were 68,600 heart failure patients being treated in hospital. Assuming that every year 50% of these 68,600 patients (= 34,000 patients) are treated in an optimized care path using telemonitoring, then a national saving of (34,000 * € 2,438 =) over 82 million euros a year is possible.
Of course, this means that - given a growing group of heart failure patients being treated in hospital - the saving in costs will also increase.

3.6 Results for patient satisfaction

Overall opinion of the optimized heart failure care

The questionnaire was sent to 276 patients who were being treated for the indication of chronic heart failure in one of the six hospitals during the period from January 2010 to June 2014. The questionnaire was completed in full by 70% of the patients approached (194). Patients gave the overall care provided for heart failure an average rating of 8.6.
The positive opinion of heart failure care is primarily attributable to the reassurance offered by this optimized care path.

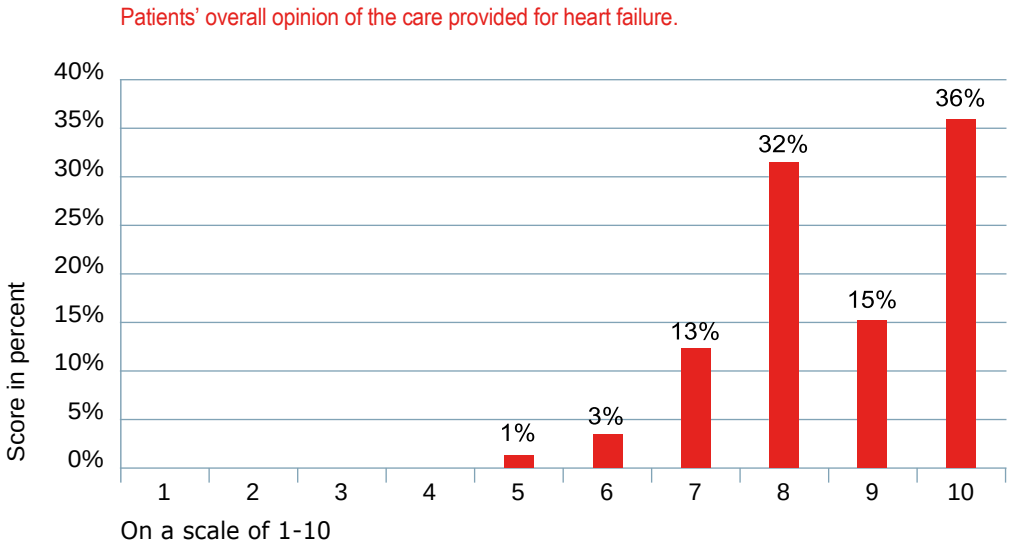


Figure 3.5 Patients' overall opinion of the care provided for heart failure.

The Net Promoter Score* for the care provided for heart failure is +47%. This is an extremely high score.

The care provided by heart failure nurses is regarded as excellent on all aspects (on a scale of 0 to 10).

The care provided by the heart failure nurse as experienced by the patient	Score	Response
The length of time it took to see the heart failure nurse	8.4	n=186
The time and attention received	8.9	n=189
The information received	8.8	n=187
The expertise provided	8.8	n=187
The number of contacts	8.4	n=177
The number of appointments	8.4	n=17

Table 3.1 The care provided by the heart failure nurse as experienced by the patient.

* The Net Promoter Score (NPS) is a simple but powerful method of measuring customer loyalty. It is an instrument in which a single question ('How likely is it that you would recommend us to a friend or colleague?') and a single score are used to show how well the organization is performing and what the potential is for customer loyalty and, by extension, for turnover growth. The NPS scale goes from -100 to +100. Companies generally achieve an NPS of around +5% to +10%.

PATIENTS ARE VERY SATISFIED WITH THE CARE PROVIDED FOR HEART FAILURE USING TELEMONITORING

The care provided by the cardiologist is also given a positive rating on all points (on a scale of 0 to 10).

The care provided by the cardiologist as experienced by the patient	Score	Response
The length of time it took to see the cardiologist	8.2	n=171
The time and attention received	8.4	n=171
The expertise provided	8.6	n=171
The number of appointments	8.1	n=168

Table 3.2 The care provided by the cardiologist as experienced by the patient.

The coordination and collaboration between the various care providers with regard to heart failure care is experienced as good.

The collaboration between care providers as experienced by the patient	Score	
The coordination and collaboration between the care providers	8.2	n=175

Table 3.3 The collaboration between care providers as experienced by the patient.

The value added by using telemonitoring as experienced by the patient is high.

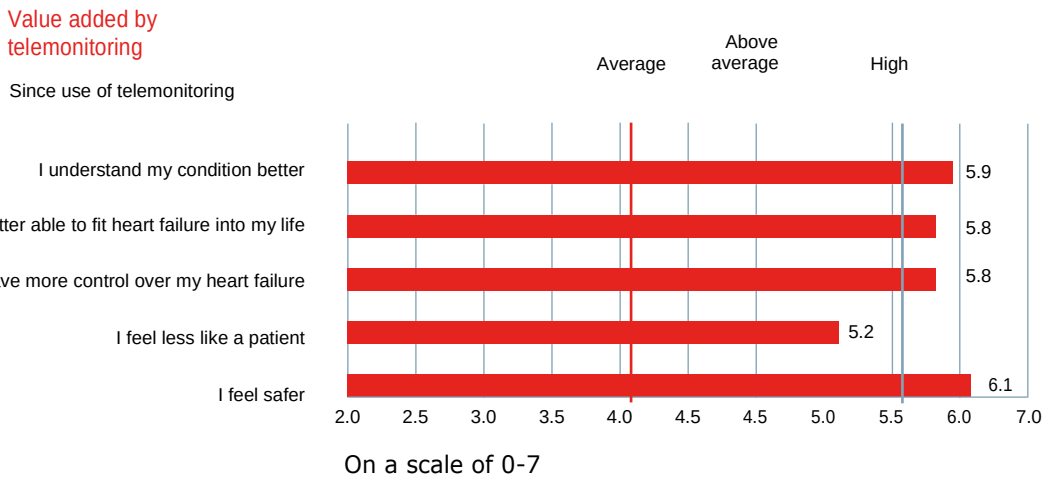


Figure 3.6 Value added by telemonitoring.

3.7 Results for care provider satisfaction

Experiences with telemonitoring in an optimized care path

The care provider satisfaction questionnaire was sent to 29 care providers, of which:

- 17 were cardiologists;
- 12 were heart failure nurses.

The survey was conducted digitally. The response was over 55%.

16 respondents completed the questionnaire in full, of which:

- 8 were cardiologists;
- 8 were heart failure nurses;
- 1 respondent partially completed the questionnaire.

On average care providers give telemonitoring for chronic heart failure a rating of 7.4.
56.3% of respondents give the use of telemonitoring a score of 8 or more.

Care providers' overall opinion of using telemonitoring

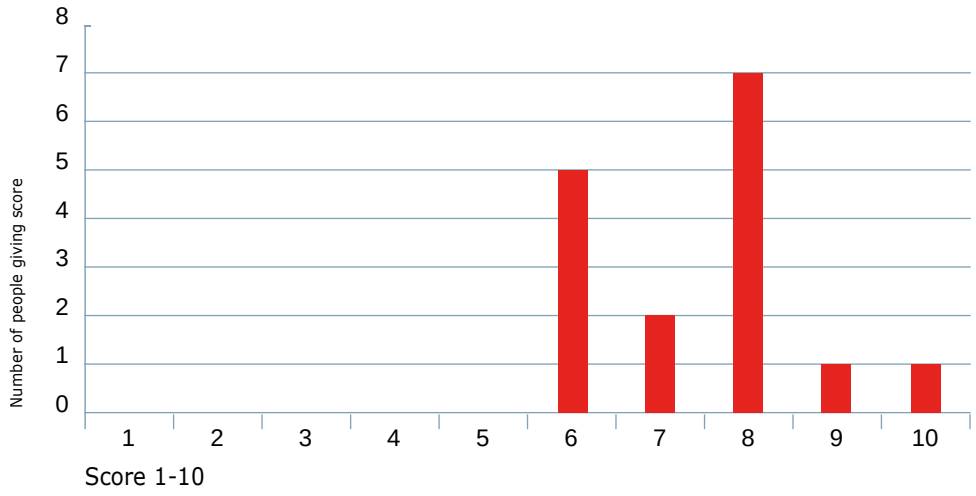


Figure 3.7 Care providers' overall opinion of using telemonitoring.

Care providers' Net Promoter Score for the care provided for heart failure using telemonitoring is -19. This is a relatively low score. The project group suspects that several care providers experience using telemonitoring as less positive. This is due on the one hand to the lack of a link between the telemonitoring equipment and the HIS, so that the care provider has to do more administrative work. On the other hand it could be the result of the lack of sufficient coaching given to care providers on implementing the new work process and the changing role in respect of the patient arising from the use of telemonitoring.

THE USE OF EHEALTH TOOLS SUCH AS TELEMONITORING REQUIRES INDIVIDUAL COACHING OF CARE PROVIDERS ON IMPLEMENTING A NEW WORK PROCESS

Care providers' objectives in using telemonitoring in the optimized care path for patients

There are several reasons why care providers are in favor of using telemonitoring for patients with chronic heart failure (multiple answers were possible). The most important reason is in order to reduce the number of clinical admissions.

Care providers' objectives in using telemonitoring	Percentage	Response
Reducing clinical admissions	88.2%	15
Improving therapy compliance	70.6%	12
Increasing patient's knowledge	70.6%	12
Supporting up-titration of medication at home	64.7%	11
Obtaining timely understanding of causes and effects of treating decompensation	58.8%	10
Stabilizing patient	58.8%	10
Reassuring patient	58.8%	10
General change in patient behavior	47.1%	8
Reducing outpatient clinic support	47.1%	8
Number of respondents		**17**

Table 3.4 Care providers' objectives in using telemonitoring for patients with chronic heart failure.

Using telemonitoring in an optimized care path

The impact of using telemonitoring in the care provider's daily work is as follows:

- 69% say that they are able to monitor and manage more patients remotely;
- 63% say that the content of the work has changed due to the use of telemonitoring;
- 63% say that they do not require any different knowledge or skills. Cardiologists and heart failure nurses have the same opinion on these matters.

Commitment by patient

Commitment on the part of the patient is crucial for successful implementation of telemonitoring.

- 94% think that commitment on the part of the patient is a success factor in implementing telemonitoring.
- 75% think that reimbursement by the health insurance company is relevant to the implementation of telemonitoring.
- 69% think that technological support by suppliers is important for the implementation.

Care providers experience higher quality of care as a result of the use of telemonitoring and are able to convince their patients of this.

- 69% experience higher quality of care for patients as a result of the use of telemonitoring.
- 88% say that they are able to convince the patient of the advantages of using telemonitoring.
- 62% think that telemonitoring is an essential part of the heart failure program.

CONCLUSION

Over the past few years there has been a great deal of discussion about the question of whether using telemonitoring makes it possible to provide adequate care - in the same available time - to a larger number of chronic heart failure patients. The Effective Cardio project demonstrates that this is certainly possible. The basic principle, however, is that the potential for self-care with telemonitoring can only be taken advantage of if telemonitoring is fully integrated in the chronic heart failure care path.

The question in Effective Cardio's practical survey was: 'What is the effect of optimizing the chronic heart failure care path using integrated telemonitoring?'. And an important sub-question is: 'What steps do you take to achieve care path optimization using telemonitoring in secondary care?'. Chapter 2 shows how care path optimization that includes telemonitoring can be implemented in secondary care. The process is described by means of four phases, each containing several steps that must be completed in order to successfully optimize the chronic heart failure care path.

Chapter 3 describes the effect survey of the optimization of the chronic heart failure care path with telemonitoring in secondary care on the primary process, workload and financial result. The survey was conducted by the independent research bureau Kiwa Carity. They analyzed the data in the activity profiles of 175 heart failure patients in six hospitals with regard to the use of an optimized care path that includes telemonitoring for at least six months before and six months after the start of this care path. The table gives a summary of the results.

Indicator	Result of using optimized care path with telemonitoring
Primary process	• reduction in number of hospital admissions by 52% • reduction in number of nursing days by 57%
Workload of care providers involved	• reduction in number of repeat visits by 11% • reduction in number of exacerbations by 43% • reduction in number of registered phone consultations by 37%
Revenue/burden of claims	• reduction in burden of claims for health insurance companies by 26% • reduction in hospital revenue by 39% • reduction in revenue from fees for cardiology partnership by 41%
Patient and care provider satisfaction	• patients give the overall care provided for heart failure an average rating of 8.6 • on average care providers give the care provided using telemonitoring a rating of 7.4.

Table 3.5 Overview table showing the results of using an optimized care path with telemonitoring on the basis of four indicators.

CONCLUSION CONTINUED

The optimization of the heart failure care path using telemonitoring gives rise to an absolute decrease in activities and a shift from a clinical to a more outpatient-based treatment setting. We can also conclude that the outcomes improve considerably for a vulnerable group of patients suffering from a serious disease. In other words, high-quality, specific care is delivered. Care path optimization that includes telemonitoring also gives rise to a considerable reduction in the burden of claims. Extrapolating the results to usage for 50% of all heart failure patients undergoing treatment in the hospitals in the Netherlands indicates that an annual saving of over 82 million euros could be achieved.

RECOMMENDATIONS

On the basis of the findings arrived at in the Effective Cardio project, the following recommendations can be made that would make it possible to take advantage of the full potential for self-care with telemonitoring on a national scale.

Recommendation 1

Revise the procurement model for telemonitoring in secondary care

Chronic care is characterized by low-complexity care with high volumes. Heart failure care in the current 'fee-for-service' model results in many activities performed by health care institutions. Since a price has been fixed for each activity (p x q), the costs are high. If the use of care path optimization gives rise to better-quality care and makes heart failure patients more self-reliant, then the patient's demand for care will decrease. As a result, the number of activities will fall. The result in today's activity model for health care institutions may be that there will be financial cutbacks for care providers, even though they provide high-quality, efficient care. Health insurance companies must look into the possibilities for removing the barriers to care providers by means of an appropriate procurement model in order to use care path optimization on a larger scale, while at the same time maintaining or improving the health outcomes.

Recommendation 2

'Share best practices' regarding care path optimization with telemonitoring

The use of telemonitoring requires a change in the care process. It means modifying the working method and the role of the care providers involved. It also requires a change in patients' behavior. Sharing experiences between care providers about how the heart failure care path has been optimized using telemonitoring and the value added that this gives for the patient and the care provider can have an inspirational and motivational effect for bringing about this change in behavior. Professional and patients' associations (and where possible health insurance companies) can play an important part in facilitating this exchange of information and knowledge.

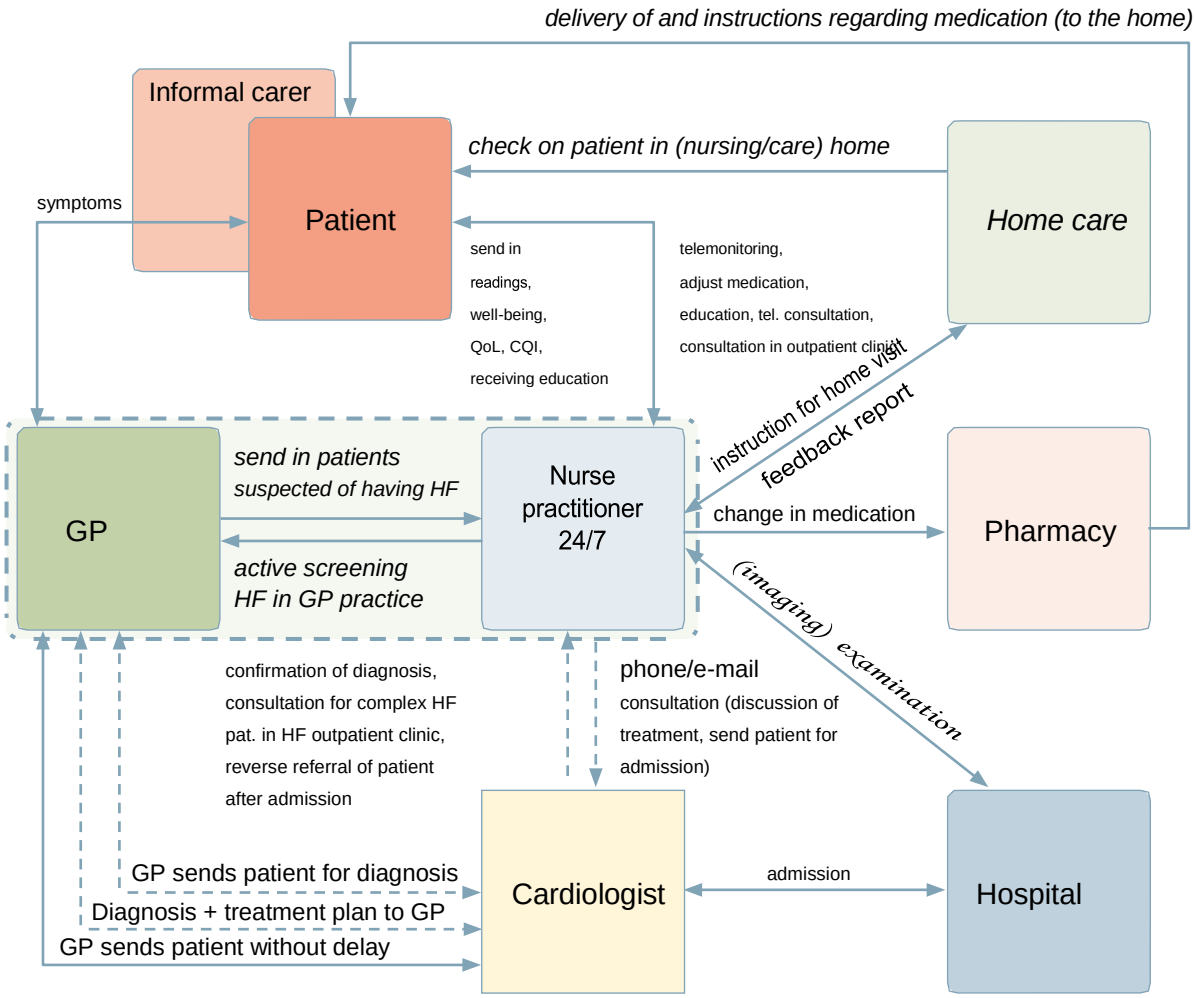
Recommendation 3

Organize (primary) chain care for patients suffering from heart failure

If we wish to organize the care so that it is as close as possible to the heart failure patient (who may also be suffering from comorbidity) and arrange it as efficiently as possible, the general practitioner ought to assume management of the care for this patient group. This means that the general practitioner takes ultimate responsibility for organizing the care of heart failure patients throughout the chain. The procurement of this care is then arranged between the care group and the health insurance company on the basis of health outcomes. Cardiologists continue to be responsible for making or confirming the diagnosis of heart failure and heart failure nurses (either organized in secondary care or otherwise) for the monitoring policy and the follow-up. If necessary, home care may be brought in to support the follow-up and the pharmacist to deliver medication to the patient at home. See the schematic representation of chain care from the perspective of primary care.
A graphic representation is shown in Annex 6.

N.B. Several of the hospitals that took part in the Effective Cardio project have now taken the first few steps towards arranging chain care. For this, agreements are made - though from secondary care - regarding (greater) use of the home care organization, the pharmacist and the general practitioner. A subsequent step for these hospitals would be to arrange the chain care from a primary-care perspective.

Primary heart failure chain care (around the patient in the home situation)



QoL quality of life
HF heart failure
CQI Customer Quality Index
GP General Practitioner

The care activities shown in italics in this diagram are optional.

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ANNEXES

Annex 1 Report by Kiwa Carity

Can be downloaded from http://www.kiwacarity.nl/Actueel/Publicaties/rapportehealth/

Annex 2 Questionnaire for patient satisfaction survey

The CQ (Consumer Quality) index is a standardized method for measuring, analyzing and reporting customer experiences in healthcare. Patients and clients are given a written questionnaire.
The CQ index formed the basis for creating the questionnaire for the patient satisfaction survey in the Effective Cardio project. The original questionnaire, by the Dutch National Health Care Institute (Zorginstituut Nederland), is so extensive that the project group decided to condense it and turn it into a specific survey of satisfaction regarding the project objective.

De Hart&Vaatgroep (The Cardiovascular Group) was consulted and asked for advice. These recommendations were adopted.
The questionnaire was sent to 276 patients who were being treated for the indication of chronic heart failure in one of the six participating hospitals during the period from January 2010 to June 2014. The questionnaire was completed in full by 70% of the patients approached (194).

INTRODUCTION

This questionnaire is about your experiences of the care provided for heart failure. We would greatly appreciate it if you would complete this questionnaire. The time required is about 15 to 20 minutes.

The questionnaire will be used anonymously and confidentially. This means that no one will know what answers you have given. Your details will also not be shared with anyone else.

Participation in this survey is entirely voluntary. Taking part or not taking part in this survey will have *no* bearing on the care you receive.

If you do not wish to take part in this survey, please put a cross in this box **!**.
Then return this sheet in the reply envelope.

COMPLETION INSTRUCTIONS

It is important that the questions should only be answered by the person referred to in the covering letter. The questionnaire must not be passed on to anyone else.
Most of the questions can be answered by placing a cross in the box of your choice. Crosses placed outside the boxes will not be recognized by the computer.
For some of the questions you can write down an answer yourself. Please do this in capital letters in the box provided.
Sometimes you will be asked to skip some of the questions in this questionnaire. You will then see an arrow with a note. This note tells you which question you should answer next. Here is an example:

☒ No ⇛ ***Go to question 3***
☐ Yes

Have you filled in an answer but you would like to change it? In that case put brackets around the incorrectly marked box and cross a different answer, as follows:

x No

(x) Yes

INTRODUCTION

Heart failure is a disorder in which the heart's pump action is reduced. This can cause shortness of breath and tiredness, either when at rest or when performing an activity. You have received this questionnaire because you are using Motiva. This is the system for measuring your weight and blood pressure at home and then sending the readings to the hospital.

This questionnaire is about the care that you have received for heart failure over the past 12 months.

1. **How long ago did the cardiologist diagnose you as suffering from chronic heart failure?**
   - Less than six months ago
   - 6 months to a year ago
   - A year or more ago

2. **Who first told you about Motiva?**
   - The cardiologist
   - The heart failure nurse
   - Someone else (please specify) ☐

   (please write in capitals)

3. **How long have you been using Motiva?**
   - Less than six months
   - 6 months to a year
   - A year or more

YOUR EXPERIENCES WITH THE HEART FAILURE NURSE(S)

The next few questions are about your experiences with the care for heart failure provided by the heart failure nurse over the past 12 months in a hospital's outpatient clinic. The medical care consists of prescribing medicines, check-ups and providing information and advice about heart failure.

4. **Have you been in contact with the heart failure nurse(s) over the past 12 months?**
   - No ⇒ **Go to question 14**
   - Yes

5. **How often have you been in telephone contact with the heart failure nurse(s) over the past 12 months?**
   - never
   - 1 - 2 times
   - 3 - 5 times
   - 6 - 10 times
   - more than 10 times

6. **How often have you had an appointment with the heart failure nurse(s) in the outpatient clinic over the past 12 months?**
   - never
   - 1 - 2 times
   - 3 - 5 times
   - 6 - 10 times
   - more than 10 times

7. **How do you rate the length of time it took before you were able to see the heart failure nurse(s)?**
   - 0 Extremely poor
   - 1
   - 2
   - 3
   - 4
   - 5
   - 6
   - 7
   - 8
   - 9
   - 10 Excellent

8. **How do you rate the time and attention that the heart failure nurse(s) gave you?**
   - 0 Extremely poor
   - 1
   - 2
   - 3
   - 4
   - 5
   - 6
   - 7
   - 8
   - 9
   - 10 Excellent

9. How do you rate the information you received from the heart failure nurse(s)?

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

10. How do you rate the expertise with which you are being dealt with / advised by the heart failure nurse(s)?

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

11. How do you rate the number of telephone contacts with the heart failure nurse(s)?

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

12. How do you rate the number of appointments with the heart failure nurse(s) in the outpatient clinic?

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

YOUR EXPERIENCES WITH THE CARDIOLOGIST

The next few questions are about your experiences with the care for heart failure provided by the cardiologist over the past 12 months in a hospital's outpatient clinic.
The medical care consists of prescribing medicines, check-ups and providing information and advice about heart failure.

13. Have you been in contact with the cardiologist?

No → Go to question 21
Yes

14. How often have you had an appointment with the cardiologist in the outpatient clinic over the past 12 months?

never
1 - 2 times
3 - 5 times
6 - 10 times
more than 10 times

15. **How do you rate the length of time it took before you were able to see the cardiologist?**

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

16. **How do you rate the time and attention that the cardiologist gave you?**

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

17. **How do you rate the expertise with which you are being dealt with / advised by the cardiologist?**

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

18. **How do you rate the number of appointments in the outpatient clinic with the cardiologist?**

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

COLLABORATION BETWEEN CARE PROVIDERS

The next question is about your experience with the collaboration between care providers that you were involved with in the past 12 months for heart failure (such as the general practitioner, pharmacist, cardiologist or heart failure nurse).

19. **How do you rate the coordination and collaboration between the care providers that were involved with the treatment of your heart failure?**

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

20. How do you rate the coordination and collaboration regarding Motiva between the heart failure nurse and the cardiologist?

0 Extremely poor
1
2
3
4
5
6
7
8
9
10 Excellent

GENERAL OPINION ABOUT HEART FAILURE CARE

21. What score would you give to the overall care that you are receiving for heart failure?

0 means very poor. 10 means excellent.

0 Extremely poor care for heart failure
1
2
3
4
5
6
7
8
9
10 Excellent care for heart failure

22. Which aspects of the treatment of heart failure with Motiva impressed you?

(please write in capitals)

23. What changes would you like to see in your treatment with Motiva?

(please write in capitals)

24. How likely are you to recommend this heart failure care to your family, friends or colleagues?

Not likely 1 2 3 4
5 6 7 8 9 10 Very likely

ABOUT YOURSELF

25. How old are you?

younger than 50
50-59
60-69
70-79
older than 80

26. How many days a week do you measure your weight using Motiva?

0 times a week
1 - 2 times a week
3 - 4 times a week
5 - 6 times a week
7 times a week

27. How many days a week do you measure your blood pressure using Motiva?

0 times a week
1 - 2 times a week
3 - 4 times a week
5 - 6 times a week
7 times a week

28. In which hospital are you being treated for your heart disorder?

Havenziekenhuis Hospital
Scheper Hospital
St. Anna Hospital
St Lucas Andreas Hospital
Wilhelmina Hospital
Zaans Medical Center

29. We give below a number of statements about Motiva.

Please answer the questions by putting a cross in the box that applies most to you. Answers may range from 'completely disagree' (1) to 'completely agree' (7). Please answer all of the questions below.

	completely disagree			*neither disagree nor agree*			*completely agree*
Since I started using Motiva I feel safer	1	2	3	4	5	6	7
Since I started using Motiva I understand my condition better	1	2	3	4	5	6	7
Since I started using Motiva I am better able to fit heart failure into my life	1	2	3	4	5	6	7
Since I started using Motiva I have greater control over my heart failure	1	2	3	4	5	6	7
Since I started using Motiva I feel less like a 'patient'	1	2	3	4	5	6	7

30. What is your highest qualification?

No qualifications (primary education: not completed)

Primary education (primary school, special-needs primary education)

Lower or preliminary vocational education (such as LTS [lower vocational technical school], LEAO [lower vocational secondary education in business and administration], LHNO [lower domestic and industrial education], VMBO [preparatory secondary vocational education])

Junior general secondary education (such as MAVO [junior general secondary education], (M)ULO [more advanced primary education], MBO-kort [short course of secondary vocational education], VMBO-t [preparatory secondary vocational education - theoretical])

Senior secondary vocational education and vocational programs for adults (such as MBO-lang [long course of secondary vocational education], MTS [technical secondary school], MEAO [upper vocational secondary education in business and administration], BOL [classroom-based vocational education], BBL [apprenticeship-based vocational education], INAS [institutional staff training course])

Senior general secondary and university preparatory education (such as HAVO [senior general secondary education], VWO [university preparatory education], Atheneum [type of grammar school], Gymnasium [type of grammar school], HBS [higher civic school], MMS [higher civic school for girls])

Higher professional education (such as HBO [higher professional education], HTS [institute of technology], HEAO [higher education in economics and management], HBO-V [higher professional nursing education], 'kandidaats' [bachelor] university education)

University education (university)

Other (please specify):

(please write in capitals)

THANK YOU VERY MUCH FOR FILLING IN THE QUESTIONNAIRE
Please return the completed questionnaire in the enclosed reply envelope.
A stamp is not required.

Annex 3 Questionnaire for care provider satisfaction survey

The CQ (Consumer Quality) index is a standardized method for measuring, analyzing and reporting customer experiences in healthcare. Patients and clients are given a written questionnaire. The CQ index formed the basis for creating the questionnaire for the care provider satisfaction survey in the Effective Cardio project. The questionnaire was submitted for checking to experts from the health insurance companies.

The care provider satisfaction questionnaire was sent to 29 care providers, of which:

- 17 were cardiologists;
- 12 were heart failure nurses and/or nurse practitioners.

The questionnaire was conducted digitally. The response was more than 55%.

16 respondents completed the questionnaire in full, of which:

- 8 were cardiologists;
- 8 were heart failure nurses and/or nurse practitioners.
- 1 respondent partially completed the questionnaire.

Introduction

This questionnaire is about your experiences of the care provided for heart failure with telemonitoring. We would greatly appreciate it if you would complete this questionnaire. This will help us to improve patient care. The time required is about 10 to 15 minutes.

The questionnaire will be used anonymously and confidentially. This means that no one will know what answers you have given. Your details will also not be shared with anyone else.

Participation in this survey is entirely voluntary.

Your objectives regarding telemonitoring

1. What is (are) your objective(s) in using telemonitoring on your patients? (put a cross alongside the objective(s) that is (are) applicable; multiple answers possible)
   - o Increasing patient's knowledge
   - o Obtaining timely understanding of causes and effects of treating decompensation
   - o Reducing clinical admissions
   - o Improving therapy compliance
   - o Stabilizing patient
   - o Reassuring patient
   - o General change in patient behavior
   - o Reducing outpatient clinic support
   - o Supporting up-titration of medication at home
   - o Other (please specify)……

2. Which of the objectives shown above do you regard as the most important? (only one answer possible)
   - o Increasing patient's knowledge
   - o Obtaining timely understanding of causes and effects of treating decompensation
   - o Reducing clinical admissions
   - o Improving therapy compliance
   - o Stabilizing patient
   - o Reassuring patient
   - o General change in patient behavior
   - o Reducing outpatient clinic support
   - o Supporting up-titration of medication at home
   - o Other (please specify)……

3. How do you rate the contribution made by the optimized care path in achieving your objectives? (0 *extremely poor* to 10 *excellent)*
0-1-2-3-4-5-6-7-8-9-10

4. How do you rate the use of telemonitoring in achieving your objectives? (0 *extremely poor* to 10 *excellent)*
0-1-2-3-4-5-6-7-8-9-10

Your work with telemonitoring

5. Have any transmural agreements been made regarding the use of telemonitoring?
No $ Go to question 6
& Yes

6. With which extramural care providers have you made agreements regarding the use of telemonitoring for heart failure patients? (multiple answers possible)
   - o GP
   - o Pharmacist
   - o Home care organization
   - o Other (please specify)……

7. Shown below are a number of statements relating to your work with telemonitoring. Please answer the questions by putting a cross in the box that applies most to you. Answers may range from ‘completely disagree’ (1) to ‘completely agree’ (7). Please answer all of the questions below.

   - o The use of telemonitoring has changed the content of my work
   - o The use of telemonitoring has changed the relationship between me and my patients
   - o Telemonitoring contributes to a more efficient arrangement of my working day
   - o The use of telemonitoring obliges me to modify the working process
   - o The use of telemonitoring requires different knowledge and skills of me than I have used in the past
   - o As a result of the use of telemonitoring I can spend more time on patients that “really” need direct care
   - o As a result of the use of telemonitoring I can monitor and manage more patients 'remotely' and where necessary modify their treatment

Your experiences with telemonitoring

8. We give below a number of statements. Say whether the following factors have contributed to a successful implementation of telemonitoring. Answers may range from ‘completely disagree’ (1) to ‘completely agree’ (7). Please answer all of the questions below.

   - o Commitment by patient
   - o Commitment by partnership
   - o Commitment by management
   - o Commitment by primary care (general practitioner, pharmacist)
   - o Commitment by home care organization
   - o Commitment by health insurance company (reimbursement)
   - o Support by a Medical Service Center (such as Achmea)
   - o Support by supplier Philips
   - o Support by hospital ICT department

9. Shown below are a number of statements relating to your experiences with telemonitoring. Please answer the questions by putting a cross in the box that applies most to you. Answers may range from 'completely disagree' (1) to 'completely agree' (7). Please answer all of the questions below.

- o Telemonitoring affects the quality of the care provided for my heart failure patients
- o On average the use of telemonitoring improves the quality of the care provided for my heart failure patients
- o I can convince my patients of the advantages of using telemonitoring
- o I think that telemonitoring is an essential part of the heart failure program

General opinion about telemonitoring for chronic heart failure

10. How do you rate the use of telemonitoring in general? (0 *extremely poor* to 10 *excellent)*
0-1-2-3-4-5-6-7-8-9-10

11. How do you rate working with Motiva? (0 *extremely poor* to 10 *excellent)*
0-1-2-3-4-5-6-7-8-9-10

12. How likely are you to recommend telemonitoring for chronic heart failure to your family, friends or colleagues?

Not likely 0-1-2-3-4-5-6-7-8-9-10 highly likely

About you and your patient population

13. You work as a:
- o Cardiologist
- o Heart failure nurse practitioner
- o Heart failure nurse

14. The number of heart failure patients in the cardiology outpatient clinic at your hospital is:
- o fewer than 200
- o 200 - 300
- o 301 - 400
- o 401 - 500
- o more than 500

15. How many patients is telemonitoring currently used for at your hospital?
- o fewer than 25
- o 25 - 50
- o 51 - 75
- o 76 - 100
- o more than 100

Annex 4 Telemonitoring service - Philips Home Healthcare Solutions

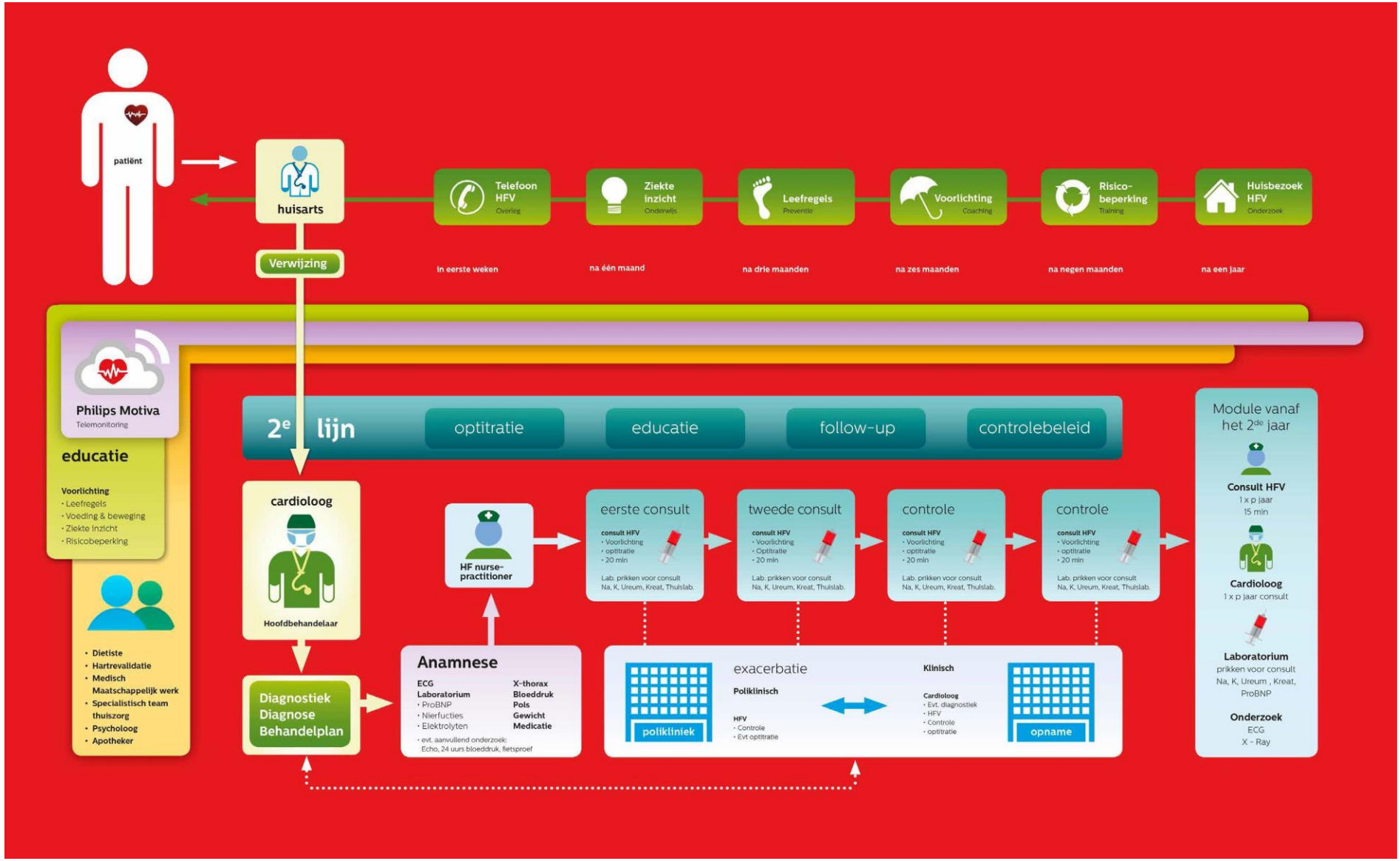
Philips' telemonitoring service was developed for chronically sick patients. In the Netherlands telemonitoring is used actively for patients with chronic heart failure. In the future telemonitoring will also be made available for other chronic conditions such as pulmonary diseases (COPD) and diabetes mellitus (DM).

How does telemonitoring work?

The patient receives the 'personal health channel' through the TV or on a tablet. He is also given access to (wireless) digital scales and a blood pressure gauge, to be used at agreed intervals. The vital parameters are sent directly via a secure Internet connection to the care provider, regardless of where this care provider is located. The service checks the readings and if any irregularities are found indicates whether there is a high/medium/low risk. This may be followed by action by the care provider in the form of contact with the patient by phone or by means of a written message. This will often involve changing the medication and/or dietary advice. Lifestyle intervention rules may also be discussed. The patient uses visual means to track how his state of health is evolving. The personal health channel also shows video films giving information about the condition and lifestyle recommendations.
By way of telemonitoring the patient completes questionnaires relating to the quality of life and care experienced. The care provider can respond to this using motivational (video) messages.

Philips' telehealth service has been available on the Dutch market since 2008 and in 2015 will be superseded by a new generation of clinical applications. Many national and international surveys have demonstrated the value added of telemonitoring for patients' quality of life, for improving various clinical parameters and for making health care more effective. The provision of care by means of telemonitoring is one of the possibilities for reducing the future pressure on health care.

Annex 5 Graphic representation of care path for secondary heart failure care



Annex 6 Graphic representation of primary heart failure (chain) care