

# Interreg



## North-West Europe

## NWE-Chance

Development and validation of promising integrated eHealth applications for hospitalisation of heart failure patients at home.

### Article “Hospitalisation@Home - two years of progress”

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## Article

### **Hospitalisation@home: Why?**

In this time of COVID more than ever, for heart failure patients being hospitalised safely at home is often more attractive than being admitted to hospital. Indeed, NWE-Chance focuses on admitting and treating patients who are recovering from heart failure at home.

Experience at the Isala Heart Centre Zwolle (Netherlands) ([www.isala.nl/](http://www.isala.nl/)) demonstrates that being hospitalised at home is also a beneficial experience for vulnerable patients. When patients are hospitalised at home, Isala has noticed reductions in the risk of hospital-acquired infections, delirium, and accidents from falls. It has even observed that hospitalisation at home stimulates patients to be more active.

Quality of life and safety remain important issues for patients. Of course, the safety and quality of the patient's treatment need to be maintained at the same level – or even better, improved – at home as in the hospital. This is where the technology – and the integrated platform being developed in NWE-Chance – comes into play.

A major question remains. Is hospitalisation at home economically sustainable? It is too early for NWE-Chance to answer this question. The integrated technology platform and its supporting care process are being investigated: the technology has not reached the market yet. Even at this stage, however, Isala has calculated that home hospitalisation using a standard technology is 40% cheaper than regular hospitalisation. This calculation does not yet include other potential economic benefits, such as an increased availability of hospital beds.

### **Hospitalisation@home and home monitoring: Are they the same?**

What makes doing hospital admissions at home different from other forms of hospital care at home?

Digital health services are used in both cases. There are two clear distinctions, however.

The first distinction relates to the terms and conditions of the two treatments. A patient who is being hospitalised at home instead of in-hospital receives treatment that is under the responsibility of the hospital. As a result, the patient cannot leave their home: they receive daily visits at home from a nurse, and their health condition is actively evaluated every day using remote monitoring from a distance for the entire duration of the home hospitalisation period. (This is in contrast to the treatment received by a patient who is monitored at home. A home monitoring patient is observed for a few months or even a longer period of time; can leave home as they wish; may be visited at home from time to time by a nurse; their health condition is assessed less often; and – in the event of an alarm – will be asked either to visit a general practitioner or go to hospital.)

The second distinction is about the stage of maturity of the two approaches. Ambulatory care at home using remote monitoring or telerehabilitation is starting to be well known and well spread in Europe. Yet hospitalisation@home is still in its infancy.

### **Care at home: Towards hybrid models of care?**

Hybrid models of care, alternatively referred to as “blended care”, are implicitly embedded in the context of the digital transformation of health and care and ongoing innovations in services delivery and provision.

Ideas about and use of hybrid care are re-emerging in 2021, however, because of the intensive use of digital health during the series of COVID-19 pandemic lockdowns. During 2020-21, patients and health and care professionals have been exposed to new ways of interacting with each other. As a consequence, the delivery of care is being transformed, based on people’s experiences of combining traditional care with new ways of working and receiving care.

It is therefore vitally important that people – health and care professionals, IT experts, and end-users including citizens and patients – work together, to learn from each other about mainstreaming hybrid (blended) care in light of all the recent COVID-19 developments and experiences.

NWE-Chance is conducting a feasibility study and small-scale pilot which will permit insights into these kinds of challenges.

### **Hospitalisation@home on three sites: Using what care pathway?**

Three NWE-Chance sites are focusing on hospitalisation@home: they are Isala, MUMC+, and Jessa. Key to their work in every case is the kind of care pathway that they use.

Isala has already ten years of experience with home hospitalisation of heart failure patients. It has a well-structured organisation, with specialised trained nurses, and delivers optimal treatment to patients in their own home.

In NWE-Chance, Isala is working with two other hospitals, MUMC+ in Maastricht (The Netherlands) (<https://www.mumc.nl/en>) and Jessa Hospital in Hasselt (Belgium) (<https://www.jessazh.be>). All three are assessing the feasibility for heart failure patients to get hospital-level care at home, in order to treat an acute decompensated heart failure<sup>1</sup>.

The average duration of the treatment and follow-up is five days.

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<sup>1</sup> Acute decompensated heart failure (ADHF) is a sudden worsening of the signs and symptoms of heart failure, which typically includes difficulty breathing (dyspnoea), leg or feet swelling, and fatigue. ADHF is a common and potentially serious cause of acute respiratory distress.

The five-day timelines of intervention are expressed as T0-T3 (Time 0 to Time 3) (see Figure 1 below).

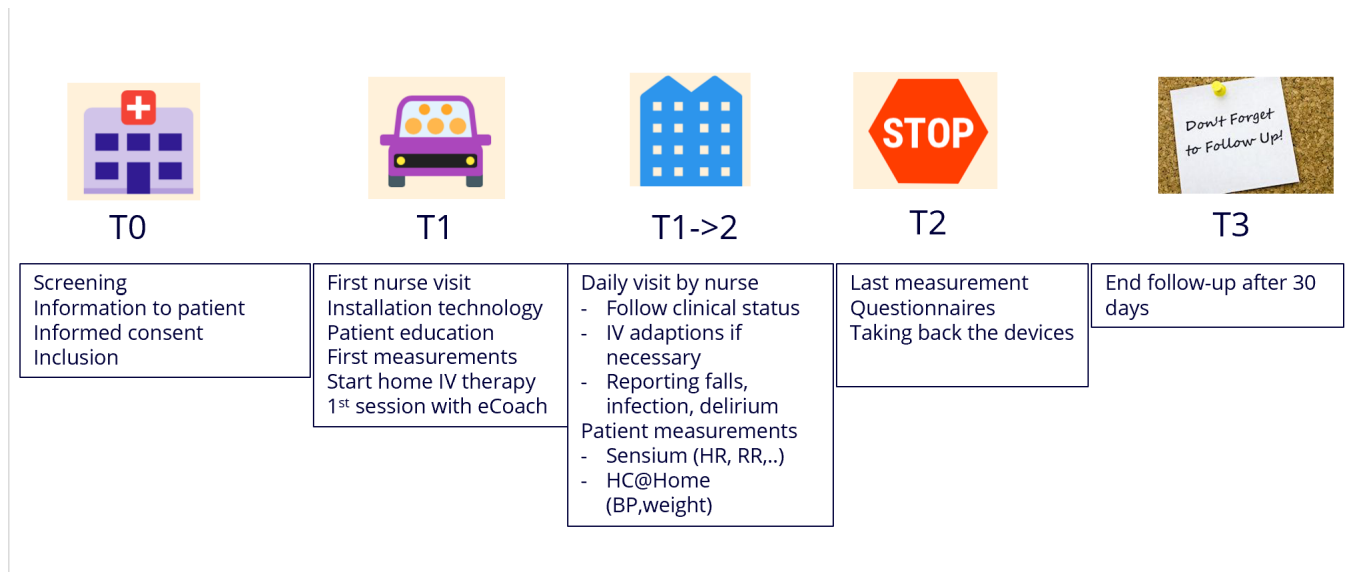


Figure 1: Timeline of interventions in NWE-Chance

All in all, a total of 100 patients will be included in the NWE-Chance feasibility study and small-scale pilot.

The Isala Heart Centre, which has experience with hospitalisation at home, will include 40 patients with acute decompensation of heart failure in its study.

MUMC+ has no experience in hospitalising patients at home, but already has experience in infusion therapy<sup>2</sup> for congestive heart failure and early discharge from hospital. MUMC+ will therefore include 25 patients in its study.

Jessa Hospital has no experience with either home-hospitalisation or remote infusion therapy. Jessa Hospital will include 35 patients at the end of their heart failure hospitalisation for further monitoring at home with the home hospitalisation platform (HHP), but no infusion therapy will be provided at the patient's home.

While NWE-Chance is concentrating on heart failure patients, home hospitalisation may also be considered for other health conditions. In Isala, for instance, also pneumothorax patients, endocarditis patients, and low-risk myocardial infarction patients are treated at home. The care pathway for each condition is similar.

<sup>2</sup> In the case of congestive heart failure, intravenous (IV) (through the vein) medications are administered by an infusion pump to help ensure the dose is accurate.

## **NWE-Chance Feasibility Study: What are the main objectives?**

NWE-Chance's feasibility study has two main objectives<sup>3</sup>.

One objective of the feasibility study is to assess the benefits and pitfalls of an integrated technology platform and the supporting care process. It is expected that the platform should be easier to use than the technology currently in use. Thanks to the use of a single display instead of one display for each device, it should offer nurses a more comprehensive view of the patient's health conditions in a single glimpse. It should also allow more frequent data transmission and a larger variety of data that can be collected (such as heart rate, respiratory rate, posture, and activity). The platform is also integrating a smartphone-based eCoach that will provide support to patients in their home and ask them a few short and customised follow-up questions.

Three positive benefits may result. As a consequence of these technology improvements, clinicians and nurses expect to provide better care and a better quality of life to patients. In turn, hospital managers anticipate, in the long run, to reduce the number of home visits thanks to a more intensive monitoring of a patient's health condition. Hospital Chief Information Officers may even have the possibility to link the integrated care platform with the electronic medical records they are in charge of.

A second objective is to enable MUMC+ and Jessa Hospital to learn from Isala's experience and define an organisational strategy to support hospitalisation at home that would answer various questions for them. Examples include: Which care process adaptations are needed? What impact has hospitalisation@home on the role and responsibilities of nurses and cardiologists? How can one deploy the technology in a patient's home?

## **NWE-Chance today: How far has the project progressed?**

After two and a half years of work, NWE-Chance has now started its pilot phase. Five obvious achievements have been accomplished relating to the organisation, readiness for field testing, nurses' training, patient recruitment, and the availability of the eCoach.

### **1. The organisation is in place**

A first version of an operational blueprint has been prepared that describes a full-service home hospitalisation programme. It outlines the hospitalisation@home care pathway to be put in place, the changes required in the organisation of the pilot hospitals with the roles and responsibilities of the staff, the logistic aspects and, last but not least, the quality management process needed. This blueprint will be updated based on the experience gained during the pilot phase of the project.

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<sup>3</sup> The NWE-Chance feasibility study is not a clinical trial (and no clinical decisions will be made only on the basis of the information collected by the platform).

## 2. The NWE-Chance home hospitalisation platform is ready for field testing

The NWE-Chance integrated home hospitalisation platform (HHP) prototype went live in October 2020. It fuses data and workflows from five different instruments in three different technical partners' sub-systems.

At home, patients are provided with digital wireless sensors from various vendors – all integrated into the HHP – in order to measure their blood pressure, weight, oxygen saturation, and pulse rate.

They also receive a chest patch for the continuous monitoring of their heart and respiration rate, as well as activity and posture.

A smartphone with a HHP mobile app is supplied to guide measurements and ensure data is securely transferred.



The eCoach function of the app can converse with the patient in order to provide guidance and collect additional information, such as daily checks on how they are feeling.

In the hospital, nurses enrol patients via the HHP portal prototype and the portal creates the necessary entities (components) in all the computerised sub-systems.

All data parameters collected by the sensors, the patches, and the eCoach are displayed and visualised together on the information management dashboard:

- point graphs for weight, oxygen saturation (+pulse), blood pressure (+pulse, potential rhythm issues),
- a bar graph showing summaries of daily activity level and posture,
- zoomed-in graphs for hourly heart rate and respiration rate averages, and dominant activity/posture for every half-hour period,
- slider visualisations of eCoach results (e.g., a score for well-being).



These on-screen graphs are supported by popups and foldable legends. The intention is to make it as easy as possible for nurses to interpret the health status of the patient at a glance, and drill down to any details needed.

### 3. Nurses have been trained to use the platform

Nurses have undergone training in use of the platform. Two physical training days were planned, but this was replaced by two online training sessions. During the training sessions, a nurse from



Isala shared her experiences on home hospitalisation. The NWE-Chance technical partners explained how the HHP works. Nurses could test it in their own location, with the remote support of the technical partners. At the end of the day, nurses felt sufficiently prepared to monitor patients at home with this new integrated platform. One of them reported,

“It’s great to follow patients from a distance. The system provides me with extra information, which can be used to advise them adequately.”

### 4. Patients are recruited and hospitalised at home

In the **Jessa Hospital**, the patients were enrolled in the system by the hospital cardiology ward after a thorough feasibility assessment by the specialist heart failure nurse. After their enrolment, patients return to the comfort of their home, and a specialist heart failure nurse visits them next day to install the HHP.

The specialist heart failure nurse will visit at home every patient they are in charge of between 8 and 11 AM each day to assess their clinical status and to assist them with taking measurements as needed. Before visiting them, the nurse first checks the caregiver dashboard and afterwards, the nurse can follow up on the vital signs of the patients at distance.





patient and especially to react quickly in the acute phase of the heart failure decompensation.”

The feedback from the Jessa patients is very positive; they really love the home hospitalisation intervention.

“The home hospitalisation gave me reassuring feeling,”

one of them said. Many patients feel reassured because they know that their information is being sent to the hospital. When hospitalised at home, they worry less about their clinical condition.

The feedback from nurses is also upbeat:

“It’s a nice and good way to follow up a heart failure

**In MUMC+**, patients are recruited either by the heart failure outpatient clinic or by the cardiology emergency ward. They are people who are experiencing heart failure deterioration and have an hospital admission indication.

Once approved for hospitalisation at home, the heart failure nurse at MUMC+ visits patients at home as soon as possible to inform them about the system, to connect them to the HHP, and go through the first session with them. Patients are visited daily by the heart failure nurse who asks them about any medical complaints, takes blood samples, and checks their vital signs data. The nurse contacts the cardiologist on duty to ascertain whether the treatment is appropriate and to adapt it as needed, and inform patients on the cardiologist’s conclusions.

So far, patients are very enthusiastic about the home hospitalisation:

“I am happy to stay at home. I really trust the heart failure nurses, since I know them very well. I can tell you that I feel very safe.”

And, to date, the feedback from the nurses is also positive:

“This is a very nice solution for patients who are often admitted in the hospital, like our patients. The impact of an admission is very mild since patients can stay at home.”

**In Isala**, patients are enrolled by the cardiology ward, the cardiac emergency unit, the heart failure outpatient clinic, or via the general practitioner. All enrolments are done under the supervision of a coordinator who is in charge of coordinating the treatment, screening, and enrolment. After their enrolment, patients go back home and a specialised nurse visits them daily. On the first day, the treatment and the technology are explained and the treatment is started.



As in Jessa and MUMC+, nurses from Isala often hear from the patients that it is a reassuring to be closely monitored. They confirm that

“the measured values are well validated”.

## **5. The eCoach is supporting patients on all three pilot sites**

On all three pilot sites, the NWE-Chance eCoach (in short, eCoach) is supporting patients and their nurses to keep track of their health condition. The eCoach sessions take place three times every day.

On the first day of hospitalisation@home, the eCoach collects the baseline data required to personalise the tool. During this initialisation session, the patient and their informal caregivers are given information about the goals and functionalities of the coaching application.

Shortly after finishing this initialisation session, the first daily check session instructs the patient on how to measure their vital signs, such as weight and blood pressure. The eCoach will ask for these measurements during the first session every day. After this session and twice during the day, the eCoach will ask a few questions about any changes in the patient’s health conditions. Vital signs that deviate from the norm or any risks arising from the answers given by the patient will trigger additional questions intended to get a more specific view of the patient’s health. The eCoach will then provide the platform with data to be visualised on the nurses’ dashboard.

The results of the feasibility study and small-scale pilot will be scientifically evaluated.

### **NWE-Chance: What next?**

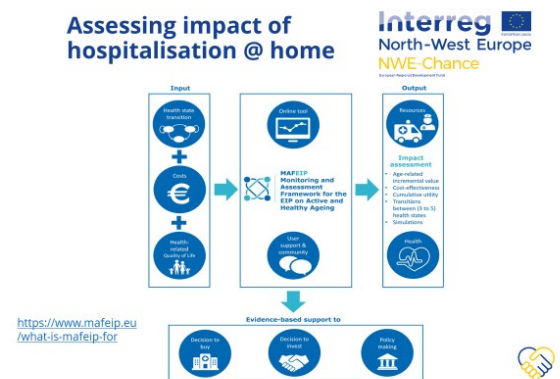
NWE-Chance has two major next steps that are about to start. They relate to an economic impact assessment and stimulating innovation in the field of hospitalisation@home. Details on each step follow.

#### **1. Economic impact assessment**

The potential economic impact of hospitalisation@home in the Netherlands, Flanders in Belgium, and the United Kingdom will be evaluated by using MAFEIP (<https://www.mafeip.eu/>).

MAFEIP is a web-based tool whose purpose is to estimate the health and economic outcomes of a large variety of ICT-enabled social and health innovations, including new care pathways. The tool is open access, and has been developed with the support of the European Commission.

MAFEIP will also enable a return-on-investment calculation to be performed for the three sites to help in determining the commercial strategy, cost structure, and business model for use of the home hospitalisation platform.



## 2. Stimulating innovation for hospitalisation@home

Over the course of the next 12 months, NWE-Chance’s innovation hub will be made more concrete.

The innovation hub will help build momentum in this field, and will develop a platform that brings together the learnings and key assets of the NWE CHANCE project. It will enable the project to make progress in attracting other stakeholders that are interested in hospitalisation@home.

The key objective in building the hub is to develop collaborative opportunities internationally for industry, hospitals, and academics who can dynamically share ideas and advance the shift taking place in care in the community.

There are several key functionalities to the innovation hub. The hub will allow collaborators to securely access information, analytics, and insights into hospitalisation@home. It will offer facilities to exchange ideas and form partnerships with other leading hospitals and small and medium-sized enterprises. An index of innovation labs will also be curated so as to bring together the best of innovation being carried out, in particular, in the field of heart failure but also in other medical conditions.

The ambition in building this cluster of innovation labs is to transfer innovation across both geographical and medical boundaries. This activity will expand the existing knowledge base of available case studies backed up by evidence.

A core endeavour of NWE-Chance is to make the Digital Innovation Hub the “go-to place” for hospitalisation@home.

More on the project and its progress is available at [www.nweurope.eu/nwe-chance](http://www.nweurope.eu/nwe-chance)

## Beneficiaries

