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Providing digitalised prevention and prediction support for ageing people in smart living environments

PRECARE:
The PreCare Clinic - A sector-neutral, data-driven, and person-centred healthcare service

May 2024

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www.smileehealth.eu

Document Summary

Our Partner, Region Zealand, published a Blueprint describing the set-up, workflow, and results of the PreCare Clinic project in Denmark from 2018 to 2023.

PreCare reorganized parts of the traditional hospital activities to occur close to the citizen and in the citizen's own home. Proactivity, early detection, and prevention were the overarching principles for the activities. The PreCare project proves that citizens can receive better care at home for lesser costs than in the traditional model.

The citizen's vital parameters were consistent benchmarks. Citizens' condition data were collected and processed through digitization and new technology to provide PreCare Clinic staff with information about the right effort at the right time and place.

PRECARE is built upon the ECM model, which is also fundamental to SMILE. From 2020 to 2023, the PreCare Clinic also functioned as one of the SMILE Living Labs, contributing significant new knowledge and insights that have also informed the content of this document.

PreCareKlinikken

PRECARE: The PreCare Clinic - A sector-neutral, data-driven, and person-centred healthcare service

May 2024

Version 3.0

Cover illustration: Urgent Agency

Projects: Community Health Innovation: Platform Development and New Models for Preventive Care and Person-centric Health Innovation: New Service Model for Preventive Care Delivery to Elderly and Citizens with Chronical Conditions or at Risk of Getting Chronical Conditions.

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1. Background

The general pressure on the health sector, due to an increasing number of older adults with an increasing number of long-term health conditions (LTHC), as well as the introduction of new technologies and medicines etc., have in recent years challenged the healthcare sector to look for new methods for diagnosis, treatment, and follow-up of citizens/patients.

In this context, there has been a particular focus on finding solutions that can assist and substitute hospital treatments with activities outside the hospital in the local community. The goal is to give citizens the greatest possible feeling of being safe and having freedom in their daily lives. At the same time, there is an expectation that this form of substitution can improve the use of total resource consumption in the health sector.

The 'Agreement on Coherence and Proximity', concluded on June 10th, 2021, between the Danish Government, the Danish Regions, and the Association of Municipalities, (KL) aim to strengthening the cooperation and coherence in the services the growing population of senior citizens and citizens with chronic conditions.

The partners agree to establish an organizational framework so that more citizens can receive treatment and preventive services in the local community. In the future, more treatment and follow-up must be solved in municipalities and at home, including digitally supported treatments. This will ensure better coherence and proximity of care for the citizens, while relieving the burden on the hospitals. The PreCare Clinic is an initiative that fits directly into the objectives of this agreement.

The PreCare Clinic is part of the PreCare project[1], which was launched in the spring of 2018 through a funding grant from the Innovation Fund Denmark[2]. The PreCare Clinic is a close strategic cooperation between Odsherred Municipality and the Region Zealand.

The PreCare Clinic offers digital as well as outgoing homecare treatments to citizens with chronic disease, which gives citizens the opportunity for increased disease awareness, self-involvement, self-monitoring of health status and easy and quick access to relevant help in acute and subacute treatment when medical exacerbations occur. Thus, the PreCare Clinic also supports a necessary reorientation of activity from acute to subacute, from hospitalization to outpatient and from hospital treatment to home based treatment when appropriate and possible.

The overall aim is thus to reorganize parts of the traditional hospital activities to take place close to the citizen and preferably in the citizen's own home. Proactivity, early detection, and prevention are the overarching principles for the activities at the PreCare Clinic. The citizen's vital parameters are consistent benchmarks for the PreCare Clinic's areas of activity. Through digitization and new technology, citizens' condition data is collected and processed to provide PreCare Clinic staff with information about the right effort at the right time and place.

In the initial phase, the PreCare cCinic will start with a smaller number of diagnoses that can be handled with the skills and resources available. The vision is for The PreCare Clinic to be able to serve older adults with one or more long-term health conditions and thus be able to handle multimorbidity with a 360-degree perspective and at the same time with focus on the individual's needs.

[1] https://www.regionsjaelland.dk/Sundhed/Innovation/innovationsprojekter/Sider/PreCare.aspx

2. Introduction

This blueprint describes the **Living Lab,** which at the same time embraces the dynamics between innovation, development, action research and upscaling of the operation of the various processes and structures that are all part of the PreCare Clinic set up.

At the heart of the **Living Lab** are the cross-sectoral influences of innovation, development, implementation, operation, and analysis wrapped in an action research-based "plan-do-study-act cycle" that is illustrated in Figure 2.1.

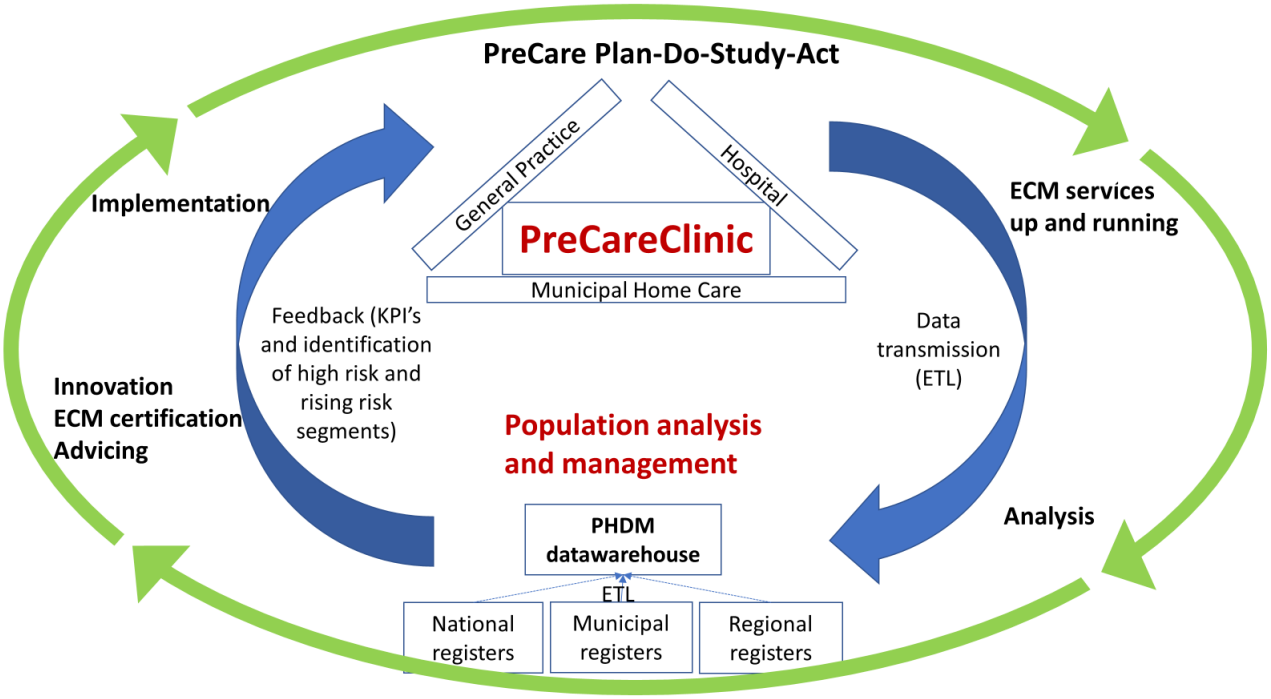


Figure 2.1. PreCare Plan-Do-Study-Act Cycle
Source: Data and Development Support, Region Zealand

The step-by-step expansion of The PreCare Clinic's operations defines what has been carried out in the project and is based on the underlying ECM model. With sector-neutral, data-driven, and person-centred healthcare services as a starting point, this blueprint describes the iterative and ongoing adjustment of operations that takes place The PreCare Clinic as a model for a sector-neutral, data-driven, and person-centred healthcare service.

It is important for understanding the extensive complexity of the project and processes to devote time to studying and understanding the thinking behind the ECM model, which is also described conceptually in this blueprint.

The blueprint was written in autumn 2020 and subsequently updated in 2021- 2023, and contains a snapshot of the processes, resources, and solutions that designed The PreCare Clinic at those times.

Based on the action-based research method (1), activities and services in the PreCare Clinic have since the start of PreCare I been constantly developed and adjusted, based on systematic data-driven knowledge and experience collection.

The description of the project and the associated processes will be continuously updated and expanded as more experience is gained and new diagnostic areas are included.

It is the hope of the partners that the described processes and materials can be used as inspiration for municipal, regional, and national actors in the work to initiate more sector-neutral, data-driven, and person-centred health services around Denmark.

3. Purpose of the PreCare project

The PreCare project has aimed to develop condition-based and person-centred services for older adults with one or more LTHC's based on continuous collection and analysis of data from both region, municipality and citizens on condition, interventions, and results.

The services developed must ensure citizens a quick response in case of anxiety or deterioration in their condition and ensure a coordinated effort, which is predominantly intended to take place at home with the citizen.

The main delivery is a fully established and commissioned PreCare Clinic in Odsherred Municipality with fully developed and tested services within COPD, heart failure and Diabetes Type 2. The present document is primarily based on experience from the COPD condition.

The development and commissioning of the PreCare Clinic has happened in three phases:

1. The establishment phase, where the PreCare Clinics infrastructure matured sufficiently to be able to initiate the planned services that are started in the intervention phase
2. The deployment phase, where the PreCare Clinic's two primary services in relation to COPD citizens and citizens with other selected diagnoses were set up:
   - Citizens with COPD are offered The PreCare Clinic's services from ECM 1 (self-monitoring) to ECM 5 (admission to MER)
   - Citizens with emergency conditions in relation to preventable hospital admissions are offered The PreCare Clinic's MERN and MER services from ECM 3-5
3. The operational phase, which, assuming a successful establishment, and intervention phase, will scale up the given services in number of citizens and to other diagnoses.

This blueprint deals with the second phase, the deployment phase.

3.1 Structure of the blueprint

This blueprint includes a description of the mindset behind the PreCare Clinic, including the ECM model. The toolbox with concrete examples of materials covers:

- The PreCare Clinic's condition-based services
- Features of the PreCare Clinic
- Data-driven follow-up and treatment
- Task, roles and responsibilities
- The logic of the PreCare Clinic, including services with associated workflows and instructions
- Development of new services
- Health professional competencies
- Requirements for equipment, devices, and IT infrastructure
- Business and economy models.

3.2 Reading guide

The PreCare Clinic in Odsherred Municipality was started as a so-called green field' project. The PreCare Clinic is built from scratch in a geographical area that has not previously known similar services and collaboration structures between the municipality and the region for chronically ill. The materials in this document can be used in connection with the establishment of similar structures in other municipalities and/or regions.

This blueprint can also be used as a reference work with inspirational materials for the further development of already existing initiatives in the healthcare field at municipal, regional, national and international level. When a toolbox appears in the blueprint, it means that this belongs to a Toolbox annex detailing practices. A list of the tools in the box is found after the section of References. Here concrete examples of materials and procedures used in the PreCare Clinic. As the PreCare Clinic was still under development in May 2023, some elements of this blueprint will be described in more detail than others.

4.The mindset behind the PreCare Clinic

The establishment of the PreCare Clinic is based on the PreCare project's vision of a sustainable healthcare system that offers citizens help to prevent diseases and to cope with a life with chronic diseases and the limitations that follow, cf. Box 4.1.

Box 4.1. Vision: From sector driven health care services to sector neutral, person-centred, and data-driven healthcare.

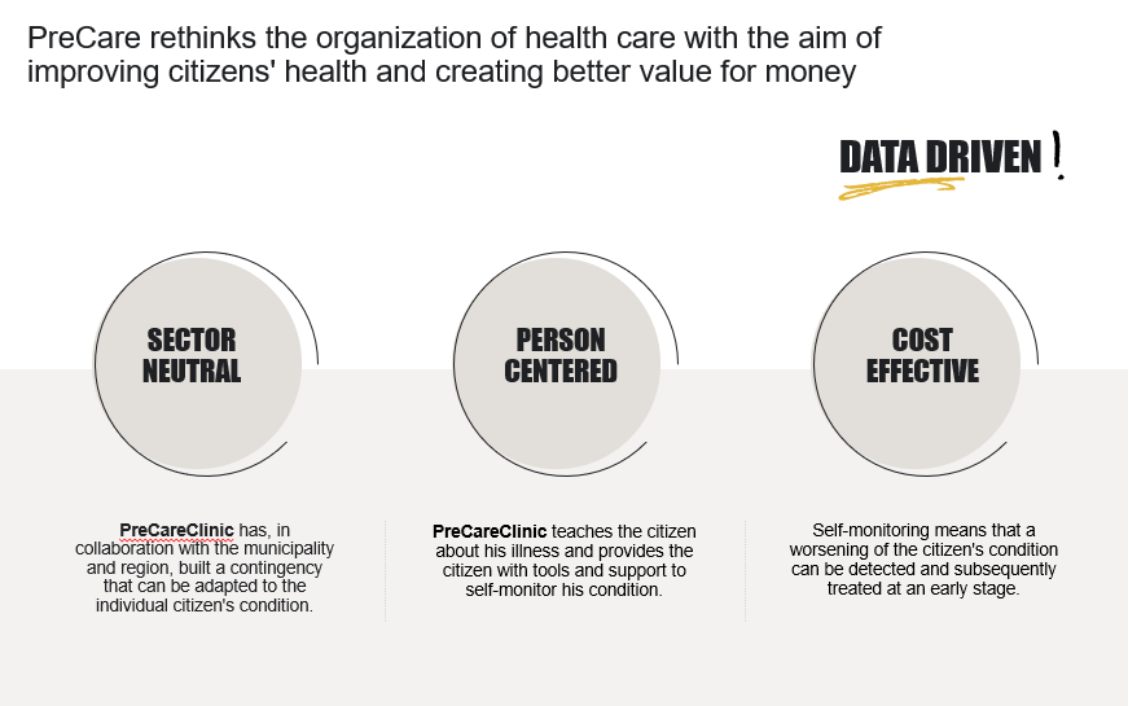
- From reactive to proactive
- Point of care in the EhealthCareModel (ECM) context: Condition monitoring and ECM-associated health services
- One-point-of-contact through new organisation: Response and Coordination Centre (RCC) – the health system's command centre – online and on time on demand
- The digital infrastructure – from sector-based documentation to citizen-centred documentation
- New healthcare roles:
    - The e-doctor – who professionally combines the general practitioner, internal medicine and telemedic
    - RN's: Response and Coordination Centre (RCC) and Mobile Emergency Nursing (MERN) in the citizen's home
    - The citizen: Self-measuring and health-navigating person in relation to their own chronic condition with the possibility of online help on demand.

The PreCare Clinic is based on WHO's "Framework on integrated people-centred health services" (2), where:

- The goal of the patient role for people with chronic disease is supreme self-control
- Proactivity is the central premise
- Condition monitoring is the key to a graduated response from healthcare professionals in case of acute deteriorations
- Sector neutralization is a necessary consequence

The PreCare Clinic is conceived as a "whole system demonstrator", which includes an integrated approach to the use of technology, new ways of organization and collaboration, new types of activities, new roles for the healthcare professionals and the identification of new opportunities for financing models.

Figure 4.1. A sector-neutral, data-driven and person-centred healthcare service.

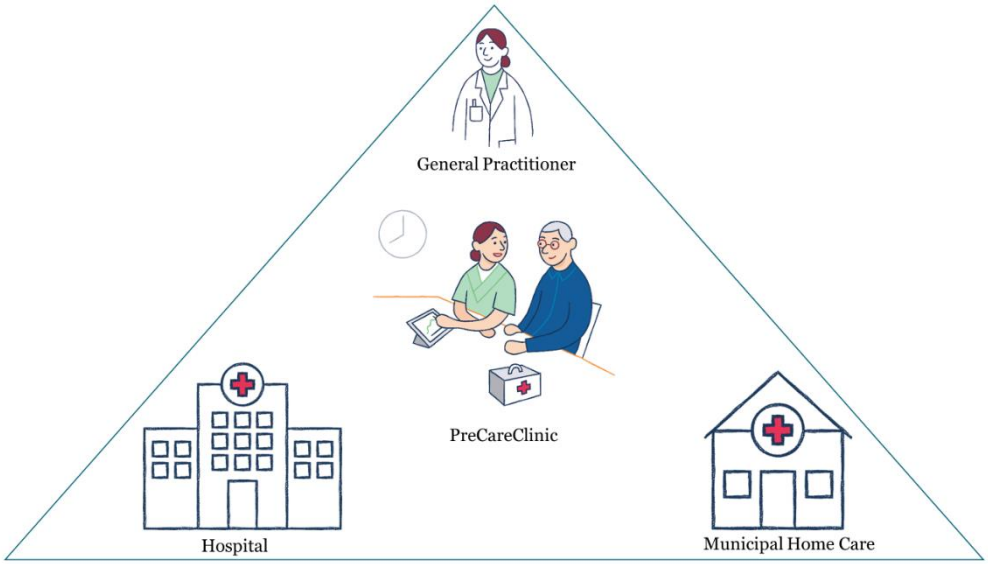


Source: Data and Development Support, Region Zealand.

Figure 4.1 illustrates the PreCare Clinic focus on integrating services across general practice, municipal care, and hospitals, that enhances the quality of the professional cooperation between the sectors. The PreCare Clinic has, in collaboration with the municipality and region, built a service that can be adapted to the individual citizen's condition. The PreCare Clinic helps both with prevention in emergency situations and with follow-up after treatment. The citizen thus experiences his or her clinical pathway as one continuous pathway. Data plays a central role in PreCare. The ongoing data input, which the PreCare Clinic receives from the citizens self-monitoring, is used together with information from the municipal and regional data registers to adapt the treatment and service to the individual citizen. These data input can, ultimately, save lives.

Figure 4.2 below, illustrates PreCare in relation to other existing health care services. The figure shows the PreCare Clinic in in the centre of the organizational set-up of the existing healthcare stakeholders. The figure also illustrates the citizen at the centre of their own treatment outside the hospital in the local healthcare system. The citizens who are affiliated with the PreCare Clinic are treated, to the extent it is possible, in their own homes.

Figure 4.2. The PreCare Clinic among the existing healthcare service providers.



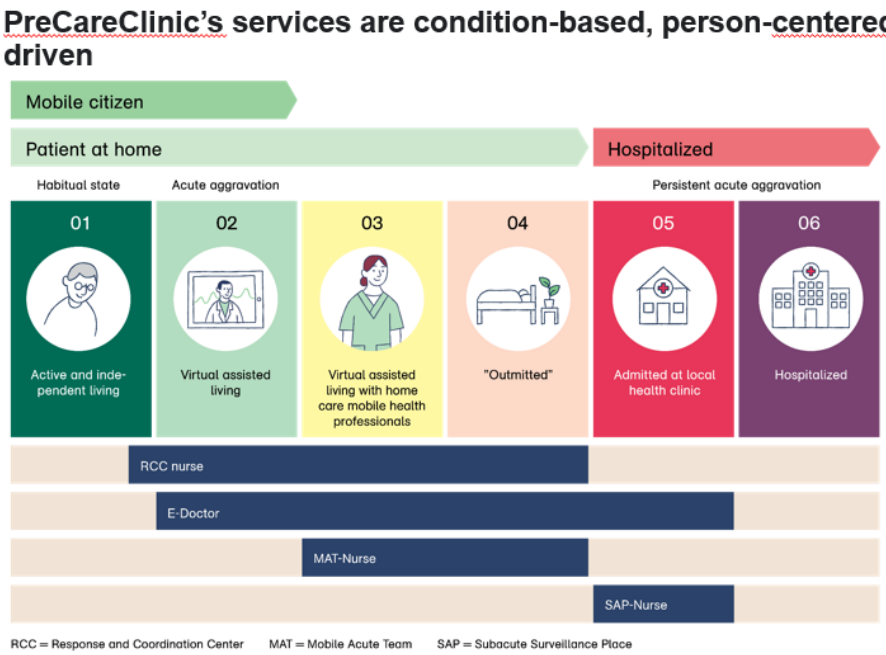
Source: Data and Development Support, Region Zealand.

The PreCare Clinic is based on a health service model that promotes work and task shifts from the specialized healthcare system towards a citizen-oriented healthcare system with renewed active roles for both health professionals and citizens.

4.1 The ECM model

Based on the vision for the PreCare Clinic, the person-centred health service model, ECM, has been chosen as the basic model for the organizational set-up for the PreCare. The ECM model has been developed and previously partially tested in Denmark (3), see Figure 4.3.

Figure 4.3. Illustration of the ECM model or people with chronic disease.



Source: Data and Development Support, Region Zealand.

Overall, ECM is a condition-responsive health service model that adaptively ensures the availability of relevant health services in response to the citizen's current condition. In ECM 1, the person is in self-control (habitual state) and manages most things on their own, but when the condition deteriorates, the relevant health services of the ECM model are activated, which are initially purely virtual (ECM 2). If this is not enough, the MERN RN is sent home to the patient (ECM 3-4). And if this is not sufficient, the citizen is temporarily moved to a municipal emergency room (ECM 5) and alternatively, if this is not sufficient, hospitalization is considered (ECM 6). The ECM allows jumps from e.g., ECM 2 to ECM 6 without the intermediate ECM levels when this is considered relevant from a healthcare point of view.

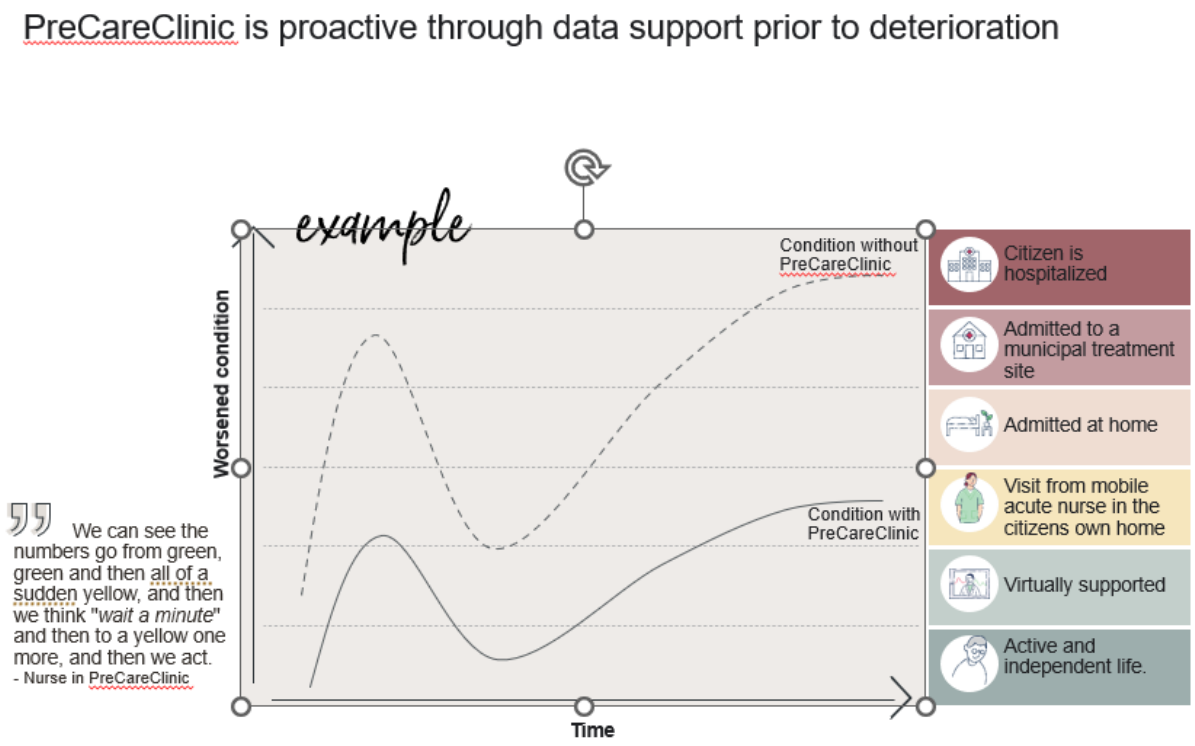
Through ECM 1-6, the model expresses different intervention levels with increasing treatment intensity (and cost level) in the spectrum from the citizen's self-management and self-control in ECM 1 to the fully healthcare controlled hospitalization in ECM 6.

ECM is thus based on a model that, through regular self-monitoring of the citizen's condition fluctuations, is immediately matched by an individualized tuned service response within ECM 2-5, cf. Figure 4.4.

A further important point is that the ECM model's efforts in ECM 2-5, in addition to the healthcare content, are all designed to bring the citizen back to ECM 1 ("active and independent living") as soon as possible, where the citizen regains his or her self-control and where the resource draw on the health system is reduced as a result.

When the citizen is in ECM 1, it is about empowerment-promoting and rehabilitative services being brought into play, so that the citizen is motivated to self-care, gains skills and built self-confidence to once again be able to master and navigate in their own illness and health.

Figure 4.4. Condition-responding health service model.



Source: Data and Development Support, Region Zealand.

5. The PreCare Clinic's condition-based services

The PreCare Clinic is a service for citizens with long-term health conditions. The citizen is at the centre of health their condition and is in close dialogue with specialized RNs and doctors. The PreCare Clinic helps the citizen to regain control in their illness and avoid acute admissions. In popular terms, The PreCare Clinic supports people in being "as much citizen as possible" and "least possible patient" with chronic disease.

The main objectives of the PreCare Clinic are to create:

- Increased security and quality of life for the citizen through increased self-control and self-management as well as the opportunity for quick access to relevant health professional assistance
- Fewer acute deteriorations of the health condition
- Fewer emergency admissions, outpatient check-ups, and GP contacts
- Task relocation away from hospitals and into the citizen-oriented healthcare system according to the "LEOON" principle, which entails that all tasks must be carried as efficient as possible with only providing just the needed care – just in time, just enough.
- Changed regional and municipal activity pattern with increased occurrence of proactive interventions and reduced number of costly emergency interventions

The PreCare Clinics offers three main different services:

- Participation in a telemedicine network for citizens with chronic diseases – initially citizens with COPD and heart failure
- Acute investigation and treatment within acute conditions in relation to preventable admissions
- Help to manage your own illness

These services are supported by the ECM model with the main purpose of keeping the citizen in his habitual state, cf. Box 5.1. The aim is that all citizens, regardless of age, illness or state of health, can live as active, free and independent a life as possible.

Box 5.1. Habitual state.

A chronicler's habitual condition may be composed of one to several diagnoses with associated stratifications, and collectively represents the person's current state of health. The habitual condition of a chronicler can worsen more or less acutely. Acute deteriorations often require urgent medical treatment, and often result in long-term, rehabilitative efforts to enable the patient to recover his habitual state to the same level as before the acute deterioration. It is a challenge that chronic disease will inevitably develop over time and negatively affect the habitual state. It therefore also requires a focus on "procrastinating" efforts – i.e. increased attention to healthy lifestyles, including the KRAM factors supplemented by rehabilitative and coaching efforts with a view to improving the quality of life. to stabilize the basic level of the habitual state as best as possible.

5.1 Participation in The PreCare Clinic's telemedicine network

Citizens who are affiliated with the PreCare Clinic are part of a digitally enabled network, where they monitor their condition in their own homes. The citizen receives a response to the measurements as soon as the measurement is registered.

Services in ECM 1 and 2

If the measurement shows a deterioration in the patient's condition, the citizen will be contacted by a RN from the PreCare Clinic's RCC (Response and Coordination Centre), (RCC), who in dialogue with the citizen initiates treatment immediately if needed.

The ongoing monitoring of the citizen's condition under the auspices of the PreCare Clinic means increased security, disease awareness for the associated citizens and the opportunity to monitor their own health status as well as easy and quick access to relevant help in acute and subacute deteriorations which requires treatment, that could otherwise lead to hospitalizations.

Services in ECM 3-6

In case of progression of the deterioration of the medical condition, it may be necessary for a MERN RN (Mobile Acute Team RNs) to visit the individual citizen in their home, to assess the citizen's condition. If /para(clinical examinations and the MERN RN's assessment of the citizen's condition give rise to initiation of medical treatment, the MERN RN can initiate this if it is within the PreCare Clinics mandated treatments delegated by the medical doctor responsible for the clinic. These delegations are described as a Framework for delegated work. If the intervention is without the scope of delegations or the MERN is in doubt, then an e-doctor will be contacted. Planned treatment and potential associated follow-up home visits by the MERN are prescribed and planned immediately. The treatment takes place in the citizen's own home.

If, for various reasons, the citizen cannot be in his or her own home due to a temporary increased need for care as a result of deterioration of the condition, the next step is that the MERN and the e-doctor can consider moving the citizen temporarily to a facility with beds in the citizen-oriented health service, e.g. a municipal clinic in the local area (MER). (ECM5)

If the municipal emergency room cannot cover the urgent need for treatment, the citizen is admitted to the hospital (ECM6). Likewise, the PreCare Clinic may decide to admit the citizen to the hospital acutely at the first contact in connection with an acute deterioration, typically in ECM 2 or 3, if necessary.

5.2 Acute examination and treatment within acute conditions in relation to preventable admissions

The PreCare Clinic also offers to examine and treat citizens who ***are not*** part of the PreCare Clinic's telemedicine network. Thus, it is possible for the general practitioners in Odsherred Municipality to request a MERN RN to examine a citizen and possibly, in consultation with the general practitioner, start treatment in the citizen's own home.

Similarly, it is possible for the home RN in Odsherred Municipality to request a MERN visit for a citizen. Here, the citizen's own doctor will have the treatment responsibility, but if he or she cannot be contacted in the specific situation, the treatment responsibility can - by prior agreement with the general practitioner - be taken over by the PreCare Clinic's e-doctor.

5.3 Help to manage your own illness

One of the PreCare Clinic's fundamental objectives is to enable the chronically ill citizen to take as much responsibility and control as possible for managing their own illness.

When the citizen is in his habitual state, it is about empowerment-promoting and rehabilitative services being brought into play, so that the citizen develops skills and self-efficacy to be able to manage the health condition.

As far as possible, citizens are encouraged to act themselves and react adequately to deteriorations', thereby reducing the traditional patient role and preferably becoming completely redundant.

To obtain this goal, the citizens receive education in their symptoms, signs of deteriorations and how to cope with them. They receive training in the use of technical equipment that the citizen uses to assess their actual health condition.

5.4 Promotion of the PreCare Clinic

Information about the PreCare Clinic takes place via:

- Brochures available at pharmacies, libraries and health centres
- Posters visible at libraries, health centres and GPs
- Info-screens with short films about the PreCare Clinic's services [3] in the municipality's sports and swimming halls. The film is also shown at Holbæk Hospital in the waiting area of the medical outpatient clinic
- Ads and articles in the local newspapers
- PreCare Clinic's website, where citizens can watch films and read about PreCare Clinic's offers and about other citizens' experiences of being part of the PreCare Clinic

In addition, the healthcare professionals from Odsherred Municipality, the general practitioners and Holbæk Hospital inform relevant citizens about the telemedicine services.

For the citizens who will be included in the telemedicine network, the RNs review equipment, measurements and answer questions with the citizens in connection with the Tele Medical certification, cf. Box 12.1.

5.5 Consent

An important prerequisite for the data-driven approach in the PreCare Clinic's telemedicine services is that the citizens included have consented to their data being collected.

The RNs from The PreCare Clinic make sure that the included citizens know how their data is used, by whom it is used, and that data is collected in accordance with existing legislation.

In practice , this is done by the citizen signing a consent form when the citizen is included in the PreCare Clinic. It is a RN from The PreCare Clinic who provides the consent form to the citizens and who ensures that the citizens are informed about their rights and complaint options, etc.

The RN brings a copy of the consent form that the citizen can keep. Citizen and RN sign on tablet, so it is registered in the PreCare Clinic's electronic medical record system that consent has been obtained.

The consent states that the work is based on a holistic approach in a cross-sectoral collaboration between the region and Odsherred Municipality with the aim of making it possible to link data across sectors.

[3] COPD: https://www.youtube.com/watch?v=LlmqKqqgVec, heart failure: https://www.youtube.com/watch?v=zfQiM_HW8x0, COPD and heart failure: https://www.youtube.com/watch?v=m_Nu44wF_fY

To ensure the necessary data basis for elucidating the holistic treatment, data is collected in a common regional and municipal database operated by Region Zealand[4].

Box 5.2. Declaration of consent.

Citizens who are included in the PreCare Clinic sign a consent form. The declaration of consent shall be renewed once a year.

With the declaration of consent, the individual citizen consents, among other things, that data necessary for the PreCare Clinic to provide holistic support and patient treatment may be collected and passed on from the citizen's home municipality, Region Zealand and selected national registers. At the same time, citizens consent to their data being used for, among other things:

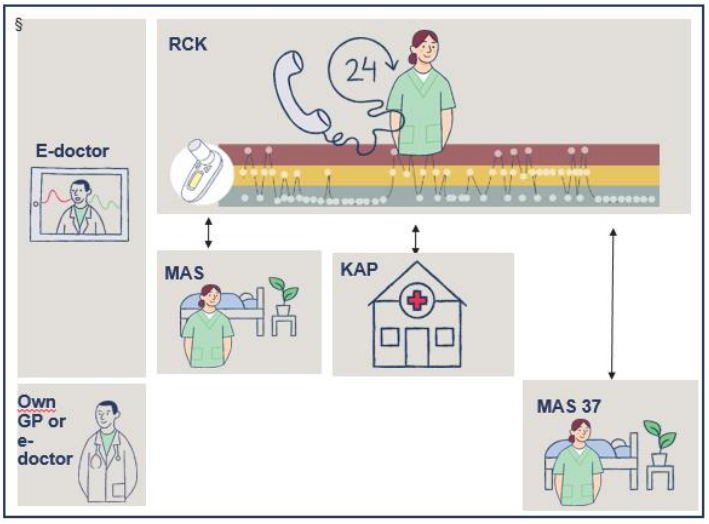
- Follow-up on objectives set
- Optimization of The PreCare Clinic's services and activities
- General management information
- Cross-sectoral planning and governance

6. Features of the PreCare Clinic

The key functions of the PreCare Clinic are described below. Overall, the PreCare Clinic consists of:

- A Response and Coordination Centre (RCC).
- An outgoing MERN team (Mobile Emergency RN - MERN)
- A municipal emergency room (MER)

Figure 6.1. Key functions of the PreCare Clinic.



Source: Data and Development Support, Region Zealand. Illustrations have been prepared by Urgent Agency.

[4] In addition to the consent form, the legal basis has therefore been expanded with agreements that enable the transfer of data from the PreCare Clinic and Odsherred Municipality to Region Zealand. In addition, a data processing agreement has been concluded with the IT company Appinux, which handles the development and operation of the PreCare Clinic's medical record system.

6.1 Response and Coordination Centre (RCC)

RCC is a 24/7 available coordination centre where citizens who are part of the telemedicine network can contact RN's if needed. The RCC monitors the state of health in its associated population through citizens' own measurements (e.g. saturation).

The RCC monitors citizens' daily measurements. If the measurements show signs of deterioration, the RCC contacts the citizen concerned by phone or video within an hour. Through dialogue between the citizen and RCC, the need for treatment is assessed.

If the deterioration requires urgent medical treatment, the RCC RN involves the e-doctor, who is available 24/7.

If, during the virtual dialogue with the citizen, the RCC RN assesses that there is a need for an in-person contact to the citizen, the RCC RN sends a Mobile Emergency RN (MERN) to the citizen's home. MERN can perform clinical examinations, take relevant blood samples and carry out other specific assessment examinations at the citizen's home.

The RCC is thus the focal point for coordinated efforts in the PreCare Clinic.

RCC is staffed by specially trained RNs, who among other things handle the following tasks:

- One point of contact for all inquiries to The PreCare Clinic
- Keeps track of associated citizens' measurements using a triage and alarm system
- Responds to phone and video calls from enrolled citizens
- Coordinates treatment efforts, MERN visits and MERN assessment, assisted by e-doctors responsible for treatment and the MERN function
- Contact to the municipality's other services.

As illustrated in Figure 6.1, the RCC RNs interact closely with the e-doctor, who acts as a kind of rear guard. The e-doctor is always responsible for treatment when initiating treatment of the enrolled citizens.

In the toolbox is a case description of an inquiry to RCC.

6.2 Mobile Emergency RN (MERN)

The outgoing MERN team consists of *specially trained emergency RNs* who can perform paraclinical and clinical examinations. In consultation with the e-doctor, who are the person authorized to prescribe medicine, the mobile emergency RNs can make diagnoses and initiate medical treatments in the citizen's own home.

MERN can examine and treat two main categories of patients/citizens:

1. TM citizens who are already included in the PreCare Clinic and thus condition monitoring and where it is assessed that there is a health problem that requires the physical presence of MERN at the citizen's home (i.e. ECM 3 or 4).
2. citizens who *are not* included in the PreCare Clinic, but where there is an acute healthcare issue that may develop into or require an emergency hospitalization. In this case, MERN can diagnostically uncover the underlying condition (ECM 3) and, in collaboration with an e-doctor or general practitioner, initiate relevant medical treatment at the citizen's home (ECM 4), or be admitted to an emergency municipal place (ECM 5) or hospital (ECM 6). In addition to RCC sending MERN out to the PreCare Clinic's permanently affiliated citizens if needed, general practitioners, home nursing and home care in Odsherred Municipality also have the opportunity to request MERN for a citizen who has become

acutely ill within a number of specific diagnostic areas. Similarly, care centres and training teams etc. in Odsherred Municipality can contact The PreCare Clinic if they need advice or assessment of an acutely ill citizen.

MERN brings a mobile point of care laboratory equipment when visiting the citizen's home and can carry out on site:

- Overall assessment of conditions surrounding the patient; ABCDE review, including need for other municipal efforts
- Measurement of vital parameters
- Acute blood tests (to measure infection rates, blood sugar and blood percentage)
- Pain management
- Changing urethral catheter
- Inhalation treatment
- Sampling for microbiological examination, including inoculation and urine culture

This means that:

- It can quickly be clarified whether there is a basis for initiating treatment or adjusting ongoing treatment of the citizen
- The sick citizen does not have to spend effort on going to another physical location to have the tests that are necessary to assess which treatment may need to be initiated
- Time is reduced when treatment is initiated
- A significant reduction of the risk of further deterioration while waiting for test results
- If hospitalization is required, the MERN RN will hand over to the ambulance staff when picked up by ambulance. The RN provides written reporting to the Emergency Department and oral reporting of the citizens condition to paramedics.

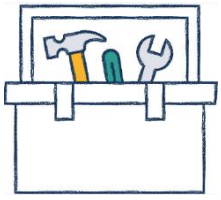
The RN helps solve technical challenges with the use of the measuring equipment of the included citizens. In this way, the citizen avoids spending effort on going to another physical location to get to grips with the technology.

Box 6.1. Examples of emergency conditions in relation to preventable hospitalizations.

The PreCare Clinic was contacted by the home care service, who on a visit to an elderly citizen found that the citizen appeared confused and febrile. The RCC sent MERN to the citizen in question. The MERN RNs found at ABCDE review that the citizen was febrile and upon examination of the citizen's urinate found that the citizen in question had a severe urinary tract infection. The patient was immediately put into treatment and avoided complications and the need for hospitalization.

MERN is tightly integrated with RCC, which receives the calls from general practitioners, home care and home RNs. RCC coordinates the requisitions and logistics of sending MERN.

In the toolbox is a case description of a MERN visit to a citizen.



6.3 Municipal emergency room (MER)

The municipal emergency rooms (MER), which are also shown in Figure 6.1, are round-the-clock manned places at a municipal nursing home, where citizens in the PreCare Clinic can enter for an appointment when the citizen's condition requires round-the-clock supervision and care due to an acute worsening of his/her illness. At MER, the necessary expertise in the form of specially trained emergency RNs with medical back-up is available. At MER, the necessary expertise is available in the form of certified RNs with medical back-up.

MER is staffed by the *municipal nursing service,* which, like the RCC and MERN RNs, is certified in emergency care. Medical coverage in relation to the treatment of the included citizens in MER is provided by the e-doctor.

7. Data-driven follow-up and treatment

A key principle of the PreCare project, is the access to data.
The data-driven approach ensures renewed development in two main areas:

- Streamlining treatment that makes it possible to replace hospital contacts with healthcare services in one's own home
- Active use of data for analyses that enable continuous adjustments in the PreCare Clinic's services and ensure cost-effective patient pathways.

One of the most significant innovations in the PreCare Clinic data-driven approach is an "automatic interpretation" of data into recommended active patient care. The aim is to ensure that citizens receive immediate treatment without delay when needed.

In relation to this, the citizens' own measurements are crucial for the PreCare Clinic to be able to provide person-centred, data-driven and condition-based services in real time.

7.1 Citizens' specific measurements of their condition

The specific condition measurements and types of equipment depend on the citizen's diagnosis, cf. chapter 8.

In the system that the citizens of the PreCare Clinic use for their measurements, it is possible both for the measurements to be transmitted automatically via Bluetooth, and for the citizen to enter the values for the individual condition measurements on a tablet, which they have been given at the TM certification in the PreCare Clinic.

It is recommended that citizens measure themselves daily, especially in the first period after inclusion. In this way, good insight into the patient's clinical condition is obtained.

The actual condition assessments must be entered by the citizen on the tablet. Box 7.1 gives an example of COPD condition assessments.

Box 7.1. The condition assessments for citizens with COPD.

Increased shortness of breath: Here the citizen indicates whether there is increased shortness of breath compared to the day before **Increasing cough:** Here the citizen indicates whether an increased cough is experienced compared to the day before **Coloured sputum:** Here the citizen indicates the colour of sputum.

Source: The PreCare Clinic.

When the condition measurements and condition assessments are registered in the system, they are automatically assigned an overall assessment in the form of the colour green, yellow or red.

The classification is done using an algorithm, which is based on values for the individual citizen's habitual state corresponding to the habitual state.

- A green coded reading means that everything is normal
- A yellow coded reading indicates a mild deterioration in the citizen's condition that requires attention in the next days
- A red coded reading indicates a deterioration that needs to be acted on now

Citizens' measurements can also help them to better navigate their own state of health. Once a citizen has entered an overall survey, the citizen receives a comment back in response to their measurement in real time. The comment tells the citizen what the state of health is and gives the citizen the opportunity to act actively in relation to their own health.

Figure 7.1 shows examples of automatically generated responses to citizens' condition measurements in the COPD area.

The figure shows next to the yellow and red measurements that the citizen is encouraged to contact RCC.

Figure 7.1. Examples of automatically generated response to a citizen's condition measurement.

Measurement results	Comment
	We have received your measurement. You are green. Your data looks fine
	We have received your measurement. You are yellow because your pulse is close to your threshold value. Please contact RCC
	We have received your measurement. You are yellow because you have increased coughing. Please contact RCC
	We have received your measurement. You are yellow, because you have registered increase cough or shortness of breathing. Please pay attention to your symptoms and we advise you to contact RCC.
	We have received your measurement. You are yellow because your temperature shows that you might have a fever. Please contact RCC
	We have received your measurement. You are yellow, because the oxygen content in your blood is close to your threshold value. Please contact the RCC
	We have received your measurement. You are yellow, because your pulmonary function has deteriorated. Please contact the RCC
	We have received your measurement. You are red, because your pulse is higher than the target. Please contact the RCC.
	We have received your measurement. You are red, because your sputum has changed colour. Please contact RCC. Please contact RCC.
	We have received your measurement. You are red, because your temperature indicated that you have a fever. Please contact RCC.
	We have received your measurement. You are red, because the oxygen level in your blood is below your target. Please contact RCC
	We have received your measurement. You are red because your lung capacity has fallen more than 20%. Please contact RCC.

Source: The PreCare Clinic.

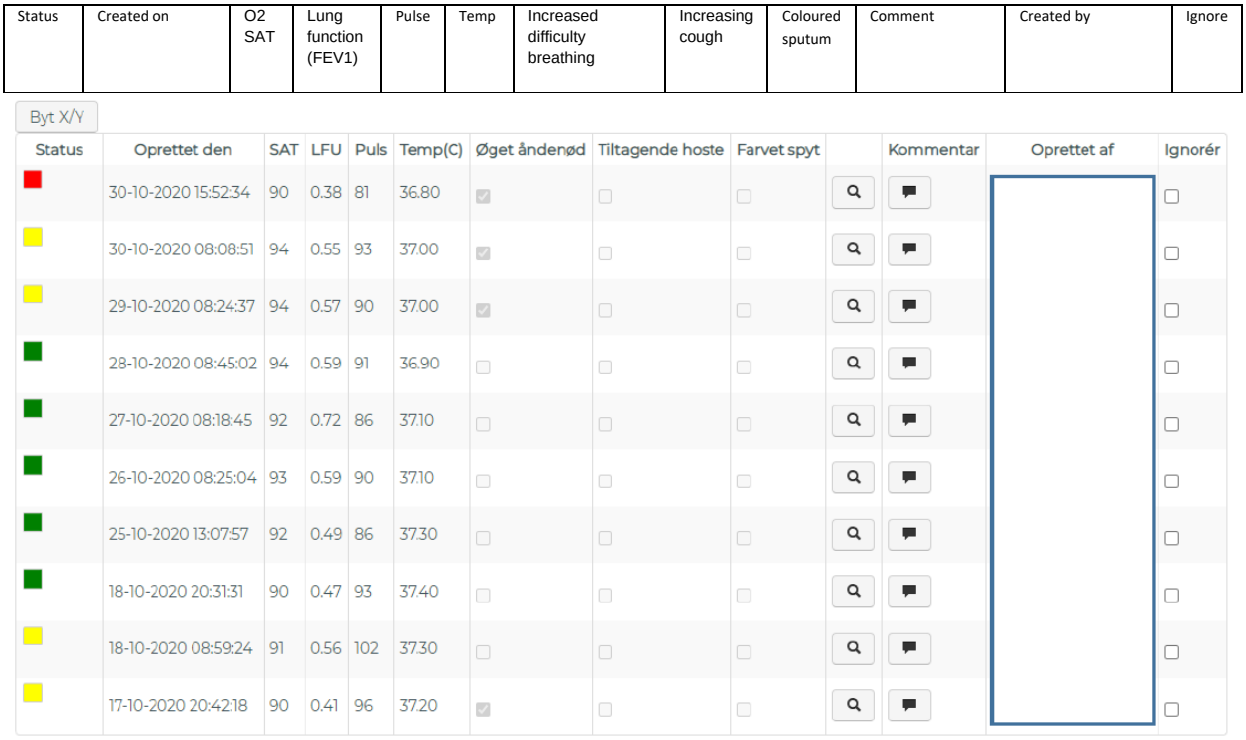
7.2 Monitoring of citizens' condition

Based on the measurements submitted by the citizens, the RNs in the PreCare Clinic monitor the citizens' condition daily and react if there is a deterioration. This constant data-based monitoring enables the PreCare Clinic to quickly response to the individual citizen's treatment when necessary.

The RNs in RCC get a comprehensive overview of the included citizens' measurements, so they can easily see red and yellow measurements, cf. Figure 7.2.

> *"We can see them going from green, green and then all of a sudden yellow, and then we think 'wait a minute', and then to another yellow, and then we already start acting on that."*
>
> - RNs in the PreCare Clinic

Figure 7.2. Example of RCC dashboard.



Status	Created on	O2 SAT	Lung function (FEV1)	Pulse	Temp	Increased difficulty breathing	Increasing cough	Coloured sputum	Comment	Created by	Ignore

Byt X/Y

Status	Oprettet den	SAT	LFU	Puls	Temp(C)	Øget åndenød	Tiltagende hoste	Farvet spyt		Kommentar	Oprettet af	Ignorér
	30-10-2020 15:52:34	90	0.38	81	36.80	☑	☐	☐	🔍	💬		☐
	30-10-2020 08:08:51	94	0.55	93	37.00	☑	☐	☐	🔍	💬		☐
	29-10-2020 08:24:37	94	0.57	90	37.00	☑	☐	☐	🔍	💬		☐
	28-10-2020 08:45:02	94	0.59	91	36.90	☐	☐	☐	🔍	💬		☐
	27-10-2020 08:18:45	92	0.72	86	37.10	☐	☐	☐	🔍	💬		☐
	26-10-2020 08:25:04	93	0.59	90	37.10	☐	☐	☐	🔍	💬		☐
	25-10-2020 13:07:57	92	0.49	86	37.30	☐	☐	☐	🔍	💬		☐
	18-10-2020 20:31:31	90	0.47	93	37.40	☐	☐	☐	🔍	💬		☐
	18-10-2020 08:59:24	91	0.56	102	37.30	☐	☐	☐	🔍	💬		☐
	17-10-2020 20:42:18	90	0.41	96	37.20	☑	☐	☐	🔍	💬		☐

Source: Appinux.

When a citizen calls the RCC, the RN can easily see the most important information about the citizen on the front page of the PreCare Clinic's record-keeping system.

The RN's in the PreCare Clinic always documents relevant knowledge about the individual citizen on the front page, which serve as a dashboard, of the citizen's electronic medical record in Appinux. For example, it may say "known with atrial fibrillation".

In addition, the electronic medical record system registers a number of basic information and a photo of the citizen in question.

In the citizen's medical record, RN's can see:

- Previous Measurements
- When they last had contact with the citizen (date and time)
- An overview in the ECM record in relation to what you have talked about at the last conversation with the citizen

This background knowledge can help the RN who are in contact with the citizen to make a holistic assessment of the citizen's condition.

The color-coding system used to report the citizens' condition measurements can also be used as a dialogue tool when the RN talks to the individual citizen, cf. Figure 7.2.

In the case of a diagnosed exacerbation, medical treatment is initiated by the RN in dialogue with e-doctors, based on a framework of instructions, delegation by the medical doctors and support by decision tools.

7.3 Development of citizens' condition

Normally, actors in the health care organizations only have partial knowledge of a citizen's health condition, based on the relatively few occasions, where the citizen has been in contact with a health service.

The PreCare Clinic's data-driven approach using the citizens' regular measurements means that The PreCare Clinic's RN's regularly can follow the development in the citizen's state of health from day to day. For example, if a citizen's lung function shows a decreasing trend, it may mean an acute exacerbation or that the citizen is moving into a more severe chronic phase of their COPD, cf. Figure 7.3.

Figure 7.3. Example image of COPD measurement

English translation

Booking hours/week

Device Data

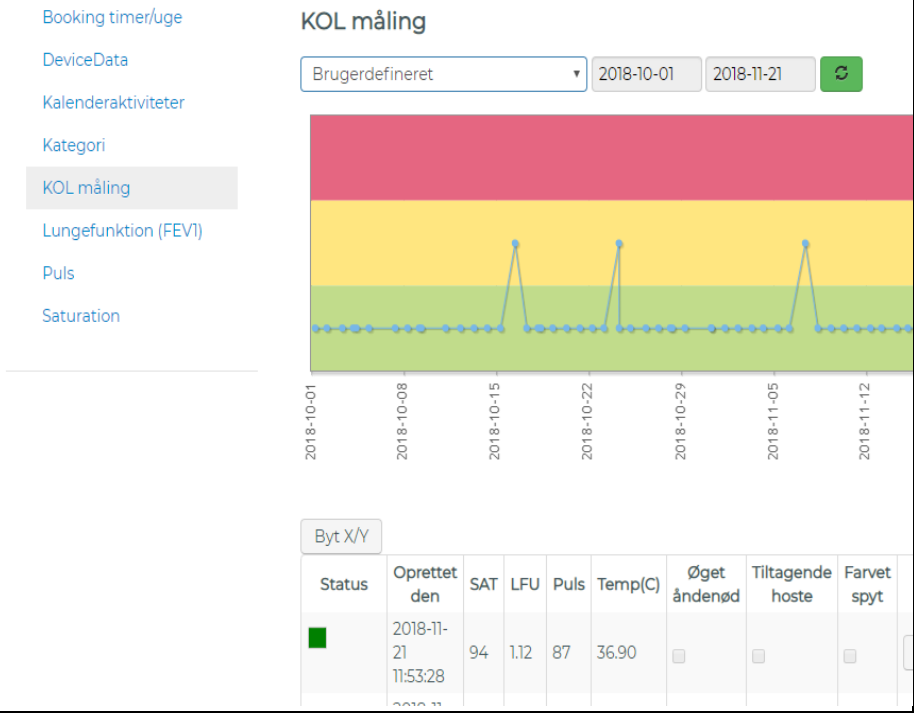
Calendar activities

Category

COPD measurement

Lung capacity

Saturation



Source: Appinux.

The data-driven approach enables RNs to act early on to signs of change in the patients.

7.3.1 Personalized Threshold values set to be able to detect changes of the condition

Threshold values for measurements about the body and condition is set as individualized normal ranges taking the habitual condition into account. This will increase the sensitivity to changes which requires treatment or further assessment. At the inclusion of the citizen in the PreCare Clinic's telemedicine services, the citizen's threshold values for the condition measurements are determined. For both COPD and heart failure, individual threshold values can be set, although it is normal to use standard threshold values. For COPD, individual threshold values can be set for FEV1, [5]O2 saturation (oxygen saturation) in blood and pulse and for heart failure, individual values can be set for weight, blood pressure and heart rate. Individual threshold values are set by the associated specialists in dialogue with the individual citizen.

After inclusion, a continuous adaptation of the individual threshold values takes place. This is as there will be ongoing changes in the citizen's habitual state.

8. The PreCare Clinic's telemedicine services

The PreCare Clinic offers telemedicine services to citizens with COPD, pulmonary fibrosis or Alpha1-antitrypsin deficiency, heart failure and Type 2 Diabetes Mellitus (T2DM).

8.1 Telemedicine services in the COPD area

Specific inclusion and exclusion criteria have been established for which citizens can be included in the PreCare Clinic.

Box 8.1 shows the inclusion and exclusion criteria that form the basis for associating citizens with COPD with COPD to the PreCare Clinic.

Box 8.1. Inclusion and exclusion criteria in the PreCare Clinic for citizens with COPD.

In the PreCare Clinic, the following inclusion criteria are used: 1. Citizen diagnosed with COPD, pulmonary fibrosis or Alpha1-antitrypsin deficiency 2. FEV1 < 70% of expected value 3. The citizen has a degree of shortness of breath (MRC >= 2) In addition, the following exclusion criteria are used: 1. Severe cognitive impairment 2. Blind 3. Deaf	

Source: The PreCare Clinic

The enrolled citizens with COPD measure the following key values:

- Pulse
- Oxygen saturation
- Lung function (FEV1)
- Temperature

[5] Forced Expired Volume in the first second, which indicates how many Liters of air the citizen can breathe out in the first second of the lung function test.

In addition, citizens are asked to consider whether they experience:

- Increased difficulty in breathing
- Increasing coughing
- Coloured sputum

To triage citizens' measurements and condition assessments, the citizen's individual threshold values are used. Box 8.2 gives an example of threshold values for the condition measurements in the COPD area.

For patients with COPD, a successive continuous reduction in the patient's pulmonary function is expected over time, as COPD is a progressive chronic lung disease in which the pulmonary function decreases successively over time (9). The reduction in the citizen's lung condition is reflected in the citizen's individual threshold values, which are adjusted in line with changes.

Box 8.2. Example of threshold values for condition measurements in the COPD area.

Parameter	Interval 1 (usually)	Interval 2 (risk)	Interval 3 (aggravation)
SET	>90	85-90%	<85%
LFU	<10% (compared to normal)	<15-20% (compared to normal)	<20% (compared to normal)
Pulse	<100	100-120	>120
Temp (C)	<37.4	37,4-38	>38
Increased shortness of breath	No	Yes	
Increasing cough	No	Yes	
Purulent expectorant	No	-	Yes
Alert Score			

Source: The PreCare Clinic

8.3 Telemedicine services in heart failure

Similarly, for heart failure- and exclusion criteria have been established. The criteria are set out in Box 8.3.

The inclusion criteria assume that citizens in the PreCare Clinic with heart failure have been assessed for this, prior to starting at the PreCare Clinic. However, it is possible for citizens with newly discovered left-sided heart failure, if there is a long wait for an outpatient assessment, to be monitored in the PreCare Clinic until the outpatient investigation starts and again after completion of the investigation at the hospital.

Box 8.3. In- and exclusion criteria in the PreCare Clinic for citizens with heart failure.

The following inclusion criteria shall be applied:

Citizens with left-sided heart failure with EC <40% which are:

- Completed from the outpatient clinic in optimal medical treatment or
- Terminated from hospital without failure if this is not deemed realistic due to
- Comorbidity
- Lack of treatment desire

Patients who do not have left-sided heart failure, but other heart diseases where the only treatment option is diuretics (e.g. valvular heart disease without the possibility of surgical treatment)

Patients with right-sided heart failure and/or pulmonary hypertension due to, for example, lung disease (but not pulmonary arterial hypertension), where the primary treatment option is diuretics.

Exclusion criteria:

- Very complex heart conditions (concrete assessment)
- Citizens who cannot participate in their own monitoring
- Dialysis patients

In addition, the following exclusion criteria are used:

- Severe cognitive impairment
- Blind
- Deaf

Source: The PreCare Clinic

As for citizens with COPD, they can be referred to the PreCare Clinic's services via:

- The PreCare Clinic
- General practice
- Self-referees
- Home nursing

After referral, an assessment is made based on medical record information as to whether the referred citizen meets the inclusion criteria for heart failure.

For the associated citizens with heart failure, the following are measured:

- Pulse
- Blood pressure
- Weight

In addition, citizens in the PreCare Clinic with heart failure have the opportunity to answer whether they experience:

- Swollen legs
- Breathlessness
- Discomfort when lying down
- Dizziness
- Faint

The triaging of citizens with heart failure is based on the citizens' own measurements and condition assessments and on the basis of individually set threshold values. Box 8.4 shows standard values for when a citizen is in a normal state (green), at risk of deterioration (yellow) and in worsening (red) based on blood pressure, pulse and weight. If a single parameter is

individually triaged red, the total triaging is red. If there are no reds but 3 yellow subtriages, the total score is also red.

Answering experienced symptoms is triaged according to the question and distribution of answers. If one or two answers to questions 1-4 are yes and the rest are no, then the symptom score is yellow overall, if three or four answers are yes and the rest are no, then the symptom score is red overall. If questions about fainting are answered with a yes, the symptom score is red overall.

Box 8.4. Standard on vital threshold values for cardiac condition measurements and examples of threshold values for symptom scores.

Parameter	Interval 1 (usually)	Interval 2 (risk)	Interval 3 (aggravation)
BT: Systolic	>100 and <170	≥80 and ≤100 ≥170 and ≤180	<80 >180
BT: Diastolic	>50 and <90	≥40 and ≤50 ≥90 and ≤100	<40 >100
Heart rate: Resting heart rate	≥55 and <80	>50 and <55 ≥80 and ≤100	≤50 >100
Weight: Deviation in kg from habitual weight*	>-1and <+1*	≥+1 and ≤+3* ≤-1 and ≥-3*	>+3* >-3*
1. Swollen legs	No	Yes	No
2. Shortness of breath	No	Yes	No
3. Discomfort when lying down	No	No	No
4. Dizziness	No	No	No
5. Fainting	No	No	Yes
Alert Score			

Source: The PreCare Clinic

After completing self-measurement and answering condition questions, citizens with heart failure receives feed-back in relation to the citizen's condition. The feed-back to citizens in the heart area takes into account the citizen's last three measurements and responds to this, so that the citizen has the opportunity to pay special attention when a condition is at risk of incipient deterioration, cf. Box 8.5 and the toolbox.

The feedback to the citizen is built up of three elements:

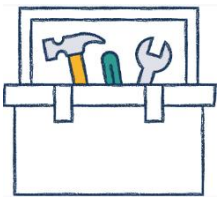
- Introductory text for citizen based on submitted measurement and the 2 previous measurements' standalone triage. (see Box 8.5)
- Health professional feedback describing any deviations from habitual value (see Box 8.4)
- Overall Alert score/triaging measurement (see Box 8.4)

Box 8.5. Examples of autogenerated feed-back for citizens in the heart area.

Result			Associated comments
Two measurements ago	Previous measurement	Current measurement	
			Your condition is normal – have a good day
			Your condition is normal – have a good day
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your numbers are not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have a steady deterioration – contact the PreCare Clinic for support and guidance if you have any doubts
			Your numbers are not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You still have a worsening condition – you will be contacted as soon as possible by the PreCare Clinic
			You still have a worsening condition – you will be contacted as soon as possible by the PreCare Clinic
			You have a worsening and may need further help – The PreCare Clinic will contact you as soon as possible

Source: The PreCare Clinic

In the toolbox is the complete overview of autogenerated feed-back for citizens with heart failure. In addition, there is a description of the possibility of making changes in the habitual value boundaries in the area of the heart.



8.3 Telemedicine services for Type 2 diabetes Mellitus (DMT2)

The purpose of the telemedicine DMT2 service is to provide citizens who for a period of time have dysregulated DMT2 and who have a special need, a coherent and continuous follow-up service, which is intended to get them in better shape so that they can return for follow-up with their general practitioner.

General practitioners have the opportunity to refer citizens with DMT2 related problems to the PreCare Clinic's services if, for example, the general practitioner wants help with:

1. An endocrinological counselling in relation to the current treatment
2. Short-term telemedicine with a view to: Supplement/conversion to second reading
3. Basal insulin titration

8.3.1 Endocrinological advice

The endocrinological counselling can as examples be in relation to citizens with:

- Newly discovered diabetes with high A1c, e.g. > 90
- Diabetes that unexpectedly becomes dysregulated
- Diabetes, where your GP considers adding insulin treatment but wants an endocrinological assessment before
- Diabetes, where treatment is complicated by one or more other concomitant diseases.
- Impaired renal function but not meeting the criteria for referral to the Department of Nephrology (eGFR<30)
- Other cases where your GP wants an endocrinological assessment

This can lead to plans concerning, for example:

- Initiation of GLP-1 based treatment – incl. training in injection technique
- Initiation of SGLT-2 inhibitor treatment
- Optimization of cholesterol-lowering treatment
- Attempts to phase out insulin therapy
- Initiation of titration in basal insulin

8.3.2 Short-term telemedicine treatment

The above issues may give rise to citizens completing a short-term telemedicine treatment in the PreCare Clinic, where blood sugar is monitored and medical adjustments are made to the medication.

These treatments can last from 1-2 weeks to a few months, depending on the individual citizen's needs.

8.3.3 Basal insulin titration treatment

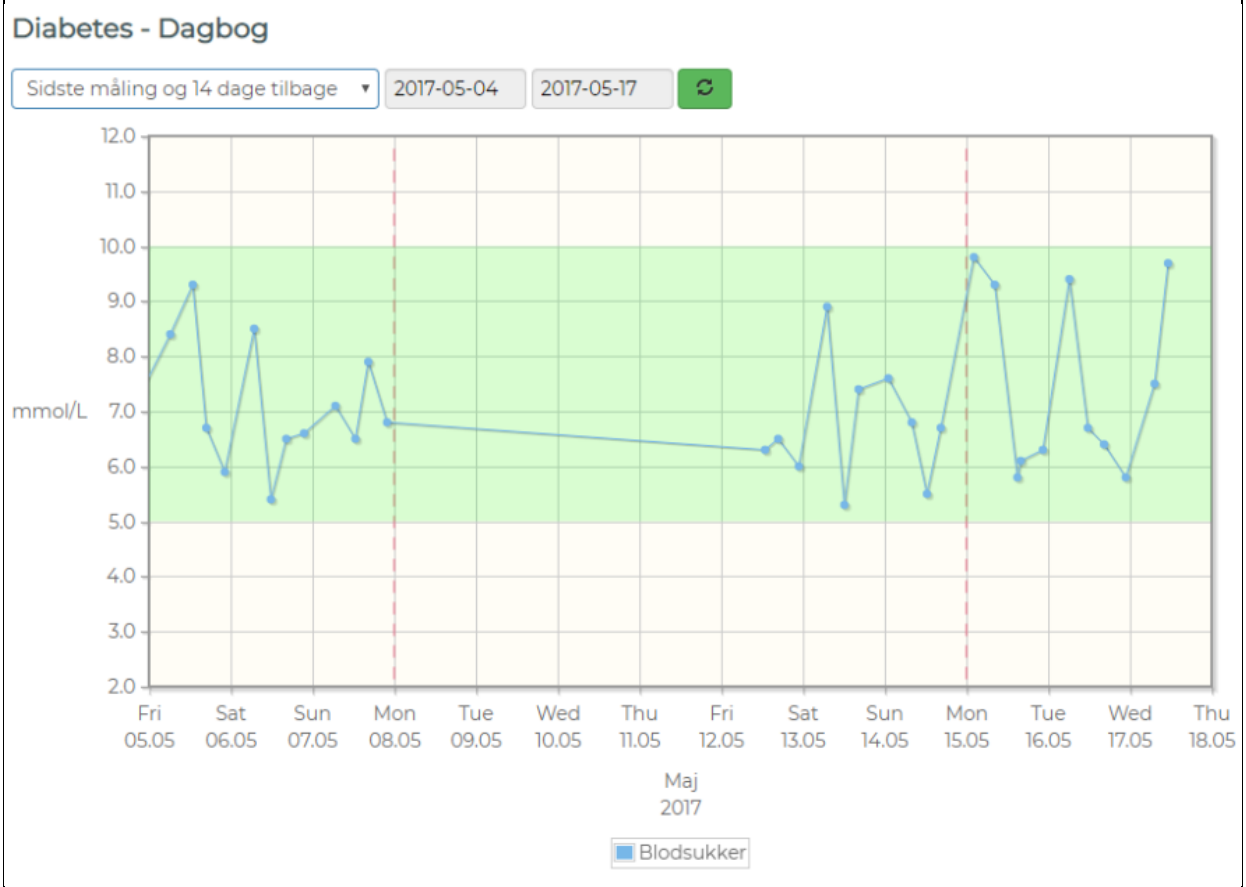
The PreCare Clinic can offer initiation of insulin therapy using close individual titration and monitoring of blood glucose values. These treatments usually last 12 weeks but may last longer.

The general practitioner and diabetes RNs in general practice will have the opportunity to access the PreCare Clinic's telemedicine record system for their own patients.

Examples of data used in connection with measurements and dialogue with citizens with DMT2 are a diabetes diary, cf. Box 8.6.

Box 8.6 Diabetes diary.

The graph shows measured blood glucose measurement values diary. The location on the X axis contains date and time, i.e. not just date.



Source: Appinux

The enrolled citizens measure their blood sugar using an app located on a tablet provided by The PreCare Clinic. The blood sugar values can either be entered manually or via Bluetooth.

It is agreed with the PreCare Clinic with what temporal cadence the blood glucose measurements are to be made. For example, it is possible to make meal measurements and display data in an easily accessible way, cf. Box 8.7.

Box 8.7. Meal measurements diabetes.

In the table of measurements, the day is divided into 4 time periods based on normal meal periods. A meal period may contain several measurements. The time of the measurement can be seen immediately to the right of the measurement value. The measured values are coloured in relation to normal values:

- value < 4 = blue
- Value >= 4 and value <= 10 = green
- otherwise = orange

Diabetes – Måltider

Sidste måling og 14 dage tilbage | 2017-05-04 | 2017-05-17

Dato	Morgen 05-11		Frokost 11-16		Aften 16-21		Nat 21-05	
	mmol/L	Tid	mmol/L	Tid	mmol/L	Tid	mmol/L	Tid
T 04/05					7,3	18:18	7,4	22:06
F 05/05	8,4	06:15	9,3	12:52	6,7	16:48	5,9	22:14
L 06/05	8,5	06:52	5,4	11:47	6,5	16:18	6,6	21:31
S 07/05	7,1	06:43	6,5	12:36	7,9	16:22	6,8	21:53
M 08/05								
T 09/05								
O 10/05								
T 11/05								
F 12/05			6,3	12:52	6,5	16:41	6	22:47
L 13/05	8,9	07:03	5,3	12:09	7,4	16:20		
S 14/05	6,8	07:55	5,5	12:24	6,7	16:26	7,6	01:02
M 15/05	9,3	08:16	5,8 6,1	14:56 15:56			9,8 6,3	02:09 22:26
T 16/05	9,4	06:11	6,7	11:37	6,4	16:23	5,8	22:44
O 17/05	7,5	07:13	9,7	11:10				

Lavt | Normalt | Højt

Low | Normal | High

(English translation)

Source: Appinux

9. Tasks, roles and responsibilities

The division of tasks and responsibilities as well as cooperation between municipalities, general practice and hospitals is described below.

9.1 Staff in the PreCare Clinic

Together with the RN's in the PreCare Clinic, the e-doctor constitutes the underlying and necessary structure for the care of the PreCare Clinic's citizen-oriented treatment. See description in the toolbox "Tasks, roles and responsibilities".

9.2 Self-organizing teams in the PreCare Clinic

The PreCare Clinic works on the basis of a number of self-organizing principles. These are reflected in the organization of the work in the clinic, whereas much of the healthcare work as possible is delegated to the RN's, who, in close cooperation with the citizen, organize the individual's treatment.

Self-organization in the PreCare Clinic is much more than employees being able to organize their own work. It is a view of humanity that everyone in the clinic works from a common desire to create the best possible service and experience for the enrolled citizens based on a holistic approach.

Organization in teams and relationships are key elements in the daily work in the clinic:

- For the employees, anchoring in a team means that the daily work is planned and lifted with access to the greatest possible professionalism and experience. There is always a colleague to draw on if the need for professional sparring should arise
- For the citizen, the team structure means that there is continuity in contact with the PreCare Clinic. It is always a RN from the team who has knowledge of the individual citizen's condition and needs.
- For colleagues in home care and nursing, access to the PreCare Clinic's team of specialized RN's means that there is the opportunity to get professional sparring in the clinical leadership while the home nursing is in the citizen's home.

9.2.1 Decisions and organization of daily work

One of the self-organizing principles that goes into daily work is that decisions are made by the employee(s) who have the knowledge required to make that decision. In practice, this means that decisions are made where and when necessary, and that decisions do not await decisions at a higher level of the hierarchy, as is known from classical bureaucracies.

It is the employees who organize the clinic's work on a daily basis. In other words, it is the knowledge and experience of the employees that form the basis for decisions and for which direction the clinic's work should go. In the PreCare Clinic, everyone can contribute to finding the solutions that can create the best possible value in their daily work.

The prerequisite for self-organization in the PreCare Clinic is based on a clear framework for the daily work that takes place in teams:

The framework consists of formalities:

- Framework delegations (See Chapter 11.2)
- Instructions (See Chapter 11.4)
- In addition, the daily collaboration and organization in the clinic rests on:
- A well-defined purpose

- A range of values

Purpose and values have been formulated by The PreCare Clinic's employees at a series of workshops held as a joint process in the spring of 2020.

Box 9.1. Purpose and values of the PreCare Clinic.

Purpose:

Strengthen the citizen's self-MERNtery of chronic disease through innovative use of telemedicine – supported by the RNs in the PreCare Clinic.

Selected values:

- We demonstrate mutual safety, trust and flexibility in the team
- We work with self-determination and co-determination
- We have respectful and equal communication with citizens, partners and colleagues
- We focus on creating safe relationships with citizens
- We want to be a learning organization

Source: The PreCare Clinic

With this clear purpose as a guiding star, the employees in their daily work focus on the shortest possible path to timely prevention and treatment of citizens using telemedicine.

9.2.2 Self-organizing teams in practice

The implementation of self-organizing principles is challenging and takes time to implement. In the daily work, the implementation of self-organization is supported by, among other things:

- Morning meetings every Monday, where handover from the weekend shift's work to colleagues is made and where the work for the coming week is organized and distributed. The RN who has been on duty over the weekend facilitates and coordinates the meeting
- Virtual rounds on a weekly basis with the participation of RNs and doctors
- Board meetings every 14 days with the participation of RNs, doctors, representatives from Odsherred municipality and the project management
- Operating meetings every 14 days with the participation of RN’s, doctors, and work package manager for professionalization of the PreCare Clinic
- Workflow workshops once a month with the participation of RN’s, doctors, data analysts and work package managers from the innovation project. Here, reviews and discussions of specific workflows are carried out with a view to continuous optimization of services to citizens and use of resources

A purpose that everyone can see themselves in, gives direction. In practice, the purpose and framework become "leader" and guide the work and the decisions made on a daily basis where there is no manager present.

The first step to get started using the purpose actively in the PreCare Clinic has been that the employees have jointly formulated a value proposition that everyone who works in the clinic can see themselves in, and values that motivates their daily work.

The process of formulating the value proposition of the PreCare Clinic was based on the questions:

Why does the PreCare Clinic exist? Why do you go to work?

After describing the values , these had to be brought to life. The employees in the clinic do this by using the value proposition actively in relation to the prioritization of tasks and to make decisions that are in the best interests of the clinic and the citizens. The value proposition is also used in evaluations and feedback in connection with the clinic's work and to support the organization in creating an identity and a common understanding amongst the involved stakeholders.

The work on formulating the value proposition for the PreCare Clinic: "Strengthen the citizen's self-management of chronic disease through innovative use of telemedicine – supported by the RN's in the PreCare Clinic" is inspired by the German philosopher Hannah Arendts[6], who writes: "Community arises when people are preoccupied with the same cause and do not know that people possess something individually that the others also have".

When employees focus on solving the tasks so that they best serve the purpose of the clinic and commit to the common purpose, it gives them as individuals a greater freedom to act in relation to the specific tasks. Self-management is therefore not that employees can choose freely in relation to what personally suits them best, but they act freely in relation to what serves the purpose of the clinic.

The purpose does not provide the answer to how value creation occurs but is intended to make employees and managers ask themselves the question of how they each contribute best to value creation.

9.3 The PreCare Clinic's collaboration with other actors

As previously described, the PreCare Clinic is in the middle of an organisational set-up of the existing healthcare organisations (see figure 4.2). Cooperation with the various actors is a central prerequisite for the PreCare Clinic's work, and in practice, the PreCare Clinic can only function by virtue of close and well-coordinated cooperation with the other authorities in the health service. This means that the PreCare Clinic has a strong focus on establishing and maintaining cooperation and relationships with the other actors in the healthcare system in Region Zealand.

In addition, the other actors in the healthcare system help identify and motivate citizens who may benefit from participation in the PreCare Clinic's telemedicine network. See Figure 6.1.

9.3.1 Hospital

The PreCare Clinic has entered a collaboration with Holbæk Hospital to test The PreCare Clinic's services, interfaces across sectors, as well as processes with regard to the treatment of the PreCare Clinic to ensure a sufficient volume of citizens to test the different hypotheses of the PreCare project. The agreement also means that Holbæk Hospital contributes with specialist competencies in relevant areas.

The cooperation agreement has been concluded at an overall level between the hospital management and the doctor responsible for the company in the PreCare Clinic.

At the operational level, a cooperation agreement has been entered into between the Medical Department at Holbæk Hospital and The PreCare Clinic in relation to cardiology medical competencies with a view to developing services for citizens with heart failure.

The cooperation agreements at the operative level are concluded with the department at Holbæk Hospital that specializes in the diagnoses covered by the PreCare Clinic. In practice, this means that specialist knowledge within the diagnosis in question will be associated with the PreCare Clinic.

An elaboration of the health professional competencies in the PreCare Clinic is described in chapter 10 on "Health professional competences".

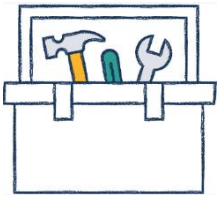
9.3.2 General practitioners

The general practitioner can refer citizens with COPD, pulmonary fibrosis, alpha1-antitrypsin deficiency, heart failure and dysregulated diabetes to the PreCare Clinic's offer.

The general practitioner also has the opportunity to make use of the PreCare Clinic's MERN function in relation to citizens who need treatment within emergency conditions within preventable admissions.

Cooperation with general practitioners in Odsherred Municipality takes place, among other things, by the doctor responsible for the company in the PreCare Clinic participating in meetings of the Municipal Medical Committee[7]. As a fixed item on the agenda, the doctor responsible for the company informs about the status, offers and new initiatives from the PreCare Clinic.

In addition to the company-responsible doctor's participation in KLU meetings, the PreCare Clinic's RN's regularly visit the local medical practices, where they talk about the PreCare Clinic's services and distribute materials about The PreCare Clinic's services available to general practitioners.



The material contains, among other things, information on how and about which citizens the general practitioners can refer to the PreCare Clinic.

The toolbox includes examples of information materials for general practice and citizens.

The establishment of collaboration with general practitioners is under continuous development and is based on a mutual dialogue between general practice and the PreCare Clinic on how the collaboration can be further strengthened.

9.3.3 Municipality

The PreCare Clinic is anchored in Odsherred Municipality.

There are several ways into the PreCare Clinic, which is referred by citizens from different partners in the municipality, e.g. from home nursing who identify citizens with lung disease, heart failure who may benefit from the telemedicine offer.

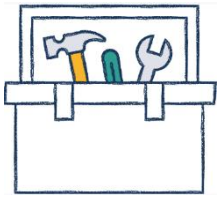
An agreement has been entered into between The PreCare Clinic's doctor responsible for business and Odsherred Municipality. The agreement covers the function of the physician

[7] KLU meeting the participants consist of a chairman who is head of centre in Odsherred Municipality, representatives from the general practitioners and employees from Odsherred Municipality.

responsible for the company as a provider of operational assistance in the PreCare Clinic's MERN, MER and RCC functions.

The PreCare Clinic's mobile emergency RNs (MERN) handle specialized acute nursing tasks with the citizens general practitioner as being the primary responsible for the treatment. The general practitioner can transfer the responsibility for the citizen to the PreCare Clinic's e-doctors by negotiation with the chief doctor. During the first period of establishing the PreCare Clinic, the RNs sent out a short newsletter every week to relevant colleagues in Odsherred Municipality. The newsletter informed about the status of The PreCare Clinic's work, including the number of citizens included in the week in question. The PreCare Clinic's service to citizens is now well known among colleagues in the municipality and is therefore no longer broadcast.

A template for the newsletter can be found in the Toolbox.



10. Healthcare professionals' skills

The telemedicine activities in the PreCare Clinic as well as the monitoring of citizens' measurements place high competence demands on the PreCare Clinic's staff. Therefore, as a starting point, experienced medical and nursing staff with specialized and broad experience from the healthcare system have been recruited.

10.1 Nursing skills

The RN function in the PreCare Clinic requires considerable clinical experience at the hospital and municipal level.

It is important that RNs have:

- Nursing skills, including
  - Knowledge and experience of COPD and related lung diseases and heart failure in care, treatment, training and palliative care
  - Broad medical knowledge to be able to handle citizens' multiple diseases
  - Knowledge about the municipality's training and rehabilitation services as well as services under the auspices of patient associations
  - Reaches out to new knowledge about treatment of COPD and heart failure
  - Certified in the ECM model and PreCare Clinic's derived services and instructions
- Health pedagogical competence, including being able to be based on the citizen's needs and abilities in relation to active self-MERNtery of disease
- Pedagogical competences, including training and instructing the citizen in the use of the equipment and tablet as well as understanding their own data
- Technical competences, including experience with telemedicine equipment, the most frequent errors that the citizen experiences with the equipment and the use of video equipment.

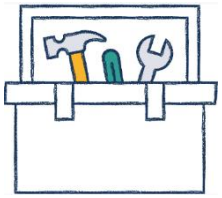
10.1.1 Recruitment

When recruiting RNs for the PreCare Clinic, emphasis is placed on employing RNs with a minimum of 5 years of experience, preferably from both hospital and primary care.

In addition to the special nursing experience, it has proven to be an advantage to recruit RNs who possess a mindset that is characterized by a desire to be part of a development environment

and who can see the point of working with tasks that alternate between telemedicine and close personal citizen contact, respectively.

In the toolbox you can see an example of job postings for RNs for the PreCare Clinic.



"*You have to want to give something of yourself and reach out, and you get a lot back from the citizens*."

RCC RN

10.1.2 Certification

The RNs assigned to the PreCare Clinic undergo thorough training with a final certification.

The purpose of the education and certification is to qualify the RNs to handle the complex portfolio of tasks that lies in the PreCare Clinic. The training helps to ensure that RNs are qualified to work in accordance with the principles of the ECM model, the derived services, and that RNs thereby "speak the same language" by a common understanding of the fundamental and innovative concepts of achieving person-centeredness and sector neutralization.

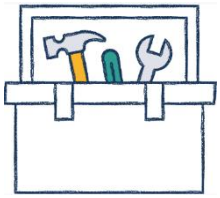
All RNs undergo the same type of certification regardless of whether they are affiliated with RCC, MERN or MER. This also means that RNs from the municipal home nursing who staff the municipal emergency rooms (MER, ECM 5 level) and RNs from the home nursing who handle the RCC task in the evening will be certified.

The certification is built around a thorough training program. In the course of this program, the following will be reviewed:

- The ECM model
- COPD, lung function
- Medication, deteriorations and The PreCare Clinics journal system (Appinux)
- The PreCare Clinic's ideologies, basic concepts and view of humanity
- Treatment videos on heart failure

Training and certification are handled by the company responsible doctor and experienced RNs from The PreCare Clinic.

See the Appendix - Toolbox, which contains a description of the content of the ECM certification used for certification of the RNs.



10.2 The e-Doctor skills

A telemedicine and data-driven set-up such as The PreCare Clinic requires the involved physicians to possess a combination of medical competencies that cover the requirements for a telemedical, data-driven and person-centred health service.

The e-doctor function in the PreCare Clinic is ideally performed by a doctor with solid knowledge within several specialties. The e-doctor in the PreCare Clinic is in principle a hybrid between a specialist in internal medicine, a general practitioner and a telemedic who has special skills to handle and coordinate treatment-requiring interventions virtually.

In addition to the e-doctor, the PreCare Clinic has associated specialists in pulmonary medicine and cardiology, who with their specialist knowledge contribute to the development of new

services, inclusion of citizens and advice the healthcare staff in the PreCare Clinic, e.g. by virtual rounds.

Box 10.1. Virtual "round".

Once a week, virtual "rounds" are held for COPD, heart failure and dysregulated diabetes. **Participants** : Doctors and RNs affiliated with the PreCare Clinic. **Purpose:** The RNs gather questions about citizens where they need professional input. **Impact:** This dialogue forum between The PreCare Clinic's staff increases the quality of treatment of the citizens and develops the competencies of the RNs.

Source: The PreCare Clinic

11. Continuous adjustment and development of services

An ongoing adjustment and development of the clinical content and/or workflows associated with the health services made available in the PreCare Clinic is taking place. This applies both to already existing condition areas, e.g. COPD, and when developing health services for new condition areas, e.g. heart failure and diabetes.

The overall objective of continuously assessing the need for the development of the health services offered and implementing changes is in the interests of citizens, either directly or indirectly, through a better and more efficient use of resources. This can be done, for example, by:

- The citizen experiences the same or better quality at a lower cost level
- RNs spend less time on administrative tasks
- Fewer hours are spent by the e-doctor and/or RN on inclusion and the quality of inclusion is the same or better
- More tasks are transferred from the e-doctor to the RNs while the citizen experiences the same or better quality
- The number of relapses after treatment is reduced
- Improved compliance in the form of daily measurements for specific target groups
- The citizen is on the waiting list for less time after prequalification has been completed

The development of the clinical content and/or workflows for pre-existing condition areas may be caused, among other things, by:

- New devices to replace discontinued/old models
- Change in clinical guidelines
- Inclusion of new areas of state either as a result of addiction or as new learning
- Result of discussion at regular workflow workshops in the PreCare Clinic
- Results of analyses of data from the PreCare Clinic
- Need for new/changed/fewer registrations in the PreCare Clinic

Depending on the identified need for development, there will be different types of activities that support this development:

- Specific technical development of software (handled by IT supplier)
- Scripts in form (JavaScript, csharp) (handled by the IT supplier, but also the possibility that the project can handle the task itself, which requires competencies in JavaScript)
- Adjustment of templates and guidance for registration in the PreCare Clinic (handled by the project)

- Change of privileges for the assigned roles (can be handled either by the IT vendor or the project)
- Adjustment of instructions or framework delegation in the PreCare Clinic (handled by the project)

Changes that concern templates, rights/roles as well as adjustments to instructions, etc. can be carried out by the project and thus give autonomy over the degree of agility in relation to the project. the desired changes. The division of labour between the IT supplier and the project applies specifically to the PreCare Clinic and depends on which facilities an IT platform contains, including how much can be configured in the platform without requiring development on the part of the IT supplier.

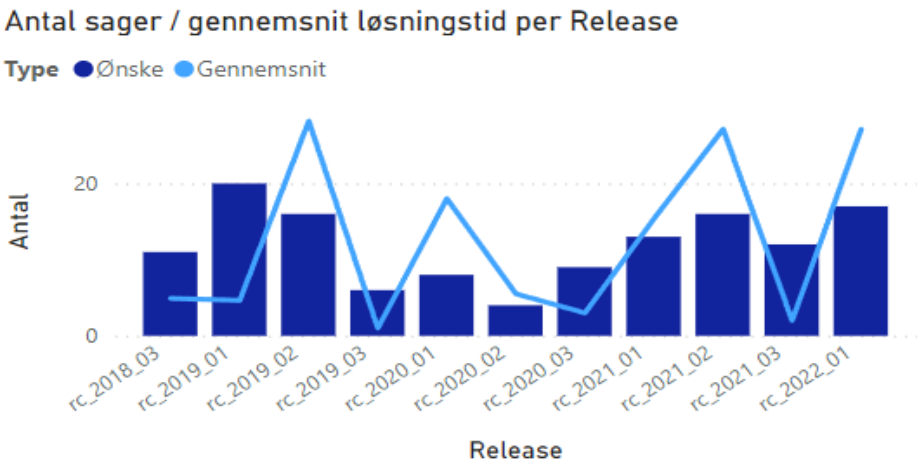
11.1 History of requests for changes of its services since the start of the project

From the start of the PreCare project in 2018, there have been a number of requests for changes, which have been handled by the IT supplier, cf. figure 11.1.

Figure 11.1. Wishes for changes in Appinux from 2018, 3 release to 2022, 1st release.

Release	Type	Number	Shortest case in days	Longest case	Average

Release	Type	Antal	Korteste sag i dage	Langvarigeste sag	Gennemsnit
rc_2018_03	Ønske	11	1	26	4,91
rc_2019_01	Ønske	20	1	18	4,65
rc_2019_02	Ønske	16	1	118	28,19
rc_2019_03	Ønske	6	1	1	1,00
rc_2020_01	Ønske	8	1	86	18,00
rc_2020_02	Ønske	4	1	15	5,50
rc_2020_03	Ønske	9	1	14	3,00
rc_2021_01	Ønske	13	1	58	15,38
rc_2021_02	Ønske	16	1	104	27,13
rc_2021_03	Ønske	12	1	8	2,00
rc_2022_01	Ønske	17	1	176	27,12
Total		**132**	**1**	**176**	**14,52**



Source: Appinux, February 2022.

The requests for the IT supplier's 1st release in 2022 include:

- Flags on MEDCOM messages to help RNs become aware of new messages and avoid missing messages
- The medical record is kept open 14 days after death, unlike today, where the medical record is closed when the death is registered in the CPR register, so RNs avoid having to reopen the record to complete documentation, including an appointment to pick up equipment, and will thus improve the workflow
- Dashboard for virtual rounds
- Possibility to adjust heart rate in the COPD algorithm in the same way as it has been developed in the heart algorithm, so that it is possible to make individual determinations of habitual heart rate for COPD citizens

The development in the changes in the PreCare Clinic does not show a picture where the major changes lie at the beginning of the project and the subsequent changes are minor. This is because, firstly, the project continuously develops new services and uses that learning to return to the originally developed services. It can be with both larger and smaller amendments. Secondly, a clear prioritization of being able to offer a service quickly at the beginning of the project has meant that there has been a need to return to develop a more complete service, including a higher degree of data support. This can largely be attributed to the innovative nature of the project.

The rate of increase in changes in 2020 and 2021, cf. Figure 11.2, is not only due to the development of services for heart failure and diabetes, but to a desire to improve the already existing solutions, e.g.:

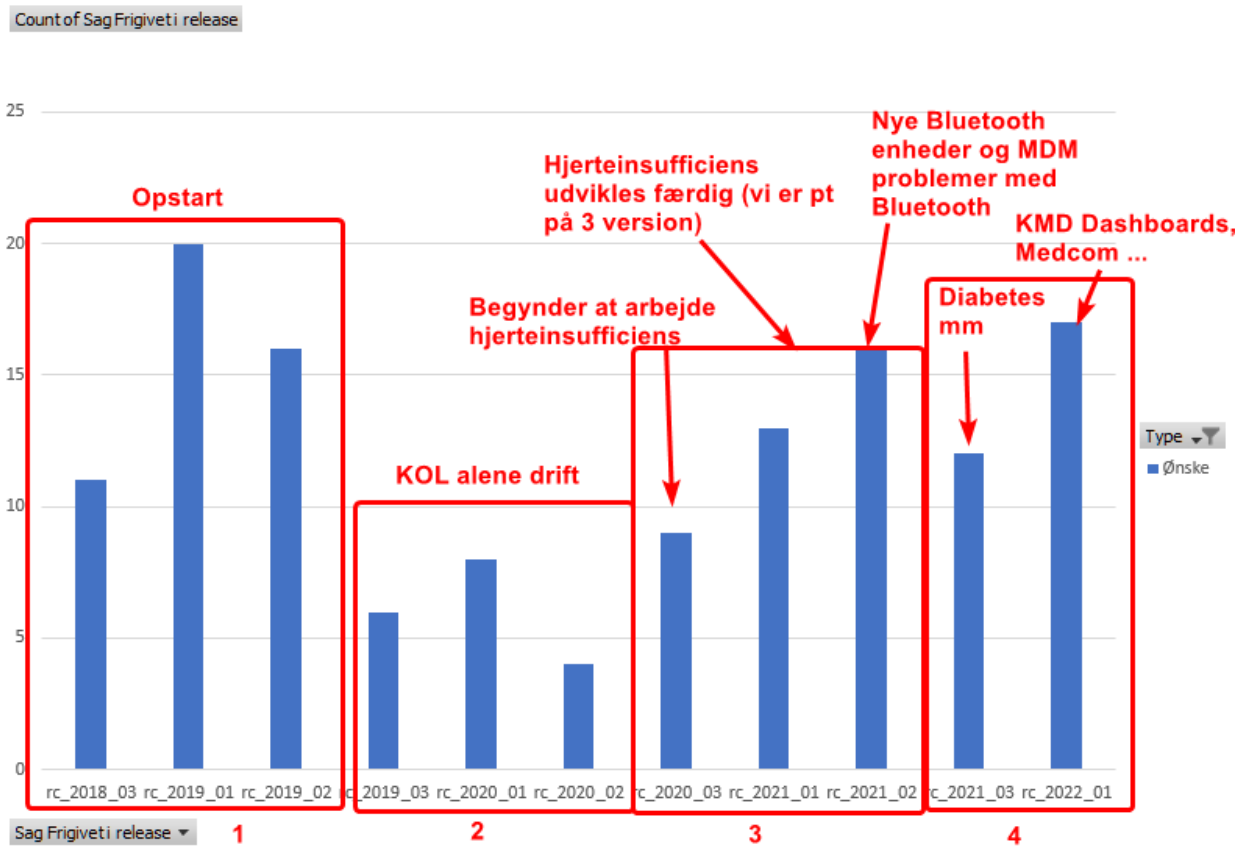
- New dashboards
- Links in message/chat module
- The blood pressure graph should be changed
- Service catalogue - list of favourites as a result of several services in the PreCare Clinic
- Desire for adjustment of habitual heart rate for COPD in the same way as heart
- Notification of Medcom messages
- Postponement of closure of citizens reported dead from the national person register (CPR)

In a more operation-like set-up, it is the experience of the IT supplier that once citizens and employees are familiar with the system, processes, etc., it is often that the IT supplier is not contacted further. However, it depends, among other things, on the customer's choice of functionality area and the number of super users at the customer.

Figure 11.2. Division of wishes for change in Appinux into diagnostic areas and improvements of the existing facilities from 2018, 3 release to 2022, 1st release.

English translation

Start	COPD alone working	Start working on heart failure	Heart failure to be developed (3rd version in May 2023)	New Bluetooth units, and MDM problems with Bluetooth	Diabetes etc.	KMD dashboard



Source: Appinux, February 2022

As mentioned, requests for changes can also be handled by the project itself. For example, it may concern changes to workflows. Box 11.1 shows some examples of changes in the workflows in the PreCare Clinic, the effect of this and which supporting development activities have been initiated. The examples relate to all the inclusion process and are changes that - for the most part - have been discussed and decided on at the workflow workshops that are regularly held in the PreCare Clinic.

Box 11.1. Examples of changes in workflows in the PreCare Clinic

Area	Before	After	Effect	Activity
Introduction of pre-qualification of citizens	No prequalification, referred citizens did not meet the inclusion criteria	Prequalification, where the e-doctor makes a lookup in SP before the inclusion visit	The number of unsuccessful inclusion visits reduced significantly and thus hours on inclusion visits and transport	New template for prequalification New workflow description
Adjustment in prequalification of COPD citizens	See 'After' for 'Introduction of prequalification of citizens'	The task of the prequalification for COPD citizens moved from the e-doctor to the RN	Registration of referral and prequalification is done in one workflow and thus less resource consumption	Change in workflow description
Merger of inclusion visits and TM certification	The inclusion visit is carried out by the e-doctor, after which the RN is in charge of the TM certification of the citizen	Inclusion visits and TM certification merged into one RN-only visit.	Task slippage to a lower level as well as faster inclusion of citizens, who thus also benefit faster from the offer	Change to existing template. Change in workflow description. Change in framework delegation
Declaration of consent	Signature on the consent form takes place for the first time in fbm. The inclusion visit is by the citizen signing two paper versions (for citizen and journal).	The signature is done digitally on the tablet provided and stored electronically in the citizen's medical record in the PreCare Clinic	The RNs' administrative tasks in connection with the consent form have lapsed as well as postage costs.	Change in software. Change in workflow description
Follow-up 5 days after TM certification	Nobody	RN calls 5 days after TM certification to ensure that newly included citizens have got off to a good start with making self-measurements	The citizen experiences present RNs and the RNs ensure that the citizen is able to carry out self-measurements and thus be able to nip acute exacerbations in the bud.	Change in workflow description

Source: The PreCare Clinic

11.2 Learning spaces

The work to optimize workflows and resource use in the PreCare Clinic have raised a number of interdisciplinary discussions that focus on collecting learning for the continued further development of the project.

In its organization, the PreCare project emphasises creating opportunities for continuous learning and development dialogues between the different actors. The project is based on respect for interdisciplinary and cross-sectoral collaboration, and thus works systematically with the establishment of so-called learning spaces and learning meetings.

These have several forms but are based on analyses and observations from the daily work in the telemedicine service.

For example, workflow workshops are ongoing held with the participation of healthcare professionals, data analysts and administrators, where existing workflows are examined in detail and adjusted in relation to the experience gained in the daily work in the PreCare Clinic. Virtual rounds are held on a weekly basis, where the RNs discuss patient cases with the clinic's affiliated specialists.

A characteristic of the various learning occasions where data support is included as a foundation is to support the goal of early detection of deterioration in the condition of the chronic condition, and that there is continuous optimization and adaptation of the services offered to the individual citizen.

The PreCare project ensures that this happens in an interdisciplinary environment, where the participants jointly collect and disseminate information about how to achieve the most health for the resources of the individual citizen in a safe environment in their own home.

12. Data-supported operation and development in the PreCare Clinic

The possibility of combining data from the traditional regional health registers and the municipality's financial and professional systems with citizens' own measurements opens up a number of new opportunities for a more active use of data.

The primary task is to secure information in real time to support the treatment of the citizen, but in addition, the new data understanding allows for improvements in analyses and management information.

The data-driven approach in the PreCare Clinic is divided into four main areas that are targeted at:

- Policymakers get an overall picture of whether the initiatives launched are having the expected impact
- The administrative managers acquire sufficient knowledge to be able to make adjustments in the effort
- The day-to-day operators gain knowledge of conditions that necessitate immediate adjustments of an operational nature
- Conduct analyses aimed at "efficiency" and "effectiveness", where effectiveness is about doing the right things, while efficiency ensures that things are done the right way

In addition, the public receives aggregated information about the PreCare Clinic's results. The PreCare Clinic's website https://precareklinikken.dk/.

Political level

At the political level, the data support is aimed at a few key figures that can contribute to strategic political decisions, and subsequently elucidation of whether the decisions made have the desired effect.

Administrative management level

The administrative management level is responsible for carrying out budget analyses and ensuring political service. This entails the need for access to more detailed information in order to identify possible health policy areas and subsequently follow up on initiatives undertaken.

Box 12.1. Example of management information.

Management information can generally describe the consumption of health services, e.g. distributed by age and gender of the population, supplemented by an inventory of the diagnoses associated with citizens at the hospitals.

It is also possible to elucidate health conditions through, for example:

Activity:

- Citizens' acute and planned contacts to hospitals
- Citizens' average number of bed days when admitted to hospitals
- Citizens' contacts with general practice and specialists
- The occurrence of preventable hospitalizations, which can theoretically be influenced through initiatives from the municipality.

Economy:

- Cost of treatment in hospitals
- Costs of preventable hospitalizations
- The costliest disease areas measured in national average DRG rates

Quality:

- Readmissions within 30 days for selected disease groups
- Citizens with preventable hospitalizations by general practice to which they are affiliated (applies to citizens who have had contact with a general practitioner)

Impact measurements of initiated initiatives:

- The use of health services in hospitals, general practice and specialists, including estimated costs for those covered by a defined initiative
- Same for a comparable group of citizens not involved in the initiative

These impact measurements will make it possible to follow the included group before and after the time they are included in the new offers.

Source: Data and Development Support, Region Zealand

Daily operational staff

The operation-oriented healthcare professionals need to get an ongoing overview of the current activity, etc. in order to adjust the efforts for the individual citizen covered by the schemes implemented in the health area. Operating information is thus targeted at the PreCare Clinic with information about included citizens, treatments and care services, etc., cf. section below.

This individual knowledge of the individual citizen's condition and development as well as the consumption of The PreCare Clinic's services will ensure that the citizens receive the best possible services and that the services for the individual citizen are adjusted if there is a change in the citizen's condition.

This need applies to both the citizens referred to the PreCare Clinic and the part of the group that is treated in the more traditional treatment environment and is not currently included in the PreCare Clinic's offer.

Analysis activities in relation to the PreCare Clinic

Various analysis activities contribute to assessing the effect of the developed services on different parameters to qualify how the clinical service should be put together to increase the effect, and how the underlying organization and associated funding can be thought and implemented taking into account that the results of the project must be secured with the fewest possible resources.

Box 12.2. Focus of the analyses.

<table>
<tr><td rowspan="3">Do the right things</td><td>Efficiency</td><td>Achieves the right goals, but at high cost</td><td>Achieve the right goals at low cost</td></tr>
<tr><td>Inefficiency</td><td>Achieving the wrong goals with the right cost</td><td>Achieving the wrong goals at low cost</td></tr>
<tr><td rowspan="2"></td><td>Ineffectiveness</td><td>Effectiveness</td></tr>
<tr><td colspan="2">Do things right</td></tr>
</table>

Source: Data and Development Support, Region Zealand.

The purpose of the analysis activities is to provide a basis for decision-making that allows decision-makers to assess whether the tested solutions are suitable to be put into operation and interact with the other health services in the municipalities and the region.

12.1 Ongoing follow-up on services in the PreCare Clinic, e.g. by using Key Performance Indicators (KPIs)

The PreCare Clinic operates on the basis of various KPIs that aim to provide insight into:

- The referral and inclusion process, including referral channels and allocation to risk groups
- Activity in general in RCC, MERN and MER by risk groups
- Acute inquiries and treatment by risk groups and type of exacerbation treatment
- Citizens' self-care (number of measurements) by risk group
- Number of care and technical contacts compared to treatment contacts

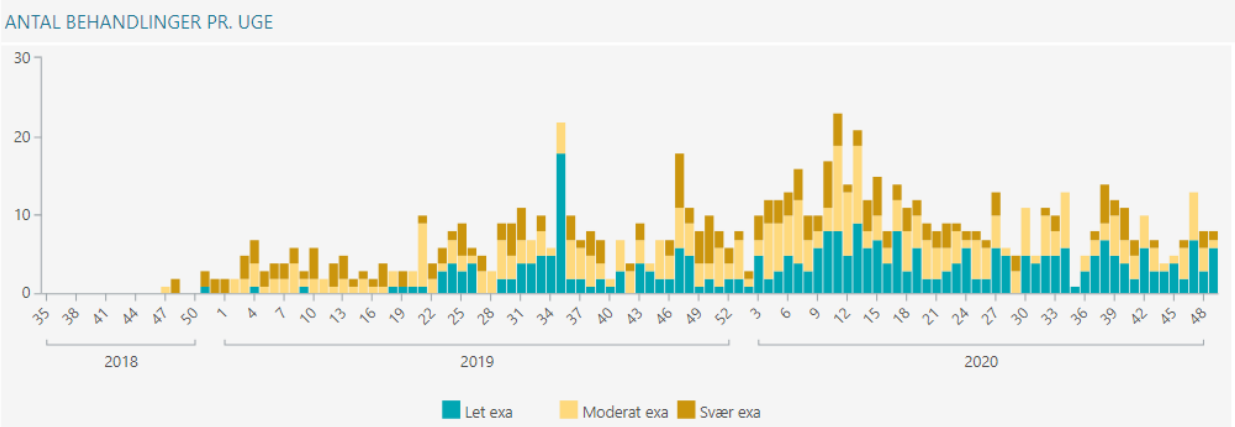
KPIs are thus used both as overall management information, as an overview for the healthcare professionals in the PreCare Clinic, as a follow-up tool and as management information for The PreCare Clinics e-doctor.

For example, the inflow of citizens is followed, i.e. referrals, prequalification's, inclusion visits and TM certifications, among other things, in order to assess whether the PreCare Clinic's goals regarding the number of citizens included on a given date are met.

In this way, data helps to support managerial priorities and focus areas on the project.

Activities in MERN and the number of urgent inquiries to the PreCare Clinic are also examples of indicators that are monitored continuously. Information about activities and urgent inquiries is used, among other things, administratively to assess capacity needs. For example, when there are most inquiries, the type of inquiries and how many and which treatments are initiated in the PreCare Clinic. Figure 12.1 shows an example of illustration of a KPI.

Figure 12.1. Example KPI – number of treatments per week



Source: Data and Development Support, Region Zealand.

The RNs in the PreCare Clinic can also gain insight into how often the citizens measure themselves. In this way, data can help to make visible if a citizen has not measured themselves for a period of time, so that RNs can follow up with the individual citizen and find out what the reason for the missing measurements is due to.

12.2 Data-driven development of services in the PreCare Clinic

The PreCare concept is continuously evolving, e.g. by adjusting treatment principles and introducing new treatments/services. At the same time, there is a focus on The PreCare Clinic ensuring that the included citizens receive the optimal treatment and care.

The purpose is, among other things, to increase the quality of The PreCare Clinic's services and offer more types of services to citizens. The development of services is based, among other things, on the developed clinical practice to follow and assess whether the quality of the services offered are at least at the state of the art or whether improvements are needed, and whether there is a basis for supplementing existing services or developing more based on the same concept.

Box 12.3. The action research-based approach in the PreCare Clinic.

The development of the PreCare Clinic is driven as an innovation and research project based on an action research-based approach.

The establishment and further development of the PreCare Clinic involves significant change processes, which in practice can be difficult to predict. Action research is based on the fact that the research is not separate from the effort itself, but rather a part of it. Thus, an attempt is not made to isolate and distance oneself from what is being researched, but rather to get involved in it and thus influence it.

This means, among other things, that it is part of the project itself to continuously adjust the effort as you become wiser. An important part of the analysis activity in the project is therefore about providing input to continuously adjust and adjust the effort itself in iterative processes.

Source: Data and Development Support, Region Zealand

The data support of the PreCare Clinic, which is based on citizens' data, the clinical experiences in the PreCare Clinic as well as data from the regional and municipal data sources, thus makes it possible to assess:

- The already established services
- Analyse the effects of services
- Propose new services and develop targeted services based on the included citizens' medical records, register data, etc. and the experience gained
- To improve and develop the quality of the PreCare Clinic's services/treatment offerings and improve the workflows in the PreCare Clinic for the benefit of the included citizens

Box 12.4. Example of analytical use of data

A segmentation of the included citizens into a number of groups (phenotypes) that have a similar chronological course of benefits and diseases has been carried out. Based on this segmentation, a group-specific standard treatment has been identified for the different groups.

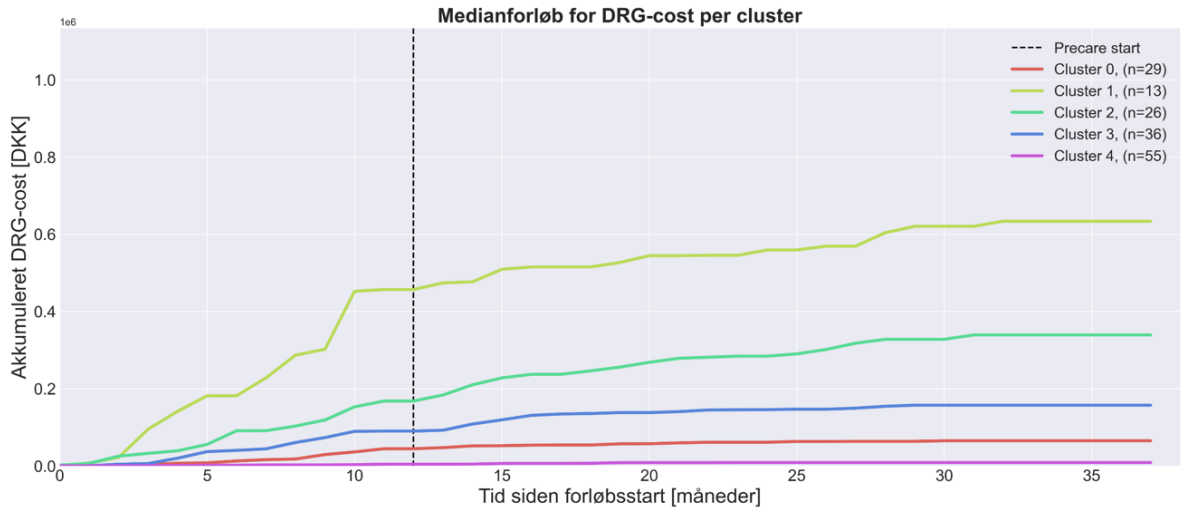
Through identification and analysis of standard processes, the goal has been to shed light on citizen-related services. That is, which citizens (groups/pseudonymized) have received which services over time from general practice, regional hospitals and municipalities? What has it cost and what has been the result? Figure 12.2 shows an example of a segmented analysis.

Based on the identified standard pathways and segmentation of the population, the next step is to assess which groups are at particular risk of moving from a "cheaper" and stable situation to a "more expensive" and unstable situation, where there is a continuous and increasing pull on health services.

The purpose is thus to identify citizens who are at risk of deterioration through prediction, so that preventive measures can be initiated before the deterioration occurs.

The data analysis is based on machine learning and quantitative statistics with a view to improving the quality of the data. to utilize the data that originates from the continuously generated data in the PreCare Clinic as well as the included citizens' contact with the healthcare system.

Figure 12.2. Segmentation of the included citizens in the PreCare Clinic



Source: Data and Development Support, Region Zealand.

13. Business and Economic models

The savings potential of the PreCare Clinic is calculated as the difference between the financial gains and costs.

The benefits of the PreCare Clinic represent the value of the change in demand for healthcare that can be observed among included citizens.

The costs represent the actual and estimated costs of investments and operation of the PreCare Clinic. Box 13.1.

The "break-even" of the PreCare Clinic is defined as the time when the total monthly gains exceed the monthly costs of running the clinic. The aggregate savings potential is used to calculate when the PreCare Clinic is expected to have a positive business case and thus constitute an economically viable offer (7, 8).

The business case is calculated for a three-year project period, divided into a project start-up period and a period of full operation.

During the project start-up period (months 1-24), more and more citizens have gradually been included in the clinic. During the period, there has been a relatively high staffing rate in relation to the included number of citizens. Staff standards have been continuously adjusted. During the period, the staff has been engaged in including and servicing the included citizens while adapting and developing the clinic's services.

In the following 12 months (months 25-36) of the project, the PreCare Clinic is almost fully operational. However, the PreCare Clinic is still under development, and the number of included citizens is still increasing. The capacity threshold of the clinic is not yet known.

Box 13.1. Overview of expense elements in the PreCare Clinic.

Capital expenditure
Capital expenditure includes the purchase of furniture, clinical equipment, IT equipment, the purchase of equipment for staff and citizens.

Capital expenditure is generally calculated monthly over a three-year period. However, the cost of purchasing equipment for citizens is calculated monthly, spread over a two-year period. The cost in the last year of the project period is assumed to correspond to the average cost in 2020.

Training of MER staff is an establishment expense that only relates to 2019.

Overheads
The fixed expenses include salary costs, car leasing expenses and other operating costs, including subscription expenses for staff phones and tablets.

Payroll and subscription expenses for staff are calculated on the basis of information about the actual number of staff affiliated with the PreCare Clinic in the current month. Other fixed expenses are included in the business case as monthly averages calculated on the basis of the year's expenses for this.

Variable costs
The variable expenses include the cost of medicine, consumption of clinical materials in the clinic and operation of citizens' tablets.

Overhead
Overhead expenses corresponding to 4 per cent of the total costs are included.

Source: Data and Development Support, Region Zealand

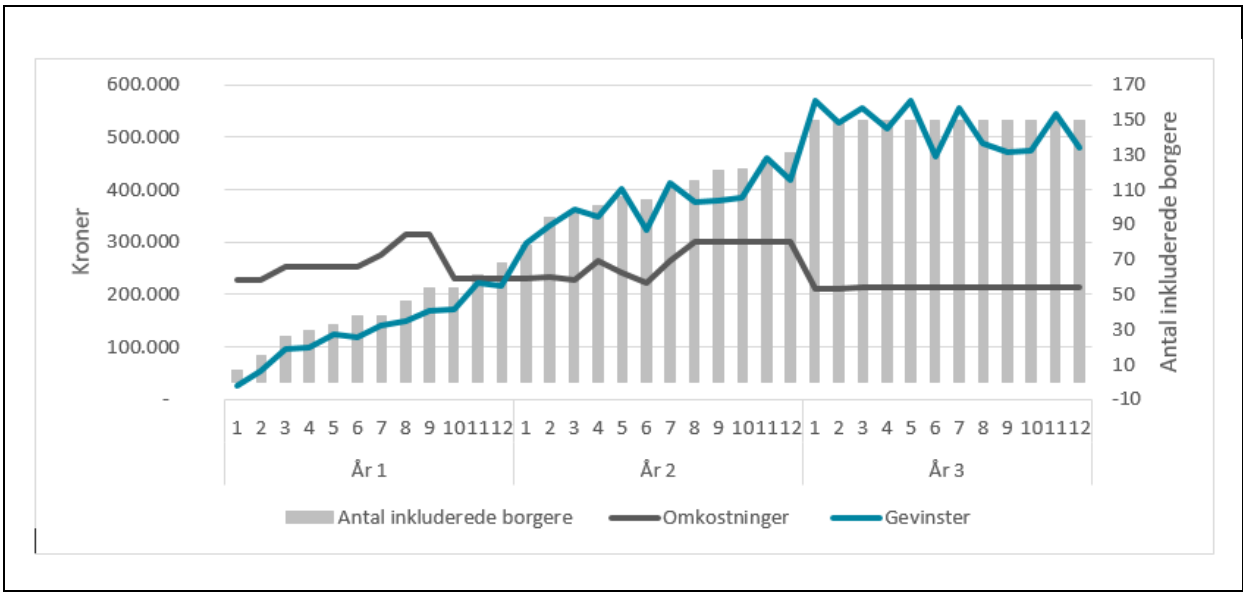
Development work is still underway in relation to the development of the company. The PreCare Clinic's clinical and administrative management, including when calculating the net gains associated with the clinic.

Thus, there are a number of factors that are not yet included, including effects from citizens who have been treated for acute preventable conditions as well as effects of MER.

The start-up costs exceed the gains in the first year or so after the start of the PreCare Clinic. This is due to investment in staff training and start-up costs for including citizens in the PreCare Clinic.

Figure 13.1 shows that the monthly gains exceed the monthly costs of running the clinic after 12-13 months. This time is defined as the PreCare Clinic's break-even.

Figure 13.1. Gains and costs of the PreCare Clinic calculated per month[8].



Source: Data and Development Support, Region Zealand.

13.1 Funding models

The business case for the PreCare Clinic has so far shown that resource added value and greater patient satisfaction are created as a result of the clinic's activities. The citizens referred to the clinic have accumulated a smaller consumption of healthcare services after affiliation with the PreCare Clinic compared to before.

A decrease can be observed in the consumption of hospital services and contacts to general practitioners.

Total healthcare costs are reduced (see reports The PreCare Clinic – results after 1 year and The PreCare Clinic – results in year 2). The services offered in the PreCare Clinic thus have added value for the citizen and for society as a whole.

This added value can form the basis for the development of value-based financing models for the producers of the relevant services in the PreCare Clinic.

Two models can be pointed out at first:

[8] See assumptions behind and calculation basis for the business case in the report “The PreCare Clinic – results in year 2".

- Contract-based producer share of registered added value
- Use of quality indices as a measuring instrument in the settlement model for individual producers

In both cases, these are simple models that allow producers and payers to monitor the results achieved on an ongoing basis.

Thus, it is possible to make calculations at such short intervals that it allows the manufacturer to adjust the services if it turns out that there is a movement away from the expected positive results.

13.1.1 Contract-based producer share of registered added value

If there is agreement that it is an improvement in quality that citizens can be treated at least as well in their own homes as in a hospital or in general practice, the value-based billing model can be based on an agreed distribution of the resources freed up by the service.

The existence of the PreCare Clinic frees up resources for the region and the municipality as a whole that are greater than the operating costs associated with the clinic's activities.

In practice, it is currently Innovation Fund Denmark and the participating parties in the project that finance The PreCare Clinic, but it could in principle be a private investor, a public authority or an independent institution. Whatever organization is chosen, the value-based financing to the producer itself, based on the resources released, can be calculated as:

The PreCare Clinic's operating expenses * x, where x expresses:

- A negotiated acceptable operating margin in relation to the manufacturer's investments and operations
- An agreed distribution between the payer (region and municipality) and the producer of the released resources – e.g. 40 per cent to the payer and 60 per cent to the producer.

The model can be applied only when resources are freed up. If the use of resources is increased, the scheme is stopped and the tasks are returned to the region and municipality.

13.1.2 Use of quality indices as a measuring instrument in the settlement model for individual producers

In the PreCare Clinic, there are both statements of the total consumption of healthcare services and elements that illuminate the quality of the treatment itself. A financing model can therefore be based directly on these monitoring, rather than a simple sharing of "profits". The measurements make it possible to compile and apply a quality index in a settlement model.

The clinical efforts in the PreCare Clinic are, as previously described, built around the ECM model.

At the lowest level ECM 1, the citizens are in their habitual condition and self-reliant. At the subsequent levels, there is a worsening of the condition, where the clinical effort increases with each level from virtual support over physical visits by RNs, etc. to end in hospitalization at the last level ECM 6.

A measure in the quality index can therefore be based on the distribution of citizens at the different levels of the ECM model.

If the levels in the ECM model are assigned the values from 1 to 6, and the number of citizens at each level is multiplied by the value of the respective level, it will be possible to calculate an average overall measure of condition in the treatment by dividing this size by the number of citizens included. The lower the value – the better the goal fulfilment.

The systems built around the PreCare Clinic also make it possible to indicate the citizens' own perception of their state of health through, among other things, the WHO's well-being index. The better they perceive their own condition, the better the PreCare Clinic's service can be assumed to be. In order for these measurements to be included as an element of the quality index, citizens will need to report them on an ongoing basis.

A third element of the index could be based on the response time of a critical measurement. The service goal in the PreCare Clinic is five minutes and no later than one hour after critical measurement in order to assess whether treatment should be initiated immediately.

Overall, the PreCare Clinic's quality index could thus consist of measurements of:

- The condition of the citizens included
- Citizens' perception of their own state of health
- Critical measurement response time.

For all three areas, a target figure must be agreed for when it is 100 per cent fulfilment. It must also be agreed whether all three areas should weigh equally in the calculation of the quality index.

Box 13.2. Calculation example for financing model based on quality index.

For example, if it is assumed that all elements weigh equally in the quality index – i.e. 1/3 each, and if it turns out that the PreCare Clinic has had a target achievement of 90, 80 and 70 per cent, the overall quality index becomes 80.[9]

This figure can then be used to determine the actual value-based settlement.

For example, it can be assumed that it has been agreed that The PreCare Clinic will have its operating costs and a value-based quality supplement corresponding to 60 per cent of the freed resources as a whole in the region and municipality covered by a quality index of 100.

If the calculated annual release of resources is calculated at DKK 30,000 (approx. Euro 7.500 per citizen on average, the PreCare Clinic at index 80 will receive DKK 30,000 * 0.6 (quality supplement) * 0.8 (quality index) = DKK 14,400 per citizen in value-based settlement.

Source: Data and Development Support, Region Zealand

The described models can be used as a 'bundled care', where all the costs traditionally incurred in the different parts of the healthcare system are collected in a budget for a defined patient group or the entire population.

But the model approach can also be used as a value-based settlement against a single product in the form of a device or medicine product, by calculating the individual citizen's resource draw before and after the use of the product.

If resource consumption decreases and the quality of health care is maintained or improved, the product has created value. The value-based settlement of the product can be done on the basis of the created value.

13.2 Value-based settlement model

A value-based funding model has been developed those rewards activities of value to citizens with chronic diseases. It supports good clinical practice through positive financial incentives. Thus, the model emphasizes quality in health care and not just activity.

It is structured in such a way that it can be generalised and used at national level in connection with the construction of the politically agreed health clusters or in hospitals.

[9] (90 + 80 + 70)/3 = 80

The funding model uses the methodology used for the introduction of the state additional activity pool in 2002. Most of the regional and hospital funding was based on a fixed appropriation, supplemented by a smaller amount that could be earned if the hospitals produced more than in previous years. Additional activity was rewarded. The aim was to increase treatment capacity to reduce waiting times.

The value-based financing model is also based on the fact that the financing of activities in the health area primarily takes place through a basic grant with the possibility of earning extra if services of value to citizens/patients are provided. Quality is rewarded.

To measure quality, the following are used:

- Recorded patient experiences
- Clinical measurements
- Activity metrics

The model follows the principles that it should be simple and transparent, as well as building on already existing registrations.

In addition, the model is directly linked to the clinical basic idea of a person-centred, sector-neutral, condition-based and data-driven healthcare system.

As described in chapters 4 and 5, the foundation of the clinical model makes it possible to assess the individual citizen's condition based on measurements made by the citizen himself.

The information on which the assessment of the citizens' condition is based is presented in Table 13.1 for COPD, heart failure and diabetes.

Table 13.1. Measurements to assess the citizen's state of health.

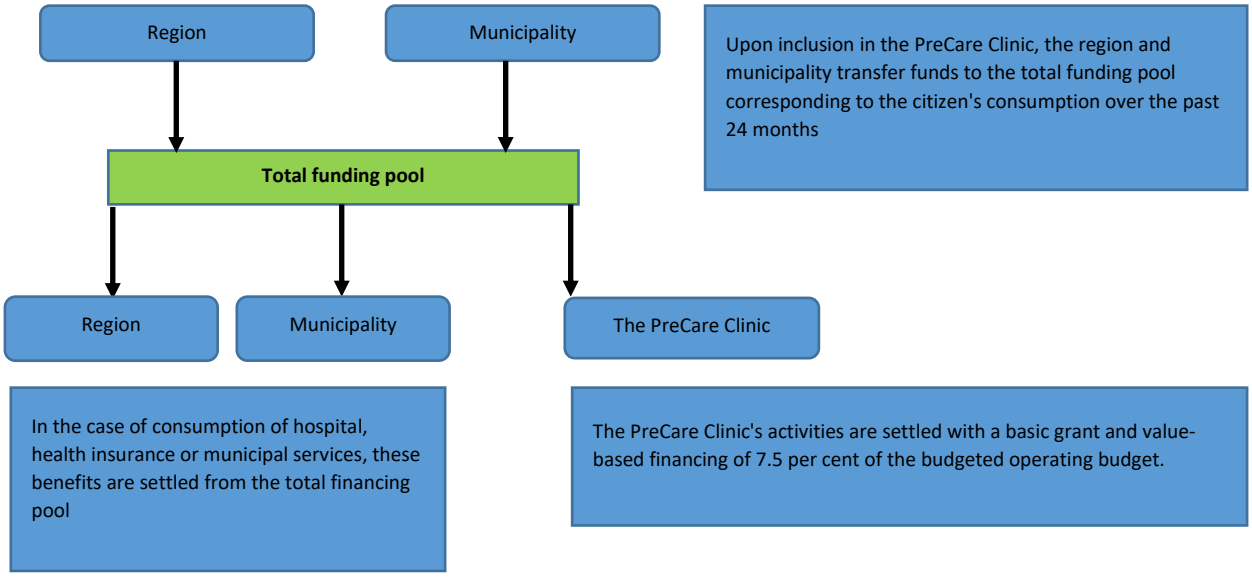
	COPD	Congestive heart failure	Diabetes
Self-monitoring	Pulse Oxygen saturation Lung function Temperature	Pulse Blood pressure Weight	Blood sugar Long-term blood sugar, HbA1c
Supplementary questions	Increasing difficulty breathing Increasing cough Coloured mucus	Swollen legs Breathlessness Discomfort when lying down Dizziness Faint	Pain in the feet and legs Disorders of the stomach and intestines Chest pain, palpitations and shortness of breath Lack of sex drive – and ability Sleep problems

Source: The PreCare Clinic

The measures shown in Table 13.1 are the same as those underlying the value-based financing model, see below. A value-based settlement model has been tested for the PreCare Clinic. The model is structured according to the principles shown in Figure 13.2.

A total funding pool has been formed for the citizens who are included in the clinic with contributions from the region and the municipalities participating in the project. This pool is then distributed between the region, the municipalities and the PreCare Clinic. In the case of the first two, this is done according to actual consumption, but the clinic is settled through two sources, a basic grant and a value-based share.

Figure 13.2 Value-based settlement model for the PreCare Clinic



Source: Data and Development Support, Region Zealand

13.3 Shadow accounting for a value-based settlement model

A "shadow account" has been prepared to illustrate how it is possible to build a financing model based on measurements of conditions of value to the citizen.

This is merely an example of a model. The model is set up one for a cluster collaboration.

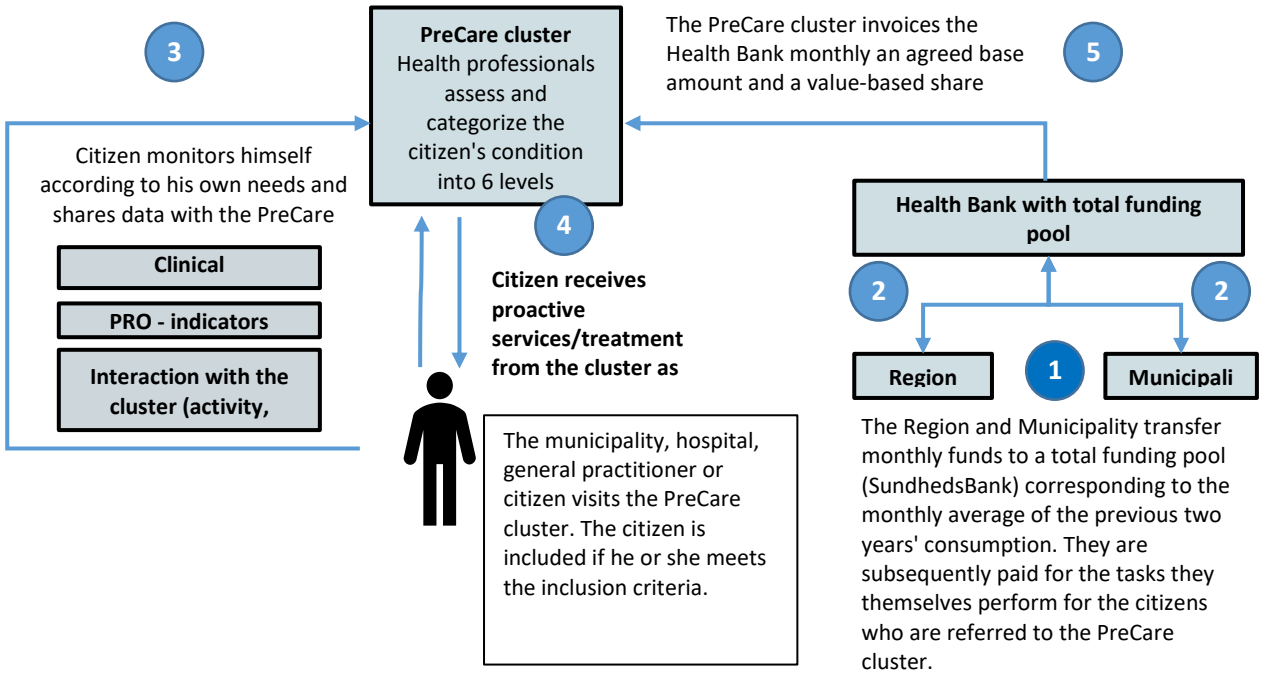
For example, the model includes the possibility that a clinic that in practice handles the coordinating work in a cluster can receive earnings that are 5 per cent larger than the budget if it delivers services that are of value to citizens/patients, but instead a model that is cost-neutral could be used.

In addition, there are no explicit requirements attached to a specific activity in order for the clinic to receive value-based funding. Instead, work could be done with a requirement that the activity in relation to the last calendar year must be maintained or increased by an agreed percentage before the value-based part can be implemented.

With these caveats, the overall framework of the funding model is illustrated in Figure 13.3.[10]

[10] The model for the overall framework has been developed in collaboration with Rehfeld, Claus and Martin Lucas Jørgensen, Nordic Health Care

Figure 13.3. The overall structure of the PreCare cluster's value-based funding model.



The model below is built on the assumption that shadow accounting started on January 1, 2022. At that time, there were 188 citizens affiliated with the PreCare Clinic. Of these, 180 had one chronic disease, while 8 had 2 concomitant chronic diseases.

13.3.1. Contribution to the overall funding pool (1)

The first step in the model is to agree on which funds should be included in the financing of the activities associated with the citizens referred and included in PreCare Clinic. The funds are paid into the Health Bank every month by the regions and municipalities.

Although the clinic's area of responsibility is limited to COPD, heart failure and diabetes, experience shows that the included citizens' consumption of health services related to other diseases is significantly affected. It is diminishing. It would therefore be most appropriate to include all the costs previously associated with the overall health area in the model.

13.3.2 Regional contribution to the overall funding pool (2)

For each citizen included in the clinic, the monthly average of the last two years of information before – calculated from the day of inclusion (Telemedicine (TM) certification) – is found about:

- Hospital contacts (DRG rates) for all registered contacts at regional and private hospitals.
- Specialists outside the hospital (fees and rates from the health insurance)
- General practice, including any weight doctor contacts (fees and service rates from the health insurance)
- Podiatrists, physiotherapists, etc. (fees and benefit rates from the health insurance)

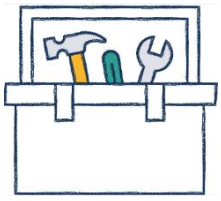
This amount is maintained as long as the citizen is affiliated with the clinic. The amount is paid into the Health Bank.

13.3.2 Municipal contribution to the overall funding pool (2)

For the municipalities, the choice of which expenses to pay into the overall financing pool (The Health bank) is more fluid. The challenge is that there is a close interaction between citizens' use

of municipal services and health. For example, it can be difficult to determine whether a person is unemployed because he or she is ill or whether the illness is caused by the unemployment situation. Even the use of the municipal library can be affected by diseases.

From an overall holistic point of view, it can therefore be argued that as much of the municipal expenses as possible should be transferred to the overall funding pool because they are affected by the health status of those included.



It is possible to allocate almost 80 different types of municipal expenditure to individuals and thus also to disease groups, see the toolbox.

This information comes from a "Public Health Management (PHM)" project between Region Zealand and Odsherred Municipality from 2016 to 2018.

However, in the following example, only the weighted averages of municipal healthcare costs for patients with COPD, diabetes and/or heart failure are included. They are calculated at DKK 11,753 per year per chronic disease in the PHM project.

The PHM material also shows that the ratio between the level of expenditure for citizens with 1, 2 or 3+ chronic diseases, respectively, is as indicated in Table 13.2. Thus, if a citizen has 2 chronic diseases, he or she has a trait that is 50 per cent higher than one with a single chronic disease.

Table 13.2. The relationship between spending levels for citizens with chronic diseases.

One chronic disease	100
Two chronic diseases	150
Three + chronic diseases	183

Source: Data and Development Support, Region Zealand

Based on the weighted average, the ratio between the expenditure levels, and the actual number of citizens with different numbers of chronic diseases, the municipal contributions for the PreCare Clinic's citizens at the start of the financing model at the beginning of 2022 can be calculated as in Table 13.3.

Table 13.3. Municipal contribution to financing pool limit in relation to municipal health expenditure.

	Relative level of expenditure	**Average expenses**	**Estimated number of persons**	**Expected municipal expenditure**
One chronic disease	100	11.753	180	2.115.540
Two chronic diseases	150	17.630	8	141.040
Three chronic diseases +	183	21.508	0	0
Total			**188**	**2.256.580**

Source: Data and Development Support, Region Zealand

Converted into monthly contributions, this corresponds to DKK 188,048 for all municipalities taken together.

Similar calculations are made at the beginning of each month, as the number of citizens changes, but the amounts are maintained, since there are no better sources.

If the condition of citizens changes during the inclusion period from 1 to more chronic diseases, the associated amount must be adjusted from the month in which the change takes place so that it takes effect in the month after the change is detected.

As regions and municipalities receive 12ths of the agreed block grant during the year, payments to the pool must follow the same pattern. Thus, for each citizen who is associated, a transfer of 12th of the average of the previous two years' consumption must be made on the 1st business day of each month, as long as the person is affiliated with the clinic.

Citizens can be included throughout the year, and contributions to the pool must start in the month following inclusion.

The actual costs are not known for the municipalities, as there is no access to the municipal information on individual citizens. It is therefore an estimate.

Similar calculations are made at the beginning of each month, as the number of citizens changes, but the amounts are maintained, since there are no better sources.

If the condition of citizens changes during the inclusion period from 1 or 2 to more chronic diseases, the associated amount must be adjusted from the month in which the change takes place so that it takes effect in the month after the change is detected.

The PreCare Clinic must receive monthly 12-part amounts to cover the budgeted annual operating expenses – minus 2.5 percent from improved productivity. This saving – and more – can be expected to be recouped through value-based settlement.

13.3.3 Total funding pool (2)

The funds included in the overall funding pool (the Health bank) are to be used to finance the overall activities associated with the citizens included in the PreCare Clinic.

The Region and the Municipality will continue to carry out some of these activities, and they will be settled on the basis of the amounts on which the payments to the Bank were based, including DRG rates for contacts with the hospital, fees for general practice, etc. in relation to the Region and with a settlement for the health services when there is contact with the municipality in the health area.

These amounts are not associated with a value-based settlement, but simply a "normal" payment according to actual consumption.

They could both be included in a funding model following the same principles as for the PreCare Clinic below, where the emphasis is on rewarding what is of value to the citizen, but that is not in this example.

13.3.4 Settlement of the PreCare Clinic based on citizens' measurements (3)

The situation is different in relation to The PreCare Clinic, which is settled with a basic grant supplemented by a share of earnings based on whether what the clinic delivers can be measured to be of value to citizens. The assessment of whether it has value is based on the measurements taken by the citizen. As mentioned earlier, the citizens make measurements via different devices, answer the questions mentioned in Table 13.1 and send the results to the PreCare Clinic.

At the same time, a number of registrations are automatically made in the PreCare Clinic's electronic medical record . In this record, all measurements and timestamps of contacts between the citizens and the clinic are stored. The electronic record is kept on the basis of a registration guide that encourages uniform records regardless of who makes the records. Timestamps enable an automatic calculation of the temporal distance between red measurements and the mandatory contact from the clinic to the citizen when this type of measurement occurs.

13.3.5 Settlement of the PreCare Clinic based on the RNs' efforts (4)

As mentioned, the healthcare staff in the clinic then assesses in dialogue with the citizen whether there is a deterioration and whether there is a need to initiate a treatment.

It is the effects of these decisions that are measured. The information makes it possible to assess whether the PreCare Clinic's efforts have ensured that the citizen's chronic disease has been stabilized, whether the patient's well-being is noticeable, and whether the clinic has lived up to the agreed goals for proactivity by complying with objectives of quick contact with the citizen by a red measurement, etc.

13.3.6 Value-based settlement of the PreCare Clinic

The clinic's efforts will be of value to the citizen if the measurements made are within the clinically defined threshold values for when the disease is stabilized.

Furthermore, the patient's well-being will be reflected in the answers to the questions answered in continuation of the self-monitoring. The patient-related outcome (PRO) of the clinic's work will be visible in the responses.

At the same time, it is possible to assess whether the clinic meets the agreed requirements for contact with citizens by red or yellow measurements, etc.

This information can then be used to calculate a financial settlement, which is based on a statement of the value that the clinic has delivered to the citizens in a given period.

13.4 Calculation of the payment flows in shadow accounting

The value-based settlement model for the PreCare Clinic has been tested according to the principles and steps shown in Figure 13.3 and taking into account how complicated the individual citizen's condition is in relation to all included citizens at the given time.

The "heaviness" of citizens may vary. It is assumed that the heavier a citizen is, the more difficult it is to keep him or her within the clinical thresholds of the condition-based vital parameters measured by self-monitoring.

The measurements of the citizens' well-being and the clinic's achievement of its own goals for response times, on the other hand, are assumed to be independent of the weight of the citizens included in the clinic. If it turns out that they are also gravitationally dependent, it can be included in the model.

13.4.1 Calculating the "weight" of citizens

The gravity calculation is made at the establishment of the pool and upon inclusion of a new citizen in the PreCare Clinic and is calculated on the basis of the total previous municipal and regional consumption for each citizen.

An average is calculated for all citizens and the individual's consumption is shared with this average.

Table 13.4. Calculation of patient weight for those included in the PreCare.

	Use of healthcare in the last two years before inclusion	Cost	Weight
Citizen 1	Hospitalization	40.000	
	Outpatient visit to hospital	1.500	
	Own doctor	150	
	Physiotherapist	450	
	Municipal consumption	11.753	
	Amount	53.853	0,7
Citizen 2	Outpatient visit to hospital	1.750	
	Outpatient visit to hospital	3.500	
	Outpatient visit to hospital	1.500	
	Own doctor	250	
	Hospitalization	80.000	
	Visit to a specialist	1.460	
	Municipal consumption	17.630	
	Amount	106.090	1,4
Citizen 3	Hospitalization	90.000	
	Hospitalization	50.000	
	Municipal consumption	11.753	
	Amount	151.753	2,1
Citizen 4	Own doctor	410	
	Municipal consumption	11.753	
	Amount	12.163	0,2
Citizen 5	Own doctor	270	
	Visit to a specialist	1.630	
	Outpatient visit to hospital	4.600	
	Hospitalization	20.000	
	Municipal consumption	17.630	
	Amount	44.130	0,6
Total		367.989	
Average		73.598	

Source: Data and Development Support, Region Zealand

In this way, each citizen is assigned a relative weight in relation to all the others included. This weight is an expression of the weight of the individual.

This is illustrated in Table 13.4. The numbers in the table are examples, not actually observed numbers.

This measure of gravity shall be used in the calculation of the value-based part of the payment flows discussed below.

13.4.2 Measurements of value for the citizen in the PreCare Clinic

As mentioned, the value-based financing model for the citizens associated with the PreCare Clinic will be based on three types of measurements containing both clinical and patient-related information.

It concerns:

1. Recorded patient experiences (PRO)
2. Clinical measurements
3. Activity metrics

The calculations were carried out for citizens with COPD and/or heart failure. Diabetes is not included in the following, as only 3 were searched at the time of testing the model. Although the system was prepared to include the chronic condition in the calculations, it made no sense to have so few people in this disease segment.

Re 1: Recorded patient experiences (PRO)

The specific wording of the questions (see Table 13.1) on whether citizens have experienced a deterioration in their condition within the last day is reproduced in Table 13.5.

Table 13.5. Questions for citizens with COPD

	Yes	No
Have you had increased shortness of breath in the last 24 hours?		
Have you had an increasing cough in the last 24 hours?		
Have you had coloured sputum in the last 24 hours?		

Source: The PreCare Clinic

The screen that citizens encounter when answering is shown in Figure 13.4.

The questions for heart failure patients are listed in Table 13.6.

Table 13.6. Questions for citizens with heart failure.

	Yes	No
Swollen legs - Are your legs more swollen today than they were yesterday?		

Shortness of breath - Do you have more shortness of breath today than yesterday?		
Discomfort when lying down - Do you find it more difficult to lie down due to shortness of breath or chest discomfort than usual?		
Dizziness – Have you experienced dizziness within the last day, e.g. when you stand up?		
Fainted – Have you fainted or nearly fainted within the last day?		

Source: The PreCare Clinic

Assuming that what matters to the citizen is that there is no lasting deterioration, it is considered to be of value to citizens if the number of days on which the answer to the questions asked is as low as possible.

The questions are answered in connection with the clinical measurements, which can vary in frequency. At the end of each month, an overall statement of the responses for each disease is made.

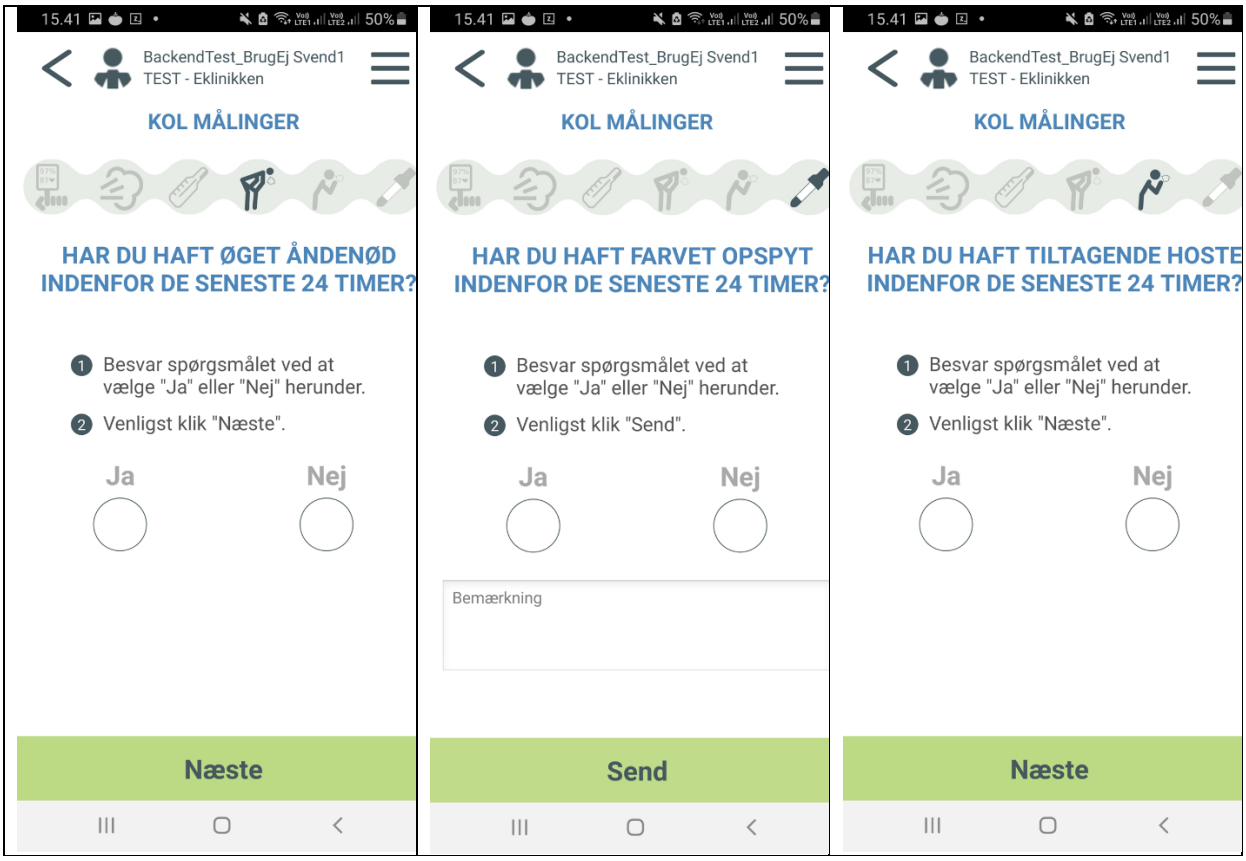
Citizens with a maximum of 10 per cent of the month's measurements, where a PRO question is answered with 'yes', are assigned the value "1" or "0".

When all citizens have been assigned a value, those who have been given the value "1" are counted together and divided by the number of citizens included. This obtains a percentage for the part of citizens who have had a relatively limited number of deteriorations in the patient's registered experience. This percentage is used in the overall model as the PRO contribution to the value-based financing share.

It should be emphasized that the 10 per cent target is an arbitrarily set target that must be adjusted as experience with the model is gained.

Figure 13.4. Screenshots with questions for citizens with COPD

Did you experience increased breathing problems within the last 4 hours?	Did you experience coloured saliva within the last 24 hours?	Did you experience increased coughing within the last 24hours?



Source: The PreCare Clinic

Re 2: Clinical measurements

For the purpose of the model, the work has initially been based on *measurements of the development in/level of* a parameter within each disease area. The result is obtained by comparing the development on average for 7 days of measurements at a time for calendar weeks – or median – whichever makes the most sense.

The frequency of the measurements may differ between citizens, but by using 7-day averages for calendar weeks, experience shows that there will be measurements for most citizens.

Overall, it is calculated how many weighted "points" have been earned in a given period compared to the possible number of "points" that could be obtained in the same period if the citizen had been completely stable.

The points are earned if the citizens' own measurements are within the desired clinically defined ranges. It should be emphasized that the intervals listed below have not been validated based on whether they are clinically meaningful. They are included to illustrate the possibilities of using them in a funding model.

If the model is to be generalised and put into operation, the intervals in question must undergo clinical validation by the relevant clinical scientific societies, so that it is ensured that the clinic's efforts are measured in relevant areas that have acceptance and ownership.

For each area, the following shall be measured:

COPD

Lung function (FEV1) – if the last 7-day measurements show a decrease in the median lung function that is less than or equal to 2%, the clinical COPD measurement is assigned the value 1 times the patient's calculated weight (cf. Table 4) – otherwise 0 (zero).

Citizens must be included for at least 4 weeks before measurements are included (2 weeks running-in, 3rd week serves as baseline for 4th week.) The week is included in the calculation of the month in which Sunday is included.

If there are weeks without measurement, points cannot be obtained. Possible points are calculated in weeks of measurement. This means that citizens who measure themselves in weeks 3 and 8 are included with the median for week 3, and any decrease is counted as a difference between weeks 3 and 8.

Heart failure

Blood pressure – if the last 7 days of measurements on average for BT-S show a value below 140 and BT-D below 90, if the patient is under 65 years of age when measuring – or BT-S below 150 and BT-D 95 if the patient is over 65 years old when measuring – the clinical blood pressure measurement is assigned the value 1 times the citizen's calculated weight – otherwise 0 (zero).

The citizen must be included for at least 4 weeks before measurements are included (2 weeks running-in, 3rd week serves as baseline for 4th week.) The week is included in the calculation of the month in which Sunday is included.

If there are weeks without measurement, points cannot be obtained. Possible points are calculated in weeks of measurement. That is, citizens who measure themselves in weeks 3 and 8 are included with the average for week 3, any decrease is counted as a difference between weeks 3 and 8.

Diabetes

The area is not included in the specific calculations, but the model is prepared to include the area with measurements of blood sugar. If the average of the last 7 days' measurements is between 7 and 10 mmol/l, if the measurements were taken between 8 – 10 in the morning, 12.00 – 14.00 and 18.00 – 20.00 and between 4 and 7 mmol/l at other times of the day, the clinical blood glucose measurement is assigned the value 1 times the citizen's calculated weight – otherwise 0 (zero).

By including patient weight as shown above, the relatively "heavy" citizens will contribute numbers greater than 1 and the "light" ones with numbers less than 1.

This takes into account the assumption that multiple patients and citizens with a previously large consumption of healthcare services may be relatively more difficult to get into the desired clinical intervals than the others included in the clinic.

As the ratio between achieved and possible points in the period is calculated, among other things, on the basis of the citizens' weight, there will be very little impact on the weight of citizens who are not yet included in the settlement of the clinical goals.

Two examples can illustrate this.

a. Citizen included on January 3 is included with prior consumption in gravity calculations for January, but will have its full 4th week measurements on January 31 and only be included in clinical goals' value calculation for the last week of January

b. Citizen with inclusion on January 10, will have completed their full 4th week by February 7. And thus be included in calculations of achieved and expected points for week 5 in February. The citizen will also be included in gravity calculations from February.

When all citizens have received one or more clinical measurements, the values within COPD, diabetes (Dia in Table 13.8) and heart failure (Hi in Table 13.8) are summed and divided by the total value that could have been obtained (sum of all possible values).

This can be shown with an example as in Table 8, where the five patients who are calculated weight in Table 3 measured for 4 weeks.

They are characterised by a disease pattern as shown in Table 13.7.

Table 13.7. Chronic diseases of 5 citizens

	COPD	Diabetes	Heart failure
Citizen 1	X	X	
Citizen 2	X	X	X
Citizen 3	X	X	X
Citizen 4	X		
Citizen 5	X		X

Source: Data and Development Support, Region Zealand

Citizen 1 has both COPD and diabetes, while citizen 2 has all three diseases, etc. Each time a value has been measured within the mentioned values for the diseases in question, a number of points corresponding to the citizen's heaviness are assigned in Table 4.

Thus, in the first week, we have managed to get measurements within the ranges for all citizens and their various diseases. In week 2, citizen 1's and 3's diabetes measurements fell outside the ranges, while citizen 2 also fell outside the measurement concerning heart failure. All the measurements that indicate that the citizen is not stable are marked in yellow in the part of the table that contains the "points" that could have been obtained.

As can be seen, the sum of the "points" that were reached is 41.2, while a total of 53.2 could have been collected. This means that target achievement can be calculated at 77.4% ((41.2/53.2) *100)

As citizens' self-monitoring is crucial for the system to work, it is essential that they are motivated to carry out the measurements. To the extent that this does not happen, it will result in a reduced ability to provide the right guidance and treatment. It will therefore have a negative effect on the value of being affiliated with the PreCare Clinic if the measurements are not available.

The number of patients who do not measure themselves will thus drag down the achievement of the target. The relative proportion that has not been measured in the last month must therefore be calculated and the percentage can be deducted from the above-mentioned percentage that has reached the recommended targets. This has been done in the established "shadow accounting" but can be omitted if deemed necessary.

Table 13.8. Calculation of weighted Quality Scores

	Heavines s	Measurement in week 1			Measurement in week 2			Measurement in week 3			Measurement in week 4		
"Points" that were obtained													
		COPD	Dia	HI	COPD	Dia	HI	COPD	Dia	HI	COPD	Dia	HI
Citizen 1	0,7	0,7	0,7		0,7	0		0,7	0,7		0,7	0	
Citizen 2	1,4	1,4	1,4	1,4	1,4	1,4	0	1,4	1,4	0	1,4	0	0
Citizen 3	2,1	2,1	2,1	2,1	2,1	0	2,1	2,1	2,1	2,1	2,1	2,1	0
Citizen 4	0,2	0,2			0,2			0			0,2		
Citizen 5	0,6	0,6		0,6	0		0,6	0,6		0,6	0,6		0,6
"Points" that could have been reached													
		COPD	Dia	HI	COPD	Dia	HI	COPD	Dia	HI	COPD	Dia	HI
Citizen 1	0,7	0,7	0,7		0,7	0,7		0,7	0,7		0,7	0.7	
Citizen 2	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4
Citizen 3	2,1	2,1	2,1	2,1	2,1	2,1	2,1	2,1	2,1	2,1	2,1	2,1	2,1
Citizen 4	0,2	0,2			0,2			0,2			0,2		
Citizen 5	0,6	0,6		0,6	0,6		0,6	0,6		0,6	0,6		0,6
Obtaining points as a result of ensuring desired results (measurements within the desired ranges)													
		41,2											
Number of possible achievable points													
		53,2											
Percentage achievement of targets (points achieved/possible number of points)													
		77,4											

Source: Data and Development Support, Region Zealand

Re 3: Activity

One of the key principles of the PreCare Clinic's service is the availability 24/7 and that there must be contact with the nursing care at the clinic's (RCC) within a short time if one of the measurements from the self-monitoring carried out by the citizens ends in a "red" or three consecutive yellow marking(s). This information indicates that there is acute deterioration and that treatment may need to be started without further delay.

At present, it is measured whether the citizen is contacted within 120 minutes if the mentioned measurements indicate a need.

Therefore, if the value is less than 120 minutes, the activity measurement is assigned the value 1, otherwise 0.

There may be errors in the reports of red measurements, which is why the citizen makes a new measurement, and in other cases there may be special agreements regarding the need for contact between the RCC and the citizen in the case of yellow measurements. The requirement for achievement of objectives for this area must therefore be adjusted according to the experience gained in the field if the model is to be put into operation in a larger context.

13.4.3 Achievement of objectives

Regardless of whether it is a question of reports in the described areas for PRO, clinical measurements or activity, it will be best to strive for the goal achievement to be 100 per cent in all areas. However, it would be an unrealistic requirement in the calculations of whether the PreCare Clinic is doing well and acting in a way that is of value to the citizens.

There may be external factors that affect the results. It may be "false" occurrences in the measurements. A recorded increased cough in COPD reports may be due to a cold and not necessarily to a worsening of the disease. A decrease in lung function may be a result of the citizen using the device incorrectly, and as mentioned, there may be special agreements about contact between the citizens and the clinic by red and yellow measurements. This will affect the calculation of the achievement of the clinic's activity goals.

In the subsequent concrete calculation of the value-based financing, it is therefore assumed that the measurements must be within the desired values for the three areas, respectively:

PRO	80 per cent
Clinical measurements	90 per cent
Activity	90 per cent

of the cases in which the objective is considered to have been satisfactorily achieved for the three categories in terms of calculation.

If, for example, it is only in 40 per cent of cases that the PRO measurements show the desired result, the target achievement will be 0.5 (40 per cent is half of the 80 per cent which is the satisfactory level). Similarly, the target achievement will also be 0.5 for the clinical measurements if 45 per cent of the measurements are within the desired clinical thresholds, etc.

It is assumed that the three measurements are of equal importance to citizens in measuring the value that the PreCare Clinic creates for them. The target achievement for the three areas is therefore included with equal weight – 1/3 – in the calculation of the amount of value-based financing.

This applies regardless of the number of chronic diseases that the citizen has. As mentioned, it is assumed that it is more difficult to achieve the desired clinical results for the "heavy" citizens, and this fact has been taken into account by using the relative "weight" of the citizens in the calculations of the clinical measurements.

The possibilities of achieving the desired goals may be influenced by the general condition of the citizens, and there may be a tendency to measure primarily when citizens are in good periods and doing well. It should therefore be made ongoing follow-ups and analyses of patterns of the measurements, etc. to assess whether they are sufficiently accurate to be used for financing purposes.

13.5 The overall model for disbursements from the funding pool

The statement of payment flows must be made once a month so that payment can in principle be made on the 1st business day of the month following the end of the calculation month. In other words, the month of January is settled on 1 March, and so on.

13.5.1 Settlement to the municipality

The overall idea is that the municipality should receive payment for the actual services provided to the citizens affiliated with the PreCare Clinic, but since it is not possible to get the specific information from the municipal medical record systems, etc., the settlement to the municipality is set at the same amount as they paid for each of the included citizens.

13.5.2 Settlement to the Region

For all the regional services provided to The PreCare Clinic's citizens, the region is settled from the financing pool. This applies to the areas from which pooled funds have been added, including calls on:

- Hospital contacts (DRG rates)
- Specialists outside the hospital (fees and rates from the health insurance)
- General practice, including any on-call physician contacts (fees and service rates from the health insurance)
- Podiatrists, physiotherapists, etc. (fees and benefit rates from the health insurance)

13.5.3 Settlement of the PreCare Clinic

The PreCare Clinic must receive monthly 12-part amounts to cover the budgeted annual operating expenses – minus 2.5 percent from improved productivity. This saving – and more – can be recouped through value-based settlement.

In the shadow accounts, a ceiling on extra earnings of 5 per cent of the PreCare Clinic's operating budget is introduced without the 2.5 per cent savings. The total amount thus at stake in the value-based settlement model is therefore 7.5 per cent of the budget.

In the model, the clinic must therefore have added the actual annual budgeted expenses (which are added to last year's accounts minus 2.5 per cent). That number is to be divided into monthly 12-parts as a basic grant.

The value-based share is calculated by taking the weighted sum of the target achievements.

If the target achievement for the three values for a month has been 1, 0.6 and 0.8, respectively, the weighted average will be 0.8. This figure must then be multiplied by 7.5% of annual budgeted expenditure divided by 12.

The result then constitutes the PreCare Clinics value-based share for the month in question.

The funds that are not disbursed in the month in question remain in the overall funding pool. At the end of the year, any remaining funds will be distributed between the municipality and the region in a proportion corresponding to their contribution to the funding pool.

If it turns out that the total consumption in the PreCare Clinic exceeds the budget, the additional consumption will be distributed between the municipality and the region in the same proportion as when paying into the financing pool.

The model outlined is just one example of how value-based financing can be designed. Alternatively, it can be designed without a productivity saving of 2.5%, the municipalities' and the region's contributions can be replaced by state funds, the funds for the current proximity funding can be used as an alternative, budget neutrality can be demanded so that the PreCare Lens or equivalent cannot generate earnings exceeding a fixed threshold, etc. Possibilities for variations in the model are manifold.

13.5.4 Determination of the PreCare Clinic's value-based financing

For the period January – June 2022, the above model has been applied to the registrations that have been accessed by the PreCare Clinic during the relevant period to assess whether the model can work in practice.

The calculations are calculated month by month, as indicated in the model based on the varying number of citizens who are affiliated with the clinic during the months in question.

At the beginning of the year, it was budgeted that the clinic would have 200 included citizens with an expected budget of DKK 4,094,000 based on the accounting information for 2021.

As the model includes a premise that a productivity increase of 2.5 per cent can be delivered, the clinic's monthly basic grant will be:

(DKK 4,094,000 * DKK 0.975)/12 = DKK 332,638

As previously stated, the 2.5 per cent can be recouped together with a possible additional grant of 5 per cent of the expected budget through the value-based funding based on the registrations and calculation of the clinic's results on PRO, clinical measurements and activity.

At full target achievement (the weighted sum of the result in the three areas is 1), the clinic's possible value-based funding each month will be:

(DKK 4,094,000 * DKK 0.075)/12 = DKK 25,588

Based on this, the target achievement in the first half of 2022 was calculated. The calculations have been carried out separately for each of the three areas measured in the model.

For the PRO measurements, it is a question of finding the proportion of the included citizens that marks a thresholder reduction in their well-being, cf. the above description and comments on tables 13.5 and 13.6. The result of the inventory is reproduced in Table 13.9.

Table 13.9. Target fulfilment for PRO – measurements of value for citizens H1 2022

		January	February	March	April	May	June
Citizens with COPD							
A	Number of included citizens with limited reduction in well-being	133	128	119	127	121	116
B	Number of citizens included	174	174	173	181	183	182
(A/B)*100	Target achievement in percentages	76,4	73,6	68,8	70,2	66,1	63,7
Citizens with heart failure							
C	Number of included citizens with limited reduction in well-being	18	16	17	15	18	18
D	Number of citizens included	19	17	17	16	22	26
(C/D)*100	Target achievement in percentages	94,7	94,1	100,0	93,8	81,8	69,2
((A+C)/ (B+D)) *100	Total PRO target achievement in percentages	78,2	75,4	71,6	72,1	67,8	64,4

Source: Data and Development Support, Region Zealand

The achievement of the clinical measurements relates to whether the measured values fall within the desired thresholds, as an expression that the disease of those included has been stabilized. The result is reproduced in Table 13.10.

Table 13.10. Target achievement for clinical measurements in H1 2022

		January	Februar y	March	April	May	June
Citizens with COPD							
A	Points achieved	462,8	373,8	348,7	393,9	476,6	349,2
B	Possible points	742,3	569,1	571,9	599,1	749,6	600,3
(A/B)*100	Target achievement in percentages	62,3	65,7	61,0	65,7	63,6	58,2
Citizens with heart failure							
C	Points achieved	94,1	68,4	57,2	56,8	73,9	92,3
D	Possible points	94,7	68,4	58,7	56,8	73,9	92,9
(C/D)*100	Target achievement rate	99,4	100,0	97,5	100,0	100,0	99,4
((A+C)/ (B+D)) *100	Total target achievement for clinical measurements in percentages	66,5	69,4	64,4	68,7	66,9	63,7

Source: Data and Development Support, Region Zealand

However, as mentioned earlier, this result is adjusted according to the proportion of citizens who do not measure themselves, as the lack of measurements makes it difficult for the clinic to be proactive. It is therefore important to keep the motivation for self-monitoring for those included high. When this does not happen, this model example is arranged in such a way that the relative proportion of the included citizens who have not measured themselves in the last month is deducted from the above-mentioned percentage who have reached the recommended clinical goals. The percentage to be deducted is shown in Table 13.11.

Table 13.11. Proportion of included citizens in the PreCare Clinic measuring themselves

		January	February	March	April	May	June
Citizens with COPD							
A	Number of included citizens measuring themselves	162	166	164	173	174	172
B	Number of citizens included	174	174	173	181	183	182
(A/B)*100	Target achievement in percentages	93,1	95,4	94,8	95,6	95,1	94,5
Citizens with heart failure							
C	Number of included citizens measuring themselves	18	17	17	15	21	26
D	Number of citizens included	19	17	17	16	22	26
(C/D)*100	Target achievement in percentages	94,7	100,0	100,0	93,8	95,5	100,0
((A+C)/ (B+D)) *100	Total proportion of citizens measuring themselves	93,3	95,8	95,3	95,4	95,1	95,2

Source: Data and Development Support, Region Zealand

Thus, the proportion that does not measure themself is also given, as the total proportion of citizens measuring themselves from Table 13.11 only needs to be subtracted from 100. This gives the proportion shown in Table 13.12.

Table 13.12. Proportion of included citizens in the PreCare Clinic who do not measure up.

	January	Februar y	March	April	May	June
Total proportion of citizens who do not measure themselves in percentages.	6,7	4,2	4,7	4,6	4,9	4,8

Source: Data and Development Support, Region Zealand

When this percentage is subtracted from the overall target achievement of the clinical goals, the corrected target achievement becomes.

Table 13.13. Adjusted target achievement for clinical measurements.

	January	Februar y	March	April	May	June
Total target achievement for clinical measurements in percentages	66,5	69,4	64,4	68,7	66,9	63,7
Total proportion of citizens who do not measure themselves in percentages.	6,7	4,2	4,7	4,6	4,9	4,8
Adjusted target achievement for clinical measurements in percentages	59,8	65,2	59,6	64,1	62,0	58,9

Source: Data and Development Support, Region Zealand

Finally, the target achievement of the activity is calculated as the proportion of red or three consecutive yellow measurements answered within 120 minutes based on the PreCare Clinic's patient record. The result of this calculation is reproduced in Table 13.14.

Table 13.14. proportion of red and yellow measurements answered within 120 minutes.

	January	February	March	April	May	June
Proportion of measurements answered within the timeframe in percentages	84,0	66,9	83,8	84,3	82,0	84,8

Source: Data and Development Support, Region Zealand

The results obtained for PRO, clinical measurements and activity, respectively, are then compared with the desired target achievement of 80, 90 and 90 as mentioned above, and the relative proportion of the actual results in the desired is calculated (e.g. the PRO result is 78.2 equal to 0.98 of the desired etc.) for January and weighted together with 1/3 for each, assuming, as mentioned above, that: that they are equally important. This is done in Table 13.15.

Table 13.15. Area goal achievement and weighted goal achievement

	Desired goal achievement	January	February	March	April	May	June
Total PRO target achievement in percentages	80	78,2	75,4	71,6	72,1	67,8	64,4
Adjusted target achievement for clinical measurements in percentages	90	59,8	65,2	59,6	64,1	62,0	58,9
Proportion of measurements answered within the timeframe in percentages	90	84,0	66,9	83,8	84,3	82,0	84,8
The actual measurements in relation to the desired							
PRO		0,98	0,94	0,89	0,90	0,85	0,81
Clinical goals		0,66	0,72	0,66	0,71	0,69	0,65
Activity		0,93	0,74	0,93	0,94	0,91	0,94
Weighted target achievement		0,86	0,80	0,83	0,85	0,82	0,80

Source: Data and Development Support, Region Zealand

The weighted target fulfilment is an expression of the proportion of the value-based pool that the clinic earns in the months in question as value-based funding.

As mentioned above, the PreCare Clinic's basic grant is DKK 332,638 each month, while the value-based part is DKK 25,588 if the weighted target fulfilment is DKK 1. When it is 0.86 in January, cf. Table 13.15, the value-based part becomes DKK 25,588 * 0.86 = DKK 22,006.

Based on the results given in Table 13.15, the clinic's funding for the first 6 months of 2022 will therefore be as indicated in Table 13.16.

Table 13.16. The PreCare Clinic total funding in H1 2022

	January	February	March	April	May	June
Value-based finance	22.006	20.470	21.238	21.750	20.982	20.470
Basic appropriation	332.638	332.638	332.638	332.638	332.638	332.638
Total funding	354.644	353.108	353.876	354.388	353.620	353.108

Source: Data and Development Support, Region Zealand

As can be seen from tables 13.9 – 13.16, it is thus possible to visualize and incorporate a value-based financing model in the settlement of The PreCare Clinic's activities.

This model can be generalised to a model that relates to the overall health care system with municipal and regional health initiatives or in connection with the settlement models of regions and hospitals.

13.6. Implementation of value-based finance

In the years 2016-2019, Danish Regions carried out work with a view to introducing value-based management. True to tradition, the steering committee for this work decided early in the process that the value-based mindset should not include funding.

The end result of the whole process was that it was left to the individual regions to implement the value-based governance themselves. There was only marginal coordination. In reality, this has meant that the project is largely non-existent and diffuse, as it has been approached differently in the individual regions, with the certainty that it will lead to inequality in the treatment of patients between regions to the extent that value-based management may have some influence on day-to-day management.

However, as part of the work on value-based management, a working group was set up to look at the framework for the development of settlement models that support value-based management11.

Although the group's work had no influence whatsoever on the final outcome, since financing elements were defined out of the work, as mentioned above, the working group established a number of principles for the framework that would characterise a value-based financial mindset.

The group worked on two main areas in terms of health policy, objectives and the very principles of the design of a financing model. The considerations that emerged from this work are still valid and can be applied to the concrete implementation of a value-based financing model.

At the same time, they have been used in the establishment of the model associated with the PreCare Clinic.

The health policy objective - Patient value management - is highlighted by the working group with the following elements as core areas:

- Focus on quality and effect
- Coherent patient pathways at the hospital, between hospitals and between sectors
- Cost-effectiveness

[11] Team Governance and Coherence, Danish Regions Working paper: Description of settlement models to support value-based management Working Group for Finance, Settlement Models and Data in project on value-based management, 2016

The PreCare project covers all three areas. The clinical ECM model mentioned in the introduction ensures both focus on quality and efficacy, while one of the key elements of the model is to create coherence for the patient through ongoing assessments of his or her condition through self-monitoring with the possibility of 24/7 follow-up.

In addition, the initiative proves to be cost-effective, as the use of the expensive hospital contacts is reduced for the heavy patients assigned to the PreCare Clinic.

In addition, the working group *attached particular importance to the following principles for model interior design:

- Settlement mechanisms must be transparent
  As shown in tables 13.9 – 13.16, this principle is fulfilled in the PreCare project. All elements of value-based settlement are visible and easy to understand.
- Improvements are rewarded
  This principle is also followed in the PreCare model, as the clinic is rewarded for doing well for the associated citizens. The only exception is that the clinic is "punished" if the motivation to monitor themselves decreases, as it is this information that is the entire foundation for being able to assess the condition of the citizens and assess the need for any actions
- Controllable for clinical staff – it must not lead to counter-productivity
  A prerequisite for the entire value-based thinking in the PreCare model is that it must be subjected to clinical validation, so that the measurements are based on statements that the clinkers themselves choose as acceptable. They must have ownership of the system and be able to control the elements selected to be part of a value-based model
- Ongoing and clinically meaningful follow-up
  The illustration of how this can be done is reproduced in Tables 13.9 – 13.16. The above envisages that the calculations are made every month, but in principle they can be made daily if needed, in order for clinicians to assess whether there is a need for quick adjustments to achieve the intended goals
- Attention to all patient groups so selection is detected
  In the above review, only patients with COPD and heart failure are included, but the model is agile and can be made general and include all patient groups.
- Visible and valid data (baseline and evaluation)
  This part is also shown to be implementable if the model from PreCare is scaled to the overall healthcare system, although there may be a need to prepare municipal data to a greater extent than is currently the case
- Clear definition of prospective rules for risk and profit sharing
  In the description of the PreCare model, it appears that this principle has also been taken into account in the structure of the model

When implementing the value-based financing model in the PreCare project, additional principles were added. It includes:

- Reuse of existing information - no new registrations for financing purposes only
- Payment flows must ensure the liquidity of the provider
- Application of a holistic approach – transparency of the impact of health care on the labour market and social sector, etc.

All three principles are incorporated into the model described above. One of the important focus areas has been to use existing registrations in the assessment of citizens' / patients' well-being instead of asking patients to later respond to PRO forms or the like, where there will definitely be

a clear decrease in the response rate, and thus a decrease in confidence that the answers can be used for financing purposes.

In addition, it should be mentioned that the PreCare project has built a "regional model" (public sector scheme) in collaboration with Statistics Denmark in order to be able to apply the holistic approach to the measurements when needed. This line of thinking can thus be incorporated into the model, although it is not illustrated in the above review.

13.7 Usability

One of the key focus areas in the PreCare project has been to ensure the data-driven aspect in the handling of the individual included citizen, but also in relation to the use of data for management, planning and financing of health areas.

In continuation of this, there has been work to create a funding regime that could ensure positive financial incentives that will encourage the PreCare cCinic to do the things that are of value to the patient.

Interest in the funding area was actualized by the fact that it has not been possible voluntarily to ensure the continuation of the PreCare project and the clinic after the current funding from Innovation Fund Denmark ends, even though the project can show very positive results.

The inability to create a long-term financial solution can primarily be attributed to the existing silo thinking that characterizes municipal and regional economies. Although there are visible regional savings in the first year for the citizens included in the PreCare Clinic, the region will not contribute to the continuation of the clinic, as they perceive it as a municipal activity, even though it is sector-neutral and, among other things, helps to relieve the pressure on the regional hospitals.

Through the work with the financing area under the auspices of PreCare, however, it has been possible to show that it will be possible to create a financial basis for the project's work to be continued and expanded within the framework of the cluster collaboration that has been politically adopted.

At the same time, it has proved possible to support activities of value to citizens/patients with positive financial incentives, which in itself should indicate that the method indicated is useful also on a large scale.

14. References

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7. Data and Development Support, Region Zealand (2020): The PreCare Clinic – results after 1 year
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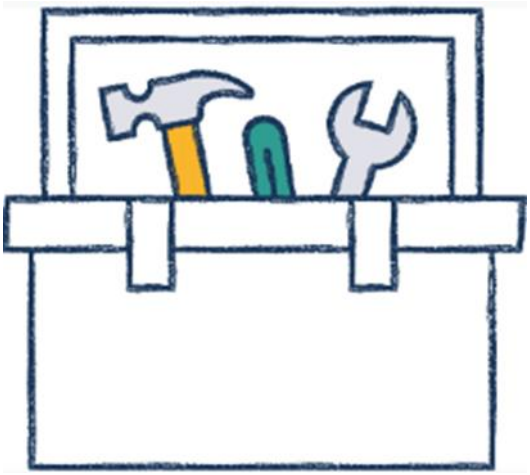
APPENDIX- TOOLBOX

Tool 1: The PreCare Clinic's condition-based services

Sample declaration of consent regarding the usage of personal data. To be signed by citizen prior to inclusion in the PreCare project.

The PreCare Clinic's condition-based services



DECLARATION OF CONSENT

I hereby confirm that I have received participant information about the PreCare project's health offer "The PreCare Clinic" and received the leaflet about Odsherred municipality's telemedicine offer.

I have also had the opportunity to ask questions and received satisfactory answers.

I agree that my participation in the PreCare Clinic is completely voluntary, and that I can withdraw my consent to participate at any time by contacting the PreCare Clinic, without necessarily giving a reason for this. It will not affect my relationship with either Odsherred municipality, my general practitioner or Holbæk Hospital.

I agree that I will acquire and pay for an emergency medicine box, dispensed by my pharmacist, containing prescribed medication for the rapid initiation of treatment in case of acute deterioration of my state of health. These costs also include replenishing medication to the medicine box as needed.

The PreCare Clinic is part of the PreCare project, which aims to provide participants with holistic treatment and support based on an overall picture of regional and municipal social, health and labour market services. The project collaborates with a number of research institutions, including the University of Copenhagen, the Technical University of Denmark (DTU) and Copenhagen Business School (CBS). This means that scientific studies are continuously carried out that help ensure an evidence-based development of the PreCare Clinic.

Consent to use my data

The consent below concerns data from my home municipality's medical record system and from my home municipality's professional systems used in job centre, care/health and social/psychiatry, from Region Zealand's patient administrative and clinical systems (including the Health Platform), as well as from the national registers CPR, Landpatientregistret (LPR) and Joint Medicine Card (FMK).

I give - in the form of ticks in the boxes below - my consent to:

- That all information from the above-mentioned systems and registers that is **necessary** for The PreCare Clinic to provide holistic support and patient treatment must be **retrieved** and **passed on** from my home municipality, Region Zealand and the mentioned national registers, respectively, **for use in support and patient treatment**. In this connection, I am aware that the information is used by regional and municipal health professionals who have documented affiliation with the PreCare Clinic.
- That the above-mentioned data may also be used by The PreCare Clinic's "owners" (Region Zealand and the associated municipalities) for **cross-sectoral planning and management**, follow-up on set goals, **optimization** of The PreCare Clinic's and PreCare project's services and activities, **analyses** and **evaluation** of whether the PreCare project in practice creates an improved state of health in the population, better patient experiences and greater cross-sectoral cost-

effectiveness, as well as for **general management information**, etc. I am aware that my information in this connection is processed by analysts in Region Zealand who have documented affiliation with the PreCare Clinic and/or the PreCare project.

- That the above-mentioned data may also be **passed on by the PreCare Clinic to research projects with** documented connection to the PreCare Clinic, which are carried out with the aim of preparing profiles for risky citizens and understanding their needs, wishes and expectations. This knowledge will lead to the development and testing of a pay-for-success based concept for high-risk and risk-risk population groups. In addition, new knowledge will be created about how digitalisation/the person-centred approach affects the actors' condition, behaviour, role perceptions and mindset. Information will be systematically collected about the project's effects on citizens, healthcare professionals and management. In addition, the transformation itself towards person-centred healthcare will be the subject of analysis.
- That my ongoing measurements are included on an equal footing with the above data for processing, analysis and research purposes.

My consent above – or parts thereof – can be withdrawn at any time and lapses no later than one year after it has been given. The PreCare Clinic may request that my consent be renewed.

I am informed that in addition to being registered in the PreCare Clinic's medical record system and on the PreCare Clinic's laboratory server, my information will be stored in a joint municipal and regional data bank established by Region Zealand, for the purposes mentioned above. All data will be treated fully confidentially and in accordance with the requirements of the authorities.

I am given a tablet, which is my contact to the PreCare Clinic. The tablet has installed only the e-consultation support application. This includes sensitive personal data. I am aware and understand that the responsibility for the data stored on the tablet is my own. It is my responsibility to ensure that data is not accessed by unauthorized persons. The tablet is not locked and must therefore be stored securely. If the tablet is stolen, it is important that I immediately inform The PreCare Clinic so that data can be deleted remotely.

The PreCare Clinic only assumes responsibility for the treatment that The PreCare Clinic performs when you are in Denmark. All trips abroad are therefore at your own risk.

Information registered about me in connection with the processing is stored for 10 years after the end of the project. Data included in research results are stored in anonymised form indefinitely.

I have the right to objection as well as insight and possible correction in the registrations made in connection with my affiliation with the PreCare Clinic. I have the right to request deletion of information that The PreCare Clinic has registered about me.

I have the right to complain to the Danish Data Protection Agency if I am dissatisfied with the way The PreCare Clinic processes my personal data. The Danish Data Protection Agency's contact information can be found at www.datatilsynet.dk

I know enough about the purpose, method, pros and cons to say yes to participating.

I have been given a copy of this consent sheet.

I do not wa☐ wish to be info☐d about the result of the research project as well as any consequences for me.

To be completed by study participants:

_____, _____, _____.

Name (capital letters) Date Signature of trial participant

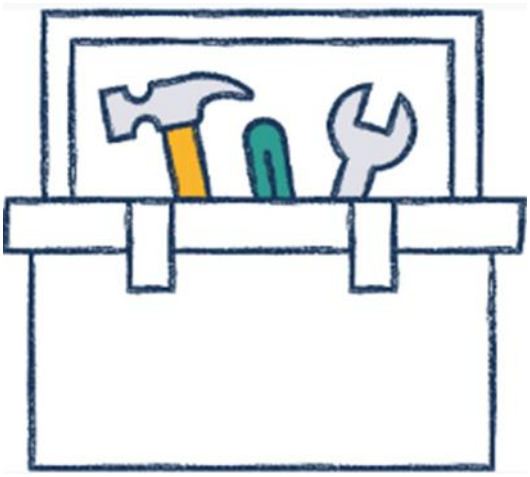
To be completed by the employee from the PreCare Clinic who has informed the citizen:
The undersigned employee from PreCare confirms that it has provided sufficient participant information, both orally and in writing, to make a decision on participation, and that the above subject has agreed to participate under the circumstances described.

A copy of this declaration of consent has been provided to the participating subject.

Tool 2: Features of the PreCare Clinic

Two case studies of workflows and response when citizens' condition deteriorates.

Features of the PreCare Clinic



Case study about calls to RCC (Response and Coordination Centre)

Just past noon, a red measurement appears on RCC's screen. It is Ester, 85 years old, who has indicated a temperature of 38.1, increased shortness of breath and coloured sputum. Together, this gives a red measurement based on the PreCare Clinic's algorithm.
The RCC RN calls Esther as soon as she sees the red measurement. Ester picks up the phone herself, clearly somewhat more dyspnoea than the RCC RN is used to seeing Esther. She says it's been mad since last night. Ester has slept badly last night, and she has coughed up green mucus several times this morning. The RN and Ester agree that Ester starts Exa 3 treatment. Ester is thoroughly instructed on what medication to take from the emergency medicine she has lying around at home. If it is nevertheless difficult to remember for Esther, she has a laminated sheet lying around, where her specific treatment is also described.
The RN and Ester talk about the importance of getting plenty of fluids for the next few days, and that Ester remembers to use her PEP whistle, which she was given at the start-up meeting. They agree that Ester will take measurements daily for the next 5 days, and that she will be called on the 5th day so that together they can make sure that things are moving forward. The measurements, of course, RCC keeps an eye on along the way.
For the next few days, Esther's measurements remain red as she ticks off coloured sputum. RCC calls Ester to see if things are moving forward after all. The temperature of the esters has dropped the next day. On the 3rd day, Esther's measurement is yellow due to slightly increased shortness of breath, but on the 4th day, her measurement is again in green. The RCC calls after 5 days and Ester feels well again. RCC talks to Ester about how important it is that she continues to remember her PEP whistle and that she must complete the treatment of antibiotics in the 10 days.
After this, Ester can switch to regular daily condition measurements, and she is of course as always welcome to call RCC if she has questions or feels unwell again, even if the measurements are green.

Source: The PreCare Clinic

Case about MERN visit from The PreCare Clinic

One morning, Ulla, a social and health assistant from the southern part of the municipality, calls. She tells us briefly and precisely who she is and what kind of citizen it is about. She has measured a full set of vital values and has just skimmed the citizen's medicine. She explains that it is a 78-year-old gentleman (Poul), who is usually healthy, but this morning is different than usual. Poul doesn't want to get out of bed, no concrete pain complaints. He has a slight fever and looks a little flushed.
The PreCare Clinic arranges for the MERN RN to arrive within an hour for the purpose of the treatment. an assessment. The PreCare Clinic agrees that Ulla will in the meantime pay a visit to another citizen, and that Ulla will then meet with the MERN RNs at Poul's so that they can make an assessment together.
They meet at Poul's and together they begin an ABCDE review with clinical assessment and remeasurement of values. Together they can piece together a complete picture of Poul's condition. Ulla knows Poul very well, and MERN comes with specialist experience and equipment that can help with the assessment. Poul has slightly skewed values, including a temperature that has risen further to 38.9 since morning. After a thorough review and measurement of CRP bedside and performance of u-stix, it appears that Poul has developed

a rapidly deteriorating UVI. The MERN RN calls Poul's own doctor on the emergency number that the RNs have for all the municipality's doctors. After a conference and presentation of the RN's assessment, Poul is put into treatment, and a new supervision from MERN is agreed the following day with a view to improving the RN's assessment. control of general condition and measurement of CRP.

Ulla, who has been at home during the review, is also informed about the plan and makes sure to inform her colleagues so that Poul gets a little extra supervision over the next few days. Bedridden, he needs a little extra help with food and drink and toileting.

The next day, MERN visits Poul again. Fever and CRP have decreased, and Poul is also experiencing a clear improvement. MERN agrees with Poul that he completes the planned treatment and contacts his own doctor in case of deterioration. Ulla, who is also at home, promises Poul to help keep an eye on progress.

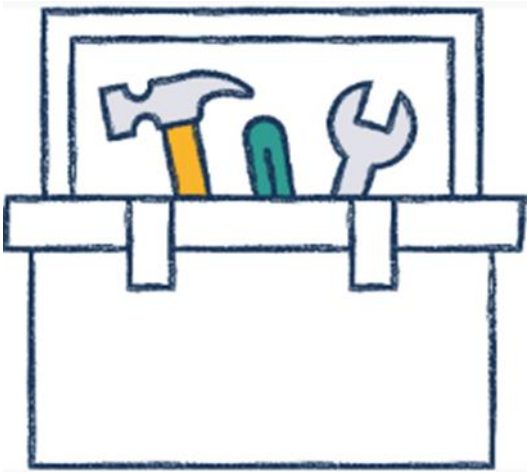
Correspondence is sent to your GP about the condition and plan. MERN' role has ended at home, but Ulla and the rest of the home care know that they can call RCC if they have questions.

Source: The PreCare Clinic

Tool 3: The PreCare Clinic's telemedicine services

Green, yellow and red dashboard feedback for autogenerated feedback. Algorithms for triage when change in habitual values.

The PreCare Clinic's telemedicine services



Algoritmeregler

I det følgende ses

1. Hvis en enkelt parameter/symptomscore enkeltvis triageres rødt, triageres der rødt samlet
2. Hvis der ikke er nogen røde, men minimum 3 gule deltriageringer, triageres der rødt samlet
3. Hvis en målt vægt minus habitualvægt er større/mindre end eller lig +-3 kg. triageres der rødt.
4. Hvis en målt vægt minus habitualvægt er større/mindre end eller lig +-1 kg. og mindre end eller lig +-3 kg. triageres der gult.
5. Hvis der kun er grønne deltriageringer triageres der samlet set grønt

Missing data:
Alle data til HI tilstandsdatasættet SKAL registreres af brugerne – missing data ikke en option!

Box 1. Autogenerated initial feed-back for citizens in the heart area

Result			Associated comments
Two measurements ago	**Previous measurement**	**Current measurement**	
			Your condition is normal – have a good day
			Your numbers are not normal – pay attention to your condition and remember to measure your values again tomorrow
			You have an aggravation – contact The PreCare Clinic for support and guidance
			Your condition is normal – have a good day
			Your numbers are not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			You have an aggravation – contact The PreCare Clinic for support and guidance
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your numbers are still not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			You have an aggravation – contact The PreCare Clinic for support and guidance
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your numbers are still not quite normal – pay attention to your condition and

			remember to measure your values again tomorrow
			You still have worsening of your condition – the PreCare Clinic will contact you shortly
			Your condition is normal – have a good day
			Your condition is normal – have a good day
			Your condition is normal – have a good day
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your condition has returned to normal – still pay attention and measure your values again tomorrow
			Your numbers are not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			Your numbers are not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			Your numbers are not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			Your numbers are still not quite normal – pay attention to your condition and remember to measure your values again tomorrow
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have a steady deterioration – contact the PreCare Clinic for support and guidance if you are in doubt
			Your numbers are still not quite normal–pay attention to your condition

			and remember to measure your values again tomorrow
			You have a steady deterioration – contact the PreCare Clinic for support and guidance if you are in doubt
			You have a steady deterioration – contact the PreCare Clinic for support and guidance if you are in doubt
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You have an aggravation – contact The PreCare Clinic for support and guidance
			You still have a worsening condition – you will be contacted as soon as possible by the PreCare Clinic
			You still have a worsening condition – you will be contacted as soon as possible by the PreCare Clinic
			You have a worsening and may need further help – The PreCare Clinic will contact you as soon as possible

Source: The PreCare Clinic

Permissible changes of habitual value thresholds in the cardiac area

When a citizen's condition measurements for the various numerical parameters are in habitual level, they are by definition green. However, in some cases these thresholds may need to be changed. This is a healthcare professional task in the specific case to assess.

Box 2. Alteration of habitual value in the heart area

Systolic BT: Habitual value is entered to:
Nothing if it is between ≥100 and <170
KHG* for sysBT≥170 and <180, the actual measured value in the algorithm is corrected by (measured sysBT + (170 - KHG))
KHG for sysBT≥80 and <100, the actual measured value in the algorithm is corrected by (measured sysBT + (100 - KHG))

*KHG: corrected habitual threshold value

It is not possible to both downcorrect and upcorrect at once. One can only choose one of the two options.

Heart rate: Habitual value is entered to:
Nothing if it is between ≥55 and <80

KHG for heart rate <100 and ≥80, actual measured heart rate is corrected by (measured heart rate – (80-KHG))
KHG for heart rate <55 and ≥50, the actual measured heart rate is corrected by (measured heart rate +(55-KHG))

It is not possible to correct up and down the KVG for heart rate simultaneously. You can only choose one of the two options.

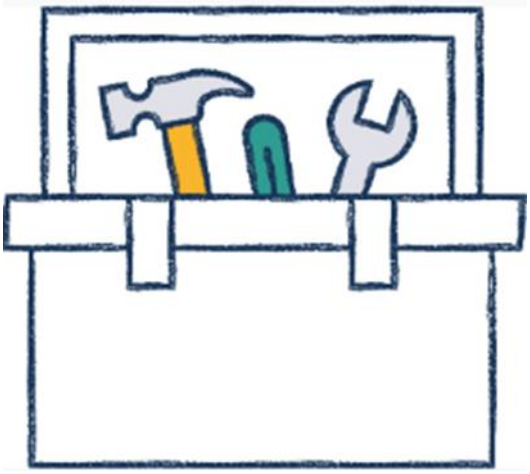
Weight: Habitual weight
Weight change value = Measured weight – habitual weight

Source: The PreCare Clinic

Tool 4: Tasks, Roles, and responsibilities

Delegation of responsibility. Example referral procedure. Example of explanatory citizen brochure for PreCare, web ad texts and poster to invite citizens to participate.

Tasks, Roles, and responsibilities



E-doctor

The e-doctors have the primary responsibility for the medical treatment of citizens in the PreCare Clinic. Some of this responsibility is delegated to the PreCare Clinic's RN's.

The e-doctor performs prequalification of the individual citizen with heart failure in connection with their inclusion in the PreCare Clinic. While it is the RN's who perform prequalification of the patient with COPD. According to the Authorisation Act, the e-doctor may delegate tasks to an assistant (4, 5).

In the PreCare Clinic, this means that the RN's, under the delegation and responsibility of the e-doctor, perform tasks such as medical treatment, and collecting specimens for paraclinical analysis in relation to the citizens change in condition.

An important prerequisite for the work to be carried out in accordance with current health professional guidelines is that the RN's are supervised with 24/7 access to the e-Doctor. There are weekly virtual "rounds" for the PreCare Clinic's RN's and e-doctors. The included citizens also have the opportunity to get in touch with the e-doctor.

The e-doctor function:

- Prequalify citizens who wish to be affiliated with the PreCare Clinic
- Doing virtual "rounds"
- Available to PreCare Clinic staff around the clock
- Responsible for treatment for citizens affiliated with The PreCare Clinic in Odsherred Municipality
- Responsible for treatment when initiating medical treatments with the associated citizens
- Responsible for certification and supervision of The PreCare Clinic's RNs
- Is available to the citizen when appropriate.

Registered Nurses in the PreCare Clinic

The PreCare Clinic's RN's are employed by Odsherred Municipality and work under the instructions of The PreCare Clinic's company-responsible doctor, who can also act as an e-doctor.

A prerequisite for being a RN in the PreCare Clinic is a broad clinical experience that makes it possible to act in telemedicine nursing.

Contact with telemedicine citizens is based on telephone or video contact, in combination with the citizen's own condition measurements. The RCC RN makes a thorough and accurate assessment of the patient's condition based on the citizen's measurements and condition. The combination of the RN's personal contact with the individual citizen in connection with inclusion and TM certification for the PreCare Clinic, the telemedicine contact in connection with changes in the citizens condition and the background information about the citizen in the PreCare Clinic's medical record system, enables the RN's to work holistically in their approach. It also makes it possible to assess which initiatives best serve the individual citizen in the specific situation.

This means that the RN's in the PreCare Clinic handle a combination of nursing tasks of an instrumental clinical nature, and that they also assess needs that relate to the entire health and social situation of the citizen.

In other words, this means that RN's in their work with early detection, timely intervention and handling of treatment, including complex and unforeseen patient pathways, draw on their broad

knowledge and competencies that go beyond emergency nursing itself, and which help ensure quality, uniformity and patient safety in the PreCare Clinic.

As mentioned above, the RN's work on delegation and with the instructions and function descriptions that cover the healthcare tasks performed under the auspices of the PreCare Clinic's various functions.

Example of framework delegation

Framework delegation for exacerbation 1-3 treatment in ECM 2.

Subject	Guidance – Framework delegation regarding the treatment of exacerbation of COPD to citizens affiliated with the PreCare Clinic.
Parties involved	RNs who are certified to The PreCare Clinic employed in Care and Health Odsherred municipality. The RN can start treatment, change the dose and end treatment. In case of doubt, always contact the PreCare Clinic's doctor.
Purpose	Describe the framework delegation for exacerbations treatment. Ensure that the RN has the sufficient knowledge and that the citizens receive the right treatment in relation to the algorithms.
Target	That the citizen is quickly and safely treated for his exacerbation so that hospitalization for this is avoided.
Approach	The prescription of exacerbation treatment is a medically reserved area of activity. The framework delegation applies to all 3 exacerbations treatments. With the framework delegation, RNs without a doctor's prescription can initiate citizens into exacerbation treatment based on the treatment algorithm. Treatment algorithm:

PreCareKlinikken

COPD Medicine Box

1. **Airway dilating – fast-acting**
   (Ventoline, Bricanyl, Duovent for Inhalation mm.pn.)
2. **Adrenal corticosteroids**
   (prednisolone – 37.5 mg (11/2 tbl. x 1 for 10 days)
3. **Inhaled steroids + LV-Beta2-agonist** (Symbicort/Seretide 1 suck x 2 double when exacerbated)
4. **Antibiotics – broad spectrum**
   (Amoxicilin 750 mg, 1tbl. x 3 for 10 days)
5. **Anxiolytica**
   (Phenergan 25 mg 1/2 tbl. p.n)
6. **Oxygen** given at home (0-6l/min)
7. **Take expectorant test**

State colors	Observations	Treatment options	Comments
	Nobody	Nobody	Nobody
	Yellow 1 day = obs, 2 days = action	2 days = contact citizen	Service: urgent inquiry
	Red 1 day = action	Contact citizens	Service: urgent inquiry
Measurements	**Observations**	**Treatment options**	**Comments**
SAT>90%		Nobody	Perhaps the single most important measurement of COPD
SAT<90% >85%	Colors, pulse, resp.frequency	**1+3** + possibly. **2** (possibly. **6**)	
SAT<85%	Colors, pulse, resp.frequency	**1+2+3** (possibly. **6**)	
SAT<80%	Colours, pulse, frequency and level of consciousness	**1+2+3** + possibly. **4** (possibly. **6**) Call rear guard	**7**. Expectorant test if necessary
Heart rate (pulse>100)	Tachycardia (side effect to B2-agonist/infection, atrial fibrillation)	If infection is suspected, this is treated (**1+2+3+4** if necessary). **6**)	**7**. Expectorant test
Respiratory rate (RF>25)	Colours/level of consciousness	If infection is suspected, this is treated (**1+2+3+4** if necessary). **6**)	If RF is > 25, contact rear guard (**7th** expectorant test)
Temperature ↑	Temp. Higher than 37.8	**1+2+3+4,** possibly. **6th**	**7**. Expectorant test

LFU (FEV1)	> 20% reduced	**1+3** (possibly **2+ 4** in case of obs. infection)	**7**. Expectorant test if necessary
Clinical assessment	**Observations**	**Treatment options**	**Comments**
Breathlessness	Unrest, anxiety	**1+3** + possibly. **5th**	
Cough + purulent sputum	Color (yellow, green, brownish)	**1+3+5+4**	**7**. Expectorant test
Tiredness / exhaustion	Colors, level of consciousness, respiration	**1+2+3** + possibly. **4** (possibly. **6**)	Consider hospitalization, call rear guard - **7**. Expectorant test
Mental state (anxiety)	Colours, level of consciousness, respiration, anamnesis	possibly. **5th**	Anxiety due to shortness of breath is treated with **1+3+** possibly. **5th**
Consciousness	Speech, agitation, anxiety, colors	**1** possibly. **3** + possibly. **5th**	
Colour	Cyanosis (fingers, lips, skin)	**1+2+3** + possibly. **6th**	

Exacerbation's treatment is divided into 3 groups:
Light exacerbations treatment, Moderate exacerbations treatment and Severe exacerbations treatment. The treatment for the different is as seen below.

Easy exacerbations treatment:

1. Increase beta2-agonist to 1-2 sucks every 4-6 hours until symptom relief. Do not take at night during sleep.2. Double dose inhaled steroid x 2 daily for 5-10 days

Moderate exacerbations treatment:

1+2 as well,3. Five-day treatment of 37.5 mg prednisolone x 1 daily (1.5 tablets x 1 for 5 days)

Severe exacerbations treatment:

1+2+3 as well,4. Start of 10-day cure with tabl. Amoxicilin 750 mg, 1tbl. x 3 for 10 days

When initiating moderate and severe exacerbation treatment, correspondence must be sent to your GP as information before initiation of treatment.

Likewise, initiation of treatment for moderate and severe exacerbation must be documented in the Appinux journal and in the care record.

Responsibility	Management is responsible for: • That all RNs who are certified for the PreCare Clinic are familiar with the framework delegation. • To supervise the tasks appropriately. The RN is responsible for: • To exercise care and conscientiousness and always consult a doctor in case of doubt in order to ensure patient safety. • To speak up and seek training and teaching in any doubt.
Reference	Executive Order on the use of assistants by authorised healthcare professionals (delegation of reserved healthcare activities) https://www.retsinformation.dk/Forms/R0710.aspx?id=129042

Source: The PreCare Clinic

Example referral procedures for citizens with COPD - General practice

The PreCare Clinic is a new offer for citizens with COPD in Odsherred Municipality. The PreCare Clinic consists of:

- A mobile emergency nursing team consisting of specially trained RNs who can be sent out to the citizen's home to clarify and treat acute medical issues in consultation with the PreCare Clinic's doctors
- 1 municipal sub emergency room at Lynghuset, where citizens with COPD under safe conditions can receive medical treatment and observation, with medical support, rather than being admitted to hospital
- A telemedicine response and coordination centre where patients with COPD can be monitored and treated 24/7 using telemedicine technology

The telemedicine initiatives for COPD citizens are part of the municipality's efforts in continuation of the Danish Health Authority's quality standards for the municipal emergency function in home nursing, which recommends supporting the treatment of the citizen in and near their own home, as well as giving the citizen the opportunity to take care of their own illness, through, among other things, the use of education and telemedicine technology.

The PreCare Clinic is established by the municipality in collaboration with Region Zealand in the project PreCare, which is supported by Innovation Fund Denmark.

As a general practitioner, how can I benefit from this?
Consider the initiatives as an additional offer and supplement to your business as a general practitioner. The above initiatives have the potential, in collaboration with you, to provide the municipality's citizens with a number of new, proactive treatment options in the local healthcare system – all the way to the citizen's home. The purpose is to reduce the incidence of acute admissions for citizens with COPD and ensure increased quality of life and security.

It is about:

- to clarify acute and sub-acute conditions that may potentially result in hospitalization in the citizen's own home,
- to carry out well-clarified treatment and monitoring in one's own home,
- to offer selected procedures in community homes, including objective assessment, EWS scores, selected blood tests and other examinations,
- initiating simple treatment regimens in one's own home, e.g. MERNk treatments,
- to be able to offer referral to municipal emergency departments rather than hospitalisation;
- to be able to offer a security-creating telemedicine treatment through the PreCare Clinic's response and coordination centre to the municipality's COPD citizens,
- to support and coordinate treatment, monitoring and care efforts in an interdisciplinary collaboration with the municipality, hospital and general practitioners to ensure better coherence and security for citizens.

We can do this - and here's how to do it if you want to refer a patient with COPD to the PreCare Clinic:
The PreCare Clinic serves citizens with COPD telemedically. This enables the patient to monitor their condition continuously and communicate with the PreCare Clinic's response and coordination centre, which is available with professional help and advice. The PreCare Clinic has round-the-clock specialist support and can, together with the citizen, initiate various medical treatments using an available emergency medicine that all participating citizens are equipped with.

If you have a COPD patient in your practice who you think would benefit from this offer, you can contact the PreCare Clinic, which will then contact the patient and initiate a start-up

procedure. You will keep your health insurance fee in full and the PreCare Clinic's doctors will send you ongoing information about the treatment of difficult exacerbations and control examinations under the auspices of the PreCare Clinic.

What about the responsibility to treat?
The following are indicative:

- All citizens who are admitted to municipal emergency departments are under the responsibility of the PreCare Clinic's doctors until the citizen is again in his or her own home.
- If treatments of the citizen are initiated in their own home through the PreCare Clinic's mobile emergency nursing care, initiated by the citizen's own doctor, the citizen has responsibility for the treatment including the follow-up until the treatment is completed.
- If treatments of citizens are initiated in their own homes through the PreCare Clinic's mobile emergency nursing, prompted by one of the PreCare Clinic's doctors, the latter is responsible for the treatment and follow-up until the treatment ends. The citizen's own doctor will receive a message about this after completing the effort.
- All COPD-related medical treatments initiated by citizens participating in the PreCare Clinic's telemedicine service are under the responsibility of the PreCare Clinic's doctors.

In all other cases, as usual, it is the general practitioner who is responsible for treatment.

Additional Info
You can read more about The PreCare Clinic on the website www.The PreCare Clinic.dk
You are welcome to call or write to the PreCare Clinic if you have questions about the project or need further information.

Source: The PreCare Clinic

Example of web ad The PreCare Clinic

PreCareKlinikken

A groundbreaking offer for those living with COPD

The PreCare Clinic is a new offer for you as a citizen of Odsherred Municipality living with Chronic Obstructive Pulmonary Disease, COPD.

The PreCare Clinic gives you the opportunity to have better control of your state of health, get greater security in your treatment, more options and thus better quality of life.

ABOUT THE PRECARE CLINIC IN BRIEF

As a citizen affiliated with the PreCare Clinic, you will be able to follow your health condition when you need it. You will receive measuring equipment and a small thin electronic screen, which is your direct access to healthcare professionals in the response and coordination centre in the PreCare Clinic. From the comfort of your home, you can instantly get picture and sound contact with a therapist at the click of the screen. Thus, you can always get help and support wherever you are and just when you need it.

PreCareKlinikken

WHAT DOES IT MEAN TO PARTICIPATE?

That you participate in an initial examination with a specialist focusing on your lung disease and your options for helping yourself, through the use of modern equipment.

Example of The PreCare Clinic's Citizen Booklet

- What is the PreCare Clinic?
- Short about the PreCare Clinic?
- What does participation entail?
- What are your benefits ?
- Contact?

Hvad er PreCareKlinikken?

PreCareKlinikken er et telemedicinsk projekt, hvor nye sundhedstilbud afprøves. PreCareKlinikken er et tilbud til dig, der lever med Kronisk Obstruktiv Lungesygdom (KOL), lungefibrose eller alfa1-antitrypsinmangel. PreCareKlinikken giver dig mulighed for selv at have bedre kontrol med din helbredstilstand, få større tryghed i din behandling og dermed bedre livskvalitet. PreCareKlinikken er bemandet med sygeplejersker og tilknyttede læger.

Kort om PreCareKlinikken

Når du er tilknyttet PreCareKlinikken, får du udleveret tablet og måleudstyr, så du via skærmen kan følge din egen helbredstilstand. Du skal selv udføre forskellige målinger såsom lungefunktion, temperatur, puls og ilt-niveau i blodet. Derudover skal du svare på nogle spørgsmål om dit velbefindende, samt hvilke symptomer du eventuelt har. Udskiftning af batterier i udstyret er noget, du selv skal betale og sørge for.

Målingerne og dine svar på spørgsmålene vil tilsammen give dig og sygeplejerskerne i PreCareKlinikken et billede af, hvordan din helbredstilstand er på det pågældende tidspunkt. Ud fra disse målinger kan PreCareKlinikkens personale, i samråd med dig, iværksætte eventuel behandling og foretage medicinjusteringer. Du får, som borger i PreCareKlinikken, en recept på akutmedicin. Medicinen skal du hente på apoteket og opbevare hjemme.

Efter du har lavet dagens måling vises en farvekode på den elektroniske skærm. Den vil være grøn, gul eller rød alt efter, hvordan din sundhedstilstand er.

- En grøn måling betyder, at din helbredstilstand er fin.
- En gul måling betyder, at din tilstand måske er på vej til en forværring.
- En rød måling betyder, at din tilstand er forværret markant.

Hvis du har tre gule målinger i træk, bliver du kontaktet af en af PreCareKlinikkens sygeplejersker, så I sammen kan lægge en plan for din helbredstilstand. Hvis din tilstand viser sig at være i det røde felt, bedes du hurtigst muligt kontakte PreCareKlinikkens sygeplejersker alle dage mellem kl. 7:30-22:30, så I sammen kan lægge en plan for din helbredstilstand. Uden for dette tidspunkt har du mulighed for at ringe direkte til PreCareKlinikkens læge.

Hvad indebærer det at deltage?

- At du deltager i en indledende samtale med en sygeplejerske med fokus på din lungesygdom og dine muligheder for at hjælpe dig selv, gennem brug af moderne udstyr.
- At du laver daglige målinger.
- At du har lyst til at afprøve tilbuddet i PreCareKlinikken og fortælle os, hvis du får idéer til, hvordan det eventuelt kan blive bedre.

Dine erfaringer som borger med KOL, lungefibrose eller alfa1-antitrypsinmangel tilknyttet PreCareKlinikken vil blive brugt i den videre udvikling af funktioner i PreCareKlinikken.

Hvad får du ud af det?

- Øget tryghed og livskvalitet i dagligdagen med KOL, lungefibrose eller alfa1-antitrypsinmangel.
- Større ejerskab og kontrol over din egen helbredstilstand.
- Et sundhedsvæsen, der er tilgængeligt, når du har brug for det.

Kontakt

Du kan kontakte PreCareKlinikken på kontakt@precareklinikken.dk eller 22 60 29 59

Du kan læse mere på PreCareKlinikkens hjemmeside: precareklinikken.dk

Omsorg og Sundhed
PreCareKlinikken
Baeshøjgårdsvej 6, 4560 Vig

22 60 29 59
precareklinikken.dk
kontakt@precareklinikken.dk

Example poster

PreCareKlinikken

THE PRECARE

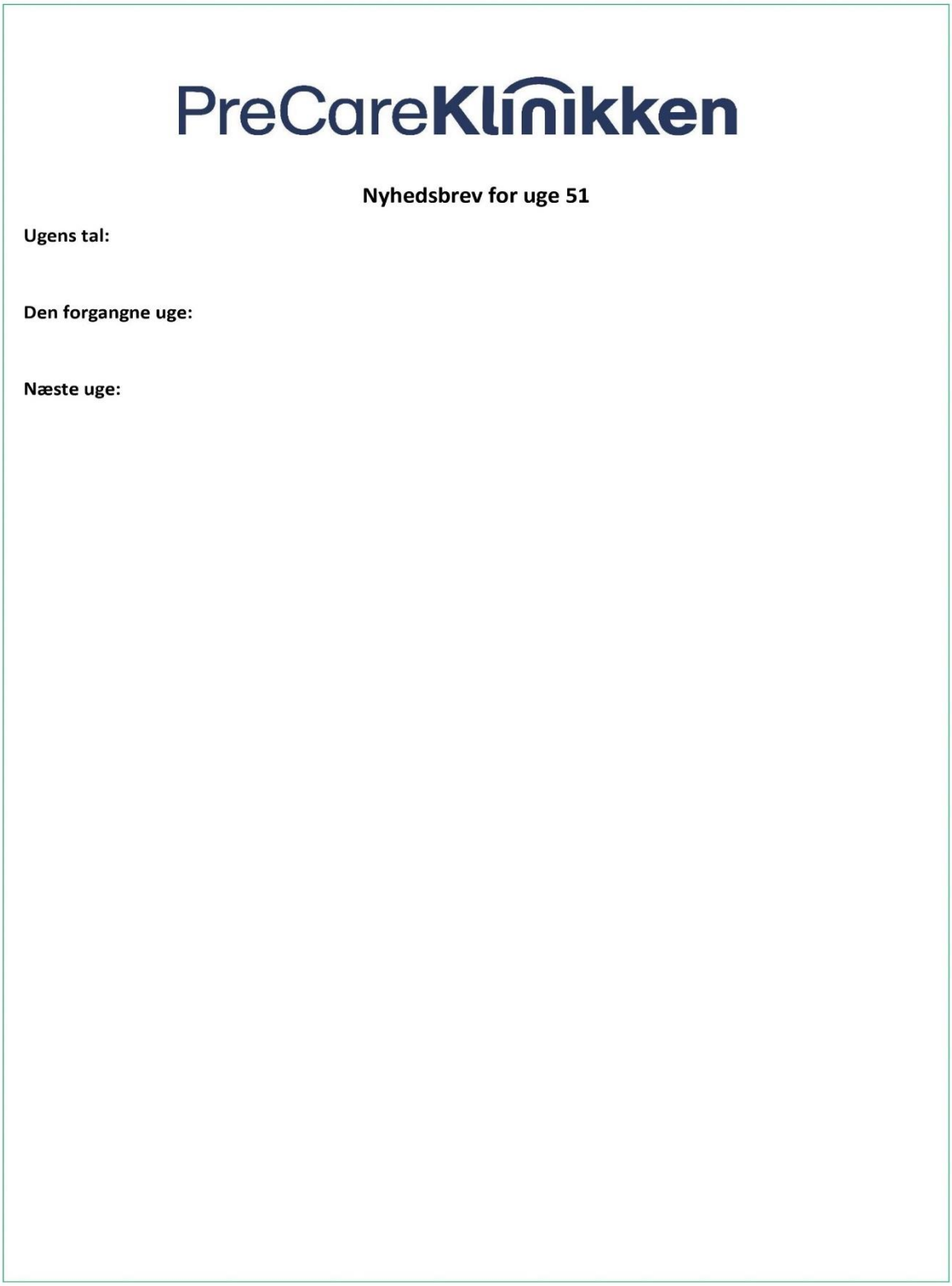
Et tilbud til dig med KOL

ODSHERRED KOMMUNE

The PreCare Clinic is a new offer for you who live in Odsherred Municipality and live with COPD. Here you will get various tools to understand and act on your lung condition, as well as the opportunity to get help from specialized RNs and doctors around the clock.

Read more on The PreCare Clinic at https://precareklinikken.dk or contact us on kontakt@precareclinikken.dk, 22 60 29 59.

Newsletter template example



PreCareKlinikken

Nyhedsbrev for uge 51

Ugens tal:

Den forgangne uge:

Næste uge:

Links

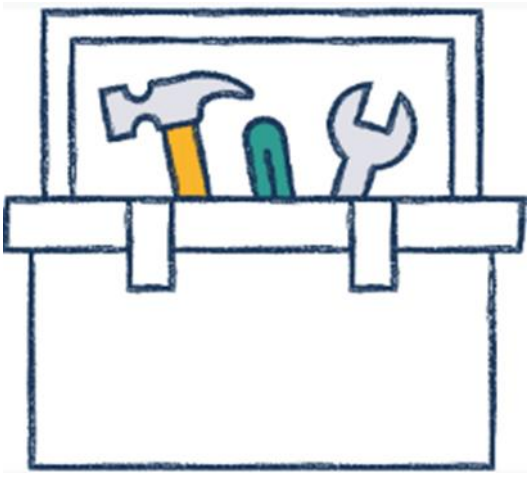
Link to The PreCare Clinic website - https://precareklinikken.dk/

Link to citizen experiences (The PreCare Clinic's website) - https://precareklinikken.dk/fortaellinger/

Tool 6: Health professional competencies

Example of recruitment advertising for eNurses for the PreCare Clinic. ECM certification.

Health professional competencies



Example of job posting

Are you a RN and do you want to help improve the Danish healthcare system?

Then take a look! In Odsherred Municipality, we need two RNs who will help improve the Danish healthcare system for the benefit of citizens, relatives and employees.
As the first municipality in the country, Odsherred Municipality has opened a clinic for citizens with COPD. Citizens affiliated with the PreCare Clinic measure themselves daily in their own homes and are treated by the PreCare Clinic's RNs and doctors via screen calls and physical visits. Before long, the PreCare Clinic will be expanded to include citizens with heart failure and will be continuously expanded to handle new diagnoses.

Many citizens have accepted the new offer and the latest results show unequivocally that the citizens are really happy with the offer and the figures even show that the PreCare Clinic has reduced the number of admissions of COPD citizens significantly.
The success of the PreCare Clinic and the imminent expansion to also be able to treat other diagnoses means that more nursing hands are needed. In addition, in the coming year, experiments will be made to expand the offer to citizens residing in neighbouring municipalities.

As a RN in the PreCare Clinic, you will get a job

- with a focus on the development of the health sector and professional innovation,
- where you will have ample opportunity to develop your skills,
- with a focus on professional sparring – both with doctors and RNs,
- with a high degree of co-responsibility and independence in the tasks,
- with skilled and dedicated colleagues,
- where the focus is on citizens.

We are a small, but very committed and well-functioning, team in The PreCare Clinic with a good collegial collaboration. What we have in common is that we love our work. We experience that we get the opportunity to develop and develop our professionalism so that it benefits the citizens the most. If you would like to be our new colleague, we hope that you send us an application.

You will be employed in a permanent position of 34-37 hours in the municipality's home nursing service associated with the PreCare Clinic. There will be weekend shifts every three/four week. As the PreCare Clinic is a project under development, working hours can be changed and tasks developed over time.

Employment as soon as possible – no later than 1/10-2020. You will of course be trained and certified in the handling of the PreCare Clinic's tasks.
Salary and terms of employment according to the current collective agreement.
For further information about the PreCare Clinic: https://dk/
We look forward to hearing from you!

ECM certification

The purpose of the ECM certification is to introduce and qualify the RNs associated with the PreCare Clinic to the logic and approach of the ECM model in connection with prevention and treatment for citizens with severe COPD and citizens with heart failure.

Teaching and final certification is conducted by a doctor and RN from the PreCare Clinic.

Target group: RNs who perform functions in RCK, MERN and MER.

Content :Presentation and review of:

- The ECM model – vision and concepts
- ECM 2-5 workflows and documentation in ECM records
- Work tasks (The PreCare Clinic's doctor and ECM RNs)
- Work slippage, instructional powers and delegations
- ECM and the empowerment-promoting approach
- COPD treatment – in stable and acute phase
- Blood sampling, performing laboratory tests and stetoscopy
- Clinical testing and certification.

Duration: 3 days

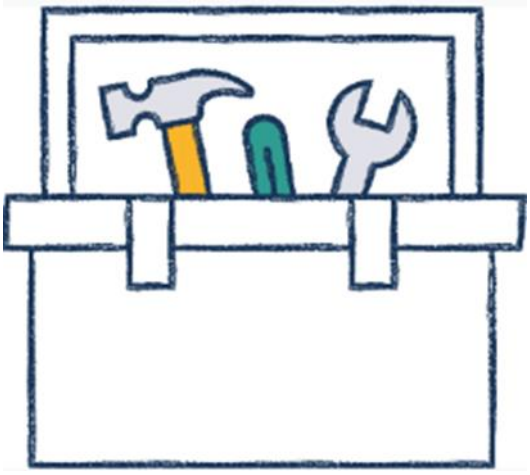
Certification: The training course ends with a certification.

Source: The PreCare Clinic

Tool 6: The logic behind the condition-based services

Detailed workflow descriptions. Services. Framework delegations. Graphical presentation of ECM workflow. Logging and reporting systems. Underlying workflows.

The logic behind the condition-based services



Workflow description for use when responding to measurement

This section describes the logic behind the condition-based services that The PreCare Clinic offers citizens. The condition-based services are described by associated workflows and instructions, which are key elements in the clinical implementation of the ECM model.

The logic is based on a hierarchy consisting of:

- Services
- Framework delegations
- Workflows
- Instructions

Services

The PreCare Clinic's services are categorized and expressed within a single service catalogue. For example, inquiries where acute treatments are initiated and a follow-up on a treatment are two different services. An annual check is also referred to as a service.

The PreCare Clinic's services are registered in specific templates in The PreCare Clinic's journal and documentation system (read more in chapter 13). In connection with a service being performed, the healthcare professionals make a registration so that there is real time data about the citizen in the system at all times.

The templates, which are associated with the individual services, support the clinic's healthcare professionals in the work of registering the necessary information about the citizen in question. For example, certain profile data is recorded in an inclusion survey.

To support the registration work, a so-called Common Content for the PreCare Clinic has been prepared, cf. box 11.1. The common content describes requirements for registration and definitions necessary for uniform registration. Box 9 shows a sample from the description of the Common Content for registration when contacting or from citizens and clinics. The user interface of the PreCare Clinic's medical record system, where the RCC RNs register inquiries, is reproduced in Figure 13.1.

Framework delegations

Authorization as a physician gives some rights that other licensed healthcare professionals do not have[12]. In the Authorization Act, this is called doctors' reserved health professional activities. These include treatment with prescription drugs, breakthroughs of the skin, such as in blood tests, vaccinations or operations, and examination with X-ray machines. The purpose is to ensure patient safety and that treatment in the healthcare system can be carried out within a clear framework and with a clear division of responsibilities. However, doctors in law have the option of delegating a reserved task to an assistant[13]. The possibility of delegating allows for flexible work organisation, so that several patients can be treated at the same time.

Almost all the doctor's duties can be delegated (examples of tasks that cannot be delegated to an assistant are prescriptions, inquests, death certificates and coercive measures in psychiatry).

[12] LBK no. 877 of 04/08/2011 Executive Order on the Act on Authorisation of Health Professionals and on Health Professional Activities.
[13] Executive Order no. 1219 of 11 December 2009 on the use of assistants by authorised healthcare professionals (delegation of reserved healthcare activities).

Examples of framework delegations in the PreCare Clinic include:

- Initiation of medical exacerbation therapy
- Blood sampling to measure infection rates, blood sugar and blood percentage
- Catheter insertion
- Sampling for microbiological examination, including inoculation and urine culture

The toolbox shows an example of a framework delegation for exacerbation 1-3 processing in ECM 2.

Workflows

It is crucial for data quality that there are rational workflows between the clinic's services and the IT registration of the contact's data in the administrative system and the associated actor roles in the ECM model. Thus, it is important that work instructions and instructions support the registration, and that attention is paid to updating and qualifying basic data and condition.

Box 11.1. Example from Common Content for The PreCare Clinic
Registration of inquiries to The PreCare Clinic – TM certified citizens

Service	Field text	Value set	Explanation
TM inquiry	Inquiry initiated by call from	Citizen RCC	Please indicate whether the citizen or the RCC has reacted to a non-planned event. The underlying reason is not known at the start of the call, and the call is not planned or part of a standardized treatment or control. If the citizen calls, then mark “citizen”. If the RCC calls, then mark “RCC”
	Reason – primary reason for inquiry	Exacerbation Beed for support/care Need for supervision Technical problem Internal message Renewal of prescription	Please indicate the main reason for the non-planned event. If an inquiry englobes several reasons for exacerbation, and worsening of the condition is one of them. Then mark “worsening of condition” as the primary reason for calling The RCC must evaluate the initial reason for the inquiry that is registered, and not the conclusion of what the inquiry was about. RCC can react on a worsening of condition which, after professional evaluation, ends up in a technical visit, because the citizen, seen from an objective perspective, is in habitual condition. In this case, mark “worsening of condition” or “technical problems” with the relevant activities marked under “planned action”. **Worsening of condition** – is marked if the citizen or the RCC reacts to a worsening of condition (in red or yellow), or if the citizen report is a worsening in condition, independently of the algorithms. **Need for support/care** – is marked when an inquiry concerns a citizens’ worries, which is not directly related to an acute deterioration. (If the need for sport/care is fulfilled through a conversation, leave “activity” field empty and “treatment not started” under conclusion and plan. If there is a need for increased care, mark “care attention”, under “planned activities”. Still mark “treatment not started” under “conclusion and plan”. **Need for supervision** – is marked when the contact to the RCC concerns concrete problems with medication or fulfilment of treatment plans. (When supervision is needed

			mark “no activities” under planned activities, and “treatment not started” under treatment and plan. **Technical problem –** is marked when the inquiry primarily concerns technical equipment, also including change of batteries, as well as technical problems with the iPad or the necessary apps. (If the technical problem is solved through conversation, then mark “no activities under planned activities and “treatment not started” under treatment and plan. If there is a need for a technical visit, mark “UTMS technical visit to be planned”, under planned activities and “treatment not started” under treatment and plan. **Internal message –** is marked when the message solely concerns a message from the citizen such as planned holidays etc**.** **Renewal of prescription –** is marked when the primary reason for contact is renewal of prescription. Also mark “renewal of prescription” under planned activities
	Objective clinical aspect	Habitual Slightly affected (speaks and answers adequately) Moderately affected (nervous, worried	By worsening of condition please mark the clinical aspects of the RKS evaluation of the citizens’ condition. Is primarily evaluated via the telephone or video.

For each registration and service, detailed workflow descriptions have been prepared.

The templates in the journal and documentation system are continuously developed and adjusted. Specifically, the PreCare Clinic holds workflow workshops, where doctors and RNs from the PreCare Clinic as well as data analyst and work package manager discuss the workflows in the clinic and the need for adjustment of the templates in the journal system.

The participants also discuss healthcare issues, registration practices and follow up on whether everyone registers correctly in the system and whether the templates in the IT system match the workflows etc.

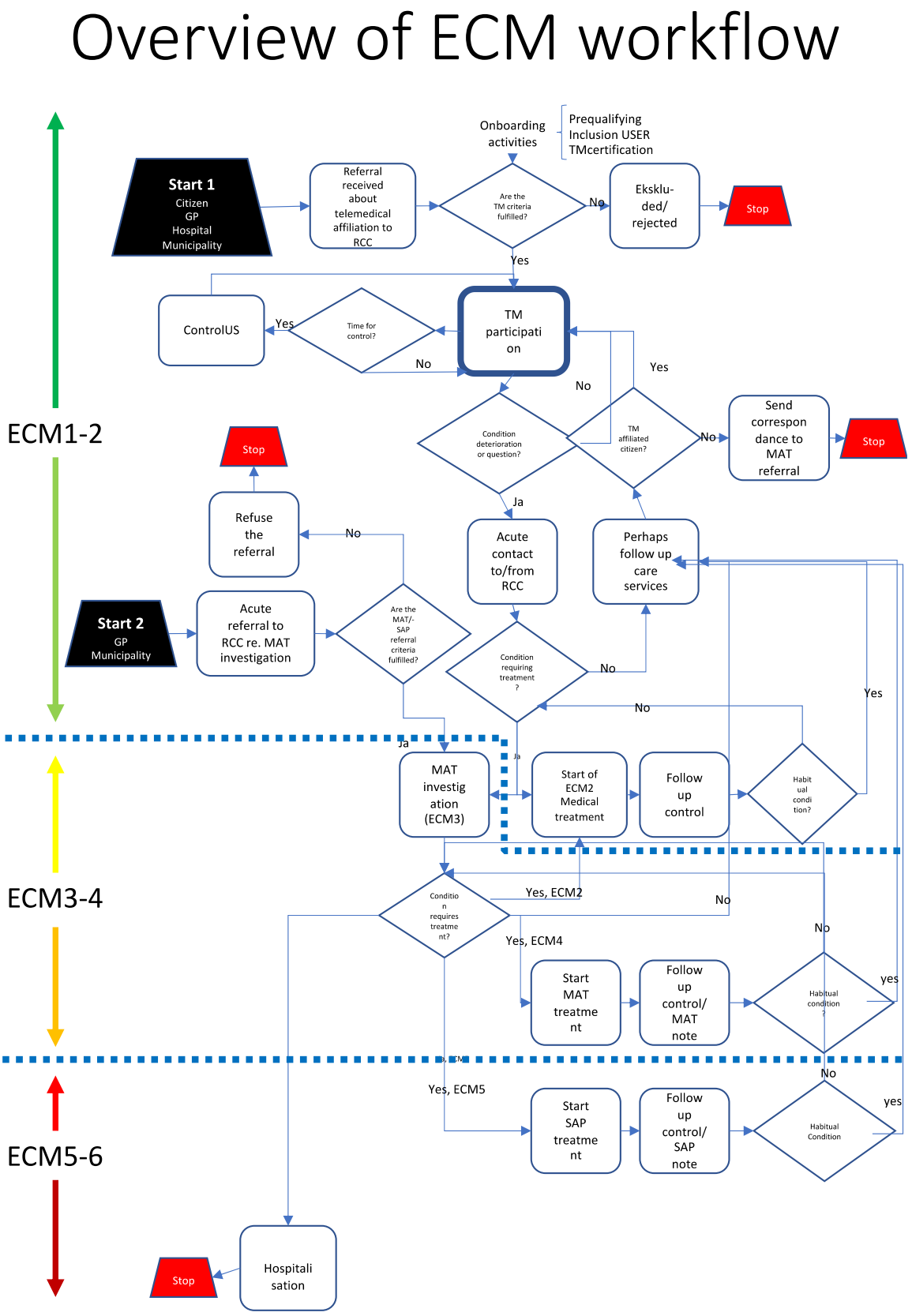
In connection with the establishment and development of the PreCare Clinic, workflows have been prepared for the work processes in the PreCare Clinic.

The PreCare Clinic's workflows have several functions. Firstly, the workflow contributes to creating clarity about the different workflows in the clinic. Secondly, the workflow serves as an introduction and introduction for healthcare professionals to the various work processes carried out in the PreCare Clinic.

The PreCare Clinic's workflows have been continuously developed and adapted. This development and adaptation continue to take place in the PreCare Clinic as experience is gained with working with the various workflows.

Figure 11.1 shows the overall workflow for the PreCare Clinic. Behind the overall workflow lies a number of more detailed workflows.

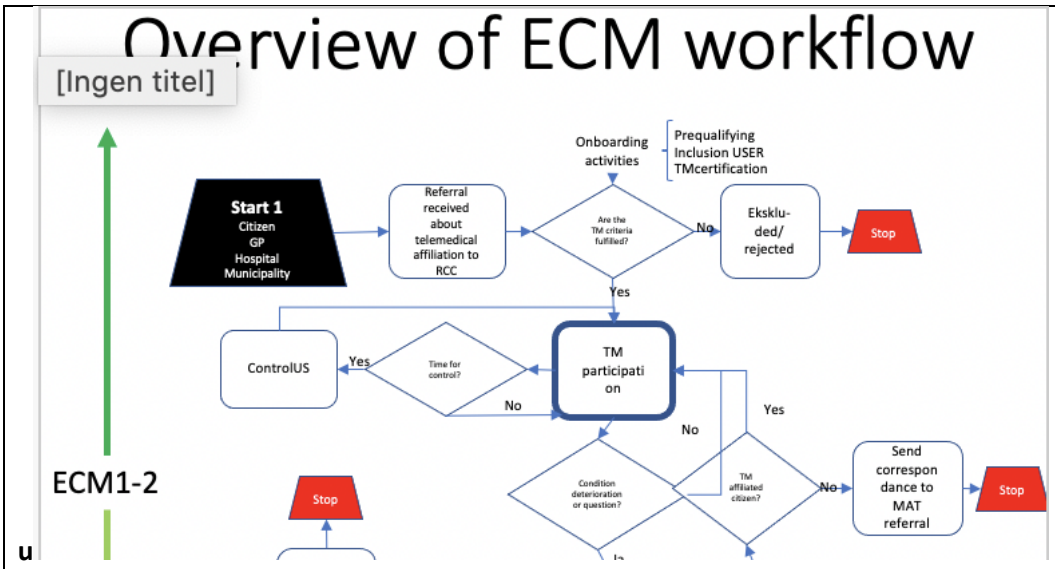
Figure 11.1. Overall workflow for the PreCare Clinic



Source: The PreCare Clinic

A sample of the overall workflow for the PreCare Clinic is presented in Box 11.2. In the sample, the citizen is in the ECM 1 level.

Box 11.2. Sample of the overall workflow for the PreCare Clinic – ECM 1



"Start 1" on the left of the figure (black trapezoid) marks the first part of the illustrated workflow. Here, the citizen is referred to the PreCare Clinic from either the general practitioner, the hospital or the municipality. The citizen can also apply himself.

When the PreCare Clinic receives a referral and/or if a citizen contacts him or herself with a view to inclusion, the PreCare Clinic assesses whether the citizen meets the established inclusion criteria (see section on target group clarification).

It is generally characteristic of the workflow that the PreCare Clinic's staff must make a number of choices/assessments when a "rhombus" occurs. The result of the selection(s) is shown by the rectangle with the rounded corners. The inclusion of a citizen takes place on the basis of three different activities (pre-qualification, inclusion examination and TM certification).
If the inclusion criteria are not met, the citizen is excluded/rejected and the workflow ends (marked with red trapezoid in the figure).

If the citizen is deemed suitable in connection with prequalification, the RN's inclusion visits and TM certification, where the RNs together with the citizen reviews how the citizen should use the telemedicine equipment for home measurements, the citizen will be included in the PreCare Clinic's telemedicine network (TM participants, cf. the workflow).

If the included citizens experience worsening conditions, they move around between the different levels in the ECM model, where relevant workflows are initiated (cf. Figure 12).

Source: The PreCare Clinic

Instructions

Different instructions are attached to the individual services in the workflow. The instructions are prepared by the doctor responsible for the company in collaboration with the RNs and serve as instruction for the RNs' work in the PreCare Clinic.

There are instructions in 6 main areas:

- ECM workflows
- Administrative instructions
- Treatments requiring medical coverage
- Care treatments
- Medicine
- Equipment and its operation

For example, there is an instruction for how a TM certification of a citizen takes place, and another instruction describes how the staff should handle urgent inquiries from self-monitoring citizens.

Administrative instructions include, for example, function descriptions for RCC, MERN and MER RNs and informed consent for telemedicine participation in the PreCare Clinic.

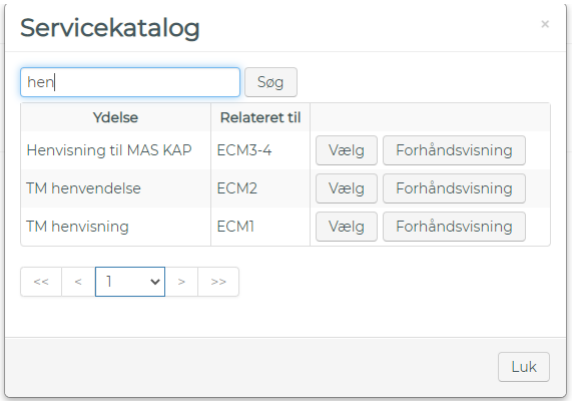
In the PreCare Clinic, work is ongoing on the preparation and revision of instructions.

This template is used when responding to condition measurements, both when the RCC calls the citizen and when the citizen calls the RCK. Remember that all fields are filled in and that SAVE must be pressed in all fields.
The template is also used if the citizen calls RCC. After that, tick off what the call is about.

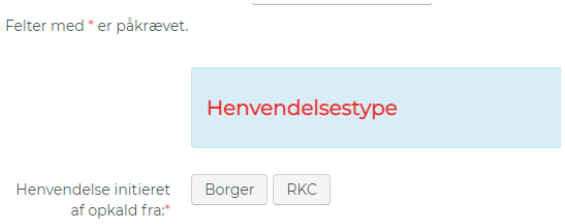
- The template is ordered by being on the citizen's page.

Ny planlagt aktivitet

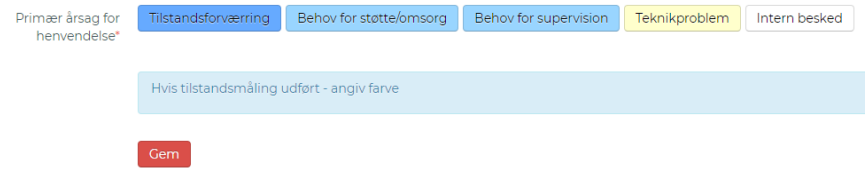
- Click this icon
- Select from service catalogue



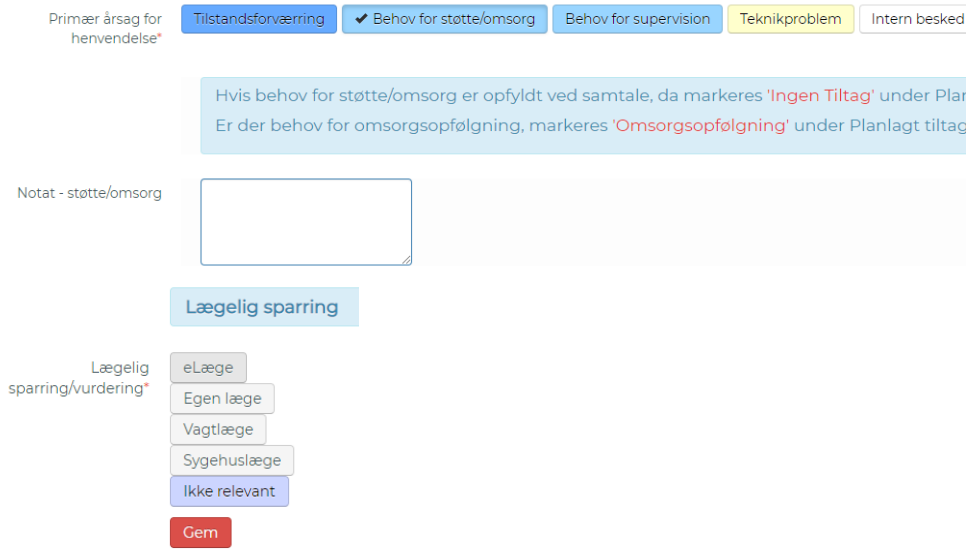
- Select TM inquiry and specify the time of call. All hours. Press save.



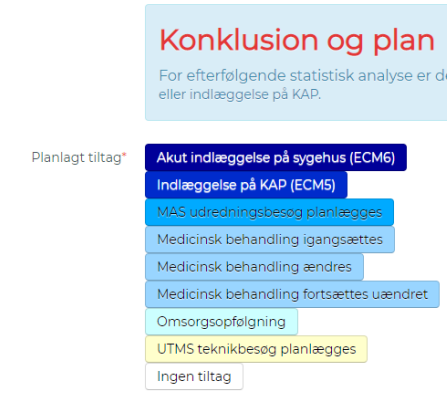
- Mark who's calling.



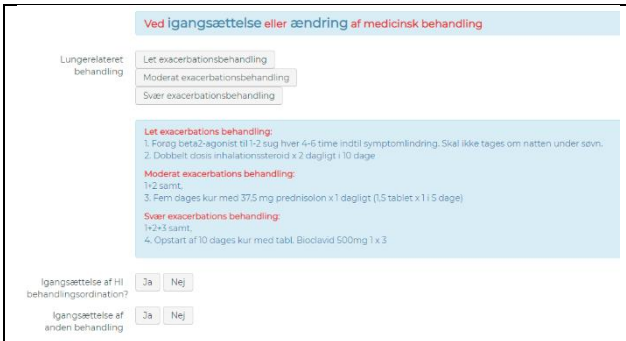
- Mark what the call is. If it is in response to measurement, then in condition deterioration should be marked. Then unfold so that you can tick off Objective Appearance as well as what algorithm colour the condition measurement of the call has. Likewise, it must be decided what it is about by ticking off in Condition Assessment
- If it is not a question of reaction to measurement, tick one of the other boxes and describe in the writing box below



- Check if there has been contact with a doctor and if not tick Not applicable



- Tick the box that fits the plan laid out in consultation with the citizen.
- If a medical treatment is initiated, a treatment follow-up must subsequently be ordered, describing what it is about in the comment field under the selected date. REMEMBER follow-up on treatment is 5 days after start date. See workflow for Treatment follow-up RCC MERN.
- If care follow-up is chosen, a follow-up must subsequently be ordered. See workflow for Follow-up (care, care and/or technique).
- If a selected technical visit is planned, a follow-up must subsequently be ordered, describing what it is about in the comment field under the selected date. See workflow for Follow-up (care, care and/or technique).



- When starting treatment for worsening of the patient's lung condition, tick the selected exacerbation treatment.
- No to HI treatment is ticked.

- Under overall assessment and plan, summarize what the call is about, treatment plan and date of any follow-up. Remember to copy by pressing Ctrl+A and Ctrl+C.
- Check box around plan.
- Remember to choose the date if follow-up is planned.

- The copied note is pasted into the box and the Status is "done" box is ticked

Text inserted in this comment field can subsequently be viewed in the ECM journal.

Source: The PreCare Clinic

Example of underlying workflows

Trigger/status	Definition	ECM
Reference to telemedicine participation	Trigger that is processed by the PreCare Clinic's healthcare professionals in order to initiate a prequalification.	0
TM prequalified	When the citizen, after FMK and medical record review as well as any call to the citizen, is assessed to be in the target group for the PreCare Clinic's telemedicine treatment	0
TM included	When an inclusion survey has been completed and the citizen continues to be assessed in the target group for the PreCare Clinic's telemedicine treatment	0
TM certified	When the citizen has received the telemedicine basic package and instructed in use	1
TM participating in habitual state	When the citizen is TM certified and completed a satisfactory 14-day period in habitual mode with self-measurements, the citizen transitions to present status	1
TM participant – inquiry	Unplanned (Urgent) contact to the PreCare Clinic prompted by either red condition triaging (RCC contacts citizen or vice versa) or citizen contacts RCC due to questions and/or apprehension	2
TM participant – in virtual treatment (cure)	The citizen has initiated an emergency medical treatment within the PreCare Clinic's predefined treatment repertoire controlled by RCC (and e-doctor)	2
MERN /MER reference	Urgent referral within the PreCare Clinic's 9 treatment groups	2
MERN investigation	Mobile Acute Nursing home visits for investigation by RCC possibly seconded by the e-doctor	3
MERN treatment	Based on Mobile Acute Nursing, home visits and investigation, an acute condition worsening is diagnosed and a medical treatment is initiated in the citizen's own home	4
MER treatment	Acute condition exacerbation that is within the PreCare Clinic's treatment area and cannot be treated at home. Citizens are admitted to Municipal Acute Space (MER), where treatment is initiated and followed.	5
Hospital emergency admission	Condition worsening that cannot be treated in the PreCare Clinic and requires urgent hospitalization	6
TM excluded	Based on the prequalification, inclusion or TM certification activities, it appears that the citizen does not meet the inclusion criteria for monitoring and treatment in the PreCare Clinic. Over time, citizens may be excluded if they are deemed to no longer meet the criteria.	0
TM withdrawn	After having TM participated, Borger wishes to withdraw from the telemedicine offer in the PreCare Clinic	0
TM standby idle	Citizen inactivates his/her condition monitoring in order to improve his/her condition. resumption at a later date.	0
Completed	Completion of acute treatment of citizens who are not TM certified, but have been offered an acute treatment by MERN	0
Death	Citizen dies	0

Source: The PreCare Clinic

Function Description - MERN

Job title	Certified RN in **MobilAkutRN** – team under The PreCare Clinics
Immediate superior	Head of Department xx
Employment	Odsherred Municipality
Department profile	The PreCare Clinic is part of Region Zealand's "PreCare" project. The PreCare Clinic stands for: Home monitoring and treatment of registered citizens with COPD in Odsherred municipality. Emergency visits (MERN visits) to acutely ill citizens, prompted by their own doctor or home care/home nursing. The PreCare Clinic consists of: A doctor responsible for treatment A **Response** and **Coordination Centre** An outdoor MERN team (**Mobile Emergency RN**. They carry out tasks in the citizens' own homes of both a technical and examination/therapeutic nature.
MERN function	The function of the MERN team is of an outdoor nature and consists of: MERN visits to The PreCare Clinic's own citizens: Worsening of condition or lack of improvement, where treatment measures are needed that require prior blood tests, expectorant tests or MERN investigation to clarify the problem. In addition, MERN visits are carried out where problems of a technical nature are handled - for example, equipment problems, change of equipment and the like. MERN visits initiated by general practitioner: The general practitioner calls RCC's emergency telephone on **xxxxxxxx** in the period 8-13. A MERN visitation template is filled in, and it is agreed which observations and/or tests are desired in connection with visits to citizens. In the template, write the name and contact phone number of the requesting doctor. RCC contacts the MERN team on duty, who drive out to the citizen and carry out the agreed observations. A written report must be completed and contact the requesting doctor by telephone for further information. any treatment measures and further plan.

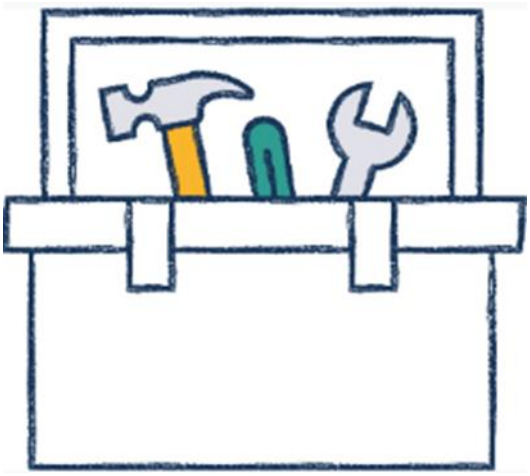
	Upon admission, it is agreed with the doctor who reports to the Emergency Department and who requests transport. Citizen is given the written report upon admission. If the citizen remains in the home, the report is taken back to the RCC and stored. PreCare Clinic Status control in Cura is written under observations. <u>MERN visits initiated by home nursing/home care:</u> Call from home nursing / home care to RCC's emergency telephone on **xxxxxxxx** with acute problems at citizen in Odsherred. MERN visitation form is filled out based on information from home nursing/home care. RCC contacts the MERN team on duty, who drive out to the citizen and assess and initiate initiatives based on current problems, possibly in collaboration with their own doctor.
Responsibility	The MERN team carries out visits of a therapeutic and technical nature to The PreCare Clinic's own citizens. The MERN team documents in Appinux and Cura treatment and technical problems at these visits, possibly in collaboration with the doctor responsible for treatment in the PreCare Clinic. It is the MERN team's responsibility to carry out MERN visits initiated by general practitioners, and in collaboration with their own doctor, diagnose and initiate treatment of acute conditions. If needed, the MERN team will be at home until the citizen is picked up by transport to hospital. The MERN team is responsible for reporting to the hospital if requested by their own doctor. The MERN team is responsible for initial treatment and planning of further treatment at the home RN/home care if the citizen stays in their own home, possibly in collaboration with their own doctor. The MERN team documents in Appinux and Cura.
Competence	Education as a RN with an interest in and experience in emergency nursing. Certified for the PreCare Clinic.

Source: The PreCare Clinic.

Tool 7: Requirements for technical equipment, devices, and IT infrastructure

Equipment for citizens. Data processing. Interoperability. Sample templates for inquiries. Instructions for citizens.

Requirements for technical equipment, devices, and IT infrastructure



Recommendations for technical equipment, devices and IT infrastructure

The PreCare Clinic includes both equipment for citizens and for the staff. The type of equipment depends on which diagnostic groups are included.

Equipment for citizens

Equipment for citizens is a prerequisite for them to be able to self-monitor their condition and send the result of their condition measurements to the PreCare Clinic (see chapter *7).

Annex “” shows the equipment that The PreCare Clinic dispenses to included citizens.

From here and down Box 13.1. Equipment for citizens with COPD and heart failure affiliated with The PreCare Clinic.

COPD:

- Thermometer
- Spirometer for measuring lung function
- Saturation meter to measure oxygen saturation
- Tablet for entering measurements and contacting the PreCare Clinic (tablet is configured so that it only contains the program that the citizen needs in connection with self-measurements)
- PEP flute
- Prescription for emergency medicine that the citizen collects from a pharmacy and stores in his or her own home
- Instructions for using a tablet and equipment

Heart failure:

- Blood pressure monitor for measuring blood pressure and heart rate
- Weight
- Tablet for entering measurements and contacting the PreCare Clinic (tablet is configured so that it only contains the program that the citizen needs in connection with self-measurements)
- Tablet usage instructions

Type 2 Diabetes Mellitus (DMT2)

- Blood glucose meter
- Tablet for entering measurements and contacting the PreCare Clinic
- Equipment Use Guide

Source: The PreCare Clinic

As part of the inclusion process, citizens in connection with the TM certification will receive their equipment from the healthcare professional. The citizen borrows the equipment as long as he or she is affiliated with the PreCare Clinic.

Administration of citizen equipment

The PreCare Clinic uses an equipment module in Appinux, cf. Box 13.2, to have an overview of the stock of equipment and what has been handed out. When new equipment arrives at the PreCare Clinic, all the individual parts are registered in the equipment module. An 'alarm' is built into the equipment module that sends an email to the person responsible for the warehouse when the number of, for example, tablets reach a certain level. After this, more tablets can be ordered, so that there will be no shortage of equipment. When a citizen is to be included in the PreCare

Clinic, a box is packed with the relevant equipment that the citizen needs for self- monitoring. In the equipment module, it is registered which equipment has been handed out to the citizen in question. The inventory is adjusted continuously so that healthcare professionals have an overview of available equipment. If a citizen dies or no longer wants to be part of the PreCare Clinic's services, it gives the opportunity to mark this in the equipment module, and there is thus a reminder in the system to have the equipment collected. If the equipment breaks down, it can also be documented in the equipment module so that the inventory matches the equipment available.

Equipment for PreCare Clinic's healthcare professionals

In the toolbox you can see a list of the equipment used by citizens and healthcare professionals in the PreCare Clinic.

IT infrastructure

The technology support in the PreCare Clinic is based on a system developed by the company Appinux, cf. Box 13.2. The use of Appinux, which is a stand-alone system, has been necessary to get started with IT support for the treatment of COPD citizens in their own homes and to develop solutions in other areas within a short time frame.

Box 13.2. Appinux Solution

The Appinux solution includes the following:

- Access to app on IOS and Android
- Accessing video from Apps and chrome browser
- Access the platform from all browsers and mobile devices
- Data collection on Bluetooth for Android app from blood sugar, spirometer, saturation, weight and blood pressure
- Graphs with measurements in the Results module
- Triage module with the possibility of setting up personal triage
- Calendar module
- Scheduling module with possible triage
- Contact module with own selected citizens and employees
- Target module
- Reports with measurement oversayer et al.
- Call centre with the possibility of multiple call centres
- User access and role management
- Equipment module

Appinux also includes a video solution for healthcare. Appinux' screen visit module is video with a user-friendly user interface, where a tablet is used in 'kiosk mode', which means that the tablet is 'locked', so that only what is necessary for the participants to access the telemedicine service appears on the screen. Appinux provides support and data security, including logging. There is 24/7 monitoring of hardware and application. There is also daily back-up of database on production server.

Record system

The healthcare professional registers and records all services in the PreCare Clinic, including which treatments and monitoring are performed and also the result of the activities and communication with the citizen. Among other things, this helps to ensure that the Executive Order on Record Keeping is complied with.

The PreCare Clinic's medical record system must comply with the provisions of the Executive Order on Record Keeping (6) and the rules for storing data. The record system must, inter alia, ensure data protection with appropriate technical and organisational measures to prevent accidental, unfair or unlawful processing. Backups shall also be carried out on an ongoing basis to ensure that records are not destroyed, lost or impaired.

Box 13.**3. Sample** of **record-keeping provisions**

The doctor responsible for the company is responsible for:

1) Ensure that the patient record is structured and arranged so that the legal requirements in connection with record keeping can be complied with
2) Ensure that the patient record is structured so that it is clear for the professional groups of authorized healthcare professionals who use it
3) Ensure that records are kept in such a way that it is possible to verify the records entered in the record using technical assistance. Technical assistance means personnel who technically enter dictations or the like into the individual patient record in written form
4) Ensure written instructions for competence and responsibilities when using technical assistance in connection with record keeping
5) Supervise technical assistance, including ensuring that records are kept as soon as possible
6) Ensure written instructions on how to keep records in case of lack of access to the electronic multidisciplinary health record

Data processing agreement

A data processing agreement has been entered into with Appinux. Appinux operates, develops and supports a software platform that is used to register data about citizens, to support preventive efforts and treatment of citizens. To the extent necessary, Appinux processes personal data according to documented instructions from The PreCare Clinic. The PreCare Clinic is the data controller for the data reported from citizens' own measurements, laboratory results and registrations from the healthcare professionals in The PreCare Clinic.

Interoperability of telemedicine equipment

Prior to purchasing the telemedicine equipment, there has been a need for clarification of which telemedicine equipment is compatible with the Appinux solution. Appinux has thus stated which specific equipment (tablet and measuring equipment) The PreCare Clinic can purchase that is supported by the Appinux solution.

It is also continuously considered whether new equipment can contribute to better measurements and a higher degree of user-friendliness than the existing one. A test of devices takes place prior to a decision on the use of new devices. In the event that the new equipment is not on the list of telemedicine solutions supported by the Appinux solution, there will have to be an integration of the new equipment to the Appinux solution.

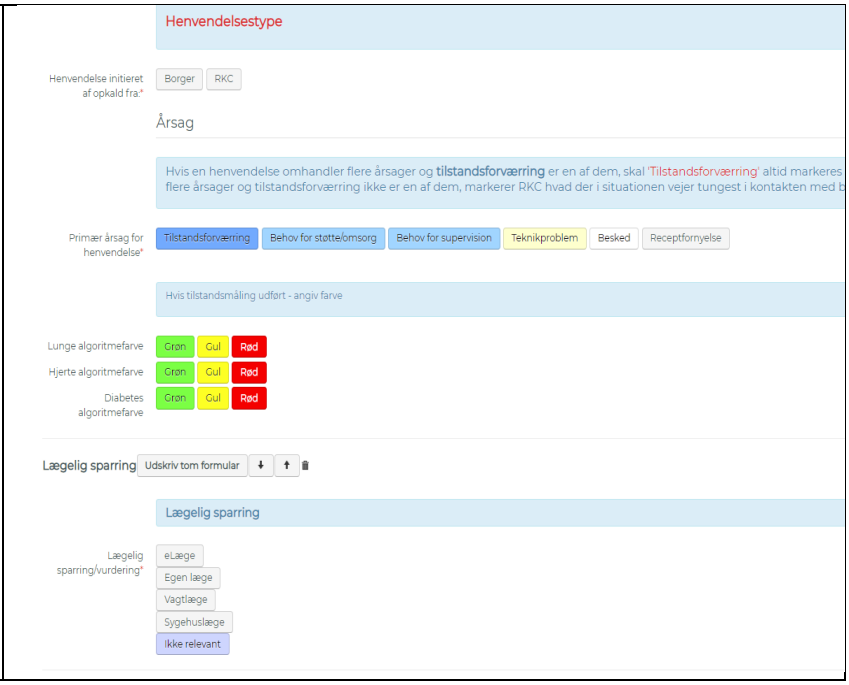
Development of templates

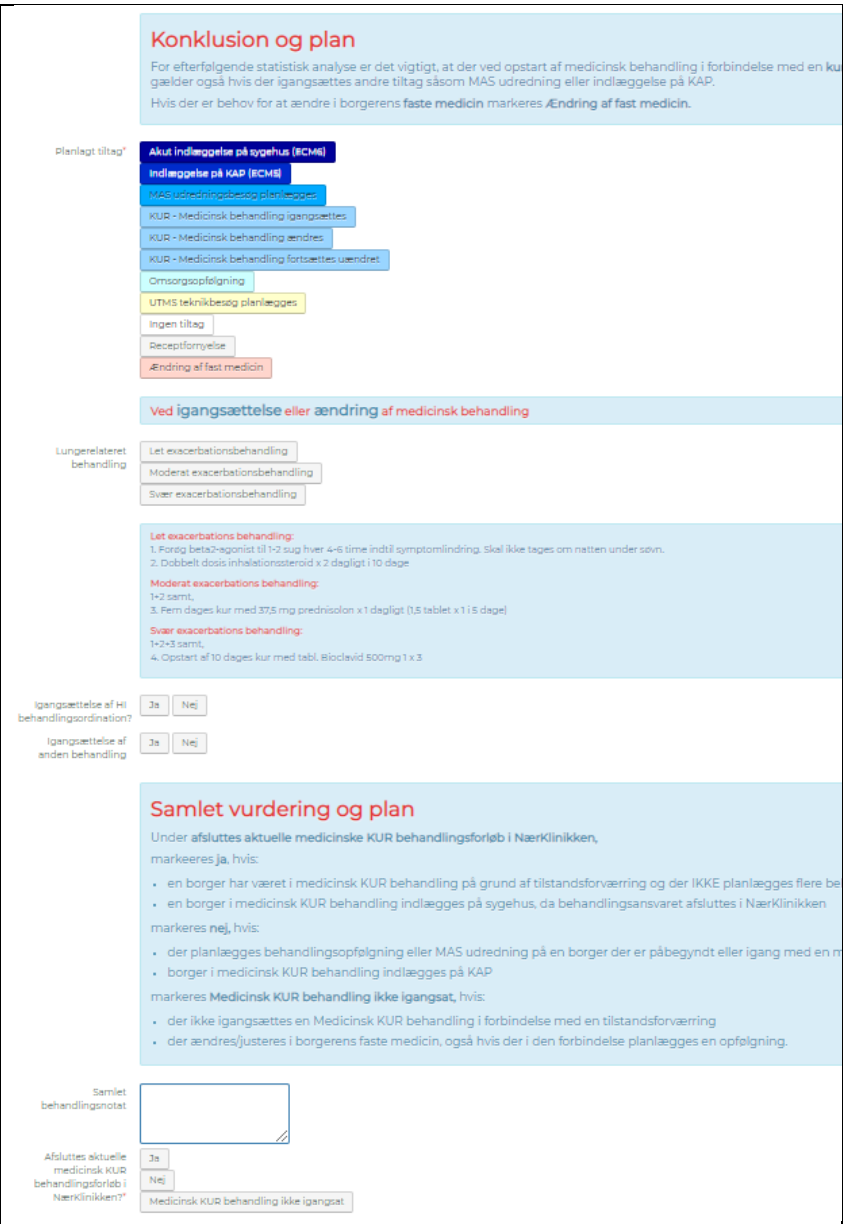
Catalogues have been developed with the various templates in Appinux that are used for the various services in the PreCare Clinic. The various templates have been specifically designed for the activity determined by the citizen's condition and ECM context, cf. section 11.

Figure 13.1 shows a sample of a template used by RCC for an unplanned inquiry.

Appinux uses a browser-based user interface from which the healthcare professional can search for the relevant template. Once the template is completed, data is stored in Appinux' database, which from here can generate a document with the collected data and descriptions.

Figure 13.1. Sample of template used by RCC for telemedicine inquiries.

Type of inquiry Inquiry due to a call from citizen RCC Primary reason for inquiry Lung algorithm Heart algorithm Diabetes algorithm eDoctor sparring eDoctor assessment	

Conclusion and plan Planned activity Pulmonary treatment Start of treatment Start of other treatment Summary note on treatment Will the actual medical treatment plan treatment in the PreCare Clinic close?	

Source: Data and Development Support, Region Zealand.

Basic equipment in the PreCare Clinic

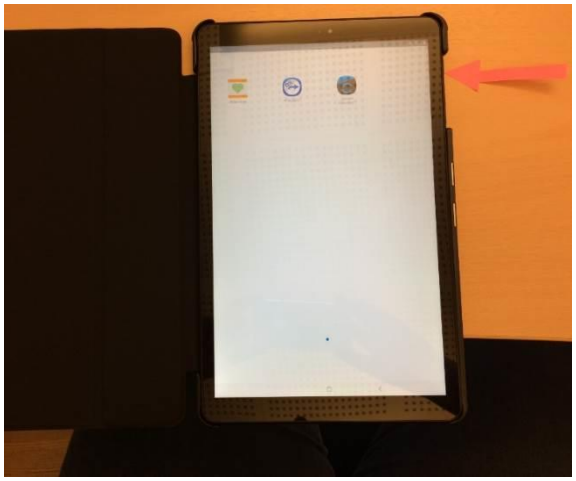
Context	Specification
(ECM1+2) Citizens	Telemedicine
All	Samsung Galaxy Tab A
COPD:	Nonin Onyx II BT - 9560
	Vitalograph Lung Monitor
	PIC Digital Thermometer oral/rectal
Heart	Blood pressure monitor: UA-767PBT-Ci
	Weight (up to 150 kg): UC-355PBT-Ci
	Weight (up to 250 kg): UC-355PBT-Ci

DMT2	CRP device QuickRead go for measuring HgBA1C
e-doctors	
	Samsung Galaxy (Dual SIM) Note 8
ECM1+2 m. RCC	**PreCareKlinik**
e-RN	PC with dual monitor and headset
	Mobile phone for every e-RN
	Tablet for every e-RN
ECM3-5 MERN/CAP	
Emergency bag	
	Bag – spacious and manageable e.g. ambu suitcase
	HaemoCue
	Stethoscope
	Blood pressure monitor
	Quick Read
	Urine stix reader
	Ear saturation meter
	Ear thermometer
	Nebulizer apparatus
	Blood glucose meter
	Rubens' balloon
	Medicine
Cars	
	Space for emergency equipment

Source: The PreCare Clinic.

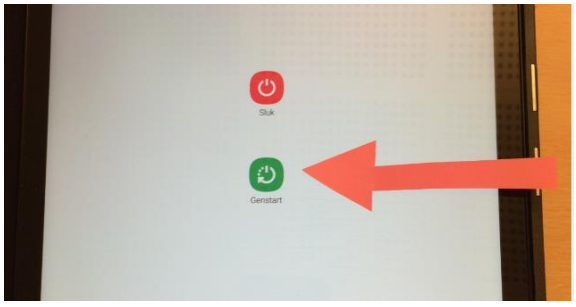
Restarting the tablet

Can be used when the screen 'freezes'.



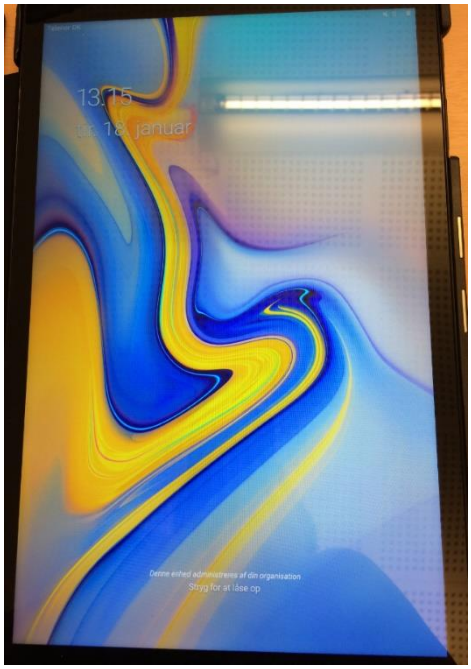
The button to restart the tablet can be found on the side in the upper right corner.

Press and hold the button until a restart and power off image appears on the screen. It's the smallest button.



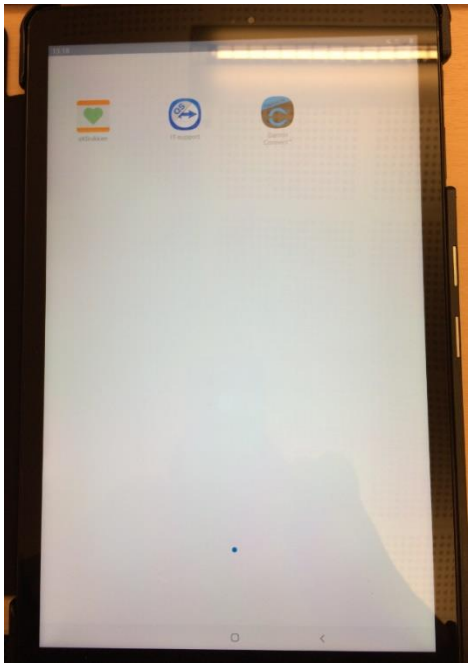
Press the green restart button. And again as the green restart button comes once more.

The tablet goes black, after which the name SAMSUNG comes again.



When, after 1-2 minutes, the screen looks like this, immediately swipe from left to right across the screen.

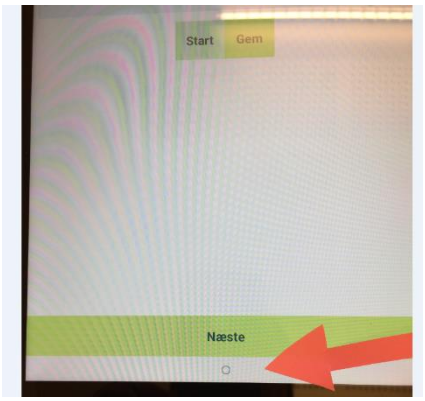
The screen is now open and the image below should appear.



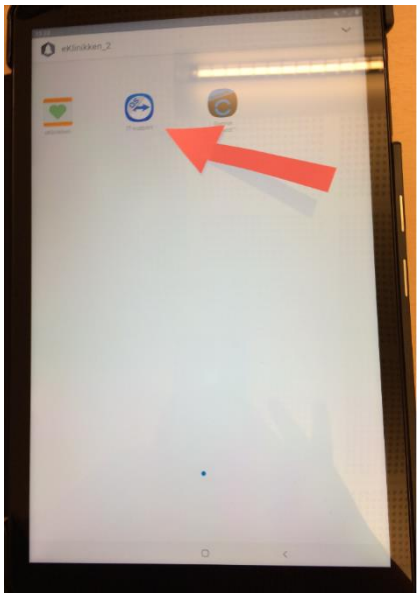
Then the eclinic (the green heart) button is pressed, where measurements can be performed.

TeamViewer/IT support

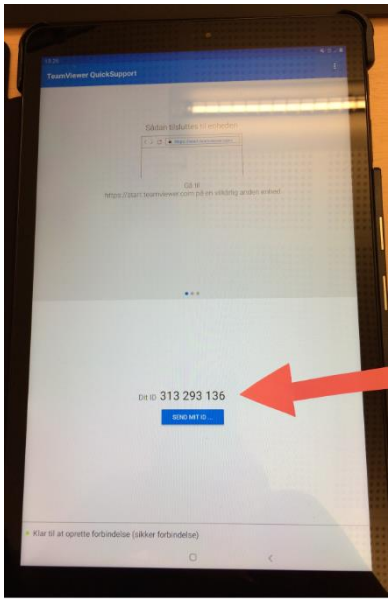
Use in agreement with the RN when there are problems with the tablet or other equipment. Using TeamViewer, the RN can take over the tablet.



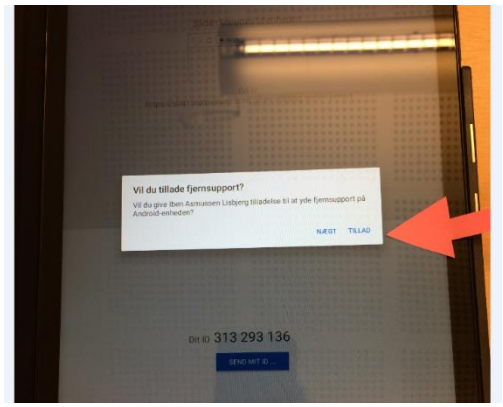
When the 'round' square at the bottom of the screen is pressed, the screen switches to the main screen.



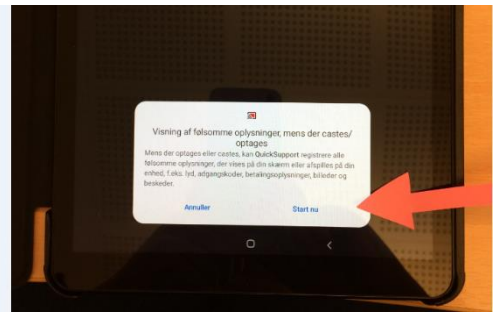
Here you press the blue IT support icon.



The ID number is provided to the RN.



A message arrives that the RN in question will take over the screen. Tap **Allow**.



Then press **Start Now** and the screen is taken over by the RN who then fixes the given problem.

Changing batteries on SAT meter and spirometer

SAT meters and spirometers use **AAA batteries** that you have to pay for yourself.

The SAT meter is turned over and the thumb and forefinger are placed at the top and bottom. Fingers are squeezed together.

The back piece is tilted out.

The batteries are changed. Pay attention to turn the batteries correctly as there is spiral at the bottom on both sides. + left up and – right up.

The SAT meter is turned over and the back cover is pushed up.

The batteries are changed. Pay attention to turn the batteries correctly as there is spiral at the bottom on both sides. – on the left side up and + on the right side up.

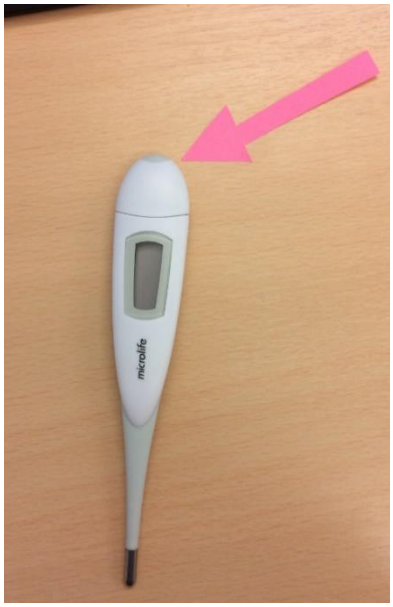
The back cover is tilted up.

The batteries are changed. Flat side versus spiral.

Thermometer

The thermometer is a mouth thermometer. When the thermometer no longer works, it must be discarded and you have to pay for a new one yourself.

If the thermometer has come on F (Fahrenheit unit of measurement).



If the thermometer has started measuring in F (Fahrenheit), change back by holding the button when the thermometer is off.

If the thermometer has started measuring in F (Fahrenheit), change back by holding the button when the thermometer is off.

Changing batteries on scale.

The scale uses **AAA batteries** , which you have to pay for yourself.

Tilt the back off. Change the batteries. 4 x AAA batteries are required.

Change of batteries on blood pressure monitor.

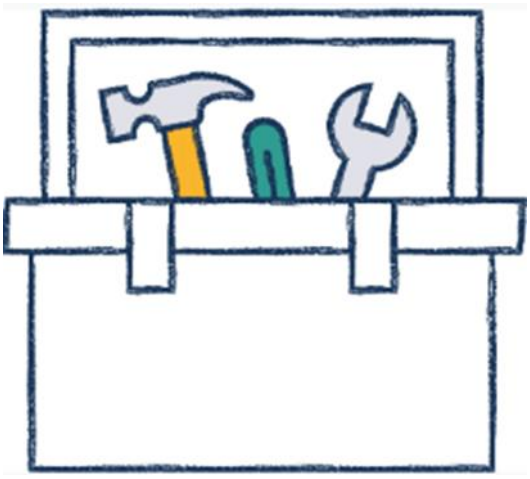
The blood pressure monitor uses **AA batteries** that you have to pay for yourself.

Tilt the back off. Change the batteries. 4 x AAA batteries are required.

8. Business and economic models

Municipal expenses for care and services that can be distributed.

Business and economy models



Municipal expenses that can be distributed among individuals

Municipal services in Odsherred municipality in 2018	Number of citizens	Total cost	Avg. cost
Personal and practical help	1.833	440.675.593	240.412
Early retirement	393	179.713.278	457.286
Sickness benefit	2.331	118.501.911	50.837
Cash and education assistance	1.574	110.642.838	70.294
Daily subsistence allowance for insured unemployed	1.303	99.720.148	76.531
Flex jobs	559	94.946.275	169.850
Special education	422	70.899.064	168.007
Long-term residential facilities Reduced functional capacity	85	68.673.759	807.927
Respite care and temporary residence/accommodation	223	67.257.760	301.604
Home nursing	1.560	66.427.690	42.582
Places of stay	50	32.388.000	647.760
Foster care	96	31.943.012	332.740
Social pedagogical assistance	196	30.663.999	156.449
Help with single expenditure	3.074	26.634.450	8.664
Housing benefit	8	26.220.461	3.277.558
Special day care for children and young people	96	26.148.814	272.383
Rehabilitation and rehabilitation	1.539	22.595.269	14.682
Resource flow	152	19.588.157	128.869
BPA	25	18.728.316	749.133
Unemployment benefit	198	17.863.543	90.220
Activation	843	17.138.072	20.330
Social psychiatry	136	17.042.398	125.312
Devices	2.661	16.533.793	6.213
Job clarification process	190	16.400.038	86.316
Transportation to special education	201	15.956.931	79.388
Activity and socializing offers	79	15.855.798	200.706
Mentor	616	15.631.290	25.375
Integration performance	275	15.484.014	56.306
Free space	1.142	15.413.020	13.497
Practical, ped., other support	30	12.881.361	429.379
Housing security	1	11.833.914	11.833.914
Permanent contact person	141	11.262.131	79.873
STU	76	10.119.237	133.148
Financial assistance	1.172	9.011.812	7.689
Integration efforts	291	8.468.610	29.102

Personal allowances	1.505	8.266.738	5.493
Sheltered employment	44	8.178.347	185.872
Senior jobs	2	8.038.865	4.019.433
Free physiotherapy	10	7.696.787	769.679
Wage subsidies	137	6.229.324	45.470
Residential	10	6.182.784	618.278
Loss of earnings, children with disabilities	79	6.031.433	76.347
Education boost	335	5.749.457	17.163
Substance abuse treatment	119	4.064.706	34.157
Activation and prevention	298	3.516.465	11.800
Alcohol treatment	143	3.457.527	24.179
Preventive home visits	2.032	3.456.362	1.701
Rehabilitation	21	2.942.546	140.121
Expenditure on refugees	115	2.903.077	25.244
Danish Language Education	96	2.555.279	26.617
Initial vocational training	43	2.237.366	52.032
Additional expenditure allowance for the maintenance of children with disabilities	104	2.206.018	21.212
Boarding and boarding schools	59	2.032.920	34.456
Health promotion and prevention	37	1.965.842	53.131
Personal assistance for people with disabilities	23	1.943.078	84.482
Family treatment	45	1.928.302	42.851
Accompanying scheme, disability	82	1.888.207	23.027
Funeral	1	1.839.616	1.839.616
Reimbursement for dental care	152	948.557	6.241
Special educational assistance for adults	17	822.864	48.404
Additional costs for adults with disabilities	41	699.003	17.049
Private room	9	657.586	73.065
Support person at placement	31	647.949	20.902
Counselling	32	610.727	19.085
Residential institutions for B&U	3	563.298	187.766
Cost of medical treatment	74	472.757	6.389
Preventive measures for children and adolescents	3	467.155	155.718
Equestrian physiotherapy	1	281.215	281.215
Production schools	2	276.317	138.159
Transport	90	250.818	2.787
Subsidy	16	137.956	8.622
Resource and job clarification process	4	120.975	30.244
Support and contact person, deaf-blind	2	84.494	42.247

Unemployment benefits	1	71.371	71.371
Social objectives	10	44.308	4.431
Consumer goods	4	22.615	5.654
Internships	2	17.630	8.815
Transport to health services	16	8.171	511

Source: Public Health Management (PHM) project between Region Zealand and Odsherred municipality from 2016 to 2018