



ST. OLAVS HOSPITAL
UNIVERSITETSSYKEHUSET I TRONDHEIM



AMBULANSE-
INNGANG AKUTTMOTTAK EMERGENCY

Measurement of Vital Signs in the Emergency Department

An Overview of Needs

About this document:

This document summarizes findings from an early needs investigation and is intended to be used as input in the dialogue conference. The dialogue conference is part of the innovation partnership process.

Contents:

- Background
- Process today
- An overview of needs:
 - Healthcare workers
 - Organisation
 - Patients
- The future vision

BACKGROUND

The Background:

Innovation partnership

St. Olav hospital was selected as one of eight participants in Innovation Norway's Innovation Partnership for 2020. Innovation partnership is a new form of procurement and a collaborative model that will facilitate different ways of thinking and innovation. The client (public actor) and private business will develop solutions and services that do not exist in the market today. After completion of the development, the client can choose to buy the solution without first going to competitors.



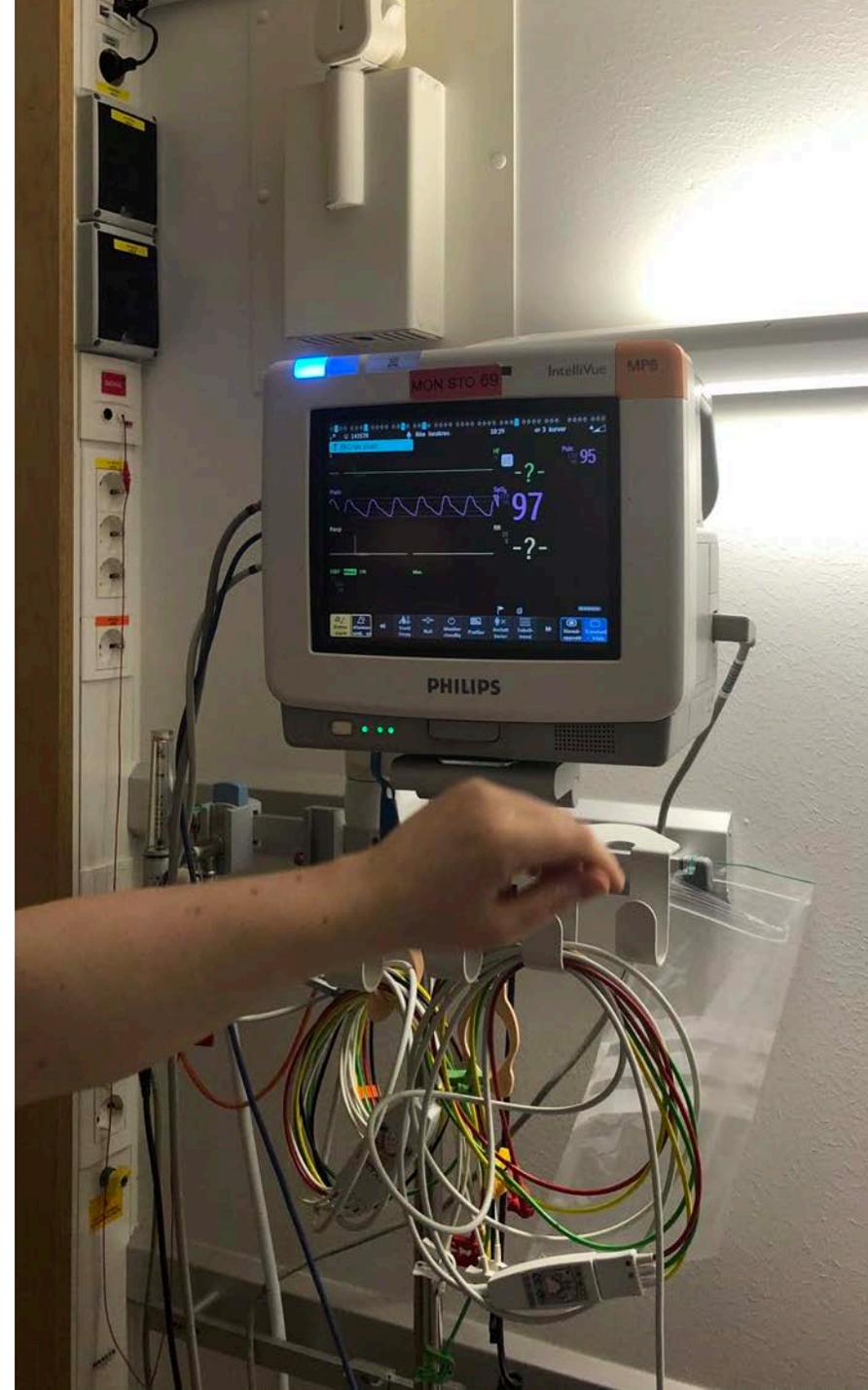
The Motivation:

Measurement of vital parameters

In acute and emergency medicine, new technology is needed to measure vital parameters. Among the challenges they have today is how time consuming it is to connect today's equipment with many cables. It is also challenging that patients have little freedom of movement when connected to the instruments. Healthcare workers have to juggle many different data sources and have a high cognitive load. In addition, sequential monitoring of patients allows for no changes to be detected. A lot of manual documentation and lack of interaction between systems can also affect the quality of patient care.

Framework

The solution may be relevant for different parts of the health care system. From primary health care to prehospital service to various parts of the specialist health service. To facilitate the development work, we are first looking at a solution for the Emergency Department at St. Olavs.



The goal:
Better quality, safe and efficient patient treatment.

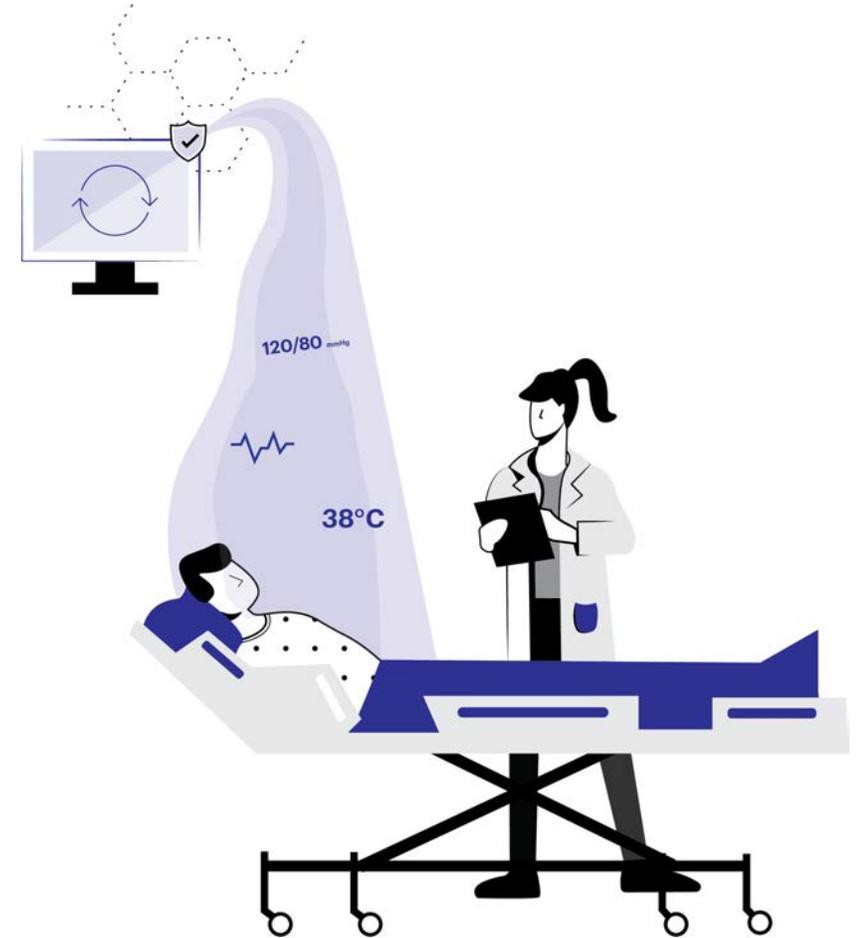
The goal is to measure vital signs* in a time and work efficient, reliable, safe and user friendly way. The aim is a less intrusive experience for the patient, efficient use of resources and less cognitive load on healthcare workers. This will lead to efficient and better decision-making and quality of care.

* Respiration rate, oxygen saturation, blood pressure, pulse rate, level of consciousness and awareness, temperature



The vision: **Contactless, continuous and automatic measurement**

The vision is a solution that measure vital signs* contactless with no cables and preferably no sensors attached to the patient. A solution that opens for accurate continuous monitoring. Healthcare workers can see the accurate vital signs in a given moment or as trends. They get notifications on monitoring screens and mobile devices if changes occur. Everything is automatic and integrated into the other systems healthcare workers use.



* Respiration rate, oxygen saturation, blood pressure, pulse rate, level of consciousness and awareness, temperature

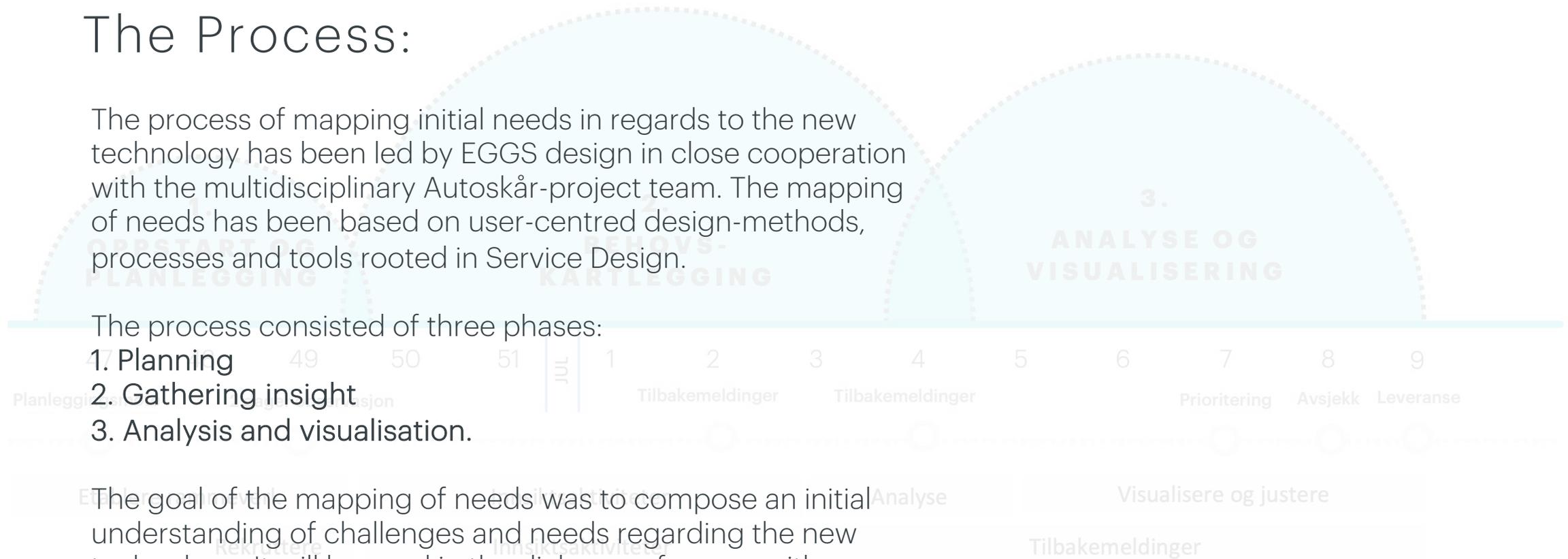
The Process:

The process of mapping initial needs in regards to the new technology has been led by EGG design in close cooperation with the multidisciplinary Autoskår-project team. The mapping of needs has been based on user-centred design-methods, processes and tools rooted in Service Design.

The process consisted of three phases:

- 1. Planning
- 2. Gathering insight
- 3. Analysis and visualisation.

The goal of the mapping of needs was to compose an initial understanding of challenges and needs regarding the new technology. It will be used in the dialog conference with possible partners for developing the new technology.



Insight focus and method:

Due to the broad variety of actors and possible technologies involved, there are many different types of needs. However, the main focus has been on healthcare workers needs because of a limited timeframe and the additional challenges of Covid-19.

The insight is based on 2 days of observation in the emergency unit (Akutten) at St.Olavs hospital in addition to 30 interviews. Emphasis have been placed on covering different professions, background, roles and experience in the selection of interview subjects. The main perspectives and needs covered has been the physicians' and the nurses'. In this document they are called the healthcare workers. Some focus has also been placed on the patient and organisational perspective, as well as inked roles in the emergency unit, including ambulance personnel, cleaning and security personnel.

The existing process of measuring vital signs has also been mapped, in addition to a simple overview of systems used frequently.



Recommendation:

Regarding the further development process, we strongly recommend user involvement and cocreation and particularly, the patients perspective. It is also worth mentioning that legal concerns is not covered in this mapping. We also strongly recommend using the dialog conference to discuss and explore technical concerns with possibilities, constraints and specifications.

ABOUT THE EMERGENCY UNIT

About the emergency care unit:

The emergency care unit (Akutten) at St. Olavs Hospital treats patients that have been referred from the primary healthcare or that arrive by ambulance after calling the 113 emergency number. St. Olavs is a regional hospital and a university hospital with close cooperation with NTNU.



About the emergency care unit:

The unit consists of the main emergency reception, the ambulatory emergency, and the emergency observation departments.



About the emergency care unit:

The emergency care unit treats around 27 000 patients per year. The healthcare workers at the unit consist of a mix of different occupations with the main categories being physicians and nurses. Some staff work only in the emergency care unit, whilst others split their time between different places, such as other departments of the hospital.



VITAL SIGNS AS PART OF THE PATIENT'S
JOURNEY

A Simple Overview of the Patients journey



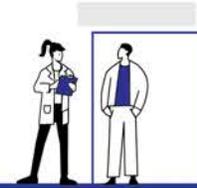
The patient is reported and taken to emergency department



Healthcare workers meet the patient

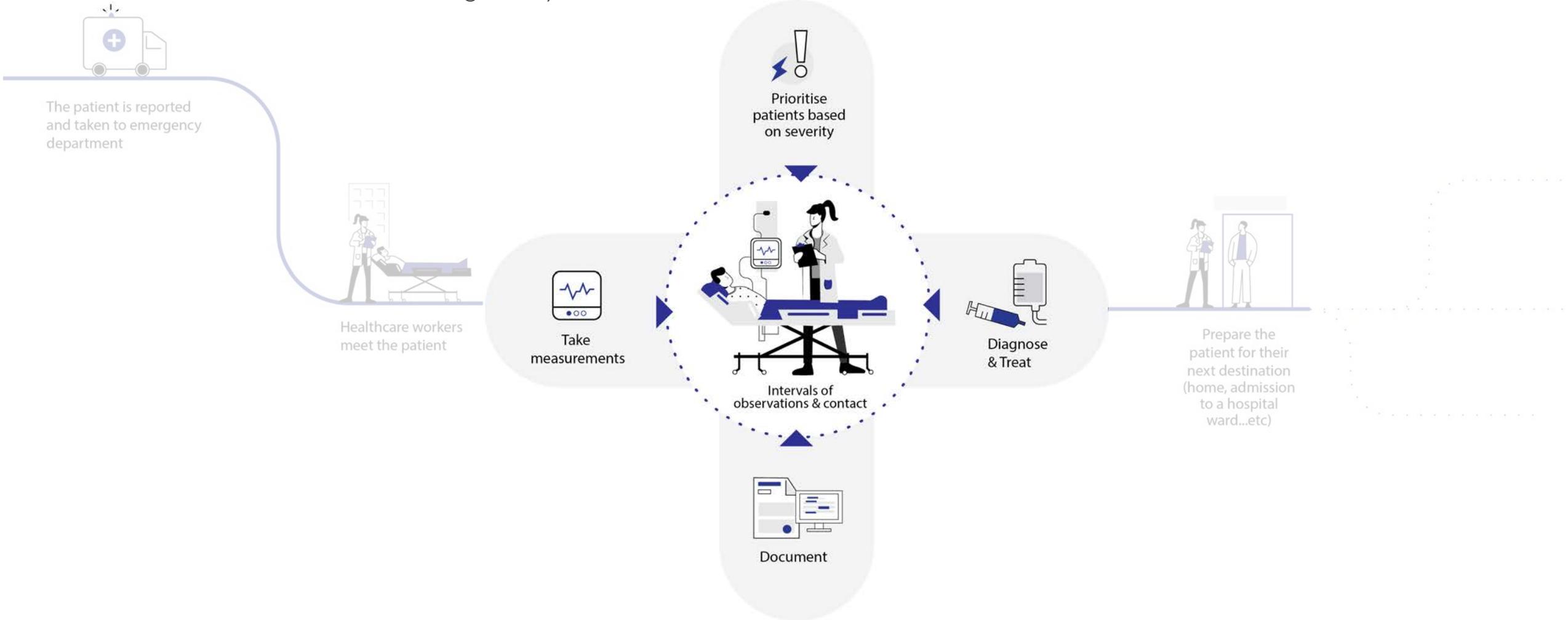


Healthcare workers take care of the patient with intervals of observations & contact



Prepare the patient for their next destination (home, admission to a hospital ward...etc)

There are four main elements to patient care, which happen continuously and interchangeably...

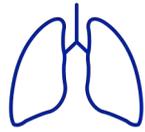


Vital Signs Overview:

There are six measurements taken today for vital signs



Oxygen saturation



Respiration rate



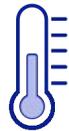
Blood pressure



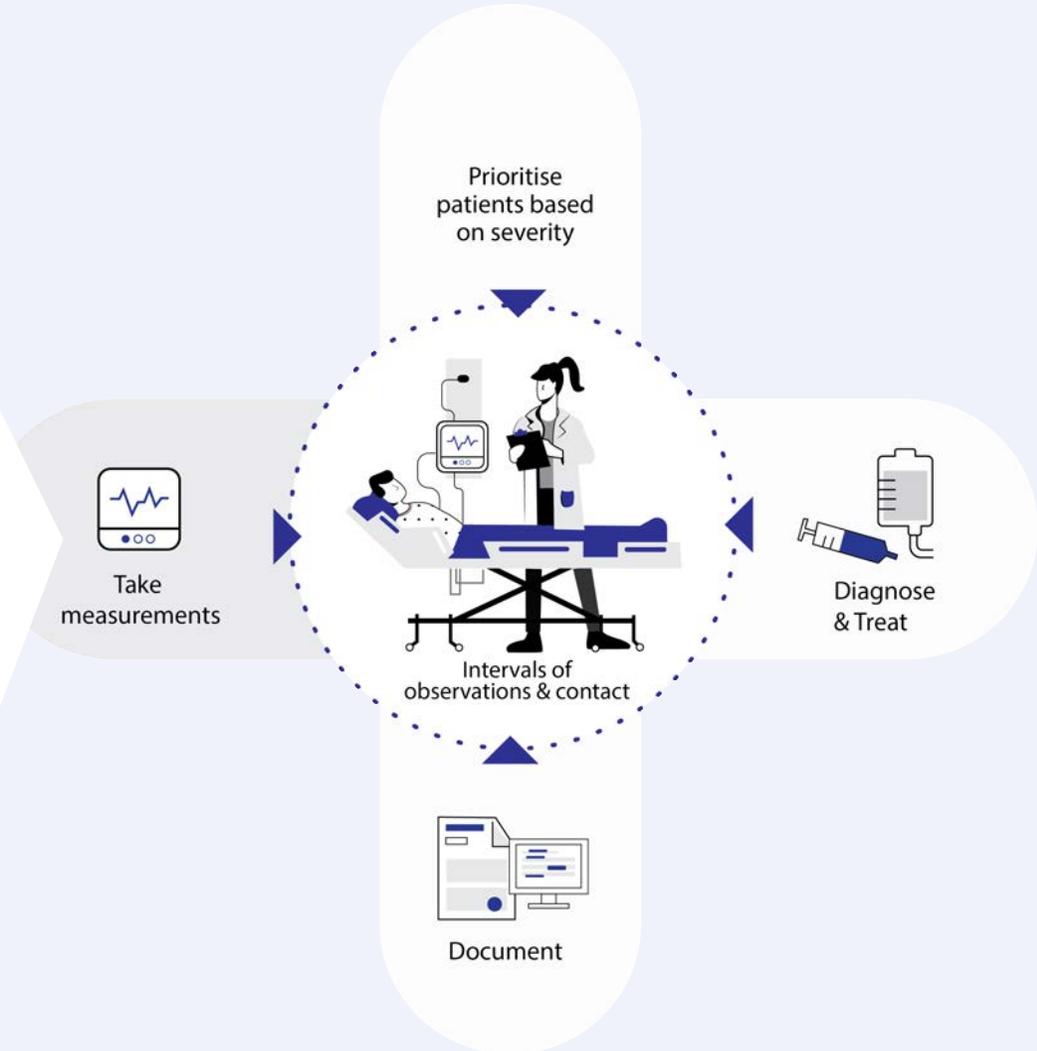
Pulse rate



Level of consciousness and awareness



Temperature



Measuring vital signs:

The process today is very manual and consists of several steps

- **Identify patient**

- Scan ID code
- Double check personal number and name with the patient
- Ask questions / have conversation with the patient

- **Connect the measuring equipment and talk the patient through the process step-by-step**

- Read the results
- Write down the results in a paper form
- Calculate score
- Set-up alarms

- **Document in akuttdatabase**

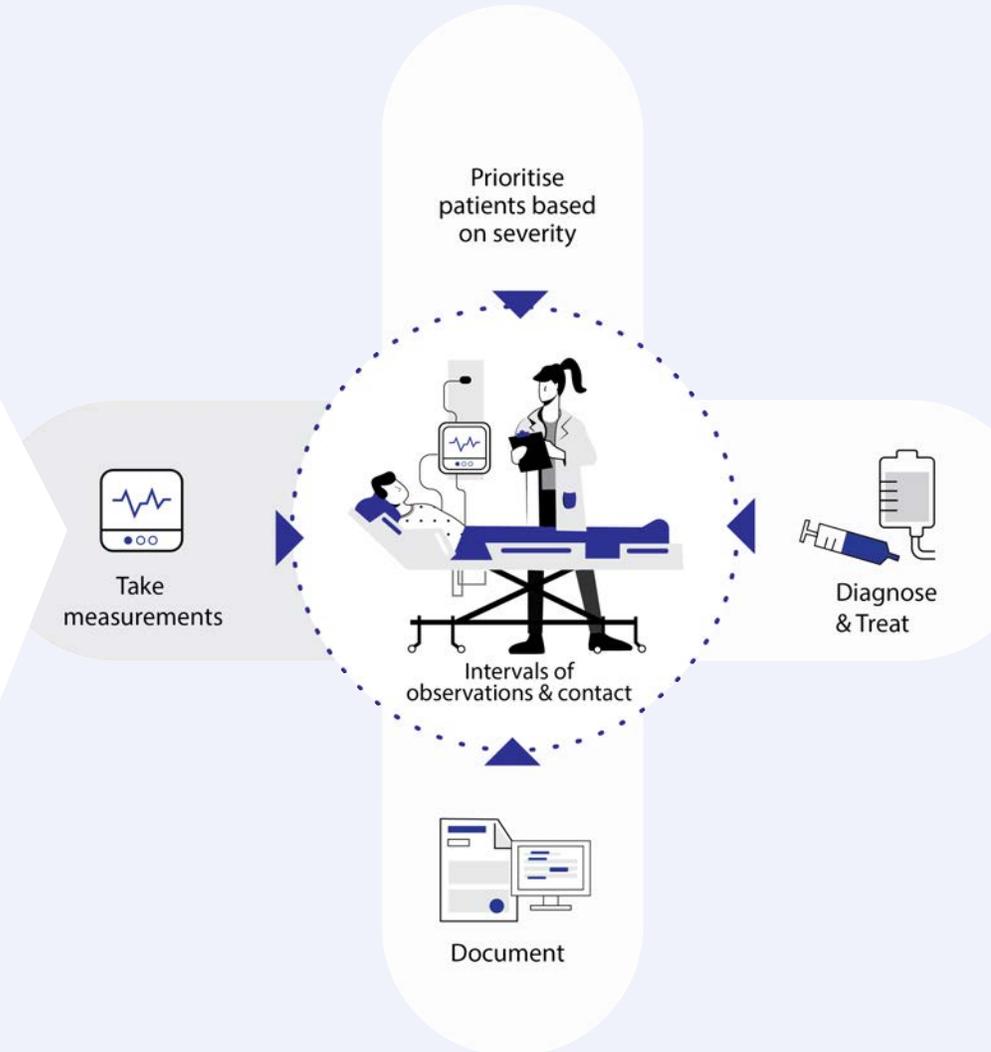
- Check RETTS and other systems for professional support, urgency, diagnosis and tests that should be ordered.
- Discuss with a doctor

- **Observe and monitor**

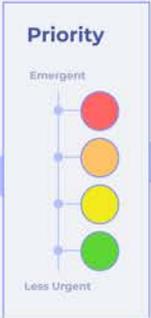
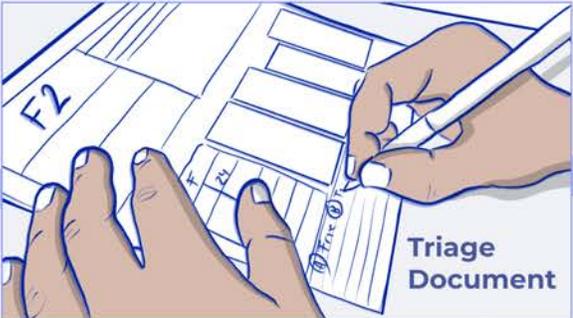
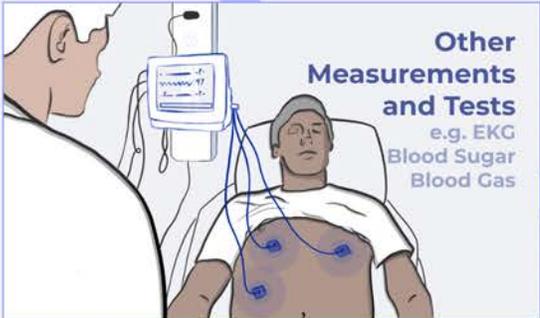
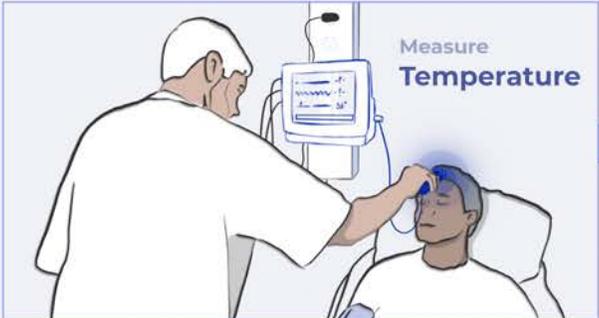
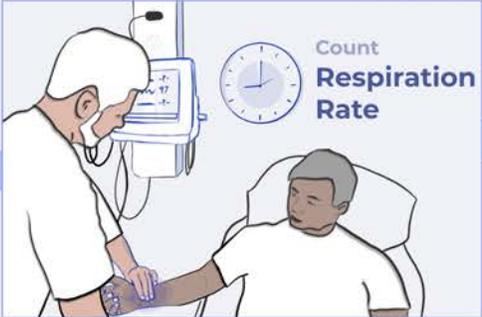
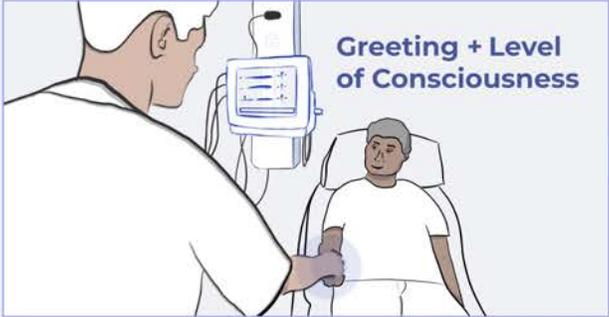
- Check documented information regarding the patient
- Take and order more tests

- **Assign priority:**

- Red - acute
- Orange - urgent
- Yellow - normal priority
- Green - not urgent



Vital Signs Measurement Process:



Top 5 challenges with vital signs today:

- It takes time and effort for healthcare workers to **gather vital signs**.
- Healthcare workers experience a high **cognitive load**.
- Patients are **sequentially supervised** .

- **Cords** connected to the patient limit the ability for free movement.
- **Manual documentation** and sharing of data is cumbersome.

OVERVIEW OF SYSTEMS USED AS PART OF THE PATIENT CARE

Overview of the Systems:

In the following section we give a simplified overview of systems used frequently at the emergency unit particularly linked to measuring vital signs. Most of these systems will be part of/integrated with the new common journal system, for hospitals and municipalities in mid-Norway (Helseplattformen), which is under development. The system is planned to be launched in the emergency care unit in may 2022.

The healthcare workers have different levels of technical knowledge from expert to novice. It is important that all future systems used by healthcare workers are developed with the novice in mind.

Overview of Software:



HELSEPLATFORM (2022)

Expectation: The platform for digital patient documentation (Helseplattformen) is based on EPICs and uses capsule tech drivers. Standards used for data are HL7 (to be replaced by FHIR) and DICOM for picture and video. The vital signs from the patient monitors at the emergency care unit are sent to a central monitoring unit. It then transfers the data to the Helseplattform. Some of the data is transferred quickly (ca. 30 seconds) whilst other data can take up to 3 hours. In other words, there is no live data in Helseplattformen.



AMIS

Department: (AMK)

What: A system for the AMK (113) department for creating short status reports

Content: all information given to AMK/113

Use: Sent to the emergency unit, printed and manually written and uploaded into their systems



AKUTTDATABASEN

Department: Emergency unit

What: Patient information and logistics.

Content:

- Where the patient is located
- Priority
- Information about patient

Use: Many people have access, so it is not used for sensitive information

Future: Will be included in the new EPIC platform Helseplattformen



DOCULIVE

Department: St. Olavs hospital

What: Patient journal and logistics

Content:

- Order tests
- Reference of patient
- Patient history, if admitted before

Use: Used as a journal / documentation system, more comprehensive descriptions than akuttdatabasen

Future: Will be included in the new EPIC platform Helseplattformen

Overview of Software:



PICIS

Department: Intensive care and others

What: Patient journal and log of measurements

Content:

- Log/journal
- Write measurements data directly into the system

Use: Particularly used by the anaesthesia personnel and in situations of critically ill/trauma patients at the emergency

Future: Will be included in the new EPIC platform Helseplattformen



AMBULANCE MEDICAL RECORD

Department: Pre-hospital /ambulance

What: Documentation from the ambulance

Content:

- Vital signs
- Priority
- Assessments
- Journal from ambulance

Use: Healthcare workers have access, can log in. Used to plan before the patient arrives.



COREPULS WEB

Department: Pre-hospital /ambulance

What: Vital signs

Content:

- Measurements from the Corepuls
- EKG

Use: Information from the ambulance

Integrations: Not integrated with Egerica but integrated with Doculive – 12 cords EKG

Future: Tender on a new vital sign monitor and defibrillator in ambulances.



RETTS

Department: Emergency care unit

What: Support and reference book prioritisation/triage

Content:

- Triage code
- Suggestions for tests
- Suggestions possible conditions based on symptoms

Use: Triage and diagnosis

Overview of Hardware:



PATIENT MONITOR

Department: Emergency care unit

What: Phillips patient monitor

Content:

- Cords connected to the monitor
- Data from measurements
 - Vital signs and heart monitoring
 - Anaesthesia apparatus
 - Ventilators

Use: Placed by each patient, in some room several screens connected to one monitor.

Data: The patient monitors are linked to a central monitor at the emergency care unit which receives live data from the patient monitors.



PORTABLE PATIENT MONITOR

Department: Emergency care unit

What: Portable unit that can be detached from stationary monitor
Content:

- Data from measurements
 - Vital signs and heart monitoring
- Cords connected to the monitor

Use: When the patient needs to be moved e.g to operation, one can bring the portable unit and monitor on the way. At the new location the transport unit is plugged into the patient monitor there.

Data: Patient identification is stored in the hardware, during transport info is stored in the hardware, then transferred to the new patient monitor,



CENTRAL PATIENT MONITOR

Department: Emergency care unit

What: Overview of several monitors/scopes. Interface of data from central patient monitor.

Content:

- Data from measurements
 - Vital signs
 - EKG
 - Temp
 - Identification
- Akuttdatabasen
- Doculive

System: Philips pic IX

Use: Nurses monitor several patient monitors at the same time

Data: Live data from patient monitors.

Overview of Hardware:



RADIO

Department: Emergency care unit

What: Radio connected to the emergency network

Use: Communication and logistics e.g. which nurse is responsible for which room

System: The radio is on the emergency network, a independent communication network for emergencies in Norway.



IP TELEPHONE

Department: Emergency care unit

What: Telephone

Use: Internal communication

System: Ascom myco 3

Developments:

Due to the basement location there are some issues with network connection. A project has been initiated(Carelent) to assign a patient to a healthcare worker by a central monitor. Then further link alarms on patient monitors to healthcare workers telephones.



MEASUREMENT EQUIPMENT

Department: Emergency care unit

What: Range of different hardware e.g.

- Blood pressure cuff
- Oxygen sensors
- Patches and cords

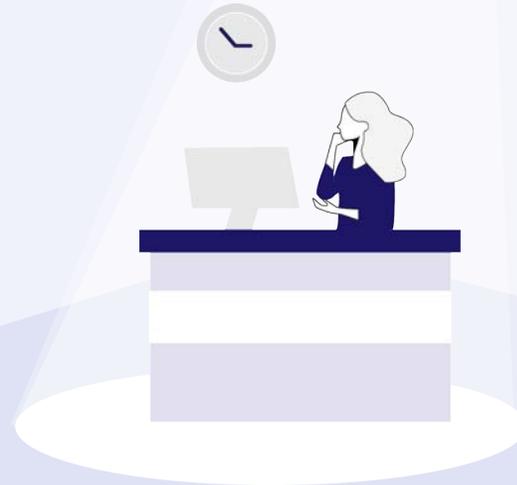
Use: Gather measurements

AN OVERVIEW OF NEEDS

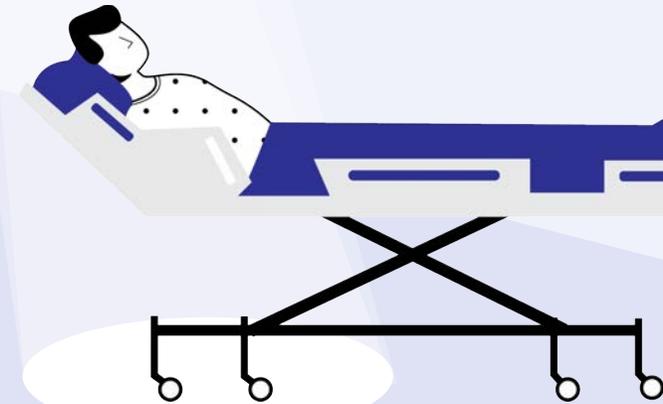
Different Types of Needs



The needs of
healthcare workers



The needs of the
Emergency
Department as an
organisation



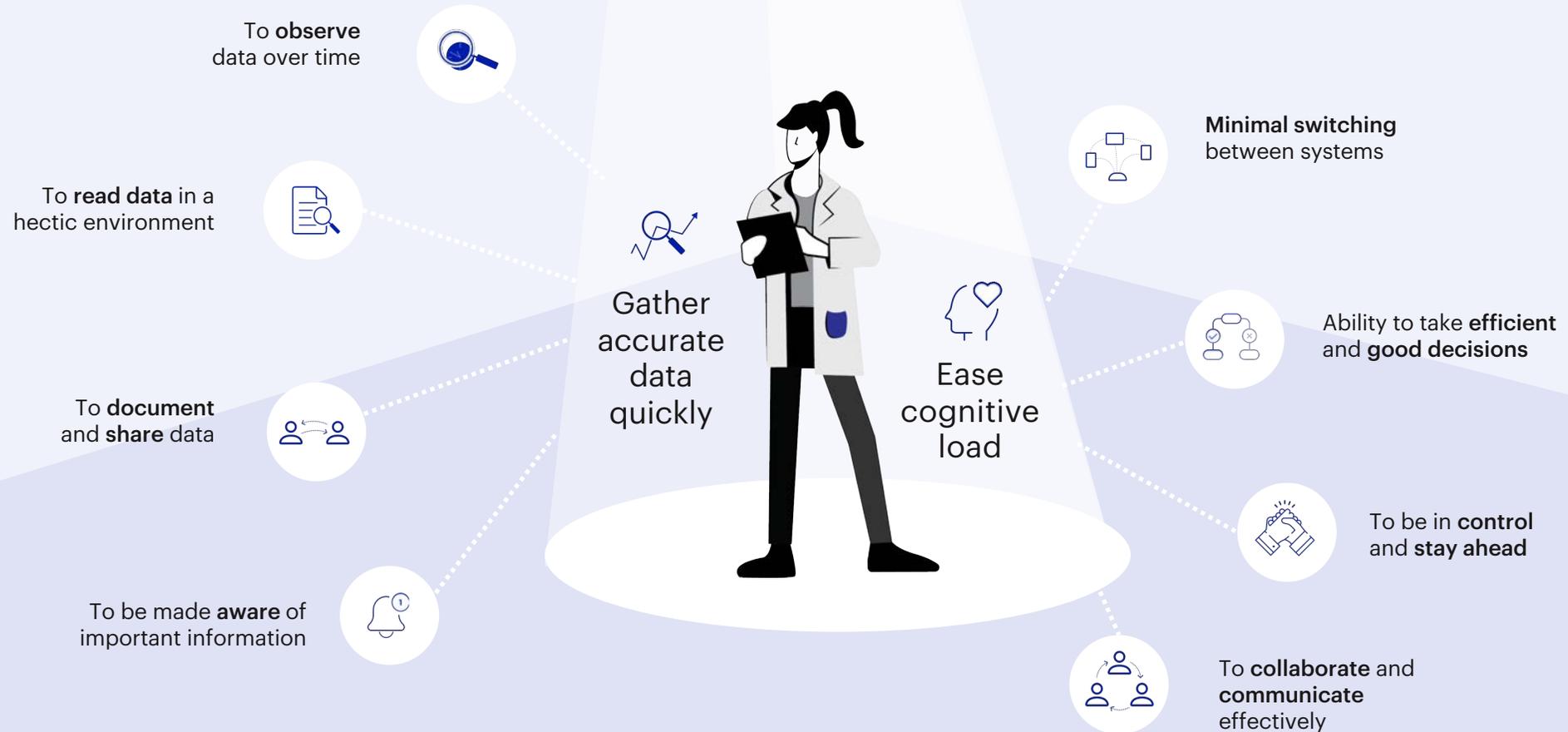
The needs of the
patients

Healthcare workers' needs...



Healthcare workers' needs...

There are two overarching healthcare needs; gathering accurate data quickly and easing cognitive load, each comprises of a number of sub-needs.



Healthcare workers need to gather **accurate data quickly**

- ...an **accurate** understanding of vital signs.
- ...to measure vital signs by the **bedside** and from **afar**.
- ...to be able to measure vital signs for **all types of patients** at the **same time**.
- ...to measure vital signs **independent of healthcare workers'** availability.
- ...to measure data **while moving** the patient.



“

When the patient is sweating it is very difficult to get the sensor to stay in place.

- Nurse





Motivation:

- Healthcare workers need to gather data and vital signs in order to make well informed decisions.
- The emergency department needs to treat all sorts of patients. Parameters to consider include:
 - Body shape/size, gender, age, race and ethnicity, consciousness, calm/restless, mental and physical disabilities, illnesses which can affect readings.
- Patients with infectious conditions (e.g. covid-19) is time-consuming to treat because of PPE.

- Healthcare workers need to monitor critically ill patients even when moving location e.g. intensive care or surgery. Vital signs are measured on the go with a smaller portable part of the scope/monitor.
- Measuring vital signs is a time and resource intensive activity. The urgency of vital signs and resources available does not always match, leading to stressed healthcare workers and decisions based on insufficient data.

Healthcare workers need to read data in hectic environment

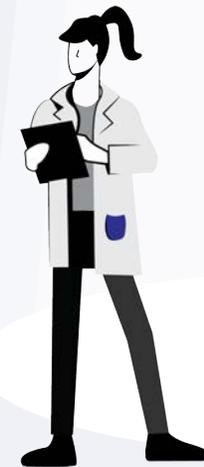
- ...to see the data **while communicating** with the patient.
- ...to have access to data **on the move** between different patients, locations and tasks.
- ...to see a lot of **different data in parallel** at the same time.
- ...to be **several people looking** at the same data at once.



“

When a trauma-team work on a patient we always read the vital signs out loud. The team leader repeats it back to make sure it is correct.

- Nurse



“

Don't give me more options. I have enough decisions to make.

- Nurse, regarding screen-interface



Motivation:

- Healthcare workers need to read data on vital signs while performing other tasks:
 - Talking to the patient. Getting patient history. Identifying if the situation (scared patient etc) might affect measurements
 - Taking other tests like blood sampling.
 - Checking and writing documentation
- In some situations many people work on the same patient and several people need to see the data at the same time.

- They need to move between patients and locations, often on short notice.
- Healthcare workers find it difficult to plan their time; how hectic it is varies. They get short breaks/waiting time in-between tasks, which they want to use to check up on patients.
- A lot of tasks and patient switching causes the need for user friendly and standardized interfaces.
- They need to see additional measurements/ data on the same screen as vital signs.

Healthcare workers need to observe data over time

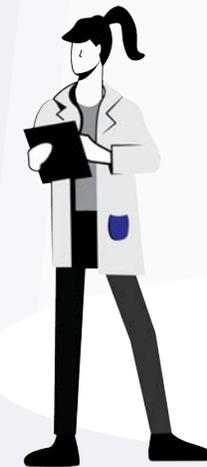
-
- ...to measure vital signs and monitor **several patients** at the same time.
 - ...to observe the data while observing **the patient**.
 - ...to see the patient's vital sign history and **trends**.
 - ...to monitor a patient when he/she **get out of bed**.



“

Today we get just a picture of the situation in this exact moment. If the blood pressure is low, we do not know if it became low a minute ago or if it has been like this for the last hour.

- Emergency care physician





Motivation:

- Number of patients at the emergency department can vary throughout the day. There needs to be a flexibility for when there is a sudden increase in patient numbers.
- Healthcare workers are not always by the bed of the patient, hence there is a need for an overview of the patients, which can detect and alert if conditions change.

- When patients go to the bathroom or get something to eat they are not monitored. Should a patient's condition worsen during this time, the consequences could be more severe. People stationed by the patient, like nurses, security guards or relatives etc. use the VS parameters, so they can tell when the patients condition is changing.

Healthcare workers need to be **made aware** of important information

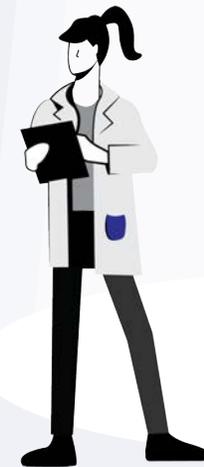
- ...to be made aware of **changes in vital signs**.
- ...to be made aware if vital signs are **outside the expected range**.
- ...to be notified about the patients they are **responsible for**.
- ...to avoid **alarm fatigue**.
- ...to be made aware of changes fitting to their **level of responsibility**.



“

Nobody looks at the monitors if it is hectic – it is so easy to miss out on a change.

- Emergency care physician





Motivation:

- Healthcare workers switch frequently between patients, tasks, decisions and responsibilities. They are stressed about overlooking a patient or forgetting something.
- Machines are constantly making “false alarms” e.g. a sensor is not attached properly etc.
- Healthcare workers are responsible for several people at the same time, and might not be nearby if and when the patient-situation change.

- Healthcare workers have different responsibilities regarding the patient. A nurse might want to be notified about smaller changes in vital signs whilst a doctor might want to be notified if the situation is about to become critical.

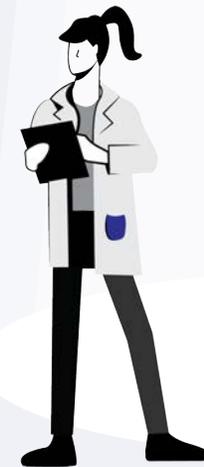
Healthcare workers need to be **document** and **share data**

- ...to document data in an **efficient** way.
- ...to **share data** in order to cooperate well and save time.
- ...to have a good understanding of where automatically logged data is **stored**.
- ...to do **less manual** documentation.
- ...to document **bedside** and from **afar**.



“
*What you document -
you will act on.*

- Chief physician





Motivation:

- It is important to document to know the situation, development and history.
 - There is a risk of human error when documenting data.
 - It is time-consuming to document manually.
 - Healthcare workers print and have paper backups of the critical and main information in case of system failure and since it takes time to log on to systems.
 - Documenting data from the bedside is better than documenting data from afar.
 - There is a legal need for documentation.
- Documentations are done in several systems, which healthcare workers need to log in and out from.
 - Separate systems lead to rewriting and scanning pdfs.
 - A new system (Helseplattformen) will integrate several of today's documentation systems.
 - Patients with infectious conditions causes the need to document from afar. One nurse will stand outside the door and document, whilst another takes measurements bedside with PPE.

Healthcare workers need to make **efficient and good decisions**

- ...to reduce **cognitive load** within hectic work environment.
- ...to take **decisions quicker**.
- ...to have as **much and good quality data** as possible.
- ...to **get feedback** on treatment.

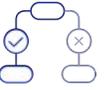


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The vital signs say so much about how the patient is doing. It is about 90% of the basis for decisions.

- Intensive care physician





Motivation:

- It takes time to connect all the measurement equipment to the patient.
- Due to limited resources, patients are treated based on priority.
- If healthcare workers get data quicker, decisions can be made faster and the patient can get treatment faster.
- The data supporting decisions vary from patient to patient.

- When giving treatment, there is a need to see how the patient reacts and possibly make adjustments.
- The vital signs are crucial for understanding the patient's condition. Around 90% of a decision is based on the vital signs.

Healthcare workers need **control, trust and to stay ahead**

- ...to know the **patient is taken care of** and is getting the right treatment and care.
- ...to be made aware of changes or trends in vital signs **before it gets critical.**
- ...to feel they have **control.**
- ...the systems to be accurate and **reliable**, and **trust** that the systems work.
- ...to know they will **get help and have a backup plan** if a system or procedure fails.



“

While attending to one patient, I always have another patient on my mind, worrying.

- Intensive care physician





Motivation:

- Systems need to be accurate and reliable to avoid wrong treatment.
- Healthcare workers are worried that they might overlook a patient or some important information.
- A patient's situation might change quickly.
- It is important that they get the right level of feedback (not generating extra noise).

- Healthcare workers are afraid of making a bad decision. The consequences can be high and in a worst case scenario; death.
- Different health care roles with different experiences and responsibilities need to trust each other and work together. Some feel lack of control and have the urge to double-check data, patients and colleagues' work.

Healthcare workers need good collaboration and communication

- ...to know who **is taking responsibility** for the patient.
- ...to be able to **volunteer/accept** a task.
- ...to be able to **delegate/reassign** a task, notification and responsibility to others.
- ...**confirmation/feedback** that a task have been completed.
- ...a **support system** that will ease their work, not generating more tasks.



“

I rely on the nurses to filter the information and notify me.

- Intensive care physician





Motivation:

- Today they rely on their colleagues to filter, prioritise and share information.
- There is a lot of “grey-zone situations”, different opinions about the right way forward and hence situations of questioning colleagues and oneself.
- There is constant change in resource allocation, responsibility and division of tasks based on type of patients, how hectic it is and the experience of the healthcare worker.

- Information is passed on throughout the patient’s journey through person to person conversation, using phone/radio, on paper, scanning documents, PDF`s and digital entries in different systems.
- 15 minutes are used to pass on information and give a short brief, when a new shift starts.

Healthcare workers need smooth digital systems

-
- ...to **reduce the need** for, or ease, the work of system switching.
 - ...to **compare** data while making clinical assessment.
 - ...to collaborate and share data within the **intensive care unit, cross-hospital** and **outside the hospital**.
 - ...**automatically documented data** in the patient journal.

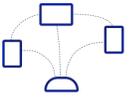


“
We print the AMIS and rewrite the information into our systems.*

- Coordination nurse



*AMIS is the initial report sent from the 113 operator

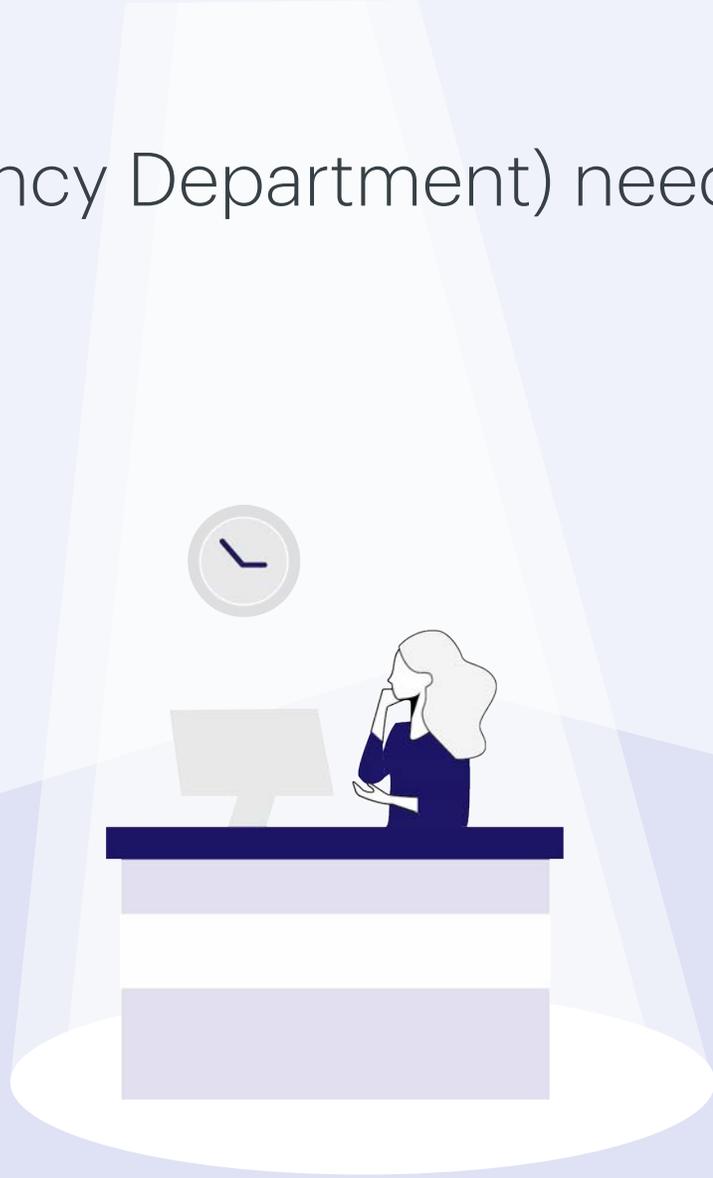


Motivation:

- Healthcare workers have challenges with information flow due to different systems which are not integrated, and it affects patient safety.
- It is time-consuming and difficult to combine different sources of data gathered in different places.
- It takes time to switch between systems, they need to use their identity card to log on to a computer.
- They also need to log out from one system, to log into an other, or when switching between patients in the same system.

- Physicians actively assess privacy when deciding what information is written in which system.
- Some systems within the hospital and intensive care unit will be integrated with a new epic based platform (Helseplattformen).
- There is a risk of false interpretations as documentation is done manually today.

Organisation (Emergency Department) needs...



Organisation (Emergency Department) needs...

Smooth logistics



Efficient use of resources
and a sustainable budget



Security and safety



The emergency department need **logistics to run smoothly**

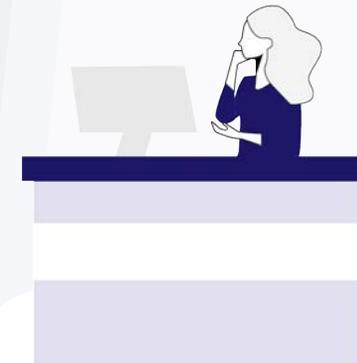
- ...to have an overview of **available equipment** in each room.
- ...to know where to **find the patient** (and staff).
- ...to know where they can **place patients**.
- ...to know when a room, bed or equipment **needs to be cleaned** (when patient has left).



“

Yesterday I had to do a bit of detective work to find a patient - he was moved, but the system (Akuttdatabasen) was not updated. It did not take me long, but still...

- Emergency physician in training



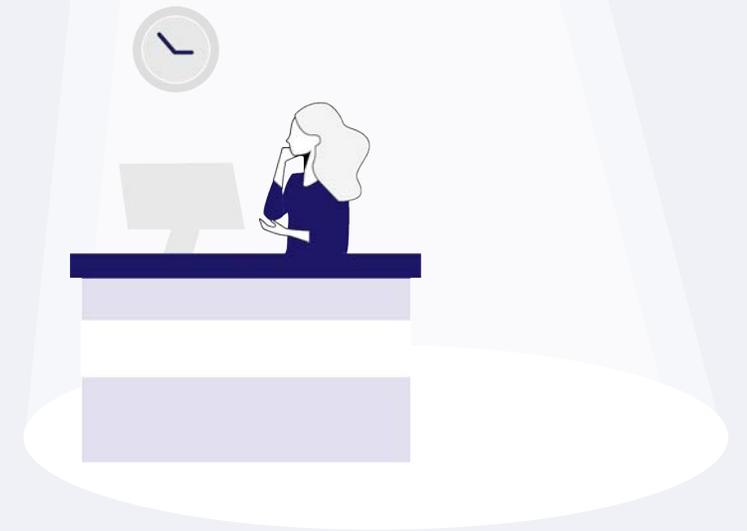


Motivation:

- The responsible nurse on each department/post is responsible for knowing where the patients are.
 - Patients might have to be moved quickly and healthcare-workers might not have time to update the new location in the system as quickly as needed.
 - Healthcare workers are moving between patients and departments/wards and it is difficult to have the full overview.
- The intricate logistics of where to place a newly arrived patient and where to move him/her after treatment, starts before the patient arrives.

The emergency department need **efficient use of resources and budget**

-
- ...to save time and expenses through good **use of resources**
 - ...to have an overview of healthcare-workers **roles and responsibilities**
 - ...to have flexible systems for **quick changes** in shift-rotation, responsibilities, notifications etc.
 - ...to have the **same possibilities of measurements, surveillance and equipment** in all areas of the emergency unit





Motivation:

- The amount of patients in the emergency unit fluctuates and makes it challenging to plan resources.
 - The healthcare workers have different responsibilities and experience. They change original plans based on the needs in the moment.
 - Today there is various equipment in different areas of the emergency unit. Making it challenging for logistics and clinical work. In addition, it requires knowledge of many systems and can increase the risk of wrong use and errors.
- Healthcare workers want to have the same basic vital sign measurements for all patients in all parts of the unit.
 - The technology needs to be sustainable in terms of available budgets from purchasing to installing, operations, maintenance and disposable/reusable equipment.
 - The hospital has had experience in the past with sensors, which after use, can be sent back to the factory, where they are then cleaned, reconfigured and returned to the hospital. Circular systems like this can be ideal from an environmental and economical point of view.

The emergency department need **safety and security**

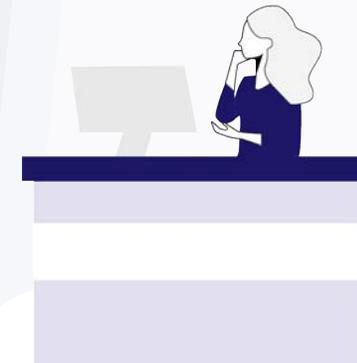
- ...**safety** for employees, patients and other persons within the emergency department.
- ...**clean equipment** so that it is safe for the patients and staff to use.
- ...**secure identification** of patients and healthcare workers.
- ...control of **access of information**.
- ...secure **storage and transfer** of data.
- ...it to be **easy** to do things correctly



“

I think a secure patient identification will be the main challenge in this project.

- Expert on medtech

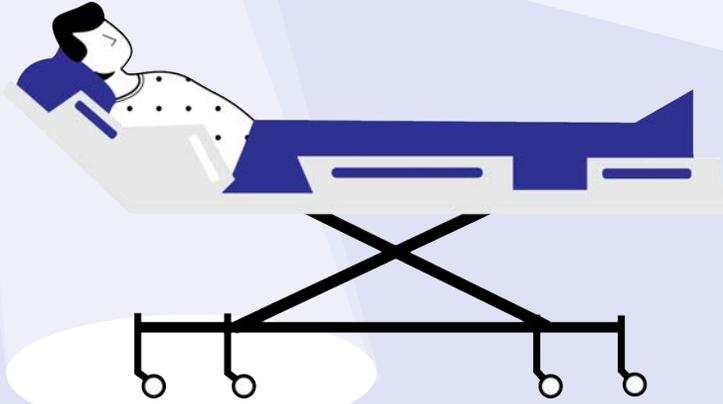




Motivation:

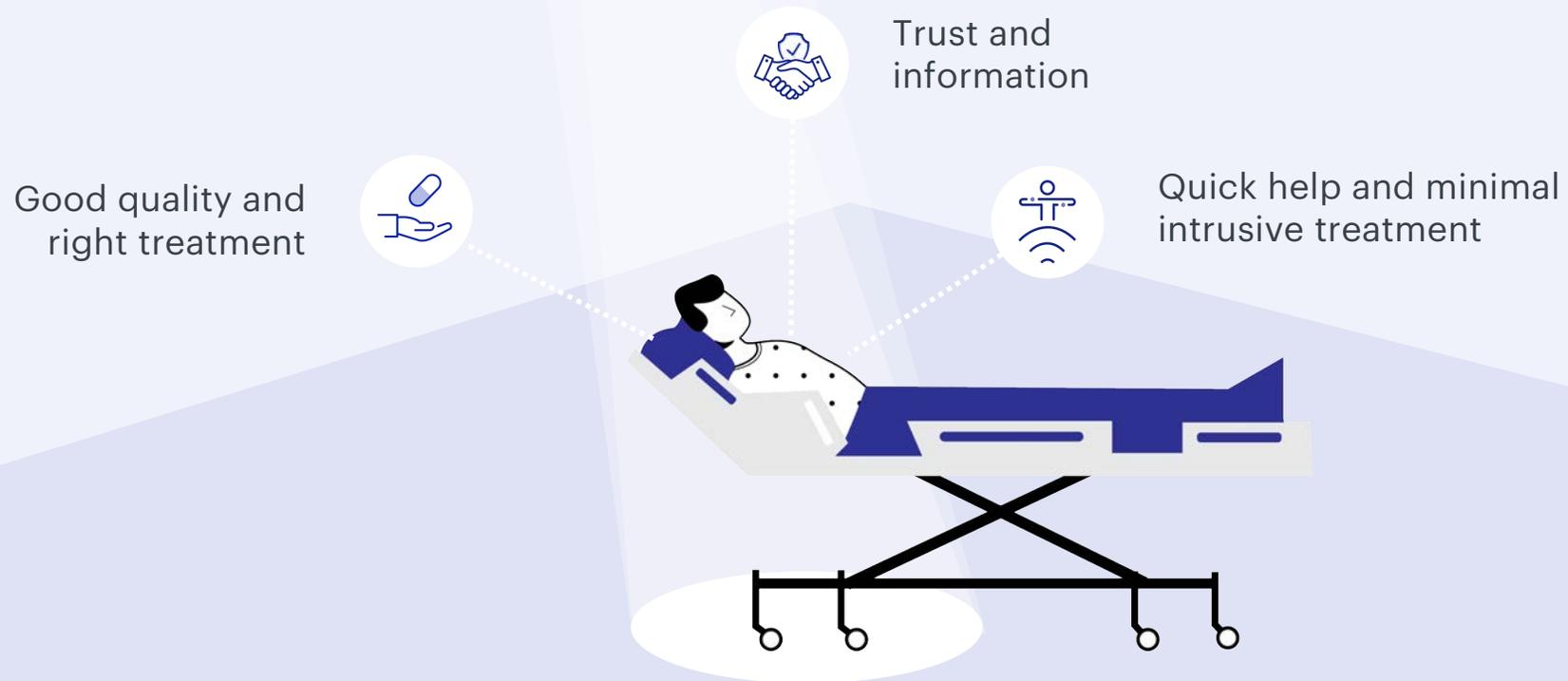
- Cleaning personnel prefer to clean rooms without patients. Smooth surfaces are easier and faster to clean and equipment above a persons high is cleaned with a mop. Disinfection and detergent may harm some materials.
- It is crucial that the right patient is linked to the data gathered, to avoid getting the wrong treatment.
- Healthcare workers only access information regarding the patient to when they are treating them.

Patients needs...



Patients needs...

There are three main categories of patient needs discovered so far. However, we recommend investigating the patient perspective more in the development work.



Patients need good quality and right treatment

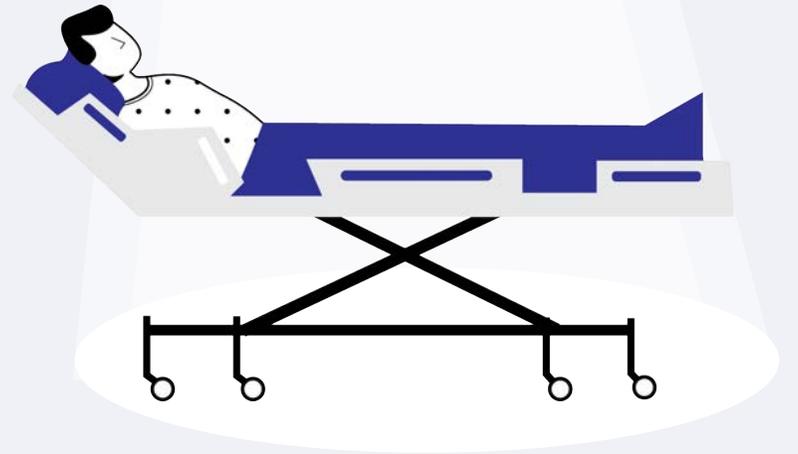
- ...to be **followed up** closely.
- ...to get the **right treatment** at the **right time**.



“

I had to take the same tests over and over again, I do not understand why.

- Patient





Motivation:

- There is a balance between getting enough data and not exposing the patient to “unnecessary” tests.
 - Patients get annoyed having to take the same tests and measurements over again e.g. at the GP, in the ambulance, in the intensive care, at the hospital.
 - Healthcare workers like to be in control of their own measurements and assessments and get the accurate picture.
- If the patient may get specialised treatment other places e.g. at the hospital, the emergency unit wants to transfer the patient as soon as possible.
 - If there is good surveillance of the patient, healthcare workers dare to give more anaesthetic hence less pain for the patient.

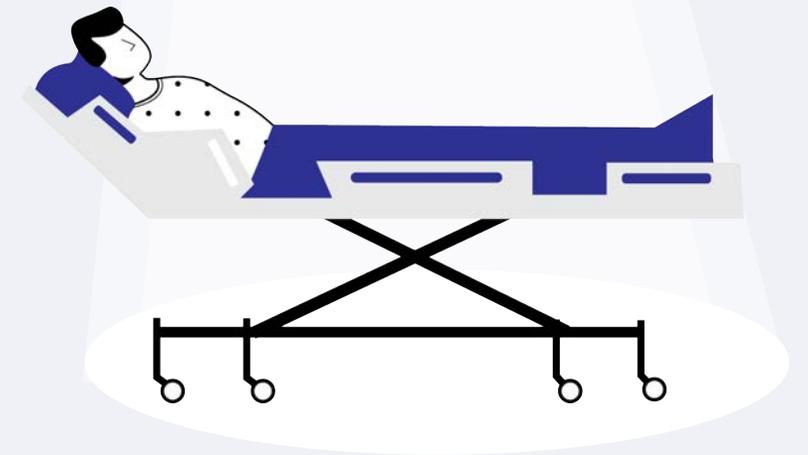
Patients need quick help and minimal intrusive treatment

- ...**quick help** and have minimal waiting-time.
- ...to have as **little intrusive** treatment as possible.
- ...to have as **little pain** as possible.



“*The ambulance drove me to my GP and she told them to drive to the emergency. I have no idea why they stopped by the GP.*”

- Patient





Motivation:

- How fast a patient is getting treatment depends on the urgency of the situation and how hectic it is.
- Patients that initially have a low priority might be waiting many hours before getting help. The situation might have changed while waiting.
- Some patients are afraid of hospitals or standard procedures with syringes, being connected to cables etc.

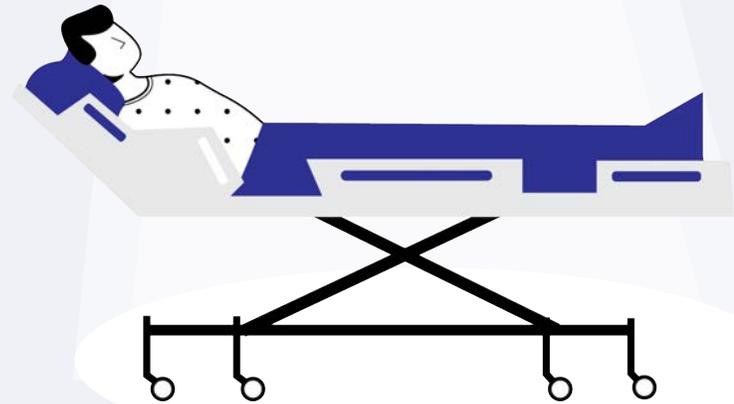
Patients need... trust and information

-
- ...to **know** they are being taken good care of.
 - ...to **get information** during their stay to know what is happening and going to happen.
 - ...healthcare workers to **understand** them.
 - ...to not tell their patient history **several times**, but trust that everyone have gotten the right information.
 - ...to **trust** they get the right, and enough, information.



“
I was freezing, but I did not tell them, I did not want to make a fuss, I do not like to be of a nuisance.

- Patient





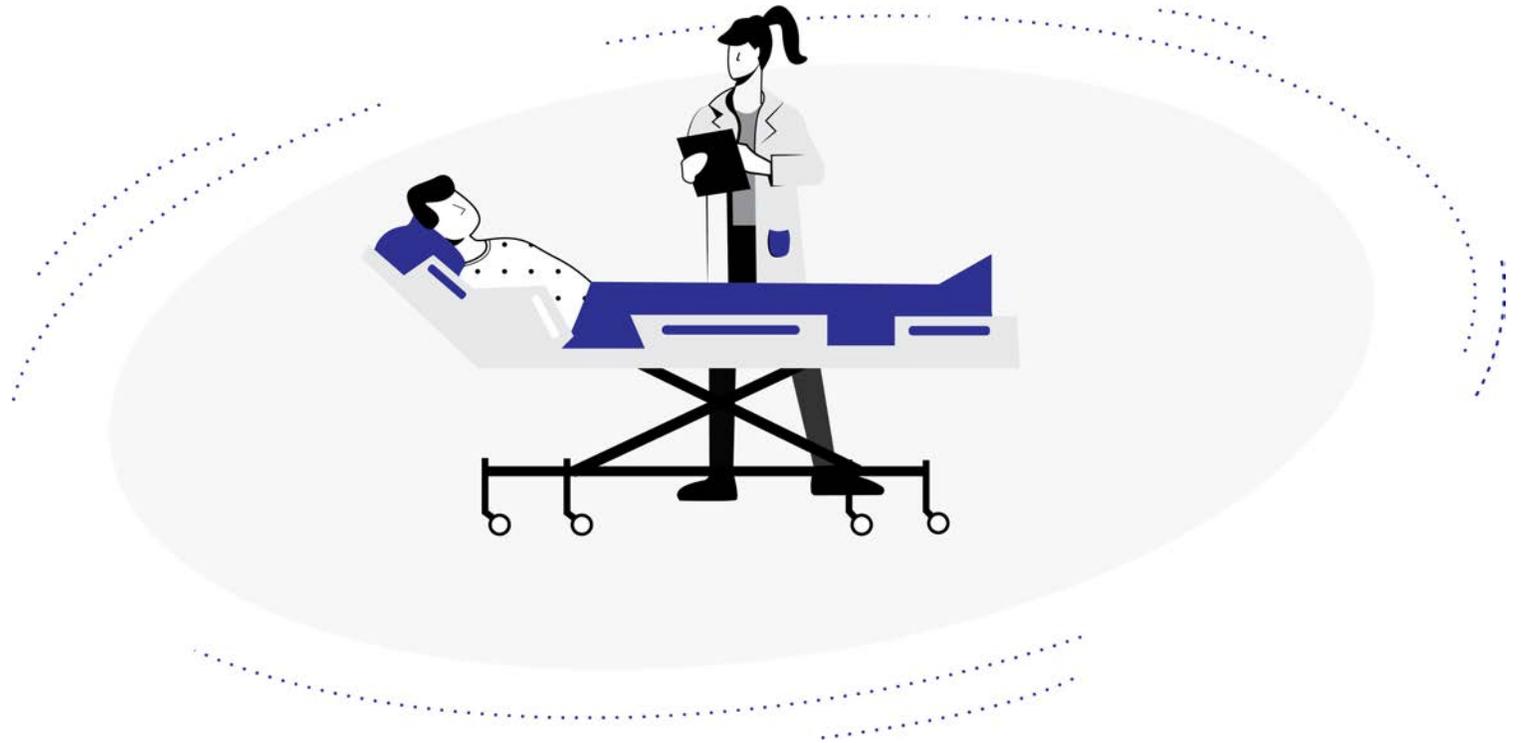
Motivation:

- Many patients are concerned and unsure whilst they are at the emergency unit.
 - Patients are reassured if they know someone is looking after them, what is happening and what is going to happen.
 - Patients easily forget and have less understanding of time when ill.
 - Some patients do not want to be a bother and “downplay” their situation, others “exaggerate”.
- Information is not shared easily between different instances and it is unclear for patients, which information healthcare workers at the emergency have about them.
 - Some patients feel they do not get enough information unless they ask.
 - Some patients need information about what happened whilst they were at the emergency unit. For example, if they cannot remember or if they were unconscious.

VISION

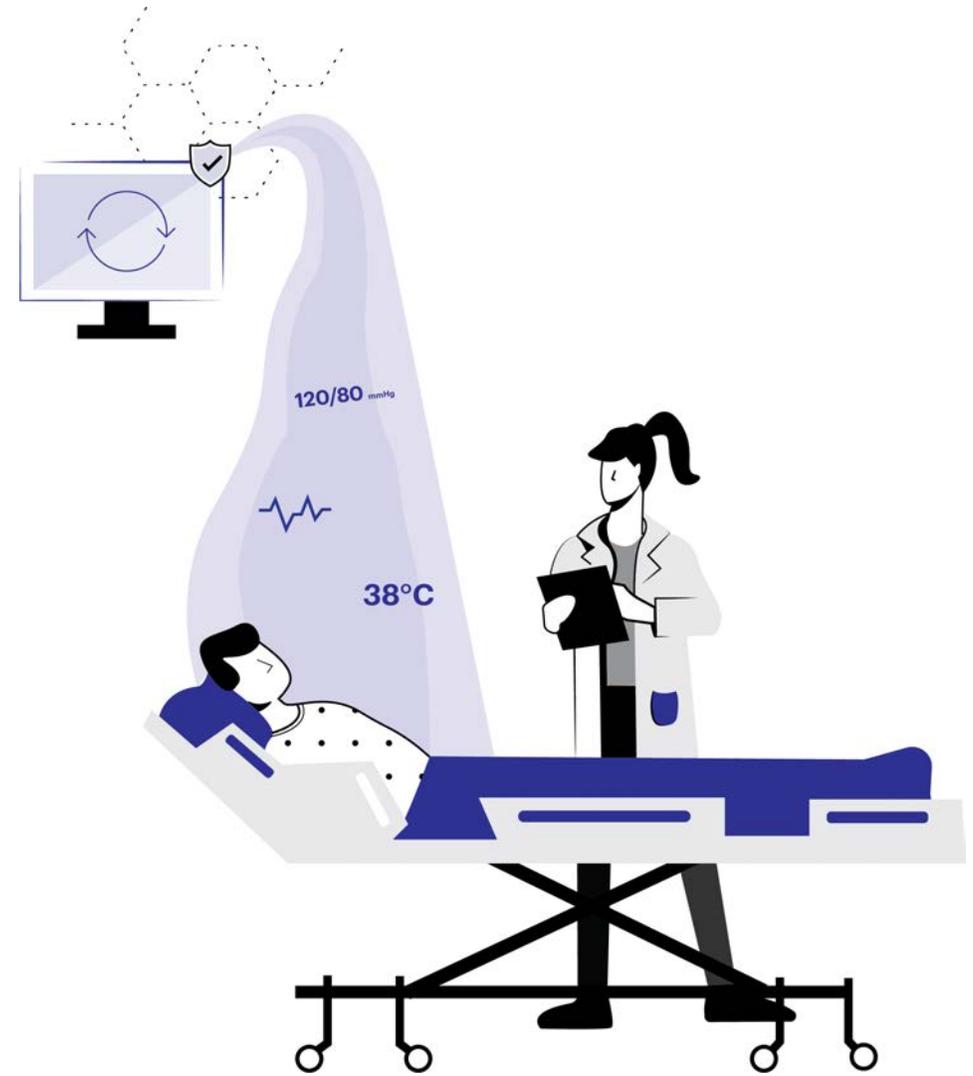
Vision:

**Better quality, safe and
efficient patient treatment**



Vision:

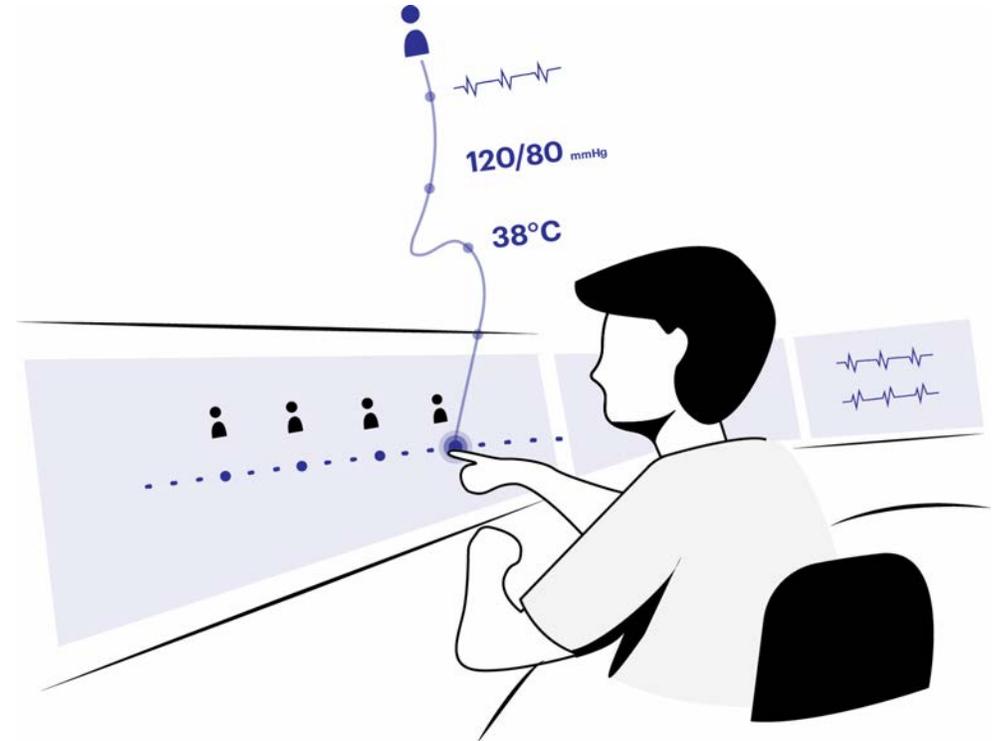
***Automatic, continuous,
wireless and accurate
measurement of vital
signs* with seamless and
secure systems
integration***



* Respiration rate, oxygen saturation, blood pressure, pulse rate, level of consciousness and awareness, temperature

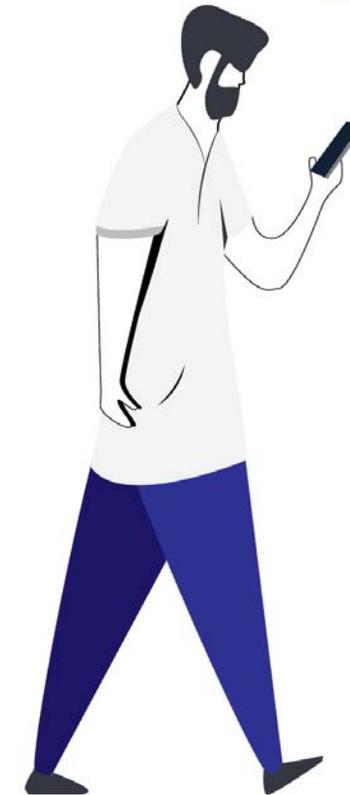
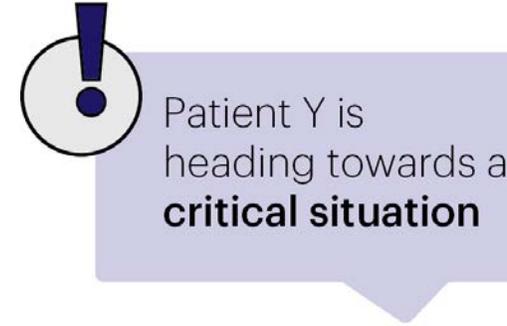
Vision:

An overview of all patients with the ability to view details, compare data and plan logistics



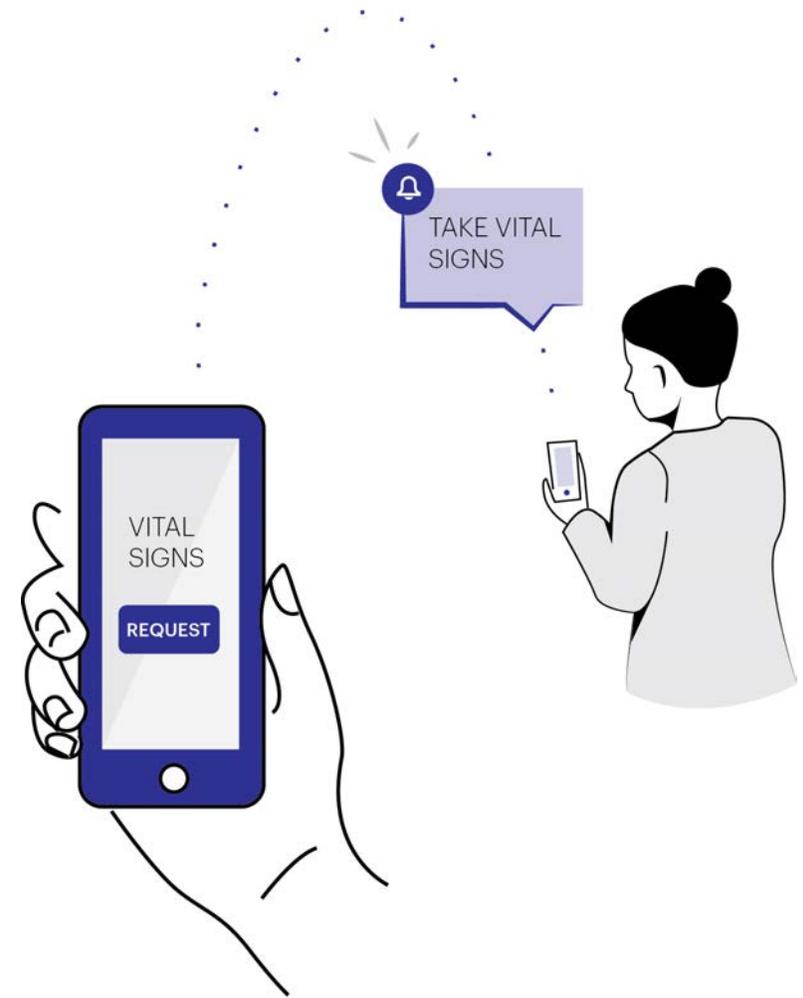
Vision:

Ability to check information on the go and stay ahead with predictions and alarms



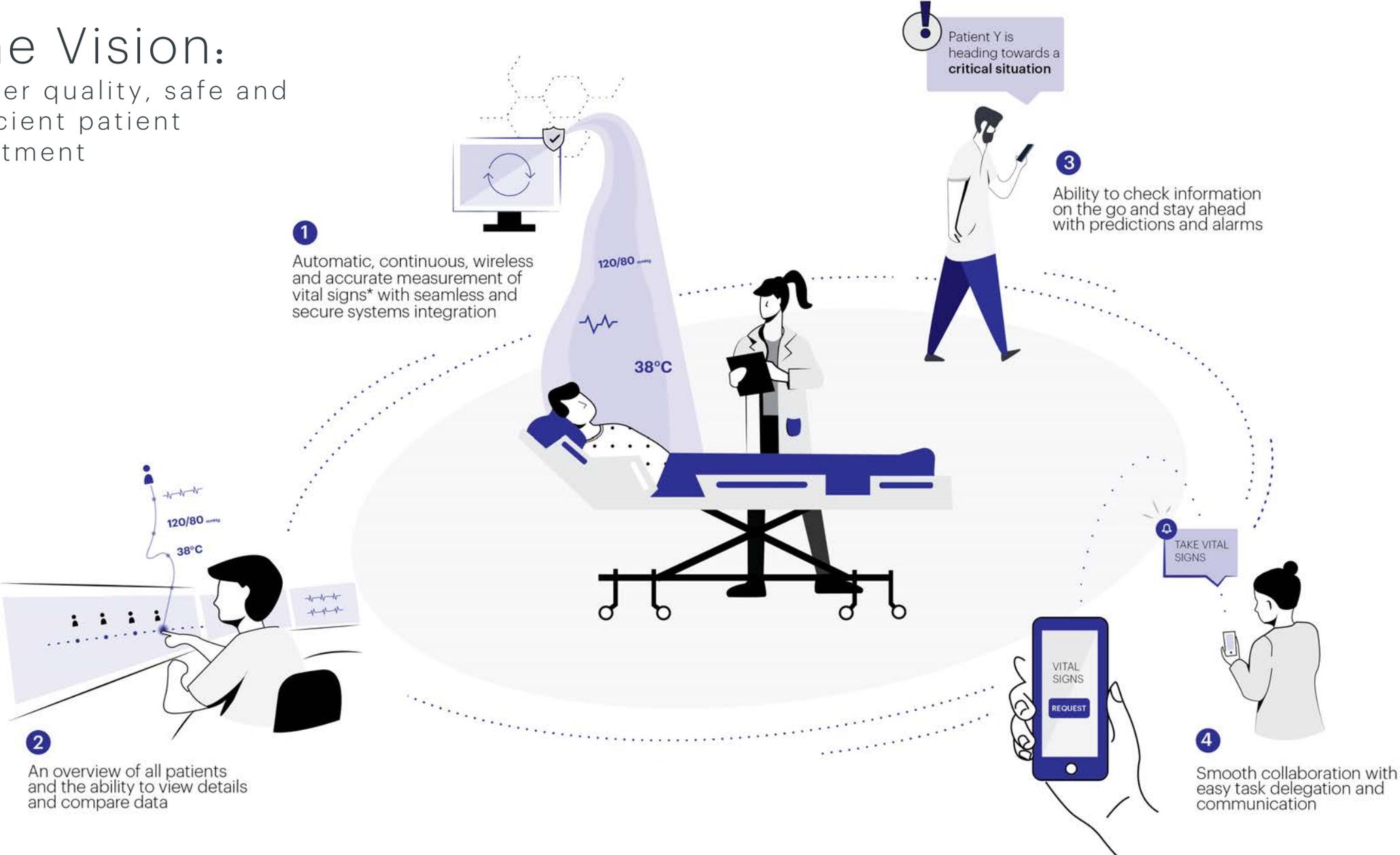
Vision:

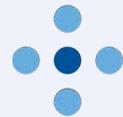
***Smooth collaboration with
easy task delegation and
communication***



The Vision:

Better quality, safe and efficient patient treatment





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APPENDIX