



Experience and stories from our telemedicine journey at Landspítali Reykjavík Iceland

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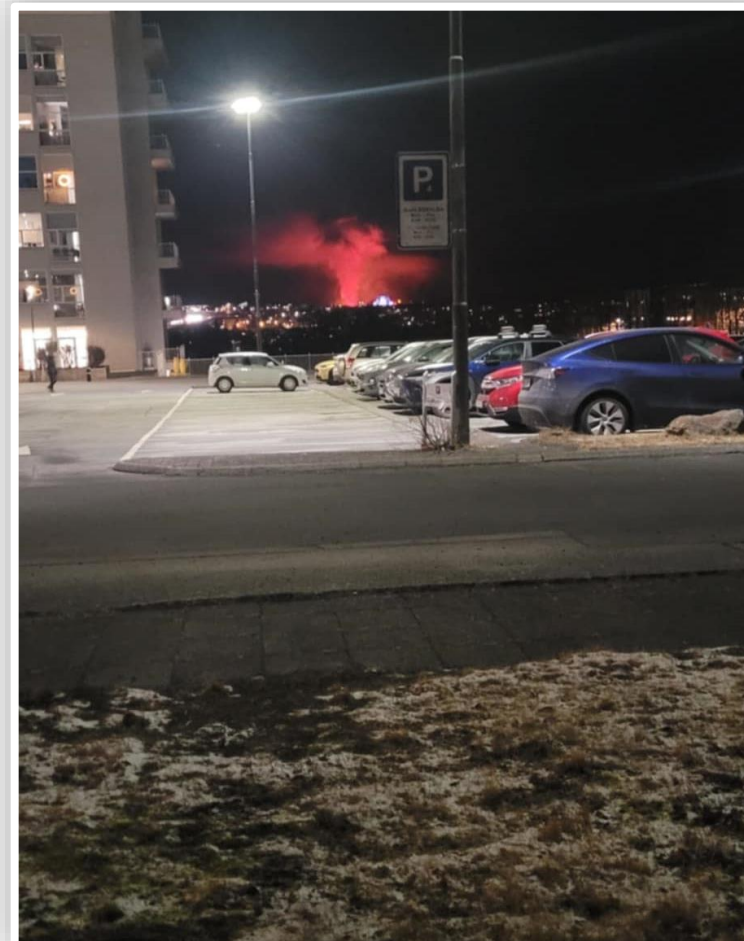
Introduction and agenda today for the next 20 minutes

- Facts about the Icelandic health system and Landspítali
- Experience and stories from our telemedicine journey at Landspítali Reykjavík Iceland
- The journey so far – overview
 - COPD and Fibrosa
- The way forward – multiple opportunities and challenges in our journey



Experience and stories from our telemedicine journey at Landspítali Reykjavík Iceland

**Facts about the Icelandic health system
and Landspítali**

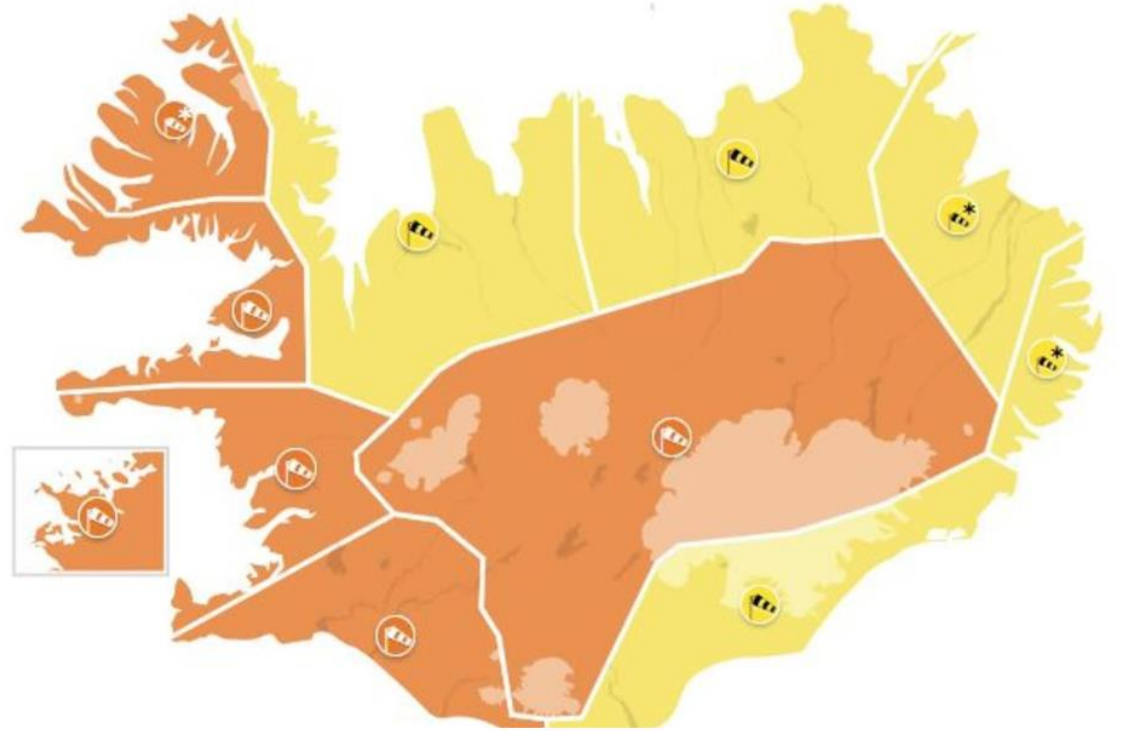
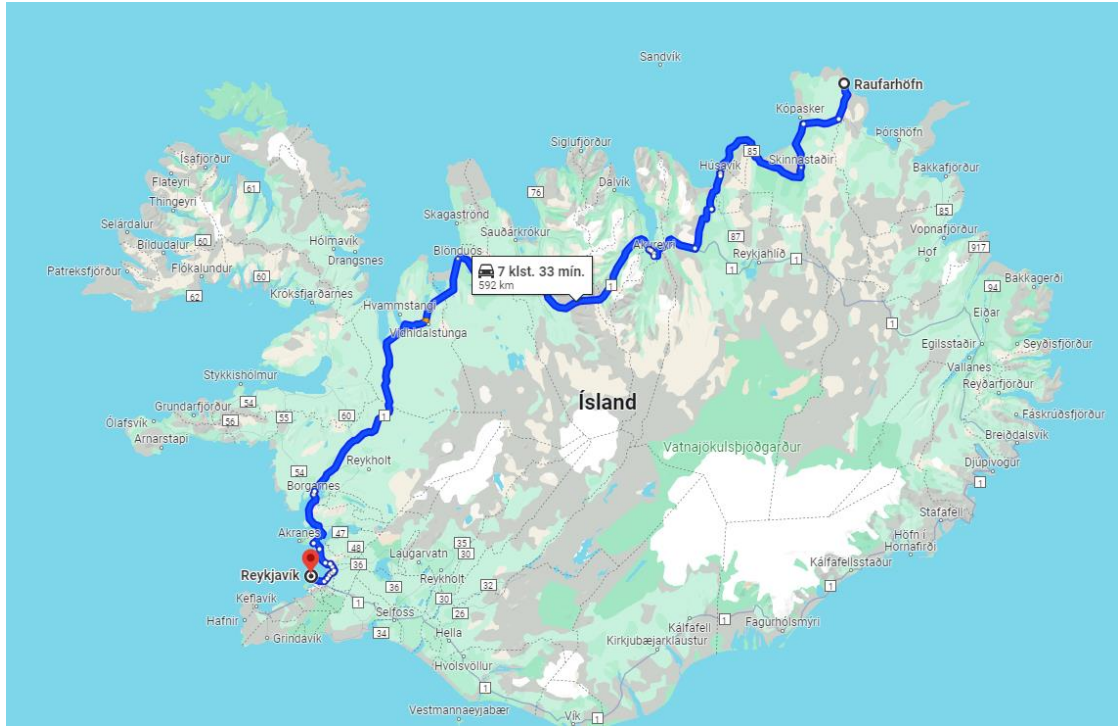


The Icelandic National Health Service

- Health care centers throughout the country deliver primary care
- Landspítali University Hospital provides general services for the Reykjavik area
- Akureyri Hospital, a teaching hospital in the Northern part of the country, delivers specialized care for the region
- Six small district general hospitals
- Private medical practice
- Generally good access to health services
- Universal health insurance



The Icelandic population numbered 384,000 in January, 2024
242,000 (63%) reside in the Capital Region



Clinical services in 2023

94,200
emergency
visits

348,958
outpatient
visits

27,400
admissions

624 hospital
beds

4.8 days
average
length of stay

14,600
surgical
procedures

3,166 births

7100
Employees
4900 FTE



The future development of Landspítali's services

Government of Iceland
Ministry of Health



To manage increasing demands by 2040, Landspítali needs to...



Improve work environment and coworker satisfaction to ensure talent retention



Reach 1% productivity increase per year¹, by improving operational and procurement-related practices



Reduce the expected increase in need for beds by ~50%, and reduce outpatient visits by ~65%², by increasing ambulatory and community care and supporting other parts of Icelandic healthcare

Reach at least 0.2-0.6%³ productivity increase from digitalization and automation per year, with goal of becoming the global front-runner within digitalized healthcare



Achieve a successful commissioning of the 'New Landspítali'

1. The future development of Landspítali's services, p. 124
2. The future development of Landspítali's services, p. 10; shifting to better suited institutions
3. The future development of Landspítali's services, p. 141

Our strategy

- Revise the organizational structure, the management team, design of clinical services and delivery of care
- Reduce the perceived gap between central and frontline management
- Enhance clinical service lines
 - Emergency services and acute care
 - Scheduled services (surgical procedures etc.)
 - Ambulatory and community services
- Overcome critical staffing shortages
- Enhance digitization and use of data in daily operations
- Promote research and innovation
- Create an attractive work environment

Our new hospital which will open 2030



Experience and stories from our telemedicine journey at Landspítali Reykjavík Iceland

The journey so far...



The journey of thousands of miles begins with just few steps.

We are just beginning our journey with several pilot projects and research project

....they will help managers to take decisions on best practises in e-health



Digital healthcare at Landspítali

Medical specialities	Partner	Type of project	Number of patients involved	Aim - Purpose	Status
Pulmonary COPD and Fibrosa	Dignio	Pilot project	30 patients	20 patients with COPD and 10 patients with fibrosa are treated from home via remote monitoring. We are testing the benefits both from the patients side and the hospital in terms of timesaving, security and other factors,	Sept 2024 - sept 2025
Cardiology	Sidekick	Science research/ feasibility study	250 patients	Improving outpatient care for heart failure through digital innovation. It is a digital solution aimed to improve health with remote monitoring of heart symptoms (sensors). It is also a solution that supports lifestyle changes and self care support. With motivational messages to patients.	Ends december 2024
Diabetes	Cloudcare	Pilot and research	900 patients	Enabling RM and management of all insulin dependent diabetes patients. CGM: > 90 %. Around 950 patients are follow up at Landspítali Diabetic clinic with RM (Type one diabetes). Insulinpumps: 624 (50%) , where 588 is using semi-automated pump	June 2024
Sleeping disorders	Resmed.com / Airview	Research and Pilot project	12000 patients	RM from home. Help people sleep better, breathe better and live longer	Ongoing
Cancer - Hospital at home	Landspítali / Hospital at home	Pilot project	10 cancer patients	The project involves implementing new equipment that uses artificial intelligence in clinical decision-making. It also requires programming a connection between remote monitoring and the patient's medical record. The solution increases continuity of care, as monitoring can be started in the hospital, people can be discharged earlier and continued at home. Remote monitoring increases patient safety, improves treatment, shortens response times and thus prevents deterioration.	Tests start in februar 2025
Cancer	Meðvera	Operational project	?	A portal for patients undergoing treatment for cancer in Landspítali. The portal was designed and embedded within the electronic medical record and public health portal of Iceland and consists of symptom and needs monitoring, educational material, and messaging.- The portal provides functional combinations of symptom tracking and remote monitoring and tailored information for symptom and self-management and clinical follow-up and a messaging function to communicate with the health care team (HCT).	2023
Employees - Wellnes center	Kara Connect	Operational project	?	A Wellbeing Hub, where our employees are free to choose from 3000+ expert practitioners to support their mental health and Wellbeing. When your employees feel better, your hospital is doing better. Wellbeing at work begins with meeting your team's needs on their terms.	2023
Mental health - eating disorder	Recovery Record	Pilot project	20 patients	Replacing food diary (on paper) with an electronic food diary with the help of recovery record. RM of patients with food disorder	sep.23

We expect the list to expand...

Experience and stories from our telemedicine journey at Landspítali Reykjavík Iceland

**Remote monitoring (RM) of Pulmonary
COPD and Fibrosa patients**



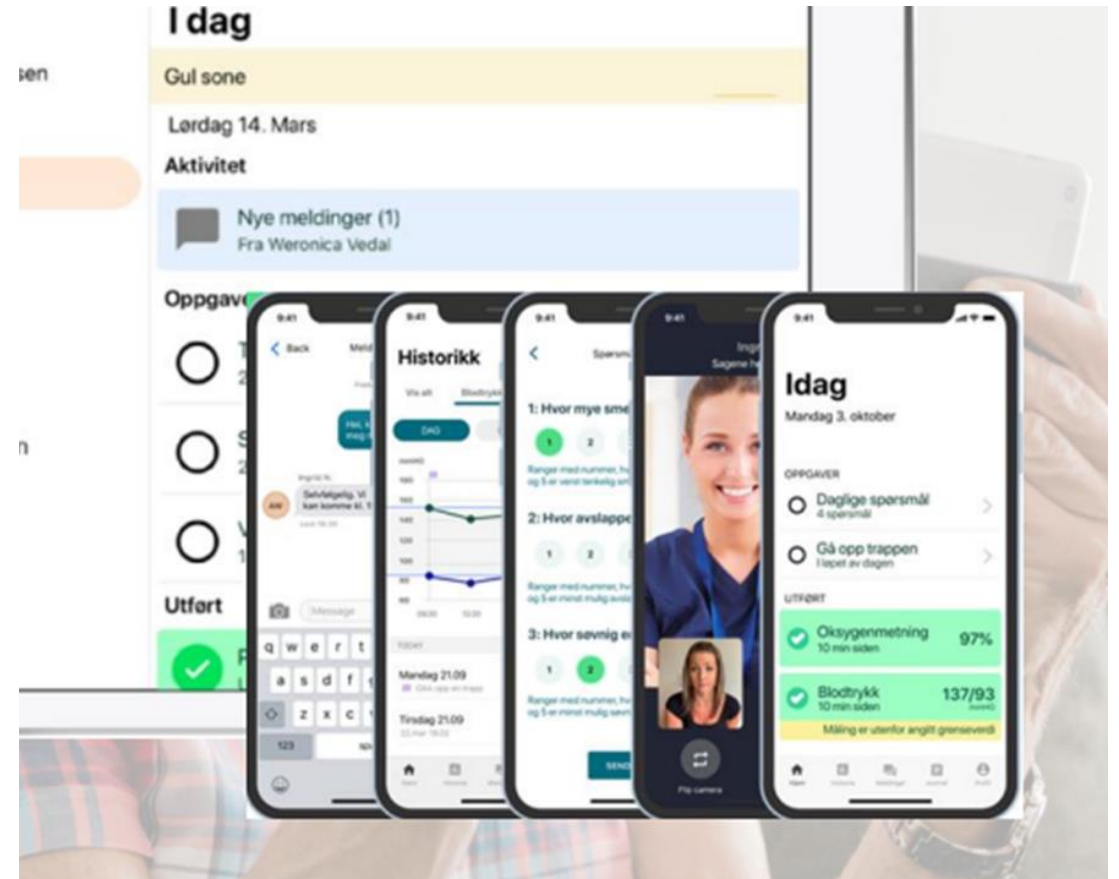
About the pilot project

- Partner; Dignio in Norway
- 30 patients chosen with criterias – technical readiness
 - 20 COPD (260)
 - 10 Fibrosa (100)
- 12 month pilot from september 2024
- Teaching period
 - MyDignio App
 - Prevent
- Training material
 - Staff and patients
- Follow up and evaluation



Simple for the patient and healthcare professional

- An app is installed on the patient's phone
- Measurements:
 - Pulse
 - Saturation
 - Blood pressure
 - Breath monitoring for some
 - Daily questionnaires
 - Weight
 - Fever
 - Many other possibilities



Remote monitoring and reaction

- To begin with, patients measure themselves daily
- When threshold values have been set for each one, the system flags:
 - Measurements that are out of range
 - Unfinished projects
 - Messages from patients



- Response to out-of-range measurements:
 - We send a message and ask the patient to measure himself again
 - If he doesn't answer or doesn't perform the measurement, we call
 - We can book a video call through the system if we feel that we need to assess the patient with our own eyes
 - Patients can always request a call via text message if they are concerned about something

Important Dignio features

- ✓ The possibilities to communicate through messages is valuable for the nurses and patients
- ✓ Questioners, both validated and our own, makes a good foundation for triage (Obs; the length of the questioners)
- ✓ Potential for better use of treatmentplans

Triage decisions



Patient is doing well and meet in summary guidelines (in our words "can fly on").



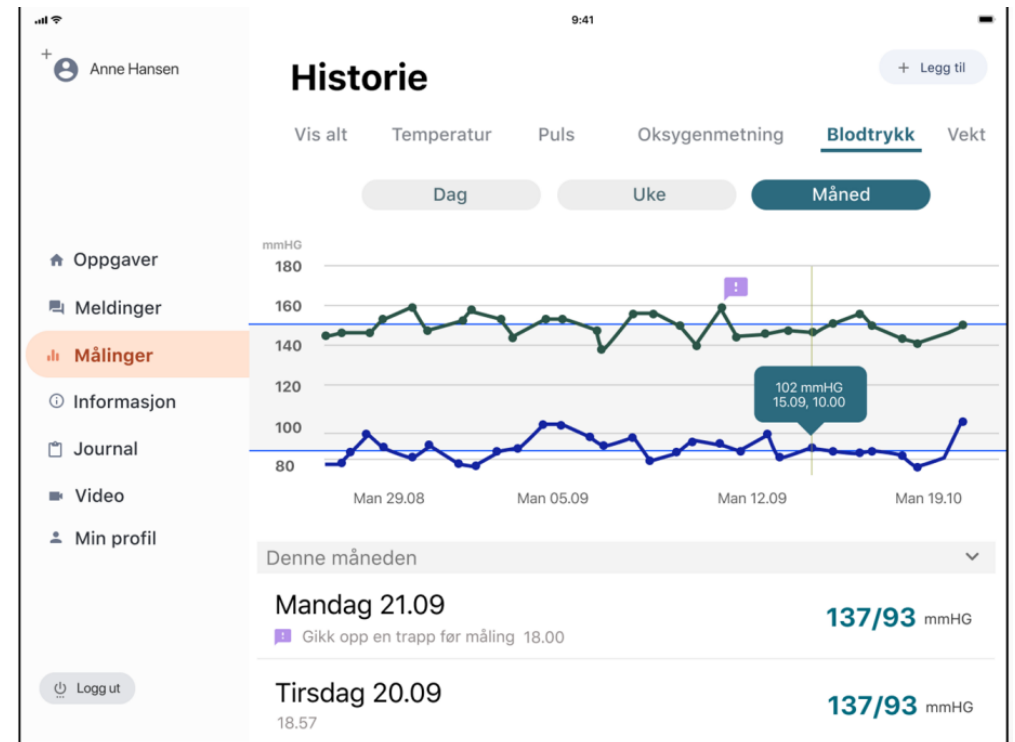
Patient is (based on glucose values and trends) not meeting expected glucose levels and therefore will be forwarded to the Cloud-Team. *



Patient not clearly meeting guidelines and require advanced triaging. If negative trends are identified, they will be sent to the Cloud-Team for further decision making. *

The patient measurements
- his overview

The patient view in the app



The patient's measurements - overview for the healthcare professional

What the healthcare professional monitors



Prevent – daily questionnaire

Remote care monitoring for patients with chronic obstructive pulmonary diseases



KOLS BEHANDLINGSPLAN VESTRE VIKEN

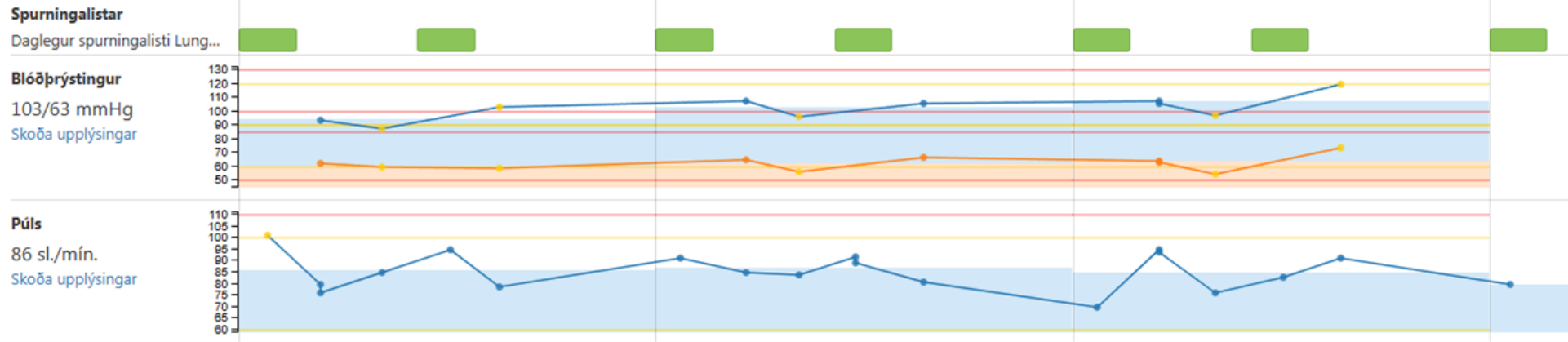
Preventor: Sirkbert Júl. Falt: Júl mín. ÁMÁ

Medisiner for KOLS pr. átt. [LÁNU 2022]

Forir KOLS medisiner: Sirkbert Júl.

Kortföðubands KOLS medisiner: Sirkbert Júl.

	EMPIFOSER	MEDISINER	ANDRE TILTAK
GRUNN SÍÐI	Ísinn er stöðug, eftir nær samtígi þri- ang í dag.	Ísinn er stöðug, eftir nær samtígi þri- ang í dag.	Stöðugt og hringt um það bil.
GRUNN SÍÐI	Þessu lang þess, þessum þessu, þessu og þessu þessu þessu þessu þessu.	Þessu þessu þessu þessu þessu þessu þessu þessu.	Þessu þessu þessu þessu þessu þessu þessu þessu.
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Blood pressure

Sjúkdómsgreiningar: Fibrosa

SKÝRINGARMYNDIR

MÆLINGAR

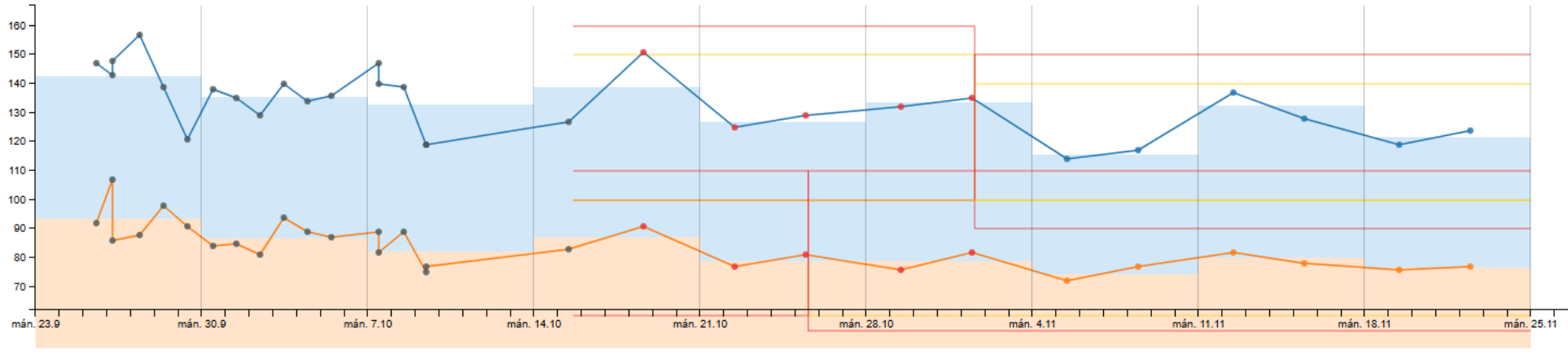
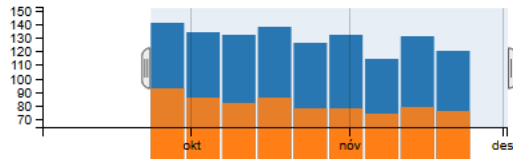
Blóðþrýstingur
133/84 mmHg

Púls
89 sl./mín.

Líkamsþyngd
91,8 kg

Súrefnismettun
95 %

12 vikur ↔ Stöðugt Heill dagur ▾



Notkunarleiðbeiningar
fyrir blóðþrýstingsmæli



Oxygen saturation

Notkunarleiðbeiningar
fyrir súrefnismettunarmæli

Tækin eru ýmist hvít eða svört.

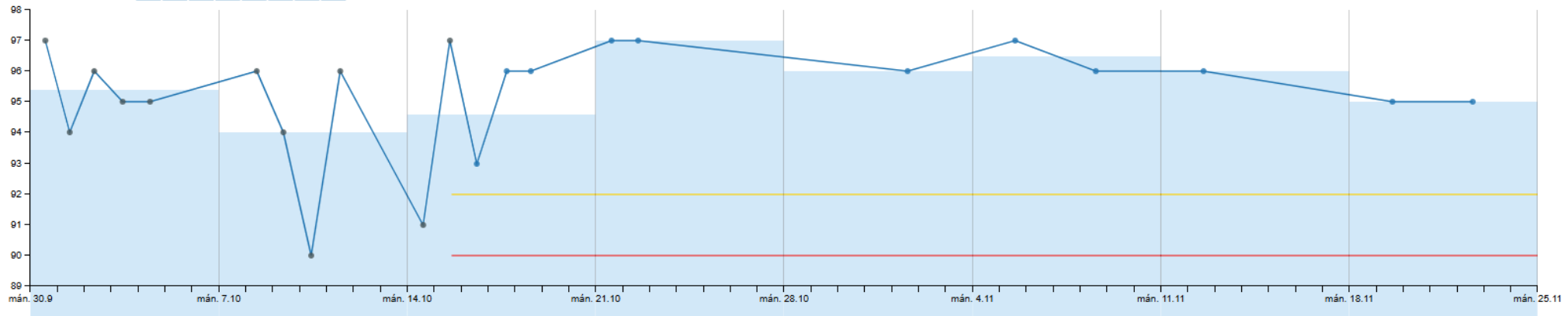
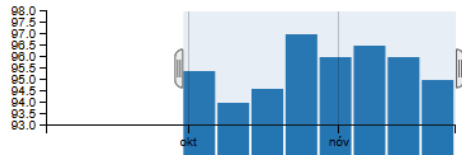


BÆTA VIÐ MÆLDU G

SKÝRINGARMYNDIR MÆLINGAR

Blóðþrýstingur 147/84 mmHg | Púls 64 sl./mín. | **Súrefnismettun 95 %** | FEV1 1,13 L | PEF 159 l/mín. | FEV6 2,01 L | FVC 2,08 L | FEV1/FVC% 55 % | FEF 25-75% 0,55 L/s

12 vikur ↔ Stöðugt Heill dagur ▾



FEV - spirometer

SKÝRINGARMYNDIR

MÆLINGAR

Blóðþrýstingur
147/84 mmHg

Púls
64 sl./mín.

Súrefnismettun
95 %

FEV1
1,13 L

PEF
159 l/mín.

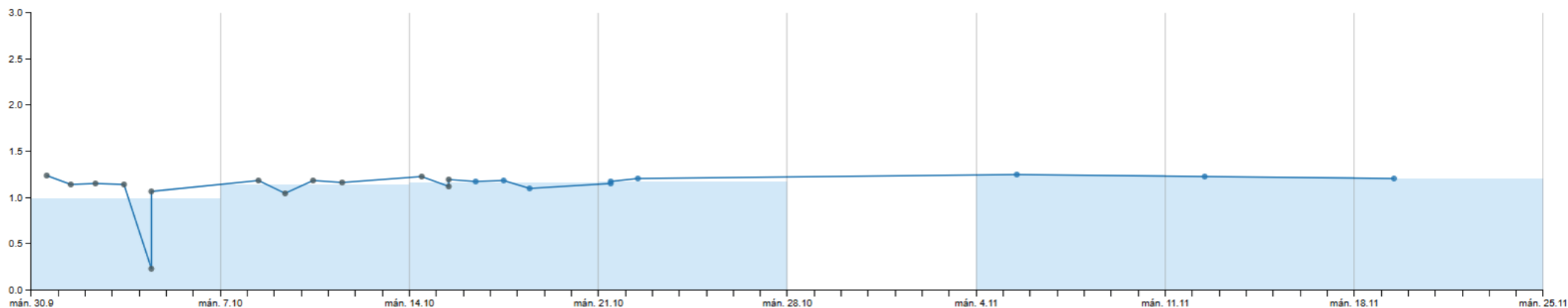
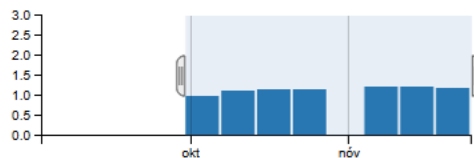
FEV6
2,01 L

FVC
2,08 L

FEV1/FVC%
55 %

FEF 25-75%
0,55 L/s

12 vikur Stöðugt Heill dagur



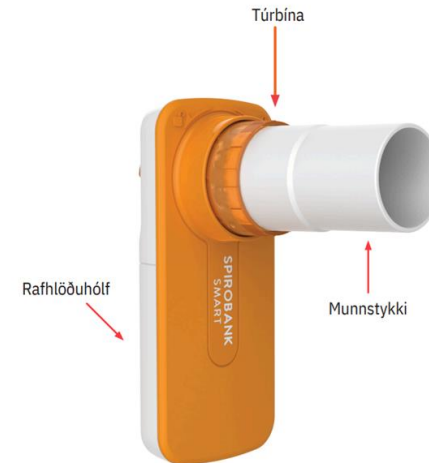
DAGSETNI TÍMI

GILDI

TÆKI

ATHUGASEMDIR

NOTKUNARLEIÐBEININGAR FYRIR
Spirometer Spirobank Smart



The healthcare professional's Experience, learnings – first sign of success

- “We have found various ailments that we have been able to help patients with that could have caused problems and hospitalizations later”
- “Already saved a considerable number of calls to patients without compromising safety”
- In our opinion, the system is most useful to those who:
 - are newly discharged from inpatient wards
 - are unstable and have frequent exacerbations
 - have recently started oxygen therapy
 - are nervous or insecure about their treatment
 - are starting complex medication therapy



Með eftirfarandi hætti verður þér fylgt eftir af heilbrigðisstarfsfólki

Dú framkvæmir mælingar. Niðurstöðurnar birtast í stafrænni heilsugátt hjá heilbrigðisstarfsfólki.

Blóðþrýstingur 115/73 Afgreitt 13:31 minnig

Dú framkvæmir verkefni sem eru útlustuð í smáforritinu og svarar persónuþúðum spurningalistum.

Hæi hæ. Blóðþrýstingurinn var of há. Eg ætla að setja niður, slaka á og mæla mig svo aftur eftir 5 mín.

Flott plan. Hvernig er annars líðan?

Hægt er að eiga samskipti við heilbrigðisstarfsfólk með vefsamtali. Einnig er hægt að skipuleggja myndsimtöl eftir þörfum.

Heilbrigðisstarfsfólk er gert viðvart þegar gildi eru fyrir utan viðmiðunarmörk og aðlaga eftirfylgni.

The patient - experience

- Some patients experience better and more secure follow up from the healthcare staff than before
- „My blood pressure went up and I knew exactly why....will try to take responsibility” 😊
- „for me it is important to have this direct access to my health professional – a kind of lifeline”
- I have more insight towards my healthcondition

- Figures from the Norwegian Ministry of Health show that Dignio is successful
 - Patient benefits:
 - 73% believe they have more knowledge about their own health
 - 90% believe they have better control over their own health
 - 93% believe they receive better follow-up in services than before
 - Better access to healthcare - on the patient's terms



Overall aim and purpose of the pilot project

- to develop working procedures regarding remote monitoring,
- evaluate the satisfaction of patients and employees with the solution,
- Evaluate economic benefits,
- evaluate the safety and quality of the service
- evaluate the possibility of technical integration with other solutions and especially the clinical portal of Landspítali
- Increase patients' health literacy
- Increase patients' safety and sense of security
- Increase efficiency and reduce waste in the healthcare system
- Make better use of manpower in the system
- Reduce patient visits to the hospital



Með eftirfarandi hætti verður þér fylgt eftir af heilbrigðisstarfsfólki

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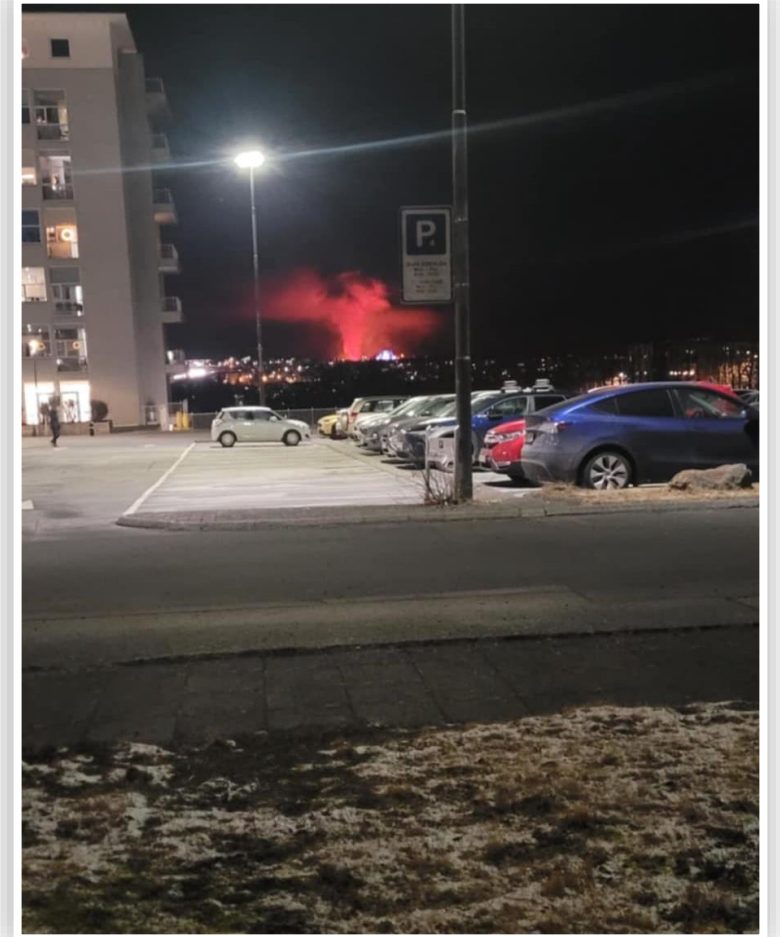
Happening now in the pilot project!

- How to use data to evaluate progress and overall benefits
- Creating service level Questionnaires for follow up – „qualitative reasearch“
- Evaluate the patient group
 - Use the solutions and equipment with other patient groups (lungs, kidney transplant) ?
 - To get the most out of the pilot project
- Knowledge and data gathering
- Learning and adapt by using experience and knowledge from other healthcare institutes
 - (Vestre Viken – AAhus in Norway, and others)



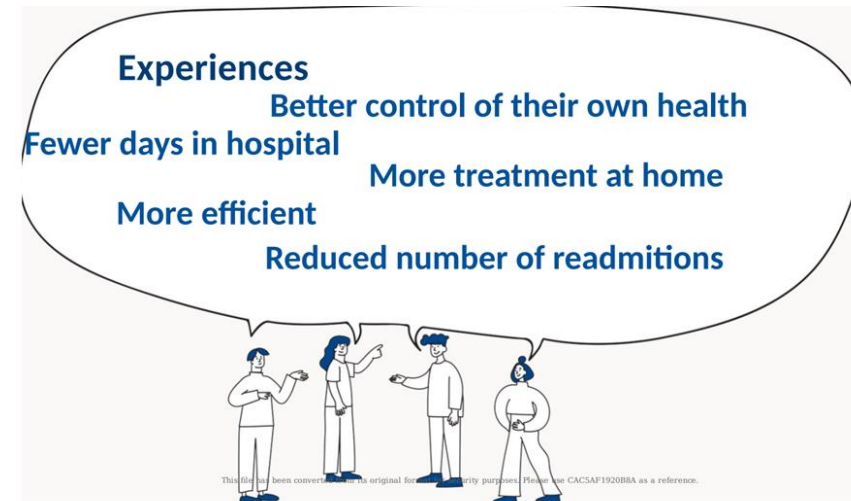
Experience and stories from our telemedicine journey at Landspítali Reykjavík Iceland

**The way forward –
Multiple opportunities, challenges and
learnings awaits us**



Expected benefits

- Improved access to specialized medical care, not least in remote areas
- to be able to respond earlier to the deterioration of patients through early intervention,
- thus preventing further deterioration and a possible visit to the Emergency Department or admission to the hospital.
- There are also hopes for a reduction in the number of home visits, and "unnecessary" visits to the outpatient department.
- Secondly, the goals for patients are to increase their health literacy, for patients
- to take more responsibility for their own health,
- to increase their safety and to improve their quality of life.



Common goals of all our ongoing telemedicine projects, and future projects

Digital healthcare with Landspítali					
Medical specialties	Partner	Type of project	Number of patients involved		Status
Pulmonary COPD and Fibrosa	Dignio	Pilot project	30 patients	20 patients with COPD and 10 patients with fibrosa are treated from home via remote monitoring. We are testing the benefits both from the patients side and the hospital in terms of timesaving, security and other factors.	Sept 2024 - sept 2025
Cardiology	Sidekick	Science reasearch/ feasibility study	250	Improving outpatient care for heart failure through digital innovation. Digital solution aimed to improve health with remote monitoring of heart symptoms (sensors). It is also a solution that supports lifestyle changes and self care support. With motivational messages to patients.	Ends desember 2024
Diabetes	Cloudcare	Pilot and research	200	Follow up at Landspítali Diabetic clinic with RM of around 950 patients. (Type one diabetes). Enables RM and management of all insulin sependent diabetes patients. CGM: > 90 % Insulinpumps: 624 (50%), where 588 is using semi-automated pump	June 2024
Sleeping dosorders	Resmed.com / Airview	Reaserach and Pilot project	12000	RM from home. Help people sleep better, breathe better and live longer	Ongoing
Hospital at home - Cancer patients	Landspítali / Hospital at home	Pilot project	10 cancer patients	The project involves implementing new equipment that uses artificial intelligence in clinical decision-making. It also requires programming a connection between remote monitoring and the patient's medical record. The solution increases continuity of care, as monitoring can be started in the hospital, people can be discharged earlier and continued at home. Remote monitoring increases patient safety, improves treatment, shortens response times and thus prevents deterioration.	Tests start in februar 2025
Cancer	Meðvera		?	Samtal við Kristínu Skúla	?
Wellness center for employees at the hospital	Kara Connect	Operation Project	?		2023
Eating disorder - mental health	Recovery Record	Pilot project	20	Replacing food diary (on paper) with an electronic food diary with the help of recovery record. RM of patients with food disorder	sep.23
We expect the list to expand...					

- Reduced admissions
- Fewer days in bed
- Prevent admissions
- Reduce visits to the outpatient department
- Promote patient engagement
- Reduce contact surfaces with "stable" patients
- Eliminate waste in patient care
- Provide services to patients in real need

Evaluation of benefits

- Opportunities to align and coordinate measures between our ongoing e- health projects
 - Not only in project silos and not only clinical measurements
 - Knowledge sharing between telemedicine projects
- Create and follow up measures that sustain „business models“ and aknowledge benefits
 - Inside the hospital
 - With the patient
 - Overall in the healthcare system
- Overall goalsetting in e-health from the government



Measuring benefits and progress

Chronic obstructive pulmonary disease – changes in admissions and days in hospital when included in digital home-based follow-up*

	Point of inclusion	Before inclusion*		After inclusion	
		Admissions	Number of days in hospital	Admissions	Number of days in hospital
Pas 1	2021	3	18	0	0
Pas 2	2021	2	14	1	4
Pas 3	2022	4	23	5	14
Pas 4	2021	3	10	0	0
Pas 5	2022	1	1	0	0
Pas 6	2023	1	4	0	0
Pas 7	2023	1	3	0	0
Pas 8	2021	2	6	0	0
Pas 9	2023	4	16	0	0
Pas 10	2023	1	2	1	2
Sum		22	97	7	20

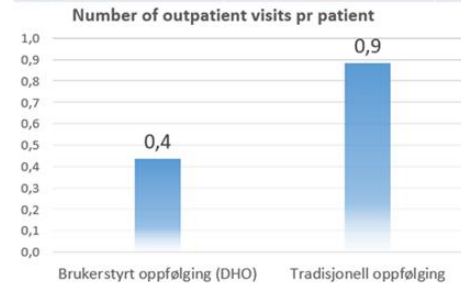
*Data from Nimes, NOT randomized

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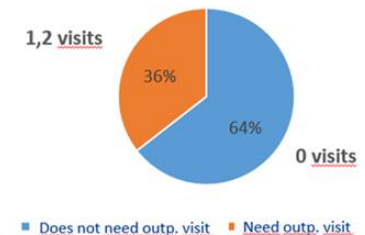


Effects of digital home-based follow-up – changes in outpatient visits

	Numbers of patients	Unique patients with outpatient visits	Unique patients without outpatient visits	Number of outpatient visits
Digital	152	54	98	66
Usual care	328	328	0	289



Number of visits depending on actual needs



Data from Nimes, NOT randomized

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Effects of digital home-based follow-up – changes in responsibilities, tasks and time spent

	Visit (doctor)	Video/ phone (doctor)	Handling the questionnaires (nurse)	Total	Time doctor	Time nurse
Digital	24 min.	3 min.	20 min.	47 min.	27 min.	20 min.
Usual care	53 min.	5 min.	0 min.	58 min.	58 min.	0 min.

* Manually registered data

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...and we want to collect data that present similar data that we see here, in the near future

Where do we want to go ?

Examples of remote care monitoring in Vestre Viken hospitals

Dignosis	Type of follow up
Epilepsy	Self registrations
Chronic obstructive pulmonary disease (COPD)	Self registrations and measures
Diabetes	Self registrations and measures
Chronical Heart Failure (CHF)	Self registrations and measures
Post follow-up after surgery (different cases)	Self registrations
Inflammatory bowel disease	Self registrations
Atrial fibrillation	Self registrations and measures
Dialysis (home)	Self registrations, measures and remote monitoring
Cancer immunotherapy, chemotherapy, surgery	Self registrations
Osteoporosis	Self registrations
CPAP, Pacemaker/ ICD, dialysis, AF, etc.	Remote monitoring
And the list expands every month!	

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VESTRE VIKEN

Digital services in Vestre Viken virtual hospital

- 26 patient courses in clinical service
- Over 10 000 patients are followed up digitally.
- #Digital first

National goal:

- 1% of the patients should be followed up digitally (PROM)
- 15% of the patients should receive digital consultations



Avdeling for forskning og innovasjon

VESTRE VIKEN

Development of the virtual hospital

2022

- 1800 unique patients followed up at the virtual hospital

2023

- 4676 unique patients followed up at the virtual hospital

2024

- 10 100 unique patients followed up at the virtual hospital

VESTRE VIKEN

Development areas for virtual hospital

- New health services, spread the health services
- Hospital in network
- Home based hospital?
- Precision medicine
- Collaboration with municipalities and industry
- Future clinic?



Klikk her for å legge til klinikk/seksjon

VESTRE VIKEN

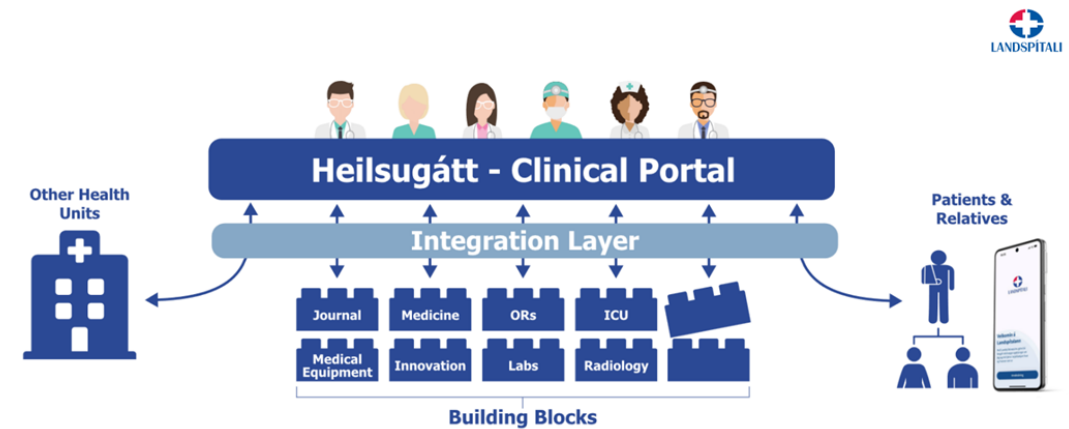
A few challenges...

Data do not flow between systems and are not integrated directly from the remote monitoring into the clinical portal

...not yet

Manual work is needed

Resource intensive and costly to integrate the RM into the clinical portal

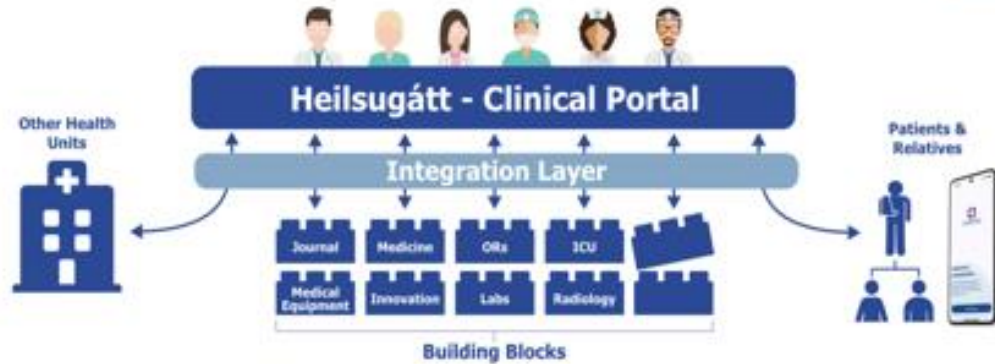


- Goal – 90% of Clinicians can do 90% of their work in HG
- Most Data in underlying system, HG reads and writes
- Agile approach, new version every month

Telemedicine
Remote monitoring
E-health



AI
Machine learning



- Goal – 90% of Clinicians can do 90% of their work in HG
- Most Data in underlying system, HG reads and writes
- Agile approach, new version every month

Seek knowledge and help from others when implementing and going forward





Thank you for your attention!
signyj@landspitali.is