



Norwegian Centre for  
E-health Research

# Annual Report 2020







Norwegian Centre for  
**E-health Research**

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# Head of the steering committee's statement

The Norwegian Centre for E-health Research continues to develop as an important knowledge provider for the sector and is recognised for its research. Compared to previous years, a good increase has been seen in the number of publications the centre has delivered. This is excellent, and contributes to safeguarding the legitimacy of the centre as a research institution within e-health nationally and internationally.

A key area of the Norwegian Centre for E-health Research's social mission is to gather, create and disseminate knowledge that contributes to knowledge-based development within e-health. The knowledge that the centre produces shall help support national efforts.

In 2020, the Norwegian Centre for E-health Research also became known to a larger portion of the population. In line with its role as an independent research centre and its outstanding professional expertise, the centre participated in the public debate on the direction of the work on the "One Citizen - One Health Record"/Akson. The centre continuously works on creating an overview of theory and empiricism within the field of e-health. It is important that this knowledge emerges in discussions in the public domain. One or more knowledge summaries will be published as a follow up to the debate around Akson.

The steering committee has diligently discussed and reflected together on the challenges that arise from participation in the public debate on cases that may seem controversial. Statements through 2020 have shown that the centre is an independent research centre that places emphasis on its professional integrity.

Upon establishment, it was assumed that the centre would be evaluated by the Ministry of Health and Care Services. The evaluation will be carried out in two phases with the first phase being completed in 2018. The Ministry is currently planning the second phase of the evaluation. In this phase, the objective will be to assess whether the centre has achieved the necessary restructuring and competence building within priority areas.



It is important for the Norwegian Centre for E-health Research to ensure a good acceptance rate for research funding applications. The acceptance rate is a measure for the number of granted applications in relation to what has been applied for. The acceptance rate was 30.9% in 2020, which is a substantial increase compared to previous years.

It is gratifying to see the Norwegian Centre for E-health Research having its research projects approved, especially by the EU and the Research Council of Norway (NFR). This provides legitimacy and secure funding of the centre in the future. The centre now needs to deliver high-quality and relevant research.

The results from 2020 show that the Norwegian Centre for E-health Research is enterprising. I interpret the excellent results to mean that the leader, leadership team and each individual coworker collectively manage to solve the tasks and challenges ensuing from the important mission the Norwegian Centre for E-health Research has been assigned.

Some changes have been made to the composition of the steering committee from 2021, a few members have left and new members have taken a seat. A big thank you to those who have left, and welcome to those who have joined us to work for the benefit of the centre. I would like to give a special thank you to Finn Henry Hansen from Northern Norway Regional Health Authority for his unrelenting effort for the centre through many years of service.

*Erik M. Hansen,  
Head of the steering committee*

# The steering committee represents all parts of the Norwegian Health Sector

All the regional health authorities and relevant sectors are represented on the steering committee and members serve for a period of two years at a time. The members can sit on the committee for two periods.

In 2020, the steering committee convened four times, three of which were digital. At the last steering committee meeting, the committee summarised its period with, among others, the following points:

- The steering committee is an industrious body and has worked constructively to strengthen the centre.
- Being a member of the steering committee has been educational.

- Anchoring in the respective organisations is important in order for the steering committee's work to be useful.
- Work on reinforcing the knowledge base within primary care services must continue.

The purpose of the steering committee is to ensure that:

- the centre further develops its expertise, and carries out research assignments and investigations on e-health in line with the sector's needs and priorities;
- the centre further develops its national (and international) role within research and investigations on e-health, and that the sector considers it a useful, relevant and competent actor;
- the centre's work related to professional activities, support functions and administrative tasks is of high quality.

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What is important to you?

**Monika Knudsen Gullslett,**  
Researcher, Personal E-health:

### What was the best thing about 2020?

For me, 2020 started off great with a full-time position at E-Health Research. I was very well received, both professionally and socially.

The centre has immense potential through its multi-disciplinary and highly skilled coworkers, which enriches research and self-development. It was very exciting to both initiate and be invited to join national, Nordic and international project applications. Work on application processes linked to various themes, and between multiple organisations and countries, is always educational and exciting. In 2020, I mostly researched the use of video consulta-

tions in mental health care where we already have a publication for peer review.

Along with several national and international actors, we were granted funding from Horizon 2020 for the BETTEReHEALTH project. This is an important project, which may have an immense impact on the development of e-health services in selected African countries, and I feel it's meaningful to be able to contribute to this.

At the end of the year, we received funding to work with children, adolescents, and the experiences and perceptions of their relatives. In addition to others, we are conducting this project with 'Mental Helse Ungdom'. I'm looking forward to collecting the data!





Photo from 2019.

### Steering committee members

- Erik M. Hansen, CEO, Western Norway Regional Health Authority ICT (Head of the steering committee)
- Finn Henry Hansen, Director, Northern Norway Regional Health Authority
- Siv Mørkved, Professor and Assistant Director of Health Sciences, Central Norway Regional Health Authority
- Ulf E. W. Sigurdson, Head of E-health, South-East Norway Health Authority (Nis Johannsen, Deputy)
- Henrik D. Finsrud, Chief Adviser, the Norwegian Association of Local and Regional Authorities (KS)
- Wenche P. Dehli, Director of Collaboration and Innovation, Kristiansand Municipality
- Anders Grimsmo, Professor, Norwegian University of Science and Technology (NTNU)
- Einar Bugge, Quality and Development Manager, University Hospital of Northern Norway Trust
- Kirsten Petersen, Senior Adviser, Norwegian Directorate of Health
- Kjetil E. Telle, Chief Director of Health Services Research, Norwegian Institute of Public Health
- Karl Vestli, Division Director, Norwegian Directorate of E-health
- Egil Rye-Hytten, User Representative
- Kristian Skauli, Department Director, Ministry of Health and Care Services (Observer)
- Irene Olaussen, Senior Adviser, Ministry of Health and Care Services (Observer)

# The organisation

## Number of employees:

- 93 with 63 FTEs
- 49 women and 44 men
- 59 permanent employees
- 34 part-time employees
- Nine additional positions
- Ten new coworkers in 2020

## Age:

- 27 aged 20-39
- 59 in the 40-59 age group
- Seven over the age of 59

## Educational background:

- Nursing
- Social Science
- Technology
- Psychology
- Sociology
- Physics
- ICT
- Socioeconomics
- Pedagogy
- Medicine
- Organisation and management
- Graphical design
- Pharmacy
- Communication
- Physiotherapy
- Business economics
- Journalism
- Biology
- Statistics
- Accounting and audits
- Civil engineering
- Bioengineering
- Health science

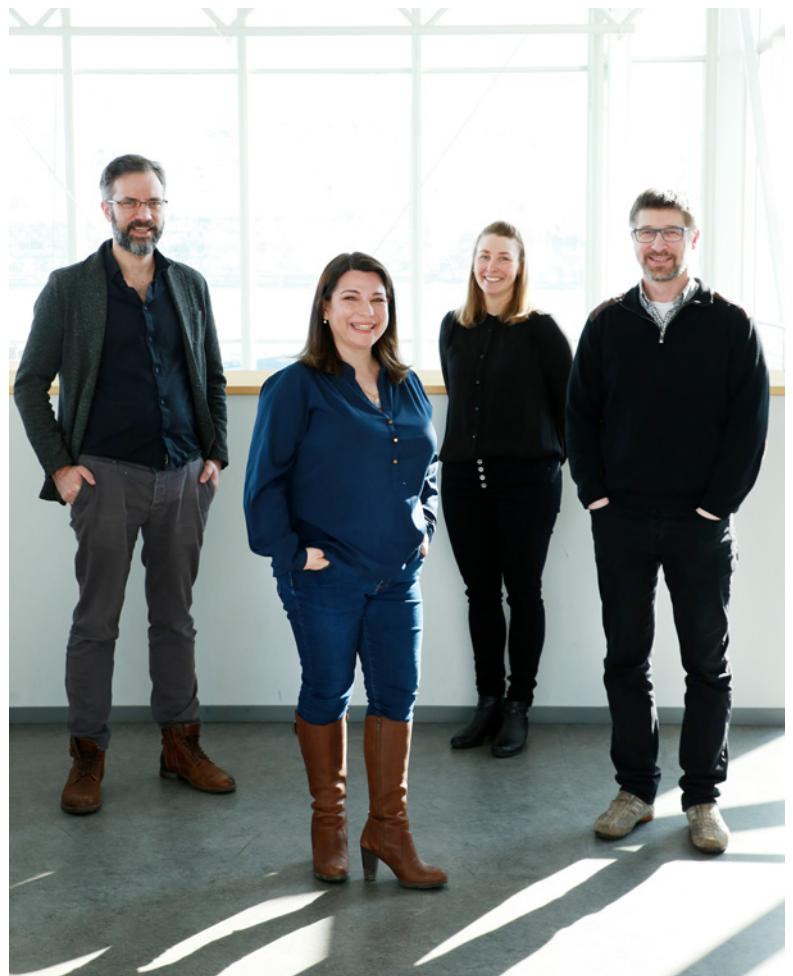
## Level of education:

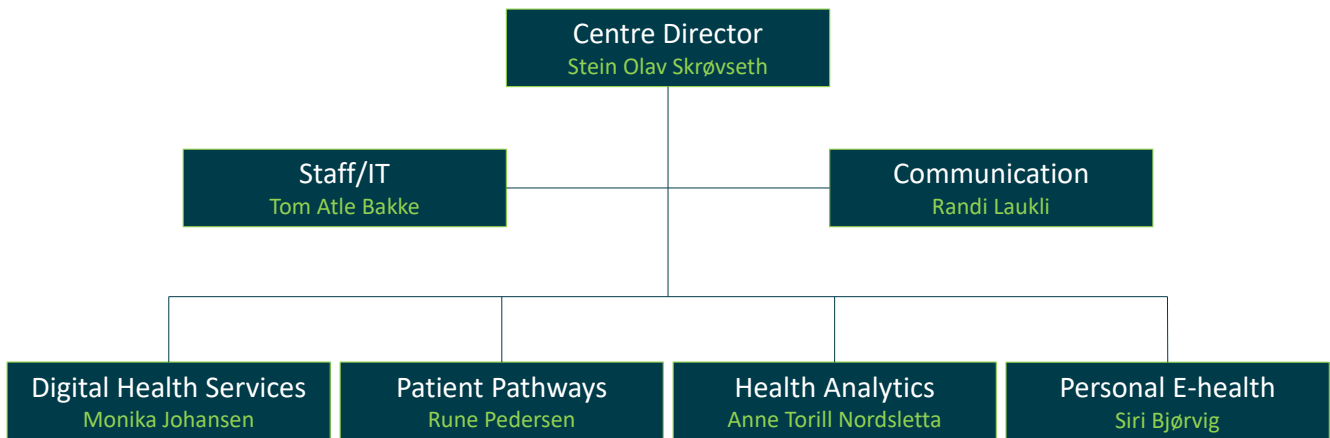
- Seven fellow researchers comprising of four women and four men
- 44 with a PhD distributed between 22 women and 22 men

## Where do we come from?

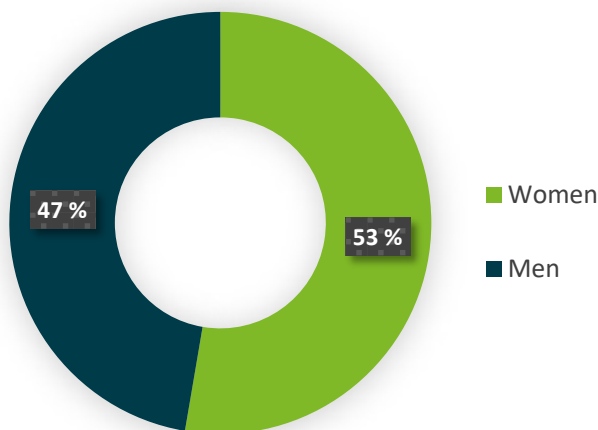
71 come from Norway and 22 come from:

- Greece
- Spain
- Italy
- Lithuania
- Ethiopia
- France
- Russia
- Portugal
- Czech Republic
- USA
- Canada
- Iceland
- Sweden
- Vietnam
- Germany
- Iran
- Ghana

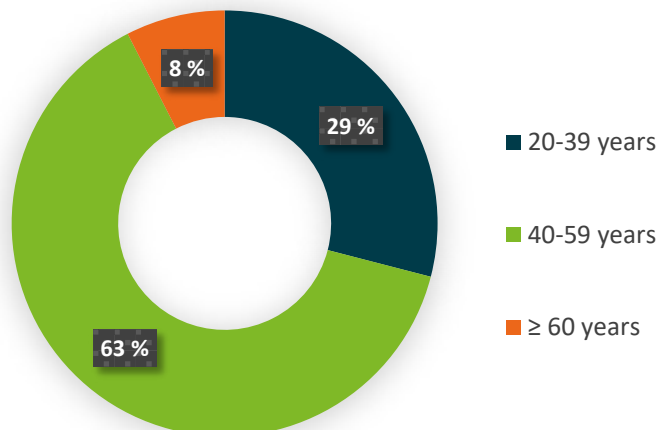




Gender distribution



Age distribution



**Terje Solvoll, Senior Researcher, Digital Health Services:**

**What was the best thing about 2020?**

It was exciting to concretise ideas we received based on personal experiences in using the e-health service. The fact that the various health actors do not have access to data from other actors in patient pathways could result in erroneous treatment and medication errors, etc. Even within the same hospital, important information about what has happened in other departments is not always checked or taken into consideration when determining a patient pathway.

We decided to test this and do something about it using psychiatry as a starting point, however we ended up sending an application to the Research Council of Norway's ICT PLUS

(IKT-PLUS) programme. The project was named Valkyrie. It has grown into a large project with many national and international cooperation partners. The Western Norway Regional Health Authority ICT is financing two fellow researchers.

The best thing of all was that we thought it was a first-class application and the Research Council of Norway did too – and gave us funding! In late autumn, we learned that the EU application, WARIFA, which we had worked on with Thomas Schopf, had also been accepted. I'm very much looking forward to working on these projects. Especially, Valkyrie, as I believe this project is important in terms of how holistic patient pathways shall contribute to making important information available to treating entities from various healthcare actors.

What is important to you?

# Even digital natives need physical meetings

The Year 2020 was demanding for everyone, especially healthcare workers. The COVID-19 pandemic brought about rapid and comprehensive digitalisation of the services. During the course of a few hectic days in March, many had to move to digital platforms with new technical solutions and work methods.

Even though the e-health environment in Tromsø has researched digitalisation for several decades, not many envisioned it happening so suddenly. Our researchers were given a unique opportunity to observe this accelerated digitalisation. What were the consequences and for whom? Will the changes last? For which health services is this a suitable/unsuitable work method? We know that it was a welcome change for some patients, but for others it was a difficult transition. This also applies to health professionals.

With the proposal of a new Act on e-health, Akson and other major initiatives, e-health was placed high on the national agenda. The Norwegian Centre for E-health Research became involved in these debates through invitations to submit comments, chronicals in the media. For the first time, the centre had a defined role in a large public debate. The introduction of e-health must be knowledge-based. Furthermore, it is important to remember that we are all working towards the same goal - the best possible healthcare services for everyone with the aid of digital tools. Digitalisation is an instrument, not the goal.

The year 2020 was also important for the centre in that the Research Council of Norway and the EU accepted several major applications. This lays a solid professional and financial foundation for the coming years. The large projects demand a great deal from us, but all the intelligent minds at the centre contribute to their success. I would like to commend everyone who has worked hard on the applications and projects at the centre, and offsite with our national and international cooperation partners. Everyone has



*Centre Director  
Stein Olav Skrøseth*

contributed towards the current acquisition of additional and relevant knowledge on e-health, which is the centre's mission and goal.

The centre has also exposed itself through popular scientific articles, podcasts and webinars. For example, the webinars on e-medicine management were a great success with many interested listeners every other week. In the future, we will follow up this model in other areas as well.

Network building has become taxing in a digital world, but we have found new ways of working, including within research. There have been many changes and lessons learned, all of which will be incorporate into our new daily lives. We look forward to the changes that are yet to come even though we do not entirely know what they will involve.

However, we can conclude that we have realised the value of meeting in either the context of treatment, or as researchers exchanging and developing ideas, or as human beings who just need to meet and see each other.

*Stein Olav Skrøseth, Centre Director*

# We are social

More and more people are finding us on social media and following us. We are extremely happy about this!

The number of followers has been increasing steadily the last few years, however the COVID-19 pandemic has probably contributed to more people seeking information and wanting to participate in online events.

For example, the webinars on e-medicine management ([ehealthresearch.no/digital-legemiddelhandtering/webinarer](http://ehealthresearch.no/digital-legemiddelhandtering/webinarer)). These have been arranged every other week since autumn 2020. Active promotion of the webinars has led to more people finding us on Facebook, Twitter and especially LinkedIn.

**Facebook:**

We have 2,519 followers on Facebook.



**LinkedIn:**

We have 2,128 followers on LinkedIn.



**Twitter:**

We have 1,357 followers on Twitter.



**Instagram:**

Our Instagram account has 647 followers.



# Media clippings

In 2020, 43 different media outlets and websites referred to us in 113 articles. Aftenposten and Dagens Medisin were among the media who wrote multiple articles about the municipal health record and collaboration project AKSON. Coworkers at the centre also participated with input in the debate.

## Her er regjeringens nye ekspertgruppe for datadeling

SINTEF-sjef Alexandra Bech Gjørv skal lede arbeidet med å kartlegge bruken av datadeling i næringslivet.



PUBLISERT Mandag 03. februar 2020 - 16:04 SIDE OPPDATER: Mandag 03. februar 2020 - 16:20

I januar ble regjeringens nye AI-strategi lansert. Her kom det blant annet frem at det skulle dannes en ekspertgruppe som skulle se på forutsetninger og vilkår for deling av data i og fra næringslivet.

Dette i forbindelse med at regjeringen skal utarbeide en stortingsmelding om datadrevet økonomi og innovasjon.

Nå er gruppa klar, melder Kommunal- og moderniseringsdepartementet.

– Hvordan og i hvilken grad næringslivet deler data, blir viktig for å skape gode tjenester og arbeidsplasser i hele landet, sier Linda Hofstad Helleland, ny distrikts- og digitaliseringsminister.

### Ekspertgruppen:

- Alexandra Bech Gjørv, konsernsjef i Sintef, Trondheim (leder)
- Arve Føyen, advokat og partner i Føyen Torkildsen, Oslo
- Terje Seljeseth, analysesjef i Stiftelsen Tinius, Oslo
- Jan Berre Rydningen, seniorrådgiver i GCE Blue Maritim Cluster, Ålesund
- Astrid Undheim, ansvarlig for teknologi og utvikling i SpareBank SMN fra 1. mars, Trondheim
- John Markus Lervik, konsernsjef og medgründer i Cognite, Oslo
- Erlend Kjesbu, daglig leder i Landbrukets Dataflyt, Steinkjer
- Jan Helge Viste, prosjektleder i CGE Node, Kristiansand
- Liv Dingsør, daglig leder i Digital Norway, Oslo
- Anne Torill Nordsletta, avdelingsleder for helsedata og analyse i Nasjonalt senter for e-helseforskning, Tromsø

Gruppen skal blant annet se på deling av data innen "viktige, norske bransjer og mellom verdikjeder".

– Vi tror at jo mer data som deles, jo større blir nytten for samfunnet. Og vi tror også at den enkelte virksomhet kan tjene på å dele sine data, sier Hofstad Helleland videre.

Ekspertgruppen skal levere sin rapport 3. april.

– Bedrifter og kompetansemiljøer på små og store steder sitter på verdifulle data som kan bidra til å skape nye arbeidsplasser i distriktene. Men da må både offentlig sektor og næringslivet dele mer data enn i dag, sier Hofstad Helleland.

Ekspertgruppen ledes av Sintef-sjef Alexandra Bech Gjørv.

Hun får selskap av blant andre John Markus Lervik, konsernsjef og medgründer i Cognite.

Les også: Suksessgründeren er ikke redd for å miste styringen: "Er man flere om samme mål, er det mye mer robust"

### Top 10 media articles on us:

Forskning.no	20 articles
Dagens Medisin	12 articles
Aftenposten	5 articles
Municipal reports	4 articles
Diabetes	4 articles
Health Talk (podcast)	2 articles
Digi.no	2 articles
Norsk Farmaceutisk Tidsskrift	2 articles
Avisa Nordland	2 articles
Sykepleien	2 articles

## Kronikk

### Pasienten endrer hvordan vi forsker på mobil helse



Meghan Bradway

PhD-stipendiat, Nasjonalt senter for e-helseforskning, Tromsø

**B**raker du helseapper på mobilen eller smartklokka? I så fall er du ikke alene. Kanskje lastet du ned en app for å slutte å røyke, eller begynte å trene. Det kan hende du har en app som hjelper deg med å håndtere angst, eller en som viser hvordan den siste kjøken du spiste, gjorde at blodsukkeret ditt føyk til værs.

Vi bruker helseapper stadig mer, og det snar den medisinske verdenen på hodet. Ved å ta i bruk helseapper, forandrer du måten vi gjør helseforskning på.

Og jeg sier: Uforordning akseptert! Men hvorfor skal du bry deg? Fordi det angår deg, dine nærmeste eller noen andre du kjenner.

**LED AN, VI FØLGER** Mobil helse endrer måten vi gjør helseforskning på – fra ovenfra og ned, til nedefra og opp. For oss forskere kan dette oppleves bakvendt. Vi er vant til å utvikle ny medisinsk teknologi ved å ta utgangspunkt i behovene til de som sitter på toppen i helsehierarkiet, jobben vår var enkel: identifisere en mulighet, teste ideen

vi forskere spørre oss selv:

I hvilke digitale teknologier bør vi lage? Hva slags informasjon burde vi dele? Og det viktige, overordnede spørsmålet: For hvem gjør vi dette?

**MÅ APNE DEN «SVARTE BOKSEN»**

Vitenskap har støttet seg på tradisjoner, standarder og protokoller. Teori og metoder blir ført videre av nye generasjoner forskere. Studier og målinger har gitt oss resultater som vi har stolte på.

En vanlig kvalitetsstudie av et mobilbasert helseverktøy ville begynne slik: Først ville legen seie deg og måle blodtrykket ditt og ta andre relevante prøver. Deretter ville forskere spørre deg – hvis du for eksempel hadde diabetes type 2 – om å prøve en ny mobilapp. Etter seks måneder ville de ta de samme prøvene av deg og spørre hva du synes om appen. Til slutt ville de sammenligne målingene.

Dette er vel og bra, og gir oss informasjon om hva som ble endret etter å ha brukt en ny app, og hvor mye det hadde endret seg.

Men vi vet fortsatt ingenting om hva som foregikk i mellomtiden i de seks månedene. Hvorfor ble helsemålingene annerledes?

**66** Mobil helse endrer måten vi gjør helseforskning på

# Kampen om pasientjournalen din pågår nå

Henning Carr Ekroll og Olav Olsen (foto)

Det handler om liv, milliarder av kroner og kompliserte teknologivalg når Helse-Norge skal samles til ett, digitalt rike. Dette er historien om den norske e-helsestriden.

**D**u har kanskje opplevd det hos fastlegen, på sykehuset eller legevakten. En lege spør deg om allergier, medisiner eller behandlinger du har fått tidligere. Og du tenker: «Dette har jeg vel fortalt en lege eller sykepleier før? Burde de ikke vite dette allerede? PC-en står jo rett der borte. Vi er i 2020, liksom. I velferdsstaten. I et av verdens rikeste land.»

Men slik er det ikke. Arbeidsverdagen for tusenvis av sykepleiere og leger er preget av jakt på informasjon. På barneavdelingen på Ullevål bruker sykepleier Daniel Hunstad Singh fremde-

til ett, digitalt helseerke er så vanskelig, må vi noen tiår tilbake i tid.

Etter at PC-en utover på 1980-tallet ble fast inventar på norske legekontorer, gikk deler av helsevesenet i gang med å bruke digitale løsninger. Sykehus og kommunale helsetjenester fulgte opp for å få pasientjournalene digitalisert, men det gikk ikke alltid knirkefritt. Utover på 1990-tallet var det flere historier om trøbbel med de nye løsningene. Dermed kjøpte eller utviklet sykehus, legekontorer og kommuner løsninger som passet til deres behov. Slik vokste en digital skog av ulike journalsystemer frem.

## Sladdet pga opphavsrett

nft Farmatid.no

Norsk Farmaceutisk Tidsskrift  
NYHETER - FORSKNING - TRENDER

Ledige stillinger | Aktuelt | Vitenskap og fag | Video | Send inn manus | Kontakt oss

Reportasjer

## E-helseforskerne finner mye feil, forblir likevel teknooptimister

Forskerne i Tromsø ser alt som går galt med de nye digitale helsesystemene. Likevel tror de teknologien kan gjøre helsetjenesten bedre og redde mange liv.



Tore Rasmussen Steien | Publisert 12.04.2020, kl. 15:13

Lange avstander og hardt klima tvang nordlendingene til å være pionerer på elektronisk kommunikasjon av helseopplysninger. Nå jobber om lag 70 medarbeidere ved Nasjonalt senter for e-helseforskning i Tromsø med å se om de nye nasjonale digitale helsetjenestene som innføres, fungerer som de skal. Alt de finner er ikke like opploftende.

— Det som skjer under panseret kan høres helt fantastisk ut, men dersom du ikke kan styre den bilen hjelper det lite, som leder i avdeling for digitale helsetjenester, Monika A. Johansen, sier.

ANNONSE

### Fakta

- Nasjonalt senter for e-helseforskning
- Opprettet 2010 som videreføring av Nasjonalt senter for samhandling og telemedisin
- Omfatter 70 medarbeidere i 60 årverk
- Skal sikre nordlendinger som framtidens

# Finances

Financial statement for 2020. Figures indicated in MNOK.

## OPERATING REVENUE

Total revenue competitive funds .....	25.1
Total basic funding .....	39.9
Total revenue assignment funds .....	1.2
<b>TOTAL operating revenue .....</b>	<b>66.2</b>

## OPERATING COSTS

Direct project costs .....	6.6
Payroll and social costs .....	52.3
Other operating costs .....	8.8
<b>TOTAL operating costs .....</b>	<b>67.7</b>

**OPERATING RESULT .....** -1.5

Operating result transferred to balance sheet ..... -1.5

**PROFIT/LOSS FOR THE YEAR.....** 0.0

### Phuong Dinh Ngo, Senior Researcher, Health Analytics:

#### What was the best thing about 2020?

The year 2020 was good for artificial intelligence (AI) in the health sector and, as such, for me as well. We have increasingly used advance machine learning algorithms based on in-depth learning, natural language processing, and other statistical tools for analysing clinical text and images in electronic patient health records. AI-based diagnosis and decision-making support tools can effectively extract useful information and give recommendations based on health data.

Nevertheless, we see many issues: access to data continues to be limited, the data quality is often poor, and security and trust in the new tools and algorithms must be improved.

Potential solutions to these issues involve the development of machine learning methods that can generate clinically relevant synthetic data, and further research on privacy preserving techniques, such as anonymisation and distributed machine learning.



# Knowledge for improved healthcare services

The Norwegian Centre for E-health Research shall contribute to evidence-based development within the field of e-health through research, cooperation and dissemination.

Through interdisciplinary research and knowledge development, we want to help improve healthcare services for citizens. Together with the entire sector, we shall achieve the national goal for patient care services.

Our goal is to be a leading national and internationally recognised research centre.

Our vision is: knowledge for improved healthcare services.

Our most important task is to conduct research with other professional environments nationally and internationally. Our research must be independent and maintain high ethical standards.

The dissemination of knowledge is a core activity and we will publish all our research openly and accessibly. We shall work towards the knowledge being used.

Through our national role, we will build a network and cooperate with the entire sector. Everyone who researches e-health will be able to participate.

## Personal e-health

We will conduct research on how technology designed for independency and self-management impacts healthcare for the elderly, the chronically ill who need monitoring and those who actively aim to change their lifestyle.

## Digital health services

We shall conduct research on national digital healthcare services and gain knowledge of what conditions and contexts need to be in place before the services can be developed. While the services are being tested, we shall look at what prevents or promotes usage. To conclude, we will study the effects and consequences of using the services. Digitalisation of medicines and the services offered on Helsenorge.no are important themes.

## Holistic patient pathways

We shall study how digital solutions can facilitate holistic patient pathways.

Technological, semantic and organisational collaboration is challenging in healthcare services and we will look at health records as a collaboration tool. We will investigate how strategies for implementation, standardisation and work processes impact quality.

We will conduct research on conditions for and the effects of digitalisation with the aim of understanding the complex interaction between technology and healthcare services.

## Health data analytics

We will look at how health data can be used to predict, detect and treat illness.

Machine learning algorithms and data extraction methods are two areas that we study. We will develop data analysis methods and safeguard privacy.

A key theme is how the health sector can adopt reliable and sustainable algorithms.

# Vision and values

**Our vision is knowledge for better healthcare services.**

## Values

Our values are crucial to our success over time and are at the heart of our culture. They motivate us to perform and guide us on how we should run the centre and cooperate with our stakeholders.

## Openness

Openness is one of the most important values in our organisational culture and helps to ensure transparent processes. By making our activities transparent and sharing knowledge and information, we build trust in our cooperation partners and society.

Openness validates a desire to learn, to be curious of others and receptive to new ideas. This also entails the ability to give and receive constructive feedback. We encourage different opinions.

## Cooperation

E-health is a multi-disciplinary field, and no one is capable of doing everything on their own. Cooperation is therefore something we hold in high regard. We often cooperate with

those we compete with for funding. Trust lies at the heart of any good cooperation. Trust and respect for one another makes working together a pleasant experience. Inclusion is the key to building a community, and being part of a community provides a sense of belonging, friendship and wellbeing. By including others, both internal and external cooperation partners, we work more efficiently towards our common goals.

## Integrity

To us at the Norwegian Centre for E-health Research, integrity means being trustworthy and conducting ourselves properly. We are characterised by doing what we say. We are confident that we want the best for each other and that everyone is doing the best they can. Quality should be the hallmark of what we deliver.

It is important that we solve our public mission as best we can, which is why we must set clear expectations for the centre and our coworkers. Our organisation wants autonomous, committed employees who take co-responsibility for the centre's success. We must be able to depend on each other for support - even when we make mistakes.

**Merethe Drivdal, Project and Financial Controller, Administration:**

**What was the best thing about 2020?**

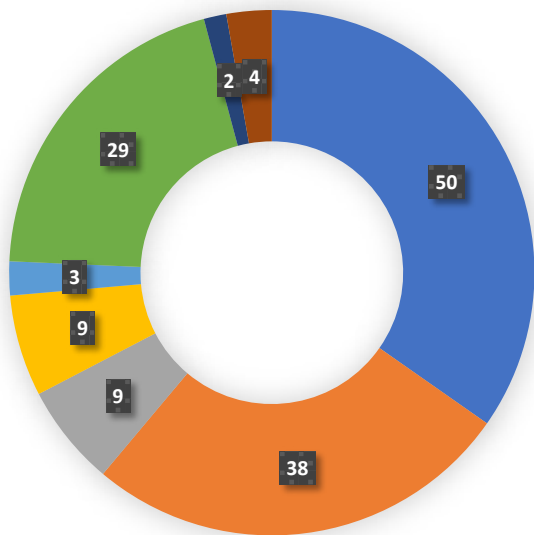
It was exciting to participate in the application for the WARIFA project, where we gathered 12 partners from six countries to apply for EU funding to develop an artificial intelligence (AI) tool to map personal risk factors for developing chronic diseases. The objective is to prevent non-infectious diseases before they develop. It was thrilling that WARIFA received

the top score for the application and we received EUR 6 million to carry out the project over the next four years.

It is educational for me and the organisation to lead to a large multi-disciplinary project with expertise involving AI, machine learning, IT, e-health, m-health, skin cancer, diabetes, lifestyle diseases, preventive medicine, sociology, psychology, public health, communication, dissemination mathematics, statistics and so forth.

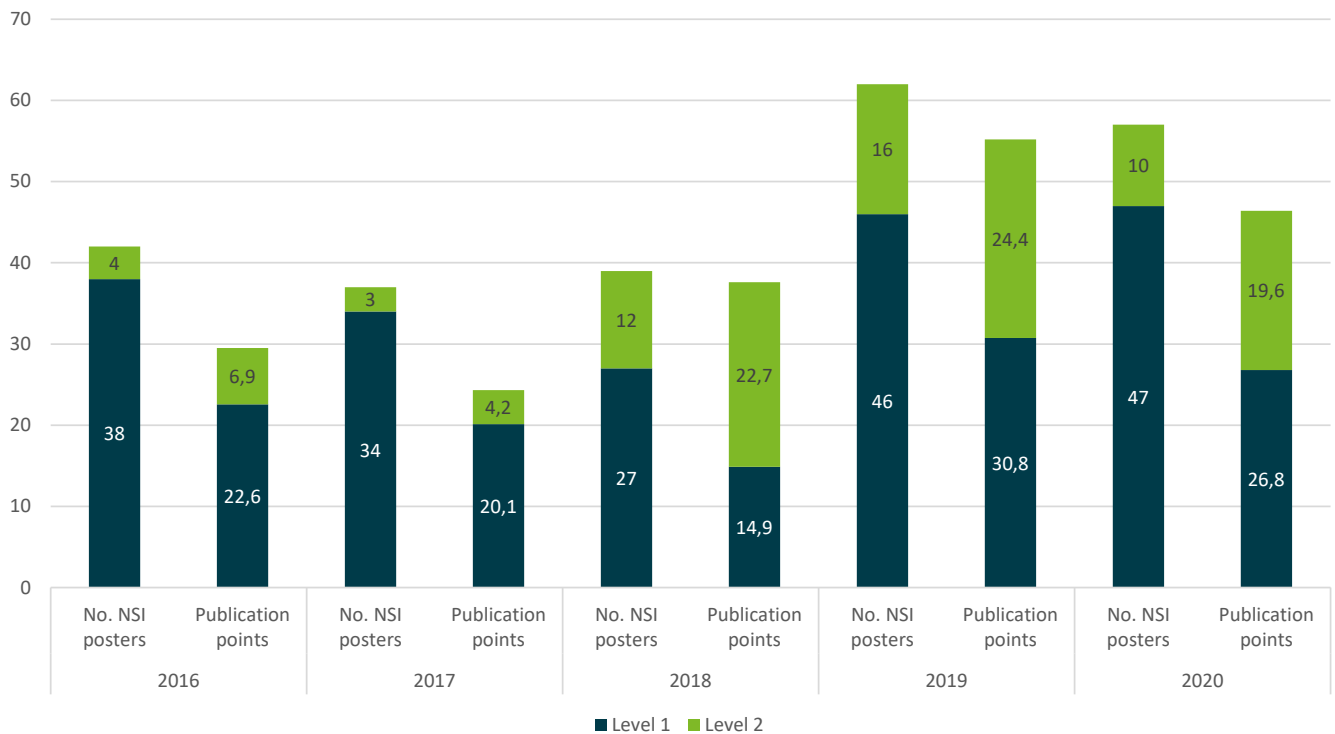


# Research figures



- 50 scientific articles/overview articles
- 38 scientific/academic lectures and poster presentations
- Nine scientific chapters/articles/conference articles
- Nine abstracts
- Three chronicles
- 29 popular science articles
- Two popular science lectures
- Four reports

Figures from Cristin

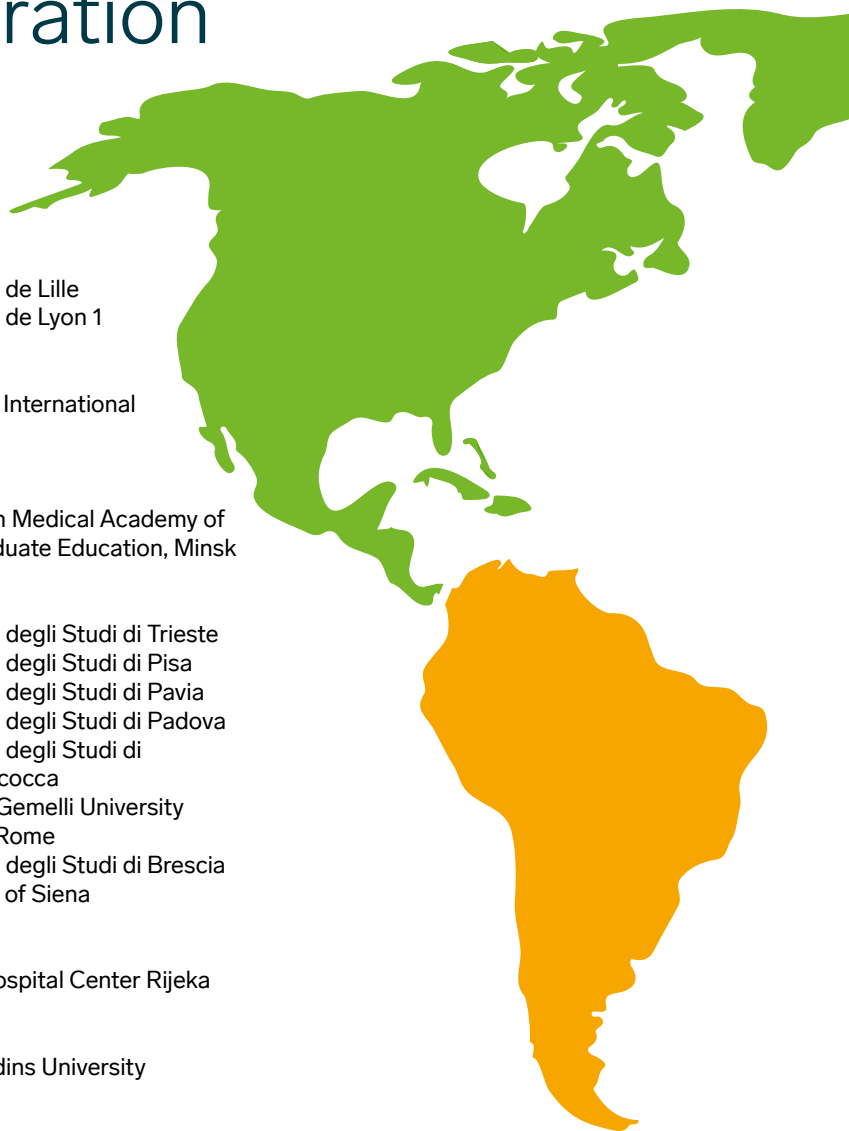


NSI: Norwegian Scientific Index

NSI publications: Publications that earn publication points, and are part of the funding schemes in the health institution and university hospital sector



# Research cooperation



## North America

### Canada

- University of Toronto
- Trinity Western University
- University of Western Ontario
- Hospital for Sick Children
- MacEwan University

### USA

- Yale University
- University of South Carolina-Columbia
- University of Oklahoma
- University of Colorado at Boulder
- Scripps Research Institute
- Stanford University
- Mayo Clinic, College of Medicine
- Harvard School of Public Health
- Brigham and Women's Hospital
- Beth Israel Deaconess Medical Center
- Louisiana State University
- Illinois Institute of Technology
- HIMSS

## South America

### Argentina

- Hospital Italiano de Buenos Aires

### Chile

- Pontifical Catholic University of Chile

## Europe

### Belgium

- Université libre de Bruxelles
- Universiteit Gent
- UC Leuven-Limburg
- Vrije Universiteit Brussel
- Hasselt University
- Research Foundation Flanders
- EHTEL

### Bosnia-Herzegovina

- Univerzitet u Sarajevu

### Bulgaria

- Medical University, Plovdiv

### Denmark

- Aalborg University

### Estonia

- Vahlberg & Pild Ltd

### Finland

- University of Oulu
- Aalto University

### France

- Université de Lille
- Université de Lyon 1

### Georgia

- Caucasus International University

### Belarus

- Belarusian Medical Academy of Post-Graduate Education, Minsk

### Italy

- Università degli Studi di Trieste
- Università degli Studi di Pisa
- Università degli Studi di Pavia
- Università degli Studi di Padova
- Università degli Studi di Milano-Bicocca
- Agostino Gemelli University Hospital, Rome
- Università degli Studi di Brescia
- University of Siena

### Croatia

- Clinical Hospital Center Rijeka

### Latvia

- Riga Stradins University

### Lithuania

- Vilniaus Universitetas
- Vilniaus Gedimino Technikos Universitetas

### The Netherlands

- Universiteit van Amsterdam
- UMC St Radboud
- Technische Universiteit Eindhoven
- Roessingh Research and Development, eHealth group
- Universiteit Leiden
- Medtronic Integrated Health Solutions

### North Macedonia

- University "St. Cyril and Methodius", Skopje

### Norway

- Vestre Viken Hospital Trust
- Western Norway Research Institute
- Askin AS
- Nord University
- Northern Norway Regional Health Authority ICT
- Norwegian Institute of Public Health

- Catalysts Association

- SINTEF AS
- NORCE Norwegian Research Centre AS
- University of Oslo
- Sørlandet Hospital Trust
- Oslo University Hospital Trust
- University of Agder
- Norwegian University of Science and Technology
- UiT The Arctic University of Norway
- University Hospital of North Norway

### Portugal

- Universidade Nova de Lisboa
- Instituto Politécnico de Lisboa
- Hospital Privado da Trofa
- Instituto Pedro Nunes
- Coimbra University
- Hospital da Luz Learning Health

### Romania

- Universitatea de Medicină și Farmacie 'Carol Davila' din București

### Serbia

- Clinical Center of Nis, Medical Faculty



#### Slovenia

- University Medical Centre Ljubljana

#### Spain

- Universitat Pompeu Fabra
- Universitat Jaume I de Castellón
- Universidad Autónoma de Madrid
- Hospital Universitario Lucus Augusti
- Institut d'Investigacions Biomèdiques August Pi i Sunyer, Barcelona
- Departament de Medicina, Universitat de Barcelona
- Centro Investigación Biomédica en Red de Enfermedades Raras (CIBERER)
- Instituto de Salud Carlos III (ISCIII)
- Universidad de Sevilla
- Universidad Politécnica de Valencia

#### United Kingdom and Northern Ireland

- University of Nottingham
- University of Manchester
- University of Leeds
- University College London
- Imperial College London
- University of Huddersfield
- Brighton & Sussex Medical School
- Belfast Health & Social Care Trust

#### Switzerland

- World Health Organization
- Université de Genève
- Universität Zürich
- Swiss Institute of Bioinformatics
- Centre hospitalier universitaire vaudois
- Berner Fachhochschule
- Réseau Hospitalier Neuchâtelois
- Swiss Institute of Bioinformatics
- University Hospital of Lausanne
- University Hospital of Zürich

#### Sweden

- Lunds universitet
- Linnéuniversitetet
- Karolinska Universitetssjukhuset
- Höskolan i Borås
- Uppsala universitet
- Karolinska Institutet

#### Czech Republic

- Univerzita Karlova v Praze

#### Turkey

- Private practice

#### Germany

- Private and Teaching Practice of Dermatology, Konstanz

#### Hungary

- University of Szeged

#### Austria

- Medizinische Universität Wien

#### Asia

##### Iraq

- Hawler Medical University

#### Iran

- Ferdowsi University of Mashhad
- Iran University of Medical Sciences
- Mashhad University of Medical Sciences

#### Israel

- Technion - Israel Institute of Technology
- Sheba Medical Center

#### Qatar

- Hamad Bin Khalifa University

#### Russia

- Central Research Dermatology Clinic, Moscow

#### Oceania

##### Australia

- University of Technology, Sydney
- University of New South Wales
- University of Melbourne
- University of Queensland
- Queensland University of Technology
- Macquarie University
- University of Sydney

# Cooperation with the World Health Organization

A new two-year cooperation agreement between the Norwegian Centre for E-health Research and the World Health Organization (WHO) was signed in autumn 2020. Senior communications adviser and project manager, Lene Lundberg, was assigned the role of WHO coordinator at the centre in April.

“It was exciting to take over responsibility for the cooperation immediately after the COVID-19 pandemic became a reality. Many of our activities have focused on obtaining knowledge on how we can use digital tools to best manage the global public health crisis,” says Lene Lundberg.

The WHO is extremely interested in themes such as infection tracking apps and the experience gained with increased use of video consultations.

We were also contacted in the autumn by the European mHealth Hub in Geneva. The organisation is an initiative of the International Telecommunication Union (ITU), WHO and the Regional Ministry of Health of Andalusia (Spain), along with 18 partners from 12 countries. They support innovation and the introduction of mobile health solutions in national health services. We delivered a brief overview of our current research on m-health.

In October we participated in a digital conference where a new overarching strategy for digitalisation of healthcare was presented: Digital Implementation Investment Guide. The presentations were held at the WHO in cooperation with other UN organisations, such as UNICEF (United Nations Children’s Fund) and UNFPA (United Nations Population Fund).



*Eighteen years of WHO cooperation: The COVID-19 pandemic has highlighted that continued commitment to technology in healthcare is needed, and that good systems must be developed and evaluated. Photo: Jarl-Stian Olsen*

# COVID-19 related research

As a result of the COVID-19 pandemic, billions of Norwegian kroner were put aside for worldwide research. Everyone needed knowledge on how the pandemic affects areas such as industry and commerce, education, health and innovation.

Several of our e-health researchers soon started investigating the impact of using technology in healthcare services. Here are some of the activities:

- ✿ Line Silsand, Gro-Hilde Severinsen and Gro Berntsen examined how health workers used video meetings to meet cooperation partners and older patients with complex and comprehensive needs.

How would health professionals be able to take care of the person-centred approach when they could not physically meet?

Health workers in, among others, Harstad, Tromsø and Narvik, were interviewed and they informed us that video meetings worked surprisingly well. They were most suitable for following up patients and arranging measures between, for example, GPs, physiotherapists and hospitals. The patients did not have to make tedious trips and the meetings were more effective. Health professionals said it was important to have access to IT support and they sought a general strategy for using video meetings in clinical practice.

- ✿ Our centre entered into a collaboration with the HealthTalk podcast to disseminate useful knowledge.

Fellow researcher, Eli Kristiansen, and senior researcher, Marianne Trondsen, were two of the individuals who went on air in the podcast to talk about how healthcare services had changed during the pandemic.

Eli's theme was the immense increase in the use of video consultations by GPs.

Marianne said that mental health practitioners had started using digital therapy and were many experiences richer. Among others, they discovered that some individuals found it easier to open up when they saw the practitioner on the screen.

The goal should be to have a wide range of physical and digital healthcare services.

- ✿ In the autumn, researcher Monika Knudsen Gullslett held a digital lecture at the EHIN conference. She talked about the experiences of mental health therapists after using video meetings for treating patients.

They were positive to the fact that videos resulted in tighter follow up and improved continuity in the treatment. It was particularly beneficial for patients who lived a long distance away.

On the other hand, therapists found it difficult to maintain security and trust when the technology did not work. A screen can become a filter that makes clinical judgement difficult.

- ✿ When the pandemic became fully established in Norway in spring 2020, GPs drastically increased their use of video consultations.

Along with the University of Science and Technology (NTNU), the centre investigated the GPs use of video consultations. The results were published in the Journal of Medical Internet Research (JMIR).

In conjunction with this, half of the doctors believed that the video consultations were better than or equal to a normal face-to-face consultation.

GPs and researchers, Tor Magne Johnsen and Børge Lønnebakke Norberg, were the lead authors of the study and Eli Kristiansen was the co-author.

- ✿ Together with the Ministry of Labour and Social Affairs, researchers Trine Bergmo, Paolo Zanaboni, Elin Breivik, Eli Kristiansen and Monika Johansen are studying sick leave during the COVID-19 pandemic. The project will investigate the experiences of GPs and patients with doctors being able to print out medical certificates without physically attending the surgery.

The SYKE project ends in spring 2021. We are looking forward to reading the results!

# Webinars became the new normal during the COVID-19 pandemic



They managed to hold a couple of physical seminars before all collaboration was transferred to video meetings.

When planning the first webinar, a couple of important issues had to be considered.

“Clinicians and pharmacists said that they didn’t have enough time during the day to participate in webinars. This also applied to other occupational groups with patient and customer contact as well. We therefore decided that the meeting would be held at 8.30am for no more than 45 minutes,” says Thomas Bäckstrøm.

This allowed many people to participate, perhaps not every time, but occasionally. It was also important to publish the recordings afterwards.

From the very beginning, many asked if the webinars would be recorded and published online. It’s wonderful that people that people can watch the recordings at their own leisure when they cannot participate live. Up to now we’ve had 1,500 live participants and 500 viewings on-demand,” say Monika Johansen.

## Focus on sharing experiences

Good quality and safety are important when treating patients. However, incorrect usage of medicines threatens patient safety. Even though we have adopted the use of digitalisation in this area, every year patients are harmed or die due to errors when prescribing, preparing and administering medicines.

“The invited speakers have shared their experiences from clinical practice and research on medicines management. For example, closed loop medicines in Western Norway Regional Health Authority and eMultidose in South-Eastern Norway Regional Health Authority.

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For e-health research, webinars were a very positive experience. ‘Everyone’ follows our webinar series on digital and safer medicine management.

“We were pleasantly surprised about how many were interested in the webinars on e-medicine management. The organisers say that 1,500 people from various professional backgrounds have participated live since we started in autumn 2020.

The first webinar on e-medicine management was aired in autumn 2020. Since then, more and more people have discovered the possibility for quick, professional and free knowledge updates in such an important area of healthcare.

## New twist during the COVID-19 pandemic

A research network for e-medicine management had already been established before the COVID-19 pandemic arrived in Norway. Østfold Hospital, Østfold Pharmaceutical Trust, the Department of Pharmacy at the University of Oslo and the Norwegian Centre for E-Health Research were behind this. The objective is more collaboration and knowledge sharing.

From the top left: Anne Gerd Granås (University of Oslo), Monika Johansen (E-health Research), Thomas Bäckström (Østfold Pharmaceutical Trust), Unn Sollid Manskow (E-health Research) and Astrid Johnsen (Pharmaceutical Trust)



The webinars are popular with a surprisingly large number of people, which we think is fantastic! Initially, I thought that it would be nice if we reached 30 people. But we've reached many more. At the last webinar on medicines reconciliation for LIS 1, we set a record with a whole 200 signed in at the same time," says Professor of Social Pharmacy at the University of Oslo, Anne Gerd Granås.

The other initiators agree.

"It's valuable for professional environments and researchers from around Norway to meet and share experiences. I've noted that people work differently with things in the regions. Through this, we have the opportunity to help shape the best practice for various processes in e-medicine management," says Senior

Researcher and Department Manager at the Norwegian Centre of E-health Research, Monika Johansen.

The Head of Østfold Pharmaceutical Trust, Kalnes, adds:

"I've received an immense amount of positive feedback from webinar participants. They're grateful that we've created a separate arena for this. It especially appears to be a good arena for those with a technological background who are not health workers. People working in IT can obtain good insight into what is important where medicines are concerned. This builds a bridge between people with a healthcare and IT background," says Hospital Pharmacist Thomas Bäckström.



**Paolo Zanaboni, Senior Researcher, Digital Health Services:**

**What was the best thing about 2020?**

The best thing was all the hard work with GPs in the middle of the COVID-19 pandemic on the

Research Council e-consultation application – and then having it granted! This is an extremely relevant and appropriate project with an incredibly talented project group consisting of diligent friendly colleagues and cooperation partner! We've received funding for two PhD students and are looking forward to starting on 1 August!



# Impact of COVID-19: GPs go digital

**PODCAST: Because of the COVID-19 crisis, researchers have seen a massive increase in the number of GP e-consultations. In this podcast you will meet e-health researcher, Eli Kristiansen, who will tell us about the developments in recent months.**

Before Norway went into lockdown due to COVID-19, people could communicate digitally with 1,400 of the 5,000 GPs in Norway. Today, 4,800 GPs offer digital services. The digitalisation suddenly accelerated when GPs and patients were forced to use technology in order to meet.

It becomes easier for patients to contact their GP when they can use videos and e-mail services, especially for patients who are confident in using technology.

The research findings of the Norwegian Centre for E-health Research show that urban women with higher education use digital GP services the most.

## Little research on GP video consultations

“Little research is available on GP digital communication, especially in relation to video consultations,” says PhD Candidate at the Norwegian Centre for E-health Research Eli Kristiansen.

In her PhD, she will be studying text and video-based e-consultations in the GP scheme. She will be looking at three things: effects, benefits and experiences within the healthcare system, and those of GPs and patients.

## Advantages for patients

With online GP services, patients spend less time and money on travelling to their GP surgery.

“In terms of society, this is certainly the best financial benefit,” says Kristiansen.

Patients are also concerned with safety. They’re curious about who can read the e-mails they send and whether it’s safe to send messages to their GP. For the doctor, it is important to know that the patient is in safe surroundings when divulging sensitive information.

## Little known about safety

The researchers cannot give a clear answer in relation to the impact of digital communication on patient safety.

“We don’t know enough about the safety aspect of online consultations. Treatment may be delayed because the patient still has to turn up physically, or the treatment may be wrong because the doctor received an incorrect



PhD Candidate  
Eli Kristiansen

**Marc Lange, General Secretary, European Health Telematics Association (EHTL):**

**Which e-health events affected you the most in 2020?**

Without any doubt the fact that healthcare services massively adopted digital consultations as a response to the risk of COVID-19 infection. On 12 May 2020, we wrote an online article stating that a digital healthcare

revolution had started. The question is whether the ‘revolution’ is here to stay. As with all revolutions, there is a tendency to create a new world instead of integrating with the existing world. We will observe the co-existence between two types of models for healthcare services, one being virtual and the other face-to-face, or perhaps new hybrid models combining the best of both worlds will emerge? EHTEL and its members will examine this theme the next few months. Watch our website for more information: Ehtel.eu.





image of the condition during the video consultation,” says Kristiansen.

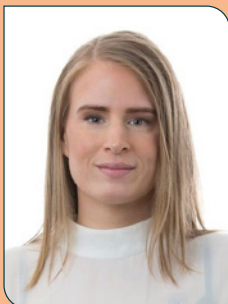
We should develop guidelines for which type of diagnoses can be made via video or whether it should be up to each individual doctor. Studies have shown that mental health issues, skin problems, and respiratory and urinary tract infections can successfully be treated via e-consultations.

### What happens after the COVID-19 crisis?

“The doctors have invested in equipment, which is substantial progress. It will be incredibly interesting to look at the experience gained during this pressured situation. Are the doctors satisfied? How do the patients feel? When the situation normalises again, how much contact will be made via video or text? We’ll just have to wait and see,” says Eli Kristiansen.

#### Reference:

Eli Kristiansen et al.: Triage i fastlegeordningen, *NSE-rapport 2019-06* [Triaged GP Scheme, Norwegian Centre for E-health Research Report]



**Kaja Asbjørnsen Betin, Head of DigPsyk, the Norwegian Psychological Association’s interest association for digital health:**

#### Which e-health events affected you the most in 2020?

The year 2020 brought a worldwide pandemic and triggered a technological healthcare

tsunami. Within a few weeks in the spring, thousands of practitioners and therapy clinics adopted video and telephone consultations to follow up their patients. It was proven in 2020 that healthcare services can adapt, but it also highlighted the prerequisites that are required in order for digitalisation to function as intended.

# Health professionals want to continue treating patients digitally

**Health workers found that videos worked in conversations with both patients and cooperation partners. Nevertheless, not all has been smooth running.**

When COVID-19 came to Norway in March, the infection control measures greatly reduced the possibility to follow up patients in the way that primary and secondary health professionals were traditionally used to. Most of it had to be carried out digitally by telephone and videos.

For many health workers, it was a new experience using video meetings in patient treatment. They were concerned about how such an abrupt transition to digital follow up would impact the person-centred approach. This is particularly important for patients who need complex follow up and coordination due to diagnoses such as, for example, cancer, diabetes or dementia.

A patient-centred approach is about understanding what is important to the person. The patient's wishes shall insofar as possible be the starting point for all plans created for the patient.

The COVID-19 crisis motivated health workers to throw themselves into unknown waters.

"They had to think innovatively to follow up patients. Collaboration via video meetings was the only option when national infection control measures had to be followed," says researcher, Gro-Hilde Severinsen. Along with her colleague, Line Silsand, she has conducted a study at the Norwegian Centre for E-health Research.

## Establishment of a separate team

The research colleagues investigated how they used video consultations in hospitals in

Tromsø, Narvik and Harstad, and three neighbouring municipalities. The University Hospital of North Norway has had a patient-centred healthcare team since 2014. A so-called PCHT includes individuals from primary and secondary care, which the Norwegian Centre for E-health Research has researched earlier.

The objective is improved collaboration across the organisation to obtain a proactive, holistic patient-centred health services. Digital collaboration is an instrument, however, it was only tested to a limited degree before the pandemic broke out.

## Videos better than telephone

"Most felt they worked very well. They noticed that patients opened up more than by telephone," says Severinsen.

The patient could connect to the video meeting at home. Thus, both primary and secondary care health workers could assess the patient and their living conditions without gathering physically.

At hospitals, video meetings were used to arrange the person's discharge from hospital. Hospital staff could also talk with the community nursing service or relatives if they connected to the meeting in the patient's home.

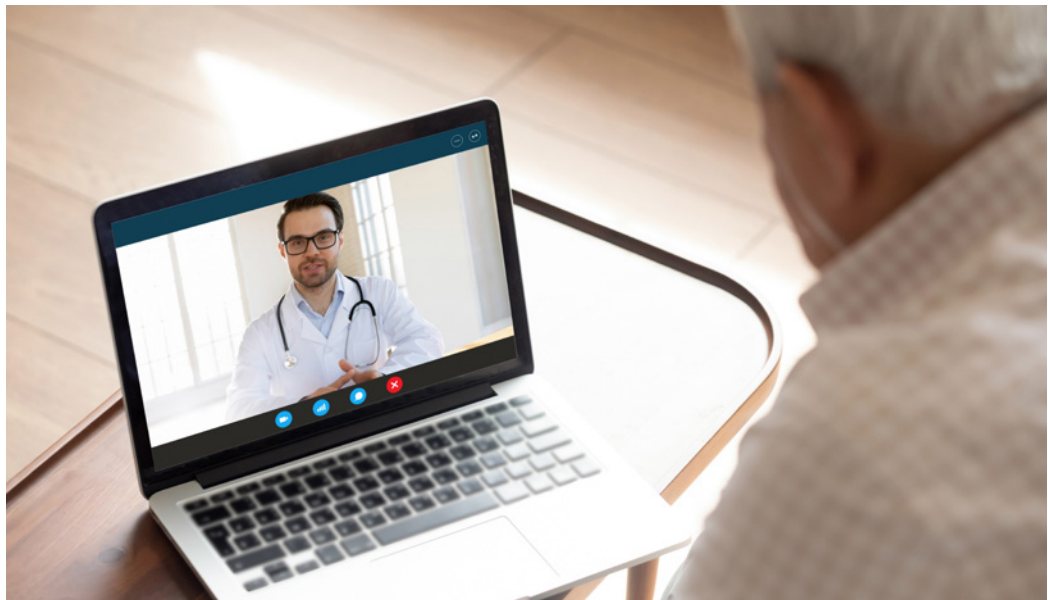
"Since they didn't need to spend time travelling to the hospital to participate, several people had the opportunity to connect to cooperation meetings, for example, the patient's GP, the community nursing service or specialist from the hospital. However, many found video meetings too intense and demanding, therefore they should not have lasted for more than an hour," says Severinsen.



*Researcher Gro-Hilde Severinsen*



*Researcher Line Silsand*



### Strategy needed for the use of videos

Despite an abrupt learning curve, health professionals want to continue with digital interaction.

“Many of those we interviewed sought a general strategy for using and supporting video technology. That strategy does not currently exist, but everything indicates that it must be in place before this can become an integral part of healthcare services,” says Gro-Hilde Severinsen.

“Our findings show that digital collaboration is an easy, affordable and effective step towards improved information exchange in healthcare

services. It may help solve the need for communication and exchange of health data between the actors, she says.

### About the project

- Patients, authorities and professionals express a great need for radical restructuring of healthcare services for patients with long-term complex needs.
- Project 3P – Patients and professionals in partnership shall support development of safe and holistic health and care services for this group of patients.
- The project is headed by Professor Gro Berntsen at the Norwegian Centre of E-health Research.

# COVID-19 may force the municipalities to use more welfare technology

**Shock digitalisation during COVID-19 may result in primary healthcare becoming more digital.**

An evaluation now shows that variation exists in the municipalities in terms of how useful they found the instruments in the National Welfare Technology Programme to be. Thus, the degree to which welfare technology has been introduced in the municipalities varies.

Researchers Elin Breivik and Gunn Hilde Rotvold at the Norwegian Centre for E-health Research in cooperation with a researcher from Sintef Digital, asked 211 municipalities about the types of technology they have adopted and the progression they have made with the work.

## Differences in municipalities

The main finding in the investigation shows great differences in the size of the municipalities and the usefulness of the instruments. It takes time to introduce welfare technology and the processes tend to be complicated. Many municipalities report that they will still rely on support in the coming years. Many small municipalities purely do not have enough resources for welfare technology.

“Despite receiving support from the State, there are challenges. The introduction was more successful in larger municipalities. Nevertheless, it is difficult to create one model for everybody, when we know how different the municipalities are,” says researcher Elin Breivik.

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What is important to you?

**Hal Wolf III, President and CEO, HIMSS (Healthcare Information and Management Systems Society, Inc.):**

**Which e-health events affected you the most in 2020?**

Never in my wildest dreams or worst nightmare would I have thought that the world could change so dramatically as it did in 2020. The COVID-19 pandemic has changed our finances and lives in ways that were almost unimaginable at the beginning of the year. Yet, despite all the changes, illness and death, the response from heroic front line health professionals, health systems and authorities has helped us to see the road forward. It is now clearer than ever before that digital technology is important for our ability to detect, treat and handle not only highly infectious diseases such as COVID-19, but the whole spectrum of health issues that we currently face and must confront in the years to come.

If it is possible to call something positive when faced with what we have experienced, it has been the massive increase in the use of digital health solutions, including telemedicine, electronic health records, digital devices, health registers and analysis tools, especially within vaccination and vaccination administration. The most important findings, which are also reflected in the mission and vision of our global organisation, is that no one is safe until everyone is safe, and in order to succeed in dealing with this global health crisis, authorities must cooperate on information and technology, exchange real time data and knowledge, and invest in digital health training and infrastructure. I'm convinced that the digital transformation of healthcare services that lies ahead of us will be the key to building a long-term and sustainable eco system on behalf of all patients.





### Changes during COVID-19

One of the instruments in the welfare technology programme is access to network arenas. The municipalities met to support each other, to share experiences and to enter into cooperation agreements.

“Those we have spoken to say that physical meeting places were good, but video conferencing has become more relevant,” the researchers emphasise.

COVID-19 brought along shock digitalisation in the municipalities and reduced the number of physical meeting places.

“All parts of the health service have become digitalised at an accelerated speed. New technology for residents and relatives has also been tested in nursing homes, for example, using iPads. The researchers, who have only observed this development, believe it is completely new.

### Will research the effects

The researchers anticipate that during COVID-19 the municipalities have been forced to use more welfare technology and that the small municipalities are also speeding up the introduction. Digital tools have played a key role in preventing infection, so whether you are a large or small municipality is irrelevant.

“Digital monitoring appears to be replacing physical meetings to prevent infection. Cameras and sensors sound an alarm if something is not as it should be at a user’s home at night, and we see that videos are increasingly being used for communication. Nevertheless, there are several aspects to this, we don’t know if more elderly people are becoming lonely,” says Elin Breivik.

In a new project, the researchers will examine the effects of welfare technology in the municipalities.

### Reference:

Elin Breivik, Gunn Hilde Rotvold and Elin Sundby Boysen: Evaluering av virkemidlene i Nasjonalt velferdsteknologiprogram [Evaluation of Instruments in the National Welfare Technology Programme]. *Norwegian Centre for E-health Research report 2019-07.*



Senior Adviser  
Elin Breivik



PhD Candidate  
Gunn Hilde Rotvold

# Can chatbots on social media make people more active?

**New research shows that health chatbots have a large potential to get people to become more active.**

A chatbot is software or an application based on statistical learning and analyses, and pedagogical theories. It aims to simulate human conversation online.

In contrast to artificial intelligence, which learns from its mistakes and makes its 'own decisions', a chatbot is controlled by algorithms. It is first fed with all types of imaginable questions and answers about the theme in advance.

## Many possibilities with health chatbots

Chatbots are already used in the medical field, for example, WHO Health Alert, which is a chatbot from the World Health Organisation on WhatsApp. It provides information about COVID-19.

Researchers Dillys Larbi and Elia Gabarron at the Norwegian Centre for E-health Research have along with data researchers at UiT The Arctic University of Norway and Bern University of Applied Sciences summarised the research, which has been converted to

chatbots from a medical perspective. The findings were published in the IOS Press Journal.

The objective was to gain an overview of research literature on the use of chatbots from a public health perspective.

The conclusion is that research literature on chatbots and health is sparse. Usage is currently in the early stages. However, the potential is immense and more research is continually being conducted.

## May work well during a pandemic

The need for measures that can get us to change lifestyle has been actualised during COVID-19. Many have been permanently fixed to their couch during restrictions when it has been difficult to get out. Perhaps a chatbot message can give you a push in the right direction.

"It's very good to use social media to get people to become more active, for example, during a pandemic. We've seen that many have been less physically active and more active on social media during COVID-19, although this varies from country to country. Many more were inactive during the first wave," says Dillys Larbi.



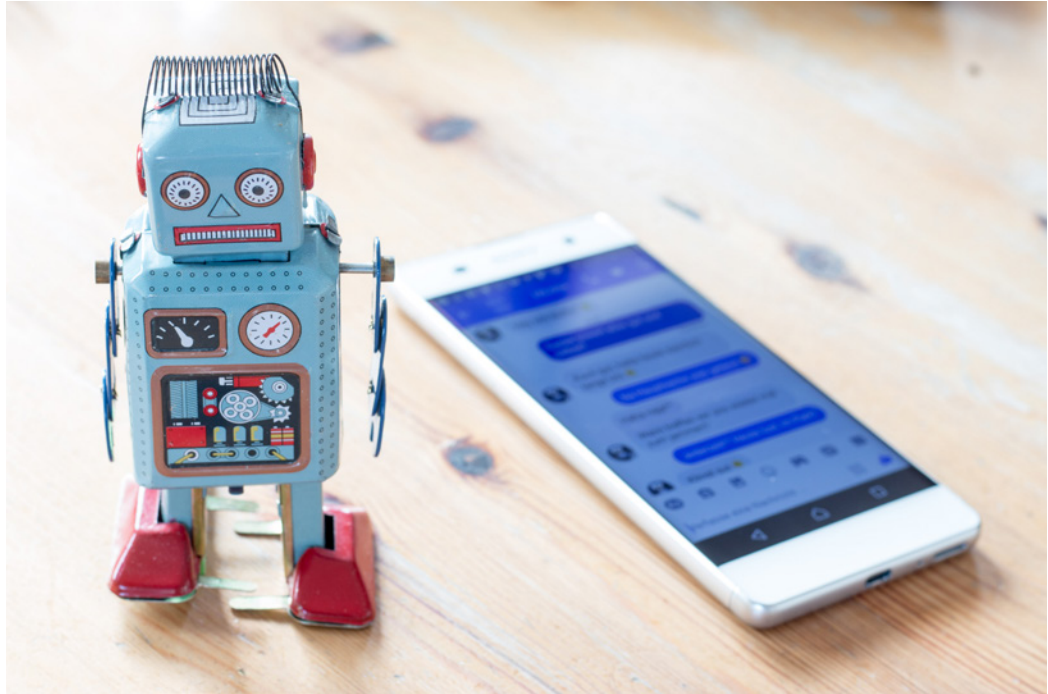
*Adviser Dillys Larbi*



*Senior Researcher Elia Gabarron*

## Reference:

Elia Gabarron et al.: What Do We Know About the Use of Chatbots for Public Health?, IOS Press, 2020.



**Kristin Bang, Senior Adviser,  
Department of National  
Management Models, Norwegian  
Directorate of E-health:**

**Which e-health events affected you the most in 2020?**

I'm currently working with the new national e-health strategy and concerned with the importance of defined roles.

The Norwegian health network took over ownership of national e-health solutions. In my opinion, this was the first important event in 2020. It is also fantastic that the national health and hospital plan elevates digitalisation as an integral part of service development.

Another important milestone was that further work on holistic collaboration and a common municipal health record was safeguarded through the national budget for 2021.

Procurement and development of the health analysis platform and establishment of the health data service, a first line service for access to health data, were also important events in 2020.

I'm concerned with events that are useful to citizens and health professionals, e.g., increased use of e-consultations, digital follow up at home and swifter access to test results and booking of COVID-19 tests on [helsenorge.no](https://helsenorge.no).

Other exciting events include the introduction of electronic reporting of deaths and cause of death, which frees up the time doctors spend on burdensome manual processes, privacy is strengthened and the information is received more rapidly. The work on disseminating summary care records to municipalities in conjunction with patient medicine lists, as part of the medicines programme, was important.



# People have more control of their health when they can view their health records

**They communicated better with health professionals, were better prepared for the meeting with the doctor and were more active in their treatment. These were the responses of a survey on digital access to patient health records.**

A total of 1,037 people responded to a survey published on Helsenorge.no. All respondents had viewed their patient health record digitally via Helsenorge.no.

Researcher, Paolo Zanaboni at the Norwegian Centre for E-health Research has investigated the typicalities of people who read their own health record, and how they use and perceive the service.

“As per today, research has been conducted on the electronic patient health record based on how health professionals use it. Few researchers have asked people how they used the record,” says Paolo Zanaboni.

He conducted the investigation and analysis along with colleagues and E-health Research, NORCE and Northern Norway Regional Health Authority ICT.

## Few people read their health record

The fact is that few people use their electronic patient health record. Here they can find information about GP consultations, examination results, nurse documentation, allergies, medicines and discharge letters following admission to hospital and treatment.

In 2016, only citizens in the north and west of Norway had access to their electronic health record. The online survey was therefore conducted in these two regions. Citizens were invited to participate in the survey if they signed in to Helsenorge.no.

The participants were asked how easy it was to find information, what they thought about the content, how it affected their health, treatment and safety, and how they thought they would use the service in the future.

## Patients share their health record with more people

The majority (88 per cent) signed in to their electronic health record for updated written information from their practitioner or hospital and to get an overview of their patient pathway. Another important reason was that they wanted to prepare before attending a doctor’s appointment or admission to hospital. The patients also found it useful to share documents with their GP, other practitioners, family or friends.

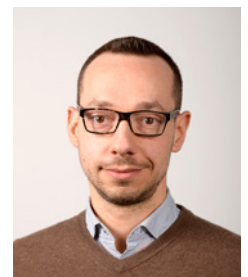
## Mostly used in Northern Norway

Northerners used the service more frequently than persons living in Vestlandet. More women than men used the service. More people also used the digital health record if they had moderate to extremely poor health and if they had been in contact with their doctor in the past year.

People with a medical background read their own digital health record more often than others, which also correlates with a Swedish survey on the same theme.

## Challenging for older patients

“One likely reason is that the elderly have poorer digital skills, especially when they are to sign in to a solution for the first time,” says Paolo Zanaboni.



Senior Researcher Paolo Zanaboni



Another likely reason why the elderly do not use the system as much is that health problems prevent them from doing so. They also have problems understanding the information they read.

“This is particularly challenging and concerning. That is, those who need to read their health record online the most are unable to do so.

“Our study shows that digital access to health records has matured as a service in Norway. Future research should look more closely at the benefits patients with a chronic disease receive from this. In Zanaboni’s opinion, healthcare services should aim for continuous improvement of the service and evaluate the quality.

#### Reference:

P. Zanaboni et al.: Patient Use and Experience With Online Access to Electronic Health Records in Norway: Results From an Online Survey. *J Med Internet Res*. Feb 2020. DOI: 10.2196/16144

# People would rather listen to stories about diabetes than facts about the disease

**The intimate and personal, preferably with videos and emojis, were most liked and shared by those who follow the Norwegian Diabetes Association on social media.**

More and more patient organisations are creating profiles on social media. They want to create a communication platform for their followers where they can give information, have a dialogue and create a community that benefits everyone. It might also contribute to improving the lives and health of more people.

But what type of content engages users the most on social media? Is it funny stories or factual health advice? Text with videos or photos?

“Researchers have found that it may be good for people with different illnesses to be part of health groups on social media, such as Facebook and Instagram. However, few have investigated what content people appreciate the most, so I’m going to find out,” says Elia Gabarron, researcher at the Norwegian Centre for E-health Research.

## Analysed 1,449 posts

Along with colleagues she carried out an observation study of the content published on the Norwegian Diabetes Association’s Facebook, Twitter and Instagram pages. As of January 2020, the Norwegian Diabetes Association had more than 34,000 followers on Facebook, more than 7,000 on Instagram and around 3,000 on Twitter.

Gabarron’s study was published in the scientific Journal of Medical Internet Research.

## High score for personal stories

The results of the analysis showed what engaged the users the most.

“The posts with interviews and personal stories received 111 per cent more likes, 106 per cent more comments and 112 per cent more shares than posts concerning other matters,” says Elia Gabarron.

Posts on campaigns and anniversaries also received more positive responses than other types of messages.

## Liked videos

Posts with videos had three times as much of a chance of being liked, four times as much of receiving a comment and two-and-a-half-times as much of being shared. When an emoji was in the message, it increased the chance of the post being liked by 71 per cent, but the chance of it being shared increased by 144 per cent.

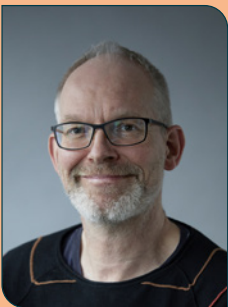
“Use of videos and emojis significantly increases a response on social media. In addition, we discovered that there is a deviation between what people say they want on social media and what they actually like,” says Elia Gabarron.



Senior Researcher Elia Gabarron

## Reference:

Elia Gabarron et al.: Factors Engaging Users of Diabetes Social Media Channels on Facebook, Twitter, and Instagram: *Observational Study, J Med Internet Res*, 2020. DOI:10.2196/21204



**Nard Schreurs, Direct of E-Health and CEO EHiN, IKT Norge:**

**Which e-health events affected you the most in 2020?**

The pandemic has massively elevated digital health. Video conferencing, the use of health

data and home monitoring has received completely new frameworks. In addition, new technology is streaming in - artificial intelligence, speech recognitions and image analysis. It's crucial that our experiences are continuously documented and analysed so Norway can steer the technology and keep it under control.

# Researchers can now analyse patient health records without viewing sensitive information

**Researchers have solved one of the three main challenges described in White Paper ‘One Citizen – One Health Record’. A new computer tool that can retrieve information from patient health records without divulging sensitive patient information.**

“We can now simply retrieve information and statistics from patient health records to conduct research and quality work without risking sensitive information going astray,” says Professor Johan Gustav Bellika at the Norwegian Centre for E-health Research.

The technology can contribute to realising the intention behind the national health record solution even though data is spread around various systems.

## Unique method

“The tool can be used for all electronic patient health records, regardless of where the health record has been safely stored in the health and care service. Even the involved researchers cannot identify where the information comes from in patient health records, explains researcher Kassaye Yitbarek Yigzaw.

The computer tool is based on a privacy algorithm, which Yigzaw developed and based a PhD on in 2017. To test the tool in practice,

the researchers have now investigated GP antibiotic prescriptions. The computer tool with the special algorithm has been added to the data servers of three different Norwegian GP surgeries.

During the test, the researchers searched for specific diagnoses and prescriptions in the health records of 20,245 patients distributed between 21 GPs. Since it is not necessary to move patient data, the researchers can retrieve even more data than earlier – without compromising privacy.

## Antibiotic use

Yigzaw explains that the Norwegian health authorities’ goal was to reduce the use of antibiotics by 30 per cent between 2012 and 2020. Each year, more than 700,000 people in the world die due to antibiotic resistant bacteria. In Norway, GPs prescribe around 80 per cent of all prescriptions for antibiotics.

“This tool allows research to be conducted on data from the primary health service to completely different extent than was possible before,” says Professor Peder Halvorsen, the person in the team with a medical background. He hopes the tool will be adopted to support research on relevancy for primary care services. Research based on such data has been lacking, but that era should now be over.



*Senior Researcher  
Kassaye Yitbarek Yigzaw*



*Professor Johan Gustav  
Bellika*



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Kassaye Yitbarek Yigzaw et al.: Privacy-preserving architecture for providing feedback to clinicians on their clinical performance, *BMC Med Inform Decis Mak.* 2020. <https://doi.org/10.1186/s12911-020-01147-5>

Hamed Abedtash: *Using OHDSI Data Network for Capturing Real-World Evidence: Our Experience with a Multi-Country Study on an Obese and Overweight Cohort*, 2019.

# Do we become hypochondriacs searching health information online?

**After a round of online searches, it is more likely that you will feel calmer and more knowledgeable than anxious and confused.**

We have all been there, searched for symptoms of illness after a late evening or watched a YouTube video about health.

“Information online is often inaccurate, you can find anything. This is why we wanted to find out how people feel when using e-health services,” says researcher Andrius Budrionis. He has recently published a scientific article on the psychological effects of health searches online in the *Journal of Medical Internet Research*.

Budrionis’ article is a series of four about e-health with data from the Seventh Tromsø Study. This population study is one of the most comprehensive in Norway, where 45,000 people have participated one or more times.

The study gave researchers unique research material on how digital tools affect people’s relation to their own health.

## Investigated the use of digital services

The researchers studied the psychological effects of people using e-health services. Literally how they feel when they Google a health question or search for information on YouTube.

They investigated how four different digital services impact people’s emotions when it comes to questions about their own health:

- Search engines such as Google
- Video search engines such as YouTube
- Health apps such as Apple Health
- Social media, for example, Facebook

## Most positive effects

The researchers were surprised by the results. Online searches often had more positive effects than negative.

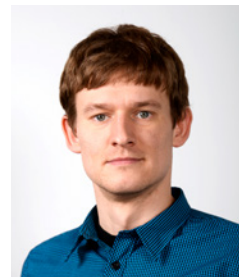
“We tried to look at factors that may play a role in relation to how people perceive it as positive or negative.

Budrionis tells us that people with higher education to a greater degree than others found that the digital tools made them feel both calmer and more knowledgeable. The researchers believe it may have something to do with the fact that they are better at filtering and adapting information online.

## Become confused about not understanding

Those who experienced negative effects from using the e-health tools were those with poor health. This group found they were more anxious and confused after Googling or watching YouTube.

“Your health status plays a role and you may not have anyone around you to correct your perception. Consequently, you will become more anxious and confused by the information you find online,” says Budrionis.



*Senior Researcher  
Andrius Budrionis*



### Must listen to those who are not shielded

On the whole, people feel that e-health tools help. That is, they have a positive effect. Nevertheless, the researcher believes that we must not underestimate the negative effects.

“We must listen to those who feel anxious and more confused afterwards. This group must receive more help,” he says.

“Perhaps we can make the tools even better with more accurate information. We must find out why online health information makes some people anxious,” says the researcher, who believes that this group may not be as well shielded in the health system.

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# Appendices

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The Research Project 3P: Results from the Evaluation of Digital Solutions for Patient-centred Care Teams (WP6). Akademisk åpning av i4H; 2020-02-26 - 2020-02-26. SSHF UIA UNN

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**Bergmo, Trine Strand; Arnstad, Mali A..**

Legene bruker fortsatt faks. Nå må de over på e-resept for alle medisiner. Forskning.no [Internett] 2020-08-01  
UNN

**Berntsen, Gro Karine Rosvold; Johnsen, Oddny.**

Flere pasienter lever bedre med nytt tilbud. Forskning.no [Internett] 2020-01-28  
UNN

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Mortality decreased among sick elderly patients after better coordination of health services. ScienceNorway [Internett] 2020-10-17  
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**Bradway, Meghan; Anderssen, Hans.**

Podcast: Mobile health (m-health) changes the health care services and health research. HealthTalk.no [Internett] 2020-10-19  
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Healthcare workers should use social media more to share health information. ScienceNorway [Internett] 2020-06-18  
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**Bradway, Meghan; Lundberg, Lene.**

Helsepersonell bør bli mer aktive på sosiale medier. Forskning.no [Internett] 2020-05-18  
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**Breivik, Elin; Rotvold, Gunn Hilde; Arnstad, Mali A..**

Koronatiden kan tvinge kommunene til å bruke mer velferdsteknologi. Forskning.no [Internett] 2020-10-21  
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**Brugrand, Camilla Skjær; Årsand, Eirik; Bangstad, Hans J.**

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Blir vi hypokondere av å søke om helse på nett?. Forskning.no [Internett] 2020-07-02. UNN

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Pasientenes erfaringer med digital fastlegekommunikasjon. Legeforeningen.no [Internett] 2020-09-14. UNN

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Pasienter opplever bedre behandling med digital legetime. Forskning.no [Internett] 2020-10-27. UNN

**Gabarron, Elia; Lundberg, Lene.**

Folk vil heller ha historier om personer med diabetes enn fakta om sykdommen. Forskning.no [Internett] 2020-11-14  
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People prefer stories about people with diabetes to facts about the disease. ScienceNorway.no [Internett] 2020-12-23  
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