



**DIGITAL
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Global Examples of Methods and Tools for Supporting and Incentivising Self-Isolation at Home

**Flash Report
2nd June 2020**



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a collaboration between





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Introduction

Whilst lockdown measures are starting to ease across the UK, there is still a need for people to practice social distancing measures and in some cases, self-isolate at home. Self-isolation applies to people who have symptoms of COVID-19 (and people who live with them) as well as those who have been identified as 'extremely vulnerable' and are staying at home to help reduce their chance of catching the virus. This flash report provides a global snapshot of the different types of technologies used to support and incentivise people to self-isolate when they have COVID-19 symptoms (or suspect they have). It was prepared by the Digital Health & Care Institute in the third week of May 2020 to support the DHI's COVID-19 related work for the Scottish Government. By the time this report is published however, the situation will have developed further.

The body of the report presents short descriptions of a selection of different methods from around the world. More detailed information is included in the Appendices, which also include references used.

Background

The Scottish Government has set out the framework they will use for decision making to continue to suppress COVID-19 and minimise its harms. A key aspect of easing lockdown is the 'test, trace, isolate, support' approach:

- Test people in the community who have symptoms consistent with COVID-19;
- Use contact tracing to identify the close contacts of those cases, who may have had the disease transmitted to them;
- Ask people (and their close contacts) to self-isolate, so that if they do develop the disease, there is less risk that they will pass it on to others; and
- Make sure that support is available to enable people to isolate effectively.

This flash report investigates how other countries have approached the 'support' issue and explores the types of incentive schemes that are being set up round the world to promote compliance with self-isolation, or ways in which positive behaviours are rewarded. It is not an exhaustive review but collates examples of different methods used in supporting and incentivising self-isolation. Whilst the primary focus is on looking at digital tools and solutions, the report also considers non-digital methods used.

It is worth noting that in April 2020, NHSX (the agency within the Department of Health and Social Care tasked with driving the digital transformation of care) launched the TechForce19 challenge in partnership with PUBLIC, the AHSN Network and the ministry of Housing, Communities and Local Government (MHCLG). Each of the 18 digital solutions that were successful were awarded up to £25,000 to develop innovative solutions that offer a digital way to support vulnerable people who need to stay at home or need other help in the community for extended periods of time. Appendix 1 outlines the winning solutions in more detail.

1. More than 1,600 innovations were submitted to the challenge

Method

This review is based on desk-research carried out over two weeks of May 2020.

A combination of the following search terms was used: “COVID-19”, “coronavirus”, “supporting self-isolation”, “incentivising self-isolation”, “supporting social distancing”, “incentivising social distancing” “digital/technology solutions self-isolation”, “nudge theory”, “patient monitoring”, “pandemic”, “disease control”, “remote monitoring of COVID-19”, “telehealth”, “telemedicine”, “digital solutions”, “health technology/ies”.

The search primarily covers information published or released during the previous 4-month period from January to May 2020. The available sources consist of news items, blog posts, government and policy statements and company or product websites, and academic articles where available. The landscape changes extremely fast. The information contained in this report is accurate as of 29th May 2020.

Key Findings

Without government intervention, most private individuals, especially asymptomatic ones, would not self-isolate. According to Sanghi and Lokshin (April, 2020), encouraging ‘stay at home’ behaviour can be achieved under three broad categories:

- Jobs: governments subsidise a set of activities that could be done from home (such as data labelling, document digitisation, and virtual services);
- Human capital: make educational provision more broadly available, including MOOCs ; and
- Fun: governments subsidise greater access to web-streamed entertainment services and access to faster and more reliable Wi-Fi (Sanghi and Lokshin, April 2020).

Other strategies include, for example financial incentives (Wood, March 2020). In a bid to encourage people who feel ill to self-isolate, the government of Ireland has relaxed application requirements for people to claim statutory sickness benefits. The changes give everyone, including those working in the gig economy, a temporary income and incentivise them to stay at home if they have symptoms of the virus. In addition, the usual six-day waiting period to claim illness benefits has been removed for anyone who has COVID-19 or has been advised by health services to self-isolate.

Claimants will also receive a 50% increase in benefit payments, rising to €305 per week. This applies for two weeks’ medically required self-isolation, or for the duration of a work absence once a COVID-19 diagnosis has been confirmed. Employers in Ireland are being urged by the government to continue paying any employee who is unable to attend work or is self-isolating the difference between the newly bolstered illness benefits and their normal wages. (Wood, March 2020)

Digital Solutions

In the current COVID-19 pandemic, connected health and remote patient monitoring tools are more important than ever. There are several examples of technological solutions being used to support those either with COVID-19 (or those most at risk of COVID-19) whilst in their own homes.

2. *Massive Open Online Courses*



At the end of March, NHS England launched a new messaging service to support people staying at home suffering with suspected COVID-19 symptoms. Daily texts (sent by the NHS to new patients who register their symptoms and basic contact details with the 111 online service) check how people are doing and ensure that those who need help with getting through the isolation period receive it.

Patient Monitoring Platforms

Remotely monitoring, triaging and managing high risk patients and citizens (for instance cancer patients, or elderly people) for COVID-19 symptoms at home will greatly reduce their exposure to infection. In March, the US Food and Drug Administration (FDA) issued a new policy to expand the use of remote monitoring devices that facilitate patient management. Hospitals and health systems are piloting Artificial Intelligence (AI) enabled solutions that promise to minimise health workers' exposure to COVID-19 while improving health outcomes for patients. (Wiggers, 2020)

Some examples of patient monitoring platforms include:

- Current Health is a patient monitoring platform that combines vital-sign sensors, connectivity with other devices, and telemedicine capability. Beyond its remote health monitoring partnerships with health care providers, Current Health is offering a symptom chatbot to stratify patients at home, in addition to telemedical visits and an AI system that continuously assesses risk based on custom settings. Current Health can alert physicians about those at risk and facilitate a video appointment, phone call, or text message, all while collating the data in web dashboards, apps for iOS and Android, and electronic medical record platforms. (Wiggers, 2020);
- The Lumeon platform provides an automated at-home monitoring service (Appendix 2 contains further details about this product). When patients present with possible COVID-19 symptoms, they can sign up for the Lumeon service. The system then checks in with the patient at home through 2-way texting, check-ins and simple questions. An algorithm interprets the patient's responses and displays the information on a dashboard, giving providers a complete picture of their patients without the need for in-person follow up. If a doctor sees something worrying (like a sustained fever) then they would follow up with that patient directly. Lumeon also has the capability to enable hospitals and healthcare systems to reach thousands of patients quickly with important COVID-19 information – like testing locations and precautions to take while at home. This new remote monitoring capability for self-isolated COVID-19 patients rolled out in April by NYC Health and Hospitals, the largest public health care system in the US. (Hung, 2020);
- Covidom is a web application for home management of patients with mild-to-moderate symptoms of COVID-19 through remote monitoring. It benefits the health system by enabling patient care while preserving hospital beds (and the time of professional carers) for patients that truly need these resources. It also mitigates risks to healthcare workers by reducing their direct contact with COVID-19 cases. Learning from patient data obtained through the app will not only improve the accuracy of the Covidom algorithms, it will also provide valuable information on the nature of COVID-19. Further details on this tool can be found in Appendix 2. (EIT Health, 2020);

3. Such as their age, mobile number and when their symptoms started.

- The BuddyCare virtual care platform provides daily symptom-tracking and supportive, secure communications between individuals and healthcare professionals. If a COVID-19 patient's symptoms are only measured on an ad hoc basis with no insight into the progress of the symptoms, the patient's condition may deteriorate until he or she requires hospitalisation. The BuddyCare app can track a patient's symptoms, and hospitals can monitor, receive alerts, communicate with patients, and produce reports for analysis. (Buddy Healthcare, 2020); and
- The TELUS Home Health Monitoring system is being used in British Columbia for COVID-19 patient tracking to help manage early response, preventing decline in patient's health and acute care visits, and monitoring of patients recovering from COVID-19 outside of hospitals. The system was developed by TELUS Health in 2013 for patients with chronic conditions such as diabetes, heart failure and respiratory disease. TELUS Health is also making a fully web-based solution available across Canada, with patients supplying their own tablet, thermometer and other equipment. This facilitates a wider and a much quicker rollout of the service across a region, and faster scaling to help support a larger number of Canadians at a time. (TELUS Health, 2020)

Wearable Devices

The wearable tech market has grown in recent years, and now wearable tech companies are turning their efforts to the COVID-19 pandemic. Finnish start-up Oura has given 2,000 of its smart rings (which measure heart rate and body temperature) to front-line healthcare workers in San Francisco, and researchers at the University of California are studying whether the devices can reliably detect symptoms of COVID-19, such as fever. Meanwhile, a team at Central Queensland University Australia is testing whether a fitness wristband from Boston-based firm Whoop that tracks breathing rates can recognise the infection. The study is measuring respiratory patterns in volunteers that have self-diagnosed with COVID-19. (Horti, 2020)

Other examples include the following:

- Researchers at Northwestern University and Shirley Ryan AbilityLab in Chicago have developed a novel wearable device that can monitor hospitalised patients and then be taken home to continue 24/7 supervision. The soft, flexible, wireless, thin device (about the size of a postage stamp) sits just below the suprasternal notch — the visible dip at the base of the throat. From this location, the device monitors coughing intensity and patterns, chest wall movements (which indicate laboured or irregular breathing), respiratory sounds, heart rate and body temperature, including fever. From there, it wirelessly transmits data to a HIPAA-protected cloud, where automated algorithms produce summaries tailored to facilitate rapid, remote monitoring. The real-time data streaming from patients gives insights into their health and outcomes that is currently not being captured or analysed by traditional monitoring systems. (Morris, 2020);
- In March 2020, Spry Health launched the Loop System monitoring service to work with its wrist-worn device which remotely tracks heart rates, pulse oximetry and breathing. The Loop System enables at-home monitoring of patients confirmed, suspected, or at risk for COVID-19. Spry Health demonstrated the efficacy of the Loop System through extensive clinical validation studies with the University of California, San Francisco (UCSF). It was cleared by the FDA in April 2019 as a tool for clinicians to remotely monitor their patients with chronic diseases, allowing them to detect early signs of deterioration. This wearable does not require any input or data from patients, and does not require a smartphone or app.



The Loop System's clinical dashboard aggregates data to easily identify patients at risk and prioritise care. (Smith, 2020); and

- In China, the VivaLNK continuous temperature sensor has been used to combat the spread of COVID-19. This monitoring and alert solution is aimed at automating the tracking of changes in patient temperature on a continuous basis. Wearable IoT (Internet of Things) enabled temperature sensors remotely transmit data to a central monitoring system, and medical staff are alerted based on trends and thresholds, identifying the patient and room, and can respond accordingly. (Koh, 2020)

Remote Support and Monitoring Tools

In addition to supporting people with COVID-19 symptoms, there has also been an increase in digital tools being used to support people with long-term medical conditions to stay at home. This ensures these people avoid COVID-19 infection in a hospital environment and enables space in hospitals for COVID-19 patients. Some of these tools could also be used as remote support tools for people with COVID-19 symptoms. There is evidence of both digital tools supporting physical health conditions such as diabetes, Chronic Obstructive Pulmonary Disease (COPD) and asthma, as well as solutions for people with mental health issues. Some examples include:

- My Diabetes My Way. This is an interactive website and smartphone app for people with diabetes and their family, friends and carers, providing them with information and resources to support them to manage their condition. The service is currently available in Somerset and across Scotland, with plans to extend its reach across England;
- AI platform Feebris takes measurements from wearables and scans them for diseases. It targets conditions such as pneumonia and asthma and mainly focusses on elderly communities, aiming to avoid hospital stays by identifying conditions before they escalate;
- Neuro Love, an online platform to help young people in care to manage anxiety and low mood while staying connected socially. The Neurolove.org website enables young people to book one-to-one sessions to chat directly with mentors and therapists and reduce feelings of loneliness. It also features resources and tips to help youngsters manage their emotional and mental health, from group therapy and creative classes to fitness and relaxation exercises; and
- The PHILIPS eCareCompanion and eCareCoordinator apps have been used in Australia to support COVID-19 patients. eCareCompanion is a telehealth app that patients can access on a secure tablet at home and to share health information with their care team. Patients can use it to fill out health questionnaires, communicate with their care teams, and sync data from connected medical devices.

Social Distancing Incentives

There are several examples of digital solutions encouraging people to practice social distancing :

- Holovis has developed a new app Crowd Solo to help visitor attractions open safely and with social distancing measures. Crowd Solo also gives guests information on their own social distance metrics and will cause their mobile device to bleep and vibrate if they get too close to other groups. This can even be gamified for extra guest engagement.

4. Social distancing is a set of measures taken to avoid the spread of a contagious disease by maintaining a physical distance between people.

- Extra features and add-ons are also planned for the app, for example, parkwide gamification, thermal imaging reports, ride popularity statistics, custom insight reports and integration with existing cashless payment methods. (Coates, April 2020);
- Augmented Reality (AR) lenses: The AR-powered Snap Lens ‘My Social Distance’ has been released recently in collaboration with WHO to help raise awareness about COVID-19. The Lens creates an AR circle on the ground at a recommended two-meter radius around the user. If another person, enters this region, the circle turns red thereby acting as a timely reminder for social distancing. (Mathers, April 2020);
- Gamification: Zenly is an app that shows live maps with location sharing for friends and family, traditionally used to encourage people to make plans and go out. Now it does the opposite, with a gamified self-isolation ‘Stay At Home Challenge’ that shows users which of their friends have spent most of the time inside on a leader board. (Chugh, April 2020); and
- In Egypt, the United National Development Programme (UNDP) is partnering with telecommunication companies to send out SMS text messages to encourage good hygiene, physical distancing, countering the spread of misinformation, and staying at home. (UNDP, May 2020)

Behavioural Science and Nudge Theory

The science of human behaviour (how real humans in the real world act and think) helps to inform governments in shaping their response to crises, and behavioural science is viewed as being key to dealing with the COVID-19 pandemic. (Lawton, 2020) The strategy of ‘nudging’ is based on the premise of changing behaviour through coaxing and pointing out positive outcomes to actions rather than through coercion. (Sengupta, 2020)

At a policy level, strategic initiatives can also act to discourage crowds. People are heavily influenced by what others around them are doing, so one of the most effective ways to promote compliance with isolation and social distancing is to emphasise how many people are already doing this.

Images of empty beaches and public places help to demonstrate that most people are complying with social distancing and staying home where possible. Salient and visible prompts in community locations also drive stronger compliance. “Prompts which are integrated within the physical environment have been proven to effectively change behaviour. In response to COVID-19, this includes visible, convenient placement of hand sanitisers and physical cues to guide people’s movement to comply with social distancing.” – New South Wales Government Behavioural Insights Unit. (Burton, 2020)

Nudging is being used to change people’s behaviour in relation to COVID-19, such as the NHS sending warnings to vulnerable people to self-isolate for 12 weeks, along with simple instructions to help them do it. Contact tracing apps also present an opportunity to introduce these insights into distancing, without needing any new data collection or sharing. They could have a feature added that works in a similar way to fitness tracking apps provide feedback on a person’s daily performance to nudge them into doing a little better tomorrow. Apps could tell users how many people they come into contact with each day, and what kind of risk profile that gives them – comparing them with other users without giving any private information away. The data could also differentiate between long and short encounters. Users could then track their efforts at distancing in real time. (Paul, April 2020)



Conclusions

Finding ways of motivating people to stay at home when they have COVID-19 symptoms (or suspect they might have) is crucial in managing a way out of lockdown. Digital tools are already being used to support people to stay at home (such as the daily texts sent by the NHS to help COVID-19 patients), and ever-more innovative solutions are being used and developed (including patient monitoring platforms and wearable devices). Crucially, there are a range of digital solutions also supporting people with long-term medical conditions to stay at home, which will also impact on the long term success of managing this pandemic.

However, a key factor in managing exit from lockdown is to consider the behaviour of the wider population. Digital incentives to ensure social distancing takes place are already being implemented, and the study of behavioural science has enabled the development of strategies to encourage, or 'nudge' people into changing their behaviour.

Appendix 1 – TechForce Challenge Awards

The table below details the 18 winning solutions awarded funding by the TechForce19 challenge. Each of the successful companies were awarded up to £25,000 each to further develop innovative solutions that offer a digital way to support vulnerable people who need to stay at home or need other help in the community for extended periods of time.

<p>Feebris</p>	<p>Feebris helps carers to identify health risks and deterioration within elderly communities. The Feebris app guides a carer through a 10min check-up, including capture of vital signs from connected medical-grade sensors (digital stethoscope, pulse oximeter etc.). Powerful AI augments clinical guidelines and personalised monitoring to help decisions on triaging health issues. The intention is to provide Feebris to care homes to help carers triage the day-to-day health needs of their residents during the COVID-19 pandemic and enhance the capabilities of remote clinicians.</p>
<p>Chanua / Neurolove</p>	<p>Chanua provides Neurolove.org, a platform providing a friendly ear and human support for young people to help them to keep virtually social and safe online. Supporting young people to manage anxiety and low mood, they can book sessions directly with mentors and therapists and find content that will support them to manage their emotional and mental health in this current period of uncertainty.</p>
<p>Peppy</p>	<p>Peppy helps parents-to-be, and new parents remotely access trusted, convenient advice from perinatal and mental health experts. This includes remote support via phone/video with lactation consultants, baby sleep consultants, specialist mental health support and more. Peppy provides timely interventions that reduce stress, anxiety and burn out for parents-to-be and new parents.</p>
<p>Team Kinetic</p>	<p>TeamKinetic's digital platform helps organisations better manage community-led volunteer programmes. The solution helps manage recruitment and retention of volunteers, as well as monitoring the impact of these programmes in real time. TeamKinetic are also looking at developing and documenting some open standards and establishing a model for better service interconnectivity across the voluntary sector.</p>
<p>Vinehealth</p>	<p>Vinehealth is a mobile app to support cancer patients and their loved ones during treatment by allowing them to easily track and understand their care, including their symptoms, side effects, appointments and medications. By completing a 1-minute daily log, cancer patients can develop a clear overview of their progress through treatment and access advice on how to cope and when to access health services. The Vinehealth app empowers cancer patients who are self-isolating to self-manage and feel more in control.</p>



Beam	Beam is a digital platform that supports the homeless and vulnerable. Beam takes referrals from local authorities and homeless charities, then ensures goods are funded, delivered and documented.
Alcuris	Alcuris' Memohub® prolongs the independence of elderly or vulnerable people, enabling them to return to home quicker, from hospital discharge. A digital platform collates data from unobtrusive sensors placed in the home, then provides actionable alerts when behaviour changes, enabling families to intervene early to delay or reduce the frequency of professional 'crisis intervention' help. This gives family a reassurance of loved one's safety and wellbeing even when left alone for extended periods. Also provides objective information to inform professional care planning.
Ampersand	Ampersand Health's self-management apps help people with long term, immune mediated diseases (such as Crohn's and Colitis) live happier and healthier lives. Using behavioural and data science, the apps deliver courses and programmes designed to improve sleep quality, stress management and medication adherence; with modules for activity, diet and relationships in the works. During the COVID-19 crisis, this will help these people better manage their conditions and reduce the need for clinical support. Ampersand are also offering their clinical management portal free of charge to NHS Trusts until January 2021, no strings attached. This will allow clinical teams to help manage their patients, remotely.
Aparito	Aparito uses remote monitoring technology (videos, wearables, photos and text) to gather patient-generated data outside of hospital. This is focused on patients with rare diseases. Data is captured and transferred via the patient's own smartphone / tablet and made available to clinicians or researchers in real-time to help avoid direct contact during the COVID-19 crisis.
Birdie	Birdie provides a digital platform for home care agencies to better manage the care they provide. Through an easy to use app, care workers capture daily visit logs, and a central hub allows staff to track real-time information. Family members receive live and daily safety and well-being updates through the app, including from optional home monitoring sensors. Birdie helps domiciliary care agencies to increase efficiency and improves the care people receive in their homes through systematic monitoring, prevention of risks, and support to carers.
Buddi	Buddi Connect is a smartphone app, enabling people to stay in touch with those they care for. Safe groups of connections are united through the app to share private, secure messages and raise instant alerts when help is needed. Important messages from the NHS can be shared directly to users. During this difficult time, while many vulnerable people are missing the face-to-face contact of family, friends and carers, the reassurance that help is available at the touch of a button is more important than ever.

<p>Just Checking</p>	<p>Just Checking supplies activity monitoring systems, used by local authorities to help with assessment of older people in their homes, for social care. Sensors pick up activities of daily living and display the data in a 24-hour chart. The company also has a second, more sophisticated activity monitoring system, to help manage the care and support of adults with learning disabilities.</p>
<p>Peopletoo Ltd/ Novoville</p>	<p>Peopletoo and Novoville have been selected to launch GetVolunteering, a volunteering app to fast track volunteers into clinical and non-clinical roles to support the fight against COVID-19. It will enable local authorities to quickly identify and assess capable volunteers in the local community to fill key roles to support social care in areas that have been impacted by loss of staffing capacity due to COVID-19, or for new roles that are required during the crisis.</p>
<p>RIX</p>	<p>The RIX Multi Me toolkit provides highly accessible and secure social networking that serves as a support network for people with learning disabilities and mental health challenges. This easy to use multimedia network, with accompanying communication, personal-organiser and goal-setting tools, enables isolated and distanced vulnerable people to build stronger support circles. It helps them self-manage their care and actively limit the impact and spread of COVID infection. Care professionals use the ‘Stay Connected’ RIX Multi Me Toolkit to remotely monitor and support people’s wellbeing in an efficient and friendly way.</p>
<p>Simply Do</p>	<p>Simply Do will develop a virtual community of NHS medical professionals currently in self-isolation. These employees have significant expertise, experience and skills which can be unlocked virtually to help solve COVID-19 care challenges set within the platform. This will create a powerful ‘think-tank’ of medical professionals to contribute virtually to fight COVID-19 by solving wider health challenges (i.e. challenges faced in the care sector).</p>
<p>SureCert</p>	<p>SureCert is a digital platform that connects people with job and volunteering opportunities. The system also manages background checks. SureCert can provide data on successful placements, and information to enable policy makers to better understand the labour market and volunteering supply and demand.</p>
<p>VideoVisit</p>	<p>VideoVisit® HOME allows the elderly to communicate with their family members and home care providers through a virtual care tablet designed specifically for elderly. VideoVisit will measure how this virtual home care service can increase people’s feeling of safety and decrease loneliness during self-isolation.</p>
<p>Virti</p>	<p>Virti aims to make experiential education affordable and accessible for everyone. Virtual and augmented reality, coupled with AI, transports users into difficult to access environments and safely assesses them under pressure to improve their performance. The system is used for training and patient education.</p>

Source: Public website (<https://www.public.io/techforce19-18-solutions-announced-to-support-the-vulnerable-or-isolating/>)



Appendix 2 – Digital Tools for Self-Isolation

The following tables outlines digital solutions from around the world (organised by region) in some detail. Whilst this is not an exhaustive list of tools or products, the findings should be considered examples of the kinds of technology that are currently available. It is important to note that DHI does not endorse or promote any of the solutions and products listed as examples in this Appendix, and that the market is rapidly evolving in response to the global COVID-19 crisis.

Name of Application:

Covidom

Country:

France

Status (planned/in development/developed/ live):

Live (operational since 9th March 2020)

Application features and function:

In France, health officials have managed to keep the city's hospitals from being completely overwhelmed using the Covidom app, to help non-critical cases of COVID-19 to cope with the disease at home. The name Covidom is a mashup of 'COVID' and 'domicile'. It was developed in early March by Paris university hospitals, working with a technology start-up called Nouveal e-santé.

The app is adapted from a proven telemedicine platform called e-fitback, developed by Nouval e-sante company (est 2015) to follow patients convalescing from surgery. The adaptation was commissioned by Paris hospital system in March 2020. The app aligns with EU GDPR-legislation. Covidom users accept these privacy conditions upon registration.

How it works:

- At diagnosis of COVID-19, the patient gets an SMS from the hospital with a link to register on the Covidom platform. Once registered, the app sends a notification for the patient to enter their symptoms and vital signs each day (breathing, heart rate, temperature, other health indicators)
- In response, the app generates a colour-coded message: Green (OK), Orange (moderate, a doctor will call within a few hours), Red (Emergency line will call you within 8 mins)
- Some 2,000 volunteers — mostly medical students and non-essential healthcare workers — have been trained to staff the Covidom platform and respond to patients' calls. They work in teams and in shifts from four floors in an empty university building in Paris
- Dr. Loic Josseran, a doctor volunteering for the platform, says you don't have to be physically present with a patient to tell when their condition is worsening. "The determining factor is the way they are breathing" he says. When a phone call is deemed necessary by the app, "We hear right away over the phone those who have trouble talking and are out of breath and coughing a lot. And we have a direct line to emergency services, so if a patient is declining, we can get them help immediately."

- A patient said: “I think the platform helps through this very psychological side of the disease, which is, basically, you think you’re good — and the day after, you’re afraid that you will need to go to the hospital. I was having this amazing monitoring but it was all virtual. Nobody touched me. I was talking to a camera – some doctor that I’ve never seen in my life. And you get through the disease like this.”
- The app had helped over 50,000 patients in the Paris region by the end of April. The psychological support the service offers during the disease is one of the most important aspects to the patients. According to a cardiologist Jourdain, the App has also transformed people’s perception of when they should go to the emergency room.

Further information:

The app is free for patients, who make up most of its 100,000 users (doctors are included in that total as well). Healthcare facilities pay for it, and some 350 are using it. There are plans for the French state to finance it. Only 300 app users have been hospitalised and their condition was detected early. Many other countries and regions in France are interested in adopting the app. Nouveal e-santé is now working on an app that would help stop the spread of COVID-19 once the nationwide lockdown ends.

Link(s) to Source:

1. <https://eithealth.eu/covid-19-rapid-response/covidom-community/>
2. <http://www.rfi.fr/en/france/20200327-covidom-app-developed-in-record-time-to-help-monitor-french-covid-19-cases-coronavirus-e-health>
3. <https://www.aphp.fr/contenu/covidom-une-solution-de-tele-suivi-domicile-pour-les-patients-porteurs-ou-suspectes-covid-19>
4. <https://www.service-public.fr/particuliers/actualites/A13927>
5. <https://www.lefigaro.fr/sciences/coronavirus-covidom-une-application-mobile-qui-suit-les-patients-20200327>



North America

Name of Application:

Lumeon

Country:

US

Status (planned/in development/developed/ live):

Live

Application features and function:

Lumeon is a United States based solution to COVID-19 home monitoring. Lumeon's solution digitally screens and enrolls COVID-19 symptomatic patients into a SMS home monitoring program, that automatically escalates those with negatively progressing symptoms to a central clinical team. The solution has been deployed in New York Health + Hospitals as of April 13th, 2020.

How it works:

- Patient enrolment and online screening: Patients who have been discharged, were not unwell enough to be admitted to the ED, or who are experiencing symptoms at home, are instructed to text 'COVID' to a designated mobile number. This triggers a patient screening form to be sent to the patient via a link in an SMS. Alternatively, for those patients who do not have a smartphone, the form can be accessed and completed via a customer-hosted webpage.
- Onboarding and risk stratification: Based on the patient's responses, the platform determines whether enrolment onto the remote monitoring program is necessary, or whether the patient should self-monitor. The patient's baseline risk level is also calculated, and any change in symptoms, is compared with this initial status.
- Daily SMS monitoring: Patients on the program are automatically sent a survey twice daily, or at the desired frequency, prompting them to report whether they face difficulty breathing. If responses indicate the patient could be deteriorating, they are added to an urgent call list. Monitoring stops only after the patient has been low risk for a number of consecutive days.
- Centralised dashboard for providers: Providers tasked with reviewing unwell community patients can access worklists organized by risk severity. Clinicians can review symptom progression trends, presenting symptoms, co-morbidities, and previously captured clinical notes before contacting the patient. They can also re-classify a patient's risk status and record call outcomes. Functionality to trigger a video call directly from the patient screen is currently being developed.

Further information:

Lumeon's customer base includes a range of innovative healthcare providers including BUPA, Nuffield Health, Alliance Medical, HCA, Optegra and Newmedica.

Link(s) to Source:

1. <https://www.lumeon.com/covid-19-remote-home-monitoring/>

Name of Application:

TELUS Health

Country:

US/ Canada

Status (planned/in development/developed/ live):

Live

Application features and function:

TELUS Health have expanded their digital health home monitoring offering in British Columbia (Canada) to virtually support patients with or at risk of COVID-19. The TELUS Home Health Monitoring system is currently aligned with the Canadian Centre for Disease Control's COVID-19 protocols for the monitoring of patients recovering from COVID-19 outside of hospitals.

How it works:

This digital health dashboard allows healthcare providers to track symptoms and provide clinical support for more patients as they recover from COVID-19 at home by:

- Using a provided link, patients can complete daily questionnaires to report biometric data including temperature, physical symptoms and overall health condition. They can use their own mobile devices, computer or use a COVID-19 kit that includes a tablet and thermometer.
- The dashboard-style program provides clinicians with crucial information on each patient's health, allowing them to remotely triage cases and quickly identify those in need of urgent care. They can manage many patients at one time; current statistics show that ratio to be approximately one clinician to 200 patients, depending on the monitoring model.
- Beyond the COVID-19 patients, clinicians can care for palliative, immunocompromised and chronic disease (like COPD, hypertension and diabetes) patients while reducing pathogen exposure.
- The standard COVID-19 HHM solution can be deployed in a short period of time. Online training is quick and easy for clinicians.

Further information:

Home Health Monitoring by TELUS Health has been in use in B.C, since 2013 to remotely monitor patients in the province living with chronic conditions such as heart failure, diabetes and respiratory diseases.

Link(s) to Source:

1. www.globenewswire.com/news-release/2020/04/23/2021113/0/en/telus-health-expands-digital-home-health-monitoring-to-virtually-support-b-c-patients-with-or-at-risk-of-covid-19.html
2. www.telus.com/en/health/covid19-public_health



Asia and Australia

Name of Application:

VivaLNK

Country:

China

Status (planned/in development/developed/ live):

Live

Application features and function:

VivaLNK is a California based connected health start-up, but its continuous temperature sensor has been used to combat the spread of COVID-19 in China. The company (and its partners) have developed the monitoring and alert solution aimed at automating the tracking of changes in patient temperature on a continuous basis. IoT enabled medical wearable temperature sensors remotely transmit data to a central monitoring system, and medical staff are alerted based on trends and thresholds, identifying the patient and room, and can respond accordingly.

How it works:

The temperature sensor is applied directly onto the patient and allows for continuous, real-time monitoring of changes in body temperature. Data is then sent electronically from the patient to a remote observation dashboard at a clinical station, this allows health and care professionals to monitor them easily and safely. Instead of physically checking the patient's temperature every few hours with a mercury thermometer, temperatures can be monitored remotely and automatically, thereby limiting patient-to-caregiver contact.

Further information:

The company's portfolio includes wearable medical grade devices and data analytics applications that continuously monitor the health and well-being of individuals.

Link(s) to Source:

1. <http://www.vivalnk.com/covid-19>
2. www.mobihealthnews.com/news/asia-pacific/combating-spread-coronavirus-china-through-continuous-temperature-monitoring

Name of Application:

PHILIPs eCareCompanion and eCareCoordinator applications

Country:

Australia

Status (planned/in development/developed/ live):

Live

Application features and function:

Australia's West Moreton Health's Community and Rural Service has utilised PHILIPs eCareCompanion and eCareCoordinator applications. eCareCompanion is a telehealth app that patients can access on a secure tablet at home and to share health information with their care team. Patients can use it to fill out health questionnaires, communicate with their care teams, and sync data from connected medical devices. So far, this app runs only on Android devices, but it will be extended to iOS in the future.

How it works:

Patients can enter in their vital information and submit it to their care team for review, and are able to answer survey questions, respond to email messages, receive reminders about their care plan, and even have a video call with their provider. eCareCoordinator is a telehealth software platform allows clinicians to remotely monitor patients' vital signs and send patients short surveys about their health status. This combination of objective data and subjective responses enables clinicians to make informed, timely care decisions.

Further information:

Philips developed the apps this summer as part of a partnership with Salesforce to build an open, cloud-based platform that helps caregivers manage patients. Salesforce expects that this platform will eventually offer patients tools that range from self-care and prevention, to diagnosis and treatment through recovery and wellness.

Link(s) to Source:

1. www.philips.com/a-w/about/news/archive/standard/news/articles/2020/20200428-philips-telehealth-solution-supports-self-isolating-covid-19-patients-in-australia.ht
2. <https://www.mobihealthnews.com/37064/philips-receives-fda-clearance-for-two-telehealth-apps>

1. Public (2020, 24 April). Techforce19: 18 Solutions Announced to Support the Vulnerable or Isolating. Public. <https://www.public.io/techforce19-18-solutions-announced-to-support-the-vulnerable-or-isolating/>
2. Sang, A. & Lokshin, M. (2020, 23 April). Can public policy incentivize staying at home during COVID-19? Brookings. <https://www.brookings.edu/blog/future-development/2020/04/23/can-public-policy-incentivize-staying-at-home-during-covid-19/>
3. Wood, J. (2020, 16 March). This is how Europe is helping companies and workers as the coronavirus crisis deepens. World Economic Forum. <https://www.weforum.org/agenda/2020/03/covid-19-quarantine-sick-pay/>
4. NHS Digital (2020, 30 March). NHS support via text message for people with symptoms of Covid-19. NHS Digital. <https://digital.nhs.uk/news-and-events/news/nhs-support-via-text-message-for-people-with-symptoms-of-covid-19>
5. Wiggers, K. (2020, 29 April). Current Health partners with the Mayo Clinic for remote coronavirus patient monitoring. Venture Beat. <https://venturebeat.com/2020/04/29/current-health-partners-with-the-mayo-clinic-for-remote-coronavirus-patient-monitoring/>
6. Hung, C. (2020, 16 April). Lumeon Adapts Their “Autopilot” to Help Hospitals With COVID-19. Healthcare IT Today. <https://www.healthcareittoday.com/2020/04/16/lumeon-adapts-their-autopilot-to-help-hospitals-with-covid-19/>
7. EIT Health. (2020). Covidom Community. EIT Health. <https://eithealth.eu/covid-19-rapid-response/covidom-community/>
8. Morris, A. (2020, 4 May). Monitoring COVID-19 from hospital to home: First wearable device continuously tracks key symptoms. Northwestern Now. <https://news.northwestern.edu/stories/2020/04/monitoring-covid-19-from-hospital-to-home-first-wearable-device-continuously-tracks-key-symptoms/>
9. Coates, C. (2020, 21 April). Holovis develops free social distancing app Crowd Solo. Blooloo. <https://blooloo.com/news/holovis-social-distancing-app-crowd-solo/>
10. Chugh, A. (2020, 6 April). Technology Trends That Are Making Social Distancing Easier. Medium. <https://medium.com/datadriveninvestor/technology-trends-that-are-making-social-distancing-easier-d019d551f36f>
11. Koh, D. (2020, 30 January). Combating the spread of coronavirus in China through continuous temperature monitoring. MobiHealth News. <https://www.mobihealthnews.com/news/asia-pacific/combating-spread-coronavirus-china-through-continuous-temperature-monitoring>
12. UNDP (2020, 7 May). Using behavioural insights to respond to COVID-19. UNDP. <https://www.undp.org/content/undp/en/home/stories/using-behavioural-insights-to-respond-to-covid-19-.html>
13. Paul, G. (2020, 29 April). Contact tracing apps: why they should learn a trick from fitness trackers. The Conversation. <https://theconversation.com/contact-tracing-apps-why-they-should-learn-a-trick-from-fitness-trackers-137429>
14. Beardsley, E. (2020, April 29). In France, A New App Is Helping Doctors Monitor COVID-19 Patients Remotely. NPR.Org. <https://www.npr.org/2020/04/29/847171229/in-paris-a-new-app-is-helping-doctors-monitor-covid-19-patients-remotely>
15. Otra-aho, P. (2020, 22 March). Buddy Healthcare Launches COVID-19 Remote Care Solution to Support Hospitals. Buddy Care. <https://www.buddyhealthcare.com/news/buddy-healthcare-launches-covid-19-remote-care-solution-to-support-hospitals>
16. Heilweil, R. (2020, March 20). Feeling anxious about coronavirus? There’s an app for that. Vox. <https://www.vox.com/recode/2020/3/20/21185351/mental-health-apps-coronavirus-pandemic-anxiety>
17. Lawton, G. (2020, 6 May) Can nudge theory really stop covid-19 by changing our behaviour? New Scientist. <https://www.newscientist.com/article/mg24632811-400-can-nudge-theory-really-stop-covid-19-by-changing-our-behaviour/>
18. Sengupta, K. (2020, 2 April). Coronavirus: Inside the UK government’s influential behavioural ‘nudge unit’. Independent. <https://www.independent.co.uk/news/uk/politics/coronavirus-uk-government-nudge-unit-dominic-cummings-herd-immunity-a9444306.html>
19. Burton, T. (2020, 26 March). Mind tricks for beating COVID-19. Financial Review. <https://www.afr.com/politics/federal/mind-tricks-for-beating-covid-19-20200326-p54e6b>