

## EVALUATION OF A DIGITAL THERAPY FOR UNCONTROLLED HYPERTENSIVE PATIENTS FOLLOWED BY GENERAL PRACTITIONERS IN FRANCE

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**Objective:** The digital therapy was designed by hypertension specialists and included

- a touch-sensitive tablet (Vodafone smart tab 3G) and an automatic blood pressure, connected via Bluetooth to the tablet (ihealth, BKN-550BT), a web portal developed specifically for the study with access reserved for health professionals involved in the follow-up of hypertensive patients. The health data were hosted on an accredited server.

**Design and method:** The digital therapy was designed by hypertension specialists and included

- a touch-sensitive tablet (Vodafone smart tab 3G) and an automatic blood pressure, connected via Bluetooth to the tablet (ihealth, BKN-550BT), a web portal developed specifically for the study with access reserved for health professionals involved in the follow-up of hypertensive patients. The health data were hosted on an accredited server.
- as software for the patient, several applications specifically developed to 1) perform home blood pressure monitoring over 3 days 2) monitor treatment compliance (GIRERD questionnaire) 3) detect excessive salt consumption (ExSel questionnaire)

for the physician a web interface specifically developed to 1) know the results of the remote monitoring of each patient 2) help to follow the recommendations of the ESH for the associations of antihypertensive drugs 3) obtain if necessary the opinion of a Hypertension specialist after a request written by e-mail.

77 patients treated for uncontrolled primary hypertension at office visit despite the prescription of bi-therapy were randomized into 2 groups: a group in which the physician had access to functions 2 and 3 of the website, and a control group in which the physician did not have access to functions 2 and 3 of the website. All patients were instructed to use the 1 2 3 applications once every 3 weeks for a total of 3 months.

**Results:** The patients included were  $63 \pm 7$  years old. 32.5% of patients used the entire program and completed 4 HBPM and visited the physician again at the final visit. The table shows the main results by randomization group:

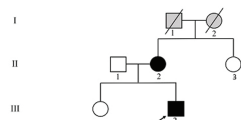


Figure 1. Family pedigree. Black filled symbols, subjects carrying the identified R272L (19901) A and R272L (19901) B mutation. Grey symbols, subjects without identified mutation. Grey filled symbols, non-sequenced. Black arrow indicates the proband.

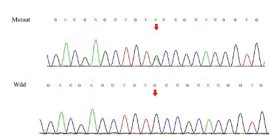


Figure 2. Sanger sequencing identifying the heterozygous C>A transition at nucleotide 1990 of R272.

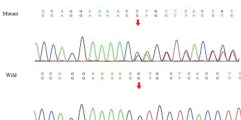


Figure 3. Sanger sequencing identifying the homozygous C>A transition at nucleotide 1990 of R272. The two bases responses on the two way are identified based on the height of the peak. Generally, the base of the peak is higher in the top.

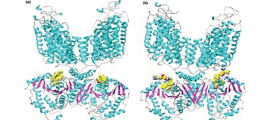


Figure 4. The ribbon models of the protein encoded by the R272L mutation and the normal R272L (PDB: 3P7N). Yellow spheres indicate conserved amino acid residues.

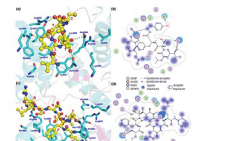


Figure 5. Left: Interaction between conserved amino acid and surrounding amino acid residues in the protein encoded by R272L. Right: Interaction between conserved amino acid and surrounding amino acid residues in the protein encoded by R272L. Yellow spheres indicate conserved amino acid residues.

**Conclusions:** A digital therapy developed by hypertension specialists is effective in improving hypertension control in patients followed by general practitioners in France.

## HOME BLOOD PRESSURE MONITORING WITH A DIGITAL BLOOD PRESSURE COACH - A PROSPECTIVE ANALYSIS OF USER DATA

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**Objective:** Home blood pressure monitoring (HBPM) is recommended by guidelines for the management of hypertension. The Manoa smart phone app is a certified digital coach that informs, guides and supports users in guideline-compliant HBPM, which involves completion of at least 6 days of home BP measurements. The app has been freely available in all relevant app stores since April 2020.

**Design and method:** From 4/20 to 3/21 we prospectively analyzed self-reported BP levels and user data from users who self-identified as having the diagnosis of hypertension. The prospective study protocol was approved by the local ethics committee.

**Results:** To evaluate the effects of a digital BP coach on BP levels we analyzed the change in app-documented BP levels between baseline and follow-up HBPM periods (8–16 weeks, n = 864). Average baseline systolic home BP was 131.5 mmHg for the total group, which decreased significantly to 128.06 mmHg at follow-up (p < 0.05), resulting in increased BP control from 70% of hypertensive users at baseline to 81% at the follow-up HBPM period. In the subgroup of users with uncontrolled BP at baseline, and who also had recorded follow-up BP data (n = 384), baseline BP was 138.8.0mmHg, which decreased significantly to 132.69 (p < 0.001).

We analyzed the change in SBP according to baseline SBP. To this end, we first used non-linear fitting followed by steady linear fitting and linear regression analysis. There was a significant negative linear correlation (r = -0.56, p < 0.001) between SBP lowering and baseline BP down to level of SBP of 125 mm Hg. Below this value, baseline SBP was not associated with SBP decrease at follow up (r = -0.19, p = 0.16).

**Conclusions:** Our data show that the use of a digital BP coach by users with self-reported hypertension is associated with a reduction in average BP and an improvement in hypertension control after two periods of structured HBPM.

## PERSON-CENTREDNESS IN HYPERTENSION MANAGEMENT USING INFORMATION TECHNOLOGY (PERHIT): A RANDOMISED CONTROLLED TRIAL IN PRIMARY HEALTH CARE

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**Objective:** Few studies address results from use of new technology and patient participation in hypertension management. The PERHIT Study is a multicentre randomised controlled trial with the aim to evaluate the effects of a person-centred approach using a web-based, interactive self-management system through the patient's own mobile phone on blood-pressure and well-being. Primary aim is the degree of achieved blood pressure (BP) control after eight weeks and one year. In addition, person-centeredness, usefulness, daily life activities in relation to BP values, awareness of risk and health care costs are studied.

**Design and method:** The PERHIT study was performed in four regions in southern Sweden. Following inclusion, more than 900 patients from 31 primary health care centres were randomised to two groups. In the intervention group (INT), patients were provided with a web-based self-management support system including a home-BP monitor. For eight consecutive weeks, they measured BP and performed self-reports regarding well-being, symptoms, lifestyle, medication intake and side effects every evening via their mobile phone. They could also receive motivational messages and reminders throughout the intervention period. Both patients and professionals had access to graphic feedback of reported values through a secure web portal. Patients in the control (CON) group received standard treatment as usual.

**Results:** The primary outcome (BP < 140/90 mmHg) was achieved by 48.5% and 47.1% in the INT, and by 40.4% and 40.9% in the CON group after 8 weeks (p = 0.016) and 12 months (p = 0.067), respectively. Both patients and professionals experienced the system as a useful resource for communication regarding BP and lifestyle. They described that it could be used to support a constructive and person-centred partnership between patients and professionals.

**Conclusions:** Blood pressure control was significantly better after eight weeks, but not after one year, following an intervention based on use of mobile phones, feedback and interaction between patients and primary care professionals compared to standard care. The system can be a tool toward a new way of working and help patients reach a controlled BP and play a role in a more person-centred and individually adapted hypertension management.

## TELEMEDICINE AND HEALTH POLICY CHANGES IN RESPONSE TO RESTRICTIONS RELATED TO COVID-19 PANDEMICS IN LATVIA

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**Objective:** Remote consultations are quickly emerging to give more access to real-time, high-quality, efficient, and cost-effective healthcare in the current COVID-19 pandemic.

Objective is to investigate the changing experiences of remote consulting for patients in Latvia and plan effective health policies, to provide a full analysis of the policy for telemedicine applications and solutions based on the current conditions.

**Design and method:** Materials and approaches include an examination of normative documents as well as a variety of informational sources. The information offered is mostly based on national strategy papers, official reports, and scientific publications on Tele-medicine implementation.

**Results:** Telemedicine's range will continue to expand, connecting patients and providers internationally as providers look to expand globally. This will not only help improve the long-term policies about health but may also provide patients with rare diseases alternative avenues to seek highly specialized care. Telemedicine strategy must react faster than ever during the COVID-19 epidemic. Latvia has reacted to Covid pandemics and have noticeable implemented new possibilities to provide new approaches provided by telemedicine: providing remote consultations to patients in different sectors, using E-referrals that were implemented but not sufficiently used before, providing more possibilities to provide remote services also for consili-ums, physician-physiscan online consultations. New ICT tools were used for patient remote monitoring. The normative regulation, stategical decisions and changes in long-term policy documents haven't been changed, so there are limitations to provide the telemedice expansion or stable use after the emengency situation ends. Health policies about telemedicine have another key role with to pursuing that.

**Conclusions:** Telemedicine is fast expanding, demand for this service is rising. Although not a replacement for face-to-face consultations, this study illustrates that remote consulting can be an acceptable adjunct to traditional face-to-face consultations. More research is required to identify overall safety and applicability. Digital Health Strategy in Latvia is still on developing stage. Changes or legislation to clarify Telemedicine are still in the process. It is important to provide a good environment for Telemedicine to expand, setting strategies and visions on how those new approaches will be regulating normatively and administratively.

#### **LATVIA'S DOCTORS EXPERIENCE ON PROVIDING REMOTE CONSULTATIONS DURING COVID-19 PANDEMICS**

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**Objective:** Major challenge for health care service became a situation of a pandemic caused by COVID-19 infection, when doctors continued to provide care switching to remote consultations when possible. This provided better accessibility to receive consultation from doctor, and those consultations where sometimes the only way to be consulted for the patient.

**Aims of the study:** To explore and analyze Latvia's doctors experience on providing remote consultations during COVID-19 pandemics.

**Objective:** 1) To detect the volume and type of work physicians are able to manage remotely. 2) To find out what technical, GDPR-associated and other difficulties face doctors during the process. 3) To define the general attractiveness of remote consulting.

**Design and method:** Two groups of doctors filled in the questionnaires in year 2021.

**Results:** In one group, which consisted of 200 general practitioners, most respondents consider they could provide remote medical consultation about healthy lifestyle - 89,0% (n = 178); regarding check-ups, screening results - 86,5% (n = 173); to manage recommendations of other healthcare specialists - 66% (n = 132). Difficulties faced: 54,0% (n = 108) were not satisfied with payment, 22,5% (n = 45) admitted lack of specific skills, 45,5% (n = 91) found it problematic to make e-referrals. 61,0% (n = 122) like the idea of implementing services in practice on a regular basis. Another group, which consisted of 62 doctors of different specialties working in Clinical University Hospital. All doctors (62) were consulting by phone, 18 doctors only by phone, however 44 were consulting via e-mails, social network on video-conference platforms as well.

Research revealed that the process of patient identification, search of patient's data and sensitive data transfer is complicated, time consuming and requires different approaches to manage.

**Conclusions:** Latvian doctors have experience in remote consulting. When consulting remotely Latvian doctors were facing technical, legal, social and other difficulties. Some Latvian doctors are interested in introducing remote consulting services in their practice, if the restrictive moments for their provision would be eliminated. As well as there is need for amendments in normative regulation for providing remote consultations, and challenges relates to payment system implementations especially for state paid services.