

## TELEMEDICINE IN SLOVENIA

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**Abstract** Telemedicine could be one of the solutions for challenges in healthcare, especially in this time of the Covid-19 pandemic. The results of the research about the state of telemedicine services in Slovenia are presented in this article. We found several telemedicine solutions in Slovenian healthcare. Metadata for them were collected. The solutions are placed in groups of telemonitoring, provision of healthcare services by remotely connecting patients with a doctor or healthcare professional and remote cooperation for the patient's treatment between doctors or healthcare professionals who are physically at different locations. The opinions of the research participants regarding the challenges associated with telemedicine services in Slovenia were also collected. They are placed in three main groups: financing, healthcare system and healthcare professionals. Telemedicine is a necessity and the future of Slovenian healthcare services. If a solution is to be applied successfully, business processes must be changed so that a practically useful service can arise from the solution.

**Keywords:**  
telemedicine,  
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## 1 Introduction

European citizens are getting older and are increasingly living with chronic diseases. Their health condition often requires enhanced medical attention. Medical support may not be available in remote areas and for certain specialities as easily or as frequently as their health condition would require. (COM(2008)689). So changes in health services are needed. On the other hand, the improvement on the information and communications technology (ICT) field is enormous. It could be successfully used for making changes in healthcare services. Some healthcare treatment can be done remotely. Telemedicine is a proper solution for these challenges, especially in this time of the Covid-19 pandemic.

Telemedicine (TM) is the provision of healthcare services, through use of ICT, in situations where the health professional and the patient (or two health professionals) are not in the same location. It involves secure transmission of medical data and information, through text, sound, images or other forms needed for the prevention, diagnosis, treatment and follow-up of patients. (COM(2008)689).

Although there are several telemedicine services available in Slovenia, no overview of them is accessible. As suggested by one of the members, the Governing board (GB) of the Slovenian Medical Informatics Association (SDMI) has decided on making the research about usage TM solutions in Slovenia.

## 2 Methodology

The purpose of the research was to learn about the state of telemedicine in Slovenia. The research question was: What is the state of telemedicine in Slovenia? The research was carried out in May and June 2020, after the first wave of the Covid-19 pandemic. In the first phase members of GB SDMI were asked to find and report the TM solutions. Members of GB SDMI were selected because they are from many medical information fields: universities, institutes, healthcare providers, software developers and other experts from the medical information field. They geographically covered all Slovenia. So we could get a very broad view about the selected topic.

With the aim to collect data we prepared a structured questionnaire. In the second phase we collected key metadata for each solution: name of the solution, members of the development, contact person and contact data, target users, users amount assessment, short solution description, potential for usage on the national level. We also asked for respondents' opinions of three most important challenges and note the person who provided the data. The data was gathered and entered in the same table by the healthcare providers' members, software development companies, experts from the Slovenian universities and the national institute, and other experts from the medical information field. We published the organized table of the answers on the SDMI web page (SDMI, 2020). These answers we analyzed further and the results of the analysis are presented in this article.

### **3 Results**

As part of the research, we collected metadata for 15 telemedicine solutions in Slovenian healthcare. We placed them in the following groups:

- telemonitoring (model Business to Customer - B2C),
- provision of healthcare services by remotely connecting patients with a doctor or healthcare professional (model Business to Customer - B2C),
- remote cooperation for the patient's treatment between doctors or healthcare professionals who are physically at different locations (model Business to Business - B2B).

A description of the solutions and their associated services is given below.

#### **3.1 Telemonitoring**

We have found five solutions for telemonitoring.

Telemonitoring is a telemedicine service aimed at monitoring the health status of patients at a distance. Data can be collected either automatically through personal health monitoring devices or through active patient collaboration (e.g. by entering weight or daily blood sugar level measurements into a web-based tool). Data, once processed and shared with relevant health professionals, may be used to optimize the patient's monitoring and treatment protocols (COM(2008)689).

**Storitve centra za zdravje na daljavo CEZAR** (*TM support service provided by the Regional Centre for Telehealth (CEZAR)*) (Rudel et al, 2016 Zdrav Vest). The solution was developed by General Hospital Slovenj Gradec, Healthcare Centre Ravne and MKS Electronic Systems Ltd., Ljubljana. It is made for telemonitoring and chronic disease management for patients with diabetes mellitus type 2 or chronic congestive heart failure (SDMI, 2020).

**Sistem za oddaljeno spremljanje in telemedicinsko obravnavo pacientov (SOSTOP)** (*The system for patient telemonitoring and telemedicine treatment*) (SOSTOP, n.d.) was developed by Ipmit d.o.o., Nova Vizija d.d., Medicina Iljaž d.o.o. and Faculty of Computer and Information Science, Ljubljana. It is made for provision of healthcare services at a distance in family medicine reference clinics for patients with chronic illnesses (SDMI, 2020).

**T-MED Gluco** was developed by MKS d.o.o., Ljubljana and VPD Bled d.o.o. It is made for provision of healthcare services at a distance for patients with diabetes mellitus type 2 and the diabetes clinics (SDMI, 2020).

**E-zdravje Telekom Slovenije** (*eHealth Telekom Slovenia*) (Oroszy & Pustatičnik, n.d.) was developed by Telekom Slovenije, d.d., University Medical Centre Ljubljana (UMCL), University Clinic Golnik and National Institute of Public Health Slovenia (NIPH). It is made for remote monitoring of patients with chronic illnesses. It is also used by the UMCL for individual Covid-19 patients in isolation at home (The Fast Mode, n.d.) (SDMI, 2020).

**E-oskrba** (*E-care Service*) (Ekosmart, n.d.) was developed by Telekom Slovenije, d.d. and the Slovene Federation of Pensioners' Associations (ZDUS). It enables active, independent and safe living at home to the elderly, patients with chronic diseases, and to disabled persons (SDMI, 2020).

### 3.2 Remotely connecting patients with a doctor or healthcare professional

We have found four solutions for provision of healthcare services by remotely connecting patients with a doctor or healthcare professional. They are made by the software developer companies for the healthcare providers. The patient can communicate with the healthcare professional safely from a distance. The solutions

provide online scheduling of appointments, ordering electronic prescriptions, electronic referrals and electronic sick leave certificates. Some of them enable safely sharing specialist reports, radiology images and also electronic or even video consultations for distance treatments.

**doZdravnika.si** (doZdravnika.si, n.d.) was developed by SRC Infonet. (SDMI, 2020).

**Hipokrat - eSodelovanje** was developed by LIST d.o.o. (SDMI, 2020).

**PriZdravniku** (Modul PriZdravniku, n.d.), (Storitev eVideoPosvet, n.d.) was developed by Nova Vizija d.d. (SDMI, 2020).

**Gospodar zdravja** (Gospodar zdravja, n.d.) was developed by Gospodar zdravja d.o.o. (SDMI, 2020).

### **3.3 Remote cooperation between doctors or healthcare professionals who are physically at different locations**

Seven solutions were found for remote cooperation for the patient's treatment between doctors or healthcare professionals who are physically at different locations.

**Teletransfuzija** (Teletransfuzija, n.d.) was developed by the Blood Transfusion Centre of Slovenia and XLAB, d.o.o. Telemedicine is used to perform mandatory pre-transfusion tests from a distance. From their own location a specialist in transfusion medicine examines, reads, orders further tests and authorises the issue of blood at other locations, where a medical laboratory scientist carries out pre-transfusion tests. The computer teleconsultation system covers the entire blood transfusion service in Slovenia since 2005 (SDMI, 2020).

**TeleFarma** (Telefarma, n.d.) was developed by The Faculty of Medicine at the University of Ljubljana (UL MF), SRC Infonet, General Hospital Murska Sobota and Healthcare Centre Škofja Loka. TeleFarma enables all physicians, regardless of their location, equal access to clinical pharmacists and offers better cooperation between physicians and clinical pharmacists (SDMI, 2020).

There are three telemedicine solutions in Slovenian eHealth under the governance of National Institute of Public Health (NIPH) Slovenia.

**Telekap** (*TeleStroke*) (Nacionalni inštitut za javno zdravje, NIJZ, n.d.) was developed by Interexport d.o.o., The Division of Neurology, UMCL, Ministry of Health of RS and NIPH Slovenia. The medical specialist from The Division of Neurology supports doctors from other hospitals if a patient is suspected of having a stroke. It takes place through a high quality video-conference, accessible 24 hours a day (SDMI, 2020).

**Teleradiologija** (*Teleradiology*) (NIJZ, n.d.) was developed by Interexport d.o.o., Ministry of Health of RS and NIPH Slovenia. It is a telemedicine service which involves the electronic transmission of radiographic images from one geographical location to another for the purposes of interpretation and consultation (SDMI, 2020).

**ePosvet** (*eConsultation*) (NIJZ, n.d.) was developed by IN2 d.o.o., Jesenice General Hospital and Osnovno zdravstvo Gorenjske. It enables consultation between general practitioners and medical specialists about a specific patient with the aim to reduce waiting periods and expedite the treatment process (SDMI, 2020).

**Mobilni zdravnik** (*Mobile doctor*) was developed by Nova Vizija d.d. It enables sharing medicine data between a nurse and a doctor, who is not in the clinic (SDMI, 2020).

### 3.4 Challenges

We also collected the opinions of the research participants regarding the challenges associated with telemedicine services in Slovenia. These opinions are analysed below.

#### 3.4.1 Financing

Funding was the problem most commonly highlighted by respondents. First and foremost, this is funding for telemedicine services provided by healthcare providers. The service is not paid for by Health Insurance Institute of Slovenia (ZZZS), which means that providers cannot be remunerated. It is important for service provision

to be financially sustainable. The process of accepting new services for funding at the national level needs to be accelerated. Other providers need to be given funding for consultations, and funding also needs to be found for measuring devices and other equipment that the patient receives for measurement purposes. The outdated information and communication equipment in hospitals is also problematic and needs to be replaced.

### **3.4.2 Healthcare system**

The respondents highlight the lack of awareness of the importance and potential of services on the part of decision-makers, and the rigidity of the healthcare system when it comes to accepting new services. The profile of the telemedicine system must be raised. Telemedicine services should be linked to national eHealth solutions. There must be cooperation between stakeholders in Slovenia. Interoperability and mobility must be ensured, standards introduced and materials standardised. There is also a lack of trust in the new communication methods. A telemedicine strategy is urgently required in Slovenia, additions must be made to the foundations of the system and to the systemic support for telemedicine and telecare, and standards put in place for the provision of services. The security aspect is also extremely important. New healthcare providers must be brought into the system. Equal access must be ensured for everyone who requires services.

### **3.4.3 Healthcare professionals**

The research highlights the lack of awareness of the importance and potential of services on the part of healthcare professionals, and the readiness of healthcare professionals to accept new services. Motivation among healthcare workers is very low and they do not see use of telemedicine as a professional challenge. Healthcare professionals are often unaware that using these services can make their work significantly easier and reduce the amount of time required to treat a patient, and that freeing up telephone lines is vital. While they find the decision to start using telemedicine a difficult one, once they overcome their resistance, they never want to go back. After the first module of the solution is used, it swiftly spreads throughout the institution or into new functionalities. Healthcare professionals are afraid that patients are able to book a specific slot in their timetable without the intervention of a nurse.

## 4 Discussion

In our analysis of the state of telemedicine services in Slovenia, we focused on an unresearched area, which meant that quantitative empirical methods could not be used. Our assessment was that a thorough analysis is the most suitable methodological approach to researching and understanding this area.

Slovenia has a long telemedicine tradition stretching back to the 'Rdeči gumb' (Red button) system in 1992. Quite a large number of telemedicine solutions were developed (mainly as part of research projects), but not all of them remain in use. One of the reasons for this is most definitely the fact that the successful introduction of telemedicine services requires a change to business processes. (Rant, 2009) (Rant, 2010). A new service is therefore designed and then put into practice. Examples of good practice are Teletransfusion, which has been successfully in place since 2005 and enables the national remote interpretation of pre-transfusion blood tests, and the distance telemedicine monitoring of chronic heart failure and type 2 diabetes patients at the CEZAR Centre for Remote Health at Slovenj Gradec General Hospital (since 2014). The use of telemedicine services is increasing in Slovenia, which is also the result of the Covid-19 pandemic. This is also shown by the operations of the Telemedicine Centre at Ljubljana University Medical Centre, which was established during the pandemic and has provided Covid-19 patients with telemedicine treatment in cooperation with clinical departments.

Scientific and professional work in the area of telemedicine has also been under way in Slovenia for quite a few years. The Slovenian Medical Informatics Society (SDMI) organised an expert conference *Telemedicina – zdravje na daljavo* ('Telemedicine – Distance Health') in Ptuj in 2010. Although members of the SDMI drew up the premises for the preparation of a national distance health strategy in 2012, no strategy has yet been forthcoming.

There is scant official data on the substantive and financial benefits and weaknesses of telemedicine (Oroszy, 2020), (Rudel et al, 2016 *Zdrav Vest*). Telemedicine does definitely help to reduce waiting lists and times, the number of hospitalisations, the duration of hospital stays and the impact on patients, which in turn leads to savings in healthcare expenditure and increases the patient's quality of life. They return to work sooner, which also reduces expenditure on sick leave. Instead of using up



resources as a result of their absence from work, the patient is able to start creating value again. These solutions also help to relieve the burden on telephone lines and therefore make doctors more accessible. Doctors are less occupied with check-ups and therefore have more time to devote to those patients who need them more.

One of the main weaknesses is the funding and financial sustainability of telemedicine provision. However, moves are being made in this area as well, with the Health Insurance Institute of Slovenia (ZZZS) funding some services in 2020 and 2021.

Those responsible for developing the services mention the lack of awareness of the importance and potential of telemedicine services on the part of decision-makers and healthcare professionals, and the rigidity of the healthcare system when it comes to introducing new services. Positive promotion must therefore be undertaken, particularly in terms of raising awareness and providing training for healthcare professionals, especially doctors. We have to realise that telemedicine entails a fundamental change to the way we normally treat patients. Business processes often have to be changed and completely reformulated in the face of a brand new service. Doctors and other healthcare professionals who wish to become involved must also be included in the process of overhauling business processes. It seems to be valued to repeat the research after the Covid-19 pandemic.

## **5 Conclusion**

Telemedicine is a necessity and the future of the Slovenian healthcare services. It helps patients to a better quality of life and brings financial benefits to the healthcare system. Positive promotion, education and training for healthcare professionals must be undertaken. Systemic regulation is required, as is the preparation of policies, strategies and standards at national level. Financial sustainability is needed. It is also very important to take into account the security aspect, as telemedicine processes particular types of personal data. One needs to realise that information and communication technology is not enough in itself, and nor are telemedicine solutions. If a solution is to be applied successfully, business processes must be changed so that a practically useful service can arise from the solution.

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