

# TELEMEDICINE IN CURRENT HEALTH CARE – general considerations and possibilities of use in the field of rehabilitation

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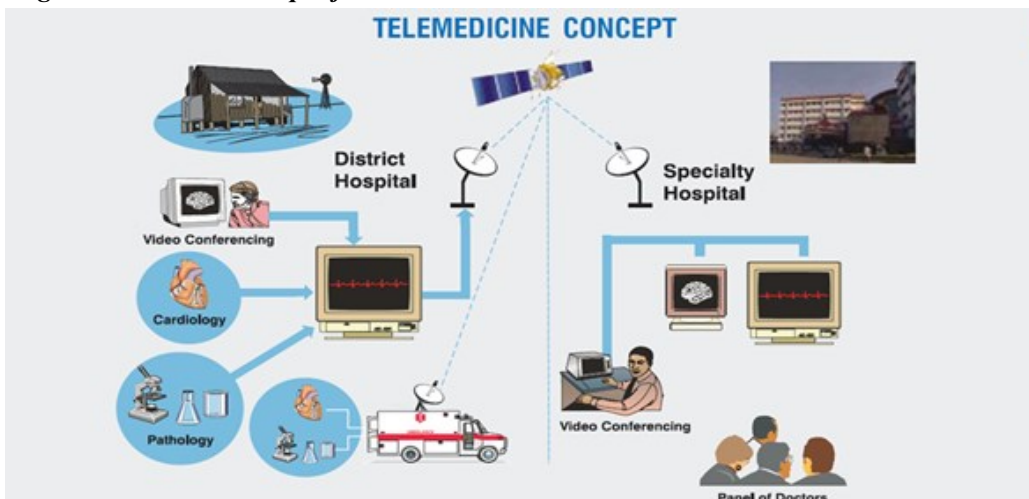
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## The concept of telemedicine

Telemedicine was first introduced around 1970 and concerned the delivery of remote clinical healthcare through telecommunications [1]. A number of hospitals have begun experimenting with telemedicine in order to reach patients in remote locations. Over time, with rapid changes in technology, telemedicine has become a complex integrated service used in both hospitals and nursing homes, private clinics and other healthcare facilities [2].

According to the European Commission, the definition of telemedicine is: “the provision of health care services, using Information and Communication Technology (ICT), in situations where the health professional and the patient (or two health professionals) are not in the same location. It involves the safe transmission of medical data and information, through text, sound, images or other forms needed for the prevention, diagnosis, treatment and follow-up of patients” [3]. ICT includes any communication device, from radio, television, cell phones, computer, network hardware, satellite systems and so on, to their various services and tools (video conferencing and distance learning). The devices used to communicate remotely can be e-mail, webcams, PDA or smartphones. The communication channel can be broadband, network or wireless (Figure 1).

Figure no. 1: The concept of telemedicine



Source: [4]

*Telemedicine has begun to be approached by more and more medical systems because it offers the possibility of providing remote healthcare and its main benefits are in reducing costs and increasing access to care and improving the effectiveness of diagnosis and treatment. Telehealth is a term associated with telemedicine which includes a broader definition of distance healthcare and does not always involve clinical services.*

*The factors that help to implement this system are represented by the development of information technology and the increasing access of the population to computers and/or mobile devices. Telemedicine will be used more and more in the future, due to the important benefits to health systems such as: increased access to care (when we refer to the long distances and travel time between doctors and patients); expanding access to specialist services; permanent communication between different groups of health professionals allowing the sharing of medical experiences, discussions on complex cases, consultation of experts or just to request a second opinion; increasing patient involvement, allowing them to connect more frequently with a physician in a convenient way; the possibility of remote monitoring - telemonitoring - of vital signs and activities of the patient by specialists.*

*However, there are limitations of telemedicine such as: lack of clinical examination of the patient; the lack of a highly developed digital infrastructure for healthcare professionals; limited number of medical specialties where telemedicine can be used; patients' reluctance about results; reduced accessibility for people with limited financial possibilities, who cannot purchase communication devices or who do not have the technical knowledge to use them.*

*Currently, telemedicine is successfully used in cardiology, psychiatry, surgery, dermatology, medical rehabilitation, etc.*

*In Romania, telemedicine is a relatively new concept that has become better known following the establishment of the state of emergency due to the COVID-19 pandemic. In 2018, the first legislative measures were taken, when the rural and military telemedicine information system was established as part of the health information system. In March 2020, a government decision established several provisions regarding the possibility of granting remote consultations, but also the transmission of medical documents by digital means. It is expected that after the end of the pandemic this system of providing medical services will continue and strengthen.*

**Keywords:** telemedicine, telehealth, telerehabilitation, legal framework

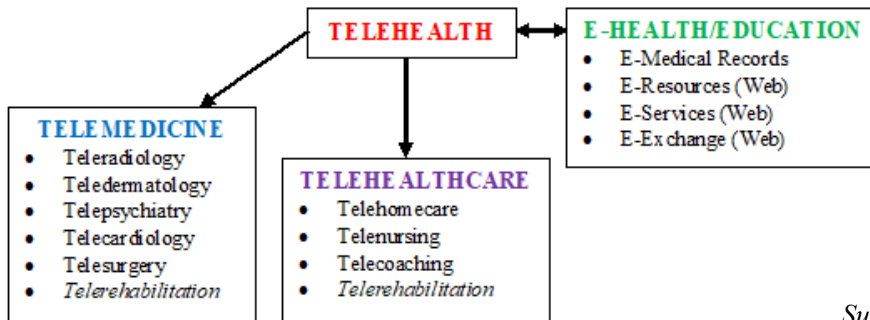
Sometimes, more detailed concepts are used, such as "cybermedicine" (conducting medical acts using internet) or "e-health" (exchanging health information using new communication technologies) [3].

Also, a term associated with telemedicine is telehealth but which includes a broader definition of distance healthcare and does not always involve clinical services (Figure 2). Thus, telehealth refers to both **clinical and non-clinical** applications in education, administration, and research models, while telemedicine is often reserved for clinical, patient care applications [5].

Telemedicine can take different forms and in this case the terms teleconsultation,



Figure no. 2: Telemedicine versus Telehealth



Sursa:[8]

Telemedicine can be particularly useful for patients in medically disadvantaged communities and for those in rural areas where there is no specialist care. The visits between doctor and patient will remain important and necessary in many situations, followed by telemedicine to supplement the classic consultations, to monitor the patient's condition and to make recommendations. If the patient has a minor acute infection (e.g. skin infection) a classic consultation will not necessarily be necessary and, in this way, it will save time for both the patient and the doctor [2].

- Through this application, the medical system will be able to expand its access to the services of specialist doctors. This can help primary care physicians consult specialists about the various cases they encounter, but it can also help patients consult a specialist on a rare diagnosis, regardless of their location. For example, a small hospital, which has no radiologists, could outsource radiographic evaluations via telemedicine [2].

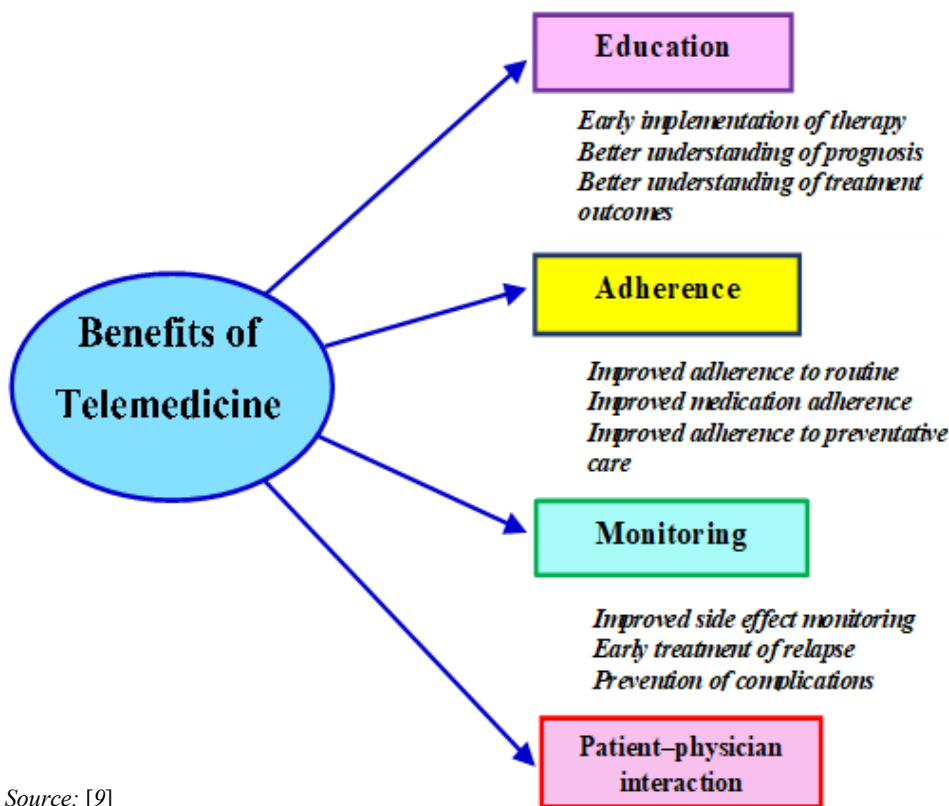
- Permanent communication between different groups of health professionals will allow the sharing of medical experiences, discussions on complex cases, consulting experts or just requesting a second opinion. All this will contribute to improving the quality of medical services provided to patients [7].

- Increasing the involvement of patients, allowing them to connect more frequently with a doctor, in a convenient way (Figure 3). On the

other hand, as patients become more aware of their rights and the risk of medical faults, they often look for second opinions, and for this they use websites or contact doctors by phone or e-mail. This is a benefit both for patients, who thus obtain information and consultations at home, and for the healthcare system, by reducing hospitalization costs. Telemedicine also has great potential in terms of patient safety, by avoiding human error [7].

- Possibility of remote monitoring of the patient's vital signs by specialists. This type of monitoring is often used for the management of high-risk patients, such as those with heart disease, and for people who are recently discharged from the hospital. It is also very useful for monitoring the treatment of chronic diseases (cardiovascular disease, chronic obstructive pulmonary disease, diabetes).

Figure no. 3: The benefits of telemedicine



Source: [9]

telemonitoring, teleintervention and tele-education are used. In teleconsultation, a process similar to the classic medical consultation (face-to-face), the doctor and the patient are in different locations and communicate in real-time conversation through videoconference, phone or chat [6]. The method could be applied in most medical specialties, even those that require the patient's clinical examination, provided that another health professional performs the examination and sends the results to the doctor who performs the remote consultation. Telemonitoring refers to the control of vital signs of patients, remotely, through systems installed far from the doctor and that can be worn by the patient, which send alarm signals to a control centre [7].

Telemedicine will certainly be used more and more in the future, as it brings important benefits to health systems:

- First, it increases access to care, if we refer to the long distances and travel time between doctors and patients.

- Improving the delivery of health care services can be achieved through greater involvement of patients in their own medical problems, through health education courses for patients, and technical education courses for professionals through the use of new communication technologies. Despite all these benefits, telemedicine is not yet widely used in Europe because there are some barriers to the application of telemedicine, the most important of which are:
- High costs of implementing a telemedicine service [10].
- Ensuring the confidentiality of medical data.
- Lack of ethical rules and laws applicable especially to telemedicine.
- The uncertainty of healthcare professionals regarding their responsibility and, in particular, the uncertainty about the legal framework for telemedicine in Europe.

In a 2016 study, which used an online questionnaire for care program managers in 24 European countries, the following barriers were mentioned [11]:

- Inadequate funding;
- Compatibility between e-Health tools;
- Inadequate technical/ICT support;
- Inadequate ICT infrastructures;
- A lack of skills among patients and care providers;
- An inadequate legislative framework;
- Uncertainty about cost efficiency;
- Privacy issues;
- Resistance by care providers;
- Cultural resistance.

In Romania, an article presented a series of barriers in the use of telemedicine at the level of medical services, without being the result of a study [12]:

- Reduced accessibility for the elderly who have limited financial possibilities and/or lack technical knowledge;
- Lack of a physical examination by a physician, a very important component for detecting certain diseases;
- Patients' distrust of using telemedicine, many of them reluctant to the results it can provide;
- Providing medical services at the highest standards. The method can be used especially in patients who know what medical problems they have or are at an advanced stage of investigations and can concisely describe symptoms;
- Lack of a highly developed digital infrastructure on which health professionals to rely;
- Limited number of medical specialties in which telemedicine can be applied. Currently, it is used more in family medicine.

#### Telemedicine in Europe - directions for development

While in some European countries the application of telemedicine has been used for many years, in others it

has been brought up to date due to the COVID-19 pandemic.

In Scotland, the first telemedicine projects were carried out by the Scottish Centre of Telehealth (SCT).

In 2009, a telemedicine pilot project was launched for patients with heart problems in a region far from Glasgow. At the community hospital in this area, patients were assessed by a consulting cardiologist at a cardiac clinic in Glasgow via video conferencing. The telecardiology project had promising results and showed that the way patients were evaluated was effective and cost-efficient (transport, hospitalization). Also, through SCT, telerehabilitation, teleneurology, telestroke and tele-endoscopy projects are currently being carried out [13].

Also, in 2009, in a south-western German region, telemedicine was used to detect early deterioration in the condition of patients with cardiac insufficiency. In this case, the "Motiva" telemedicine network was supported by health insurers and collaborators, with technology partners Philips and T-Systems. The "Motiva" network requires a TV, broadband internet access, digital scales and blood pressure (BP) measuring equipment. Patients regularly transmitted a series of data (BP, heart rate, body weight, and so on) to the hospital in their region, via a TV, thus being continuously monitored. The results showed that severely ill patients felt safer, reduced hospital stays and avoided trips to the family doctor or hospital [13].

In 2008 a telehealth project was introduced in a rural area of England for two chronic conditions, Heart Failure (HF) and chronic obstructive pulmonary disease (COPD). In 2011, the project became a centralized program. The results showed that the use of monitoring in a number of patients, with different ages and morbidities, led to a reduction in hospitalizations. Patients accepted this type of service, but there were some difficulties with the first use of telehealth [14]. Other studies conducted in the UK have shown that by implementing telehealth systems to monitor patients with chronic diseases (CHF, COPD, stroke) can achieve reductions in medical resource use. The main factor that leads to lower costs is a reduction in unplanned hospital admissions. In addition, it was pointed out that various factors can influence the real impact of telehealth, such as: acceptance of the system, type of intervention, location of the intervention (rural or urban) [15].

In the Veneto Region (Italy) a platform has been developed for delivery of telehealth and telecare services, in order to meet the needs of chronic patients and to give doctors, nurses and social workers with the opportunity to better monitor chronic patients. They receive at home a telecare device (emergency button) and portable devices with which they signal any situation in which their condition worsens. They send some clinical data that have been previously established by physicians. This information is transmitted to the regional e-health centre where trained operators analyze the data and inform clinicians when problems arise, and they will make appropriate decisions based on the evolution of the established parameters. In turn, operators make control calls to monitor the patient's needs and quality of life. Telemonitoring integrates the telecare service to detect and intervene in real time in emergencies [16].

management of chronic diseases, ensuring the continuity of patient care in long-term care centers or rehabilitation centers, access 24 hours at specialists in the field of imaging and so on. Thus, 14 telemedicine pilot programs were implemented to address the problems of elderly patients in nursing homes or rehabilitation facilities, inmates with skin diseases, patients with psychiatric disorders or end-stage renal disease. Preliminary work on the program protocols has shown the need for a strong administrative body, staff training and a redesign of the health system, including retraining activities and financial incentives [17].

At the annual Telemedicine and Telehealth Congress in London (2013), the results obtained from the use of telemedicine in physician-patient communication were presented. Thus, over 1000 patients from 33 residences and private nursing homes had access to medical consultations through video systems within the Airedale hospital, for 24 hours a day. After the implementation of the telemedicine system, it was found that the hospitalization period of patients decreased to 30%, the number of occupied beds decreased to 60% and the number of people coming to the hospital for consultations decreased to 45% [18].

In an article published in May 2020, on the Health Advances blog, the situation of telemedicine in some European countries was presented. Country surveys and interviews highlight that the most important elements that must exist for the unhindered provision of telemedicine are funding and reimbursement. This implies the existence of a single, coherent governance, management and funding strategy. The cross-border application of telemedicine in the European Union (EU) is hampered by the involvement of different legal authorities, and healthcare professionals must comply with the requirements of their own jurisdiction and not those of patients [19]. If countries such as Sweden, France, the United Kingdom (UK), and Portugal already have an established framework for telemedicine, Germany, Spain, Belgium and Poland are developing, and Greece, the Czech Republic, Ireland, Italy, and Austria are in the early stages. While in the UK there are well-known teleconsultation platforms and a national regulatory environment, in Greece and the Czech Republic the first teleconsultation platforms were initiated during the COVID-19 pandemic, and in Italy, although these platforms exist, the national legislative framework is missing [20]. Only in the UK, Sweden, Portugal, Germany and France (since September 2018) the reimbursement is public. Private reimbursement is available in all countries mentioned in the article.

In Romania, the potential of telemedicine was evaluated by a team of researchers in 2004. They conducted a literature review, made personal visits to the country and met with individuals from academia, the Ministry of Health and Family, and businesses. The results suggested that telemedicine has the potential to accelerate health care reform in Romania. Major hospitals and universities could promote the wider distribution and development of telemedicine, which could be of great benefit to the population, with 46% living in rural areas [21].

According to the International Society for Telemedicine and eHealth [22], in 2018 there were at least three operational models worldwide to implement telemedicine:

1. Storage and sending of medical documents (records, photographs, imaging, MRI analysis, and so on). These can

be sent from the patient to a doctor or from one doctor to another, within secure medical communication platforms, where data confidentiality is strictly maintained. Each specialist can provide medical services without direct contact with the patient, can send recommendations regarding the diagnosis and treatment back to the one who requested it. In this way, people who cannot move and those who are in isolated areas can also have access to specialists.

2. Application of the telemedicine system in emergency medicine by equipping ambulances with portable telemedicine systems that will ensure the real-time transmission of the main biometric and clinical data of patients to the Emergency Unit, but also the transmission of specialist indications to ambulance staff.

3. Remote monitoring allows healthcare professionals to track the patient remotely, using various technological devices. The total costs of medical services are low, compared to the quality of medical services they provide and the time in which a medical problem is solved.

### **The legislative framework in the field of telemedicine in Romania**

Even though telemedicine has been used in many European countries for many years, it is a relatively new concept in our country, which has become better known due to the COVID-19 pandemic.

Starting with 2018, the legal framework was created for the establishment of the rural and military telemedicine information system by Law no. 95/2006 on health care reform, republished in the Official Monitor of Romania, Part I, no. 652 of August 28, 2015, with subsequent amendments and completions.

In Art. 16 of the Law [23] these systems are defined as follows:

- "the rural telemedicine information system means the delivery of remote medical services, by using information technology and modern communication systems (ITCS), between the offices of family doctors in rural areas and specialists in county hospitals / health institutions";

- "the defense telemedicine information system means the delivery of remote medical services by using ITCS between operational medicine structures, medical structures within military units and health units in the health network of the Ministry of National Defense."

The implementation of the two information systems was done in stages: for rural telemedicine, the pilot stage took place in the first semester of 2018 and the operating stage starting with the second semester of the same year; for defense telemedicine, the implementation took place in the second semester of 2018.

At the same time, both in the Decision of the Romanian Parliament no. 53/2017 as well as in the Decision of the Romanian Parliament no. 1/2018 for granting the Government's trust, is included, within other objectives promoted in the field of health and the implementation of ICT solutions (e-health, telemedicine, exchange of best practices, online training programs for staff involved in the use of state-of-the-art equipment and technologies). →

The national strategy in the field of health aims at streamlining the health system, by accelerating the use of modern e-health IT tools. This approach includes two major directions:

1. Development of regional or national telemedicine centers depending on the specialty, to which medical centers can be connected, both for diagnosis and for second opinion.
2. Investments in more than 400 pre-hospital and hospital units that will use telemedicine systems, with the aim of increasing access to quality health services at cost-effective for citizens, especially those in vulnerable groups.

This year, in response to the current pandemic, the Romanian government had to adopt new measures to facilitate the provision of remote care and telemedicine [24]. Thus, GD no. 252/2020 [25] introduced a new set of telemedicine measures to be applied during the state of emergency. These include:

- Family doctors and outpatient specialists can provide distance consultations for basic services and in the minimum package of medical services by any means of communication within a maximum of 8 consultations/hour.
- Distance consultations will be granted and resolved in accordance with the legal regulations in force applicable to medical consultations, as provided in the packages of primary care services and specialized outpatient care for clinical specialties.
- The family doctor or the outpatient specialist will record the remote medical consultations in the patient's file and in the consultation register. The record must indicate the means of communication used and the duration of the consultation. The doctor will then issue the patient with all the necessary documents by electronic means.
- An insured person may send documents by electronic means to the health insurance house, which in turn may use electronic means to transmit the issued documents necessary to the insured person.
- The distance consultations are granted and settled according to the legal regulations in force applicable to the consultations at the office provided in the service packages.

GD no. 369/2020 [26] introduced additional measures to address the issue of reimbursement of public funds for the price of healthcare, including distance care under GD 252/2020.

It is expected that these measures will be extended after the end of the alert. The National Health Insurance House (NHIH) recommended that each patient contact the family doctor by phone and that the doctor decide whether the patient can be consulted remotely or should be called to the doctor's office or sent to another health care specialist. According to the Association of Private Healthcare Providers (PALMED), more than half of the activity of private medical units is currently carried out through telemedicine through phone or video applications. Moreover, in the case of private offices, PALMED estimates that approximately 80% of its activities are carried out through telemedicine. It is not known exactly how telemedicine will be legally modified and defined after the end of the pandemic, but it is expected that the Ministry of Health and NHIH will

continue their efforts to establish a functional framework for telemedicine in Romania in the future [27].

### Telemedicine and telehealth in the field of medical rehabilitation

The term "telerehabilitation" has been largely used in the literature and is defined as "the delivery of rehabilitation services through information and communication technologies". This terminology may change and vary for each country depending on the technology available, and the regulatory and professional bodies involved [28].

A review published in a journal [29] presents a series of data on the use of telehealth in the field of medical rehabilitation. Professionals can use telehealth to provide care to people with neurological and musculoskeletal disorders, commonly treated in both acute care and outpatient settings. Patients with impaired mobility and those living in regions with limited access to healthcare can particularly benefit. Video-teleconferencing has proven to be effective for the management of burn patients during acute rehabilitation, including in reducing healthcare costs and discontinuations in care. Patients with neurological conditions, including stroke, spinal cord injury, traumatic brain injury, and amyotrophic lateral sclerosis may use telehealth to monitor symptoms and response to treatment. Telehealth can also facilitate occupational and physical therapy programs, as well as improve obesity management and skin care in patients with chronic conditions. Other applications include imaging review in sports medicine, symptom management and concussion counselling, traumatic brain injury, and pain management programs. The expansion of telehealth services in the field of rehabilitation is expected to increase and can improve patient satisfaction by providing high quality and value of care.

Telehealth is an effective alternative for people who cannot access traditional healthcare services in monitoring musculoskeletal disorders. There are several articles and reviews that support the use of telehealth in the field of musculoskeletal physiotherapy. Thus, in a study published online in May 2020 [30], the authors present data from the literature on telehealth in this field. Some systematic reviews have shown that telehealth can help improve physical function and disability, and reduce pain, benefits similar to those obtained by conventional care for people with musculoskeletal disorders, such as osteoarthritis, non-specific low back pain, or following total knees arthroplasty [31,32,33]. Other articles have shown that the use of telehealth increases adherence to exercise for a variety of musculoskeletal disorders [34,35]. Other studies have investigated the concordance between the diagnosis established by telehealth and the classic consultation of the patient, for a variety of musculoskeletal conditions and it showed variations between 59.7% and 93.3% [36,37,38,39,40]. Also, some authors have found a high levels of patient satisfaction [41,42,43], where satisfaction can be significantly higher compared to those receiving classic care [44]. In addition, research to date has shown that telehealth services are cost-effective with cost-savings to the health service [45,46,47,48]. For the implementation and delivery of a telehealth service, the authors specify that some steps must be taken [30]:



**I. Analysis of clinical factors with reference to:**

1. Individual characteristics of patients: age, medical comorbidities, mobility / balance, visual, hearing, cognitive deficits, language barriers that may determine the criteria eligible for telehealth. In addition, the patient's clinical presentation, including the severity of symptoms, chronic condition, urgent access to care may have an additional impact on their suitability for telehealth.
2. How to delivery telehealth services. These can be offered in a mixed model, which assumes that some services can be of the classic patient consultation type and others of the telehealth type. Complex cases can be managed much better if initially a classic assessment of patients is made and later surveillance through telehealth is ensured.
3. The patient's physical location (e.g. home, local healthcare unit). This is important for the patient's privacy or when another person or medical professional needs to assist the patient remotely. The geographical location may also have an impact on the internet connectivity, which should be tested before the first consultation.
4. The experience and / or expertise of the clinician in order to appropriately manage the patient. The level of training of the doctor is relevant for those patients who will receive telehealth. Physicians should be familiar with both the technology available and how to adapt the clinical care that will be delivered through telehealth. For example, for patients who would have traditionally benefited from manual therapy techniques, it should be investigated whether other therapeutic interventions are appropriate, such as exercises and self-management techniques.
5. Patient selection may be influenced by eligibility criteria for reimbursement of telehealth consults.

**II. Telehealth platform selection (videoconferencing)**

There are a variety of videoconferencing software platforms that allow patients to connect with their clinicians using their own personal devices. It is recommended that the final selection be limited to a single videoconferencing platform that meets the needs of the telehealth scheme and is easy for clinicians and support staff (receptionists, telehealth coordinators, and so on). The selection process must be rigorous and address the following issues:

- be suitable for the purpose set and meets the basic needs required by telehealth consultation (e.g., if it is necessary to measure the range of motion (ROM), a platform offering this feature will be selected);
- be useful for both the patient and the clinician; the platform that requires minimal effort for the patient and clinician to connect with each other should facilitate the implementation process;
- the health professional/ healthcare service must remain under control when a patient may enter the consultation; this can be done if the platform has designated "virtual waiting rooms" where the patient waits until the clinician connects to start the consultation;
- the financial cost of accessing the platform; most telehealth platforms require the healthcare provider to pay a license fee; however, the costs of using data, especially for

home-based telehealth services, must also be taken into account;

- the interoperability of the platform and whether it can be accessed across different operating systems (e.g. Android/iOS) and/or web browsers (e.g. Google Chrome, Microsoft Edge, Mozilla Firefox, and so on) or if it interacts with other hardware-based videoconferencing systems;
- have additional built-in functions, such as scheduling, photo/video-recording and playback, exercise libraries, questionnaires and measuring instruments (e.g. goniometry) that can help the telehealth experience.

**III. Ethical and professional considerations**

Even if the patient's written consent is not required, he or she should be provided with information (either written or verbal) about what telehealth is, how it can be different from a classic consultation, and what are the advantages and disadvantages in accessing care. Thus, patients make informed decisions before participating in telehealth consultations. The consultations should take place in a private and safe location, both for the clinician and the patient.

**IV. Preparing the physical environment**

The aspects related to the framework where the consultations will take place must also be taken into account: physical environment, acoustic, visual environment, appropriate clothing.

**Evaluation of the implementation of the telehealth service**

The evaluation process can target results at both the individual and organizational level [49] and can be clinical (e.g. improvements function, pain reduction and so on) related to experiences (e.g. patient/ clinician satisfaction), economic (from a patient and/or service perspective) and use of services (e.g. referral and attendance rates).

A cross-sectional study conducted in Queensland, Australia, involving 85 patients receiving care at the Neurosurgical and Orthopaedic Physiotherapy Clinic, showed that: most patients were generally satisfied with the services provided, but almost a quarter of patients reported discontinuation of treatment due to difficulties in accessing services; more than half of respondents were willing to use telehealth if it reduced the costs (53%) and time (57%) associated with participating in appointments. Patients in paid employment were more willing to use telehealth (65%) if this reduced absenteeism from work. Overall, 78% of patients had access to appropriate technology to use telehealth at home. Particularly, 43% of patients would prefer telehealth at home than having to travel to attend appointments [50].

In a retrospective case series study, the authors aimed to determine the effects of implementing a telerehabilitation program, called HSS@Home, in patients receiving care after a total knee or total hip arthroplasty. The program included 19 patients (9 men and 10 women, average age, 69 years) who underwent pre- and post-operative screening. Video sessions were conducted via telehealth,

which a physiotherapist assisted patients in following exercise and mobility programs, addressing patients' problems when switching to outpatient therapy. Patients were seen 24 hours after discharge from the hospital, then 3 times a week for 3 weeks, for an average of 11 sessions. The episodes of care were recorded in the electronic medical record of each patient. There were no readmissions among the 19 patients. Nurses practitioners were consulted for all patients, especially for non-emergency cases. Feedback from patients and physicians was positive, and no overuse of services was observed [51].

## Conclusions and future directions

Telemedicine opens new horizons for medical consultation, increases the benefits for patients, allows the rapid exchange of information and techniques between specialists and eliminates geographical distances. It also opens new perspectives to patients who want a medical second opinion for their conditions [52,53], as they can remotely access medical resources that would otherwise require high costs and time. Telemedicine can be used as an important cost-effective tool and can provide quality healthcare as well as classic consultation, in many medical fields [54].

Interactive telemedicine can be a viable alternative when classic consultation is not available, not feasible or impossible (due to distances, costs or weather conditions). This method can be compared to a consultation, a diagnosis, a prescription and the associated medical recommendations.

The European Commission has stated in a communication to the European Parliament and other EU institutions that ensuring legal clarity in the field of telemedicine is important to ensure patient safety standards and data confidentiality. "The cross-border delivery of telemedicine services requires legal clarification, including on confidentiality, but not all Member States have clear legal frameworks to enable these services to operate. There are also limitations in reimbursing these services. The extension and completion of the legislative framework even after the restrictions of this period are lifted are necessary to solve problems that the medical system has been facing for a long time and that will not disappear once the COVID-19 pandemic ends. Thus, telemedicine can relieve specialized outpatient clinics of those conditions that do not require the patient's physical presence in the hospital/clinic. The waiting times and the traffic generated in the areas adjacent to the medical institutions are diminished, the access of the patients with locomotor problems to medical assistance is improved if they are monitored and consulted from home." [55].

In the future, e-health and bioengineering will address a number of challenges in modern medicine, including: prosthetic arms, bioinstrumentation for non-invasive diagnosis and treatment, robotic imaging-guided instruments for surgery, computer and telecommunications to extensively assist medical interventions, new and multimodal imaging techniques to explore the inside of the human body to the level of microcellular structures [56]

## References

1. Strehle E.M., Shabde N. „One hundred years of telemedicine: does this new technology have a place in paediatrics? Archives of disease in childhood”. 2006;19(12):956–959
2. <https://www.medic.chat/articles/telemedicina-solutia-viitorului-impotriva-alertelor-false/>
3. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on telemedicine for the benefit of patients, healthcare systems and society /COM/2008/0689 final/ [cited 2015 Nov 10]. Available from: <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52008DC0689>.
4. [https://www.google.com/search?source=univ&tbm=isch&q=telemonitoring+graphic&client=firefox-b-d&sa=X&ved=2ahUKEwi\\_gp3lI5DrAhXwsYsKHaCMARgQsAR6BAGKEAE&biw=1920&bih=966#imgrc=j8PEaAapwnmOjM&imgdii=cuF37hVc6An5WM](https://www.google.com/search?source=univ&tbm=isch&q=telemonitoring+graphic&client=firefox-b-d&sa=X&ved=2ahUKEwi_gp3lI5DrAhXwsYsKHaCMARgQsAR6BAGKEAE&biw=1920&bih=966#imgrc=j8PEaAapwnmOjM&imgdii=cuF37hVc6An5WM)
5. Miller, E.A. „Solving the disjuncture between research and practice: Telehealth trends in the 21st century”. Health Policy 2007;82,133-141
6. McMenamin JP, Schanz SJ, Storey DD. „Regulatory perspectives on telephone-based cross-coverage: Principles for decision-makers”. 2009. [cited 2015 Sep 14]. Available from: <http://communications.teladoc.com/www/RegulatoryPerspectivesOnTelephone-BasedCross-Coverage.pdf>. [Google Scholar]
7. Raposo V.L. „Telemedicine: The legal framework (or the lack of it) in Europe”. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4987488/>
8. <http://newtel.vn/en/difference-between-telemedicine-and-telehealth/>
9. [https://www.google.com/search?q=telemedicine+benefits&client=firefox-b-d&tbm=isch&source=iu&ictx=1&fir=y30z4P2kkWuVUM%253A%252COnhe9CW2cTAXCM%252C\\_&vet=1&usq=A14\\_kQuij-N3x3YTszBz76qVlmv6fZ0q3w&sa=X&ved=2ahUKEwiwhcrawoPqAhUopIsKHc03BBwQ\\_h0wAHoECAsQBA&biw=1920&bih=966#imgrc=QPOPS1VN\\_sXINM](https://www.google.com/search?q=telemedicine+benefits&client=firefox-b-d&tbm=isch&source=iu&ictx=1&fir=y30z4P2kkWuVUM%253A%252COnhe9CW2cTAXCM%252C_&vet=1&usq=A14_kQuij-N3x3YTszBz76qVlmv6fZ0q3w&sa=X&ved=2ahUKEwiwhcrawoPqAhUopIsKHc03BBwQ_h0wAHoECAsQBA&biw=1920&bih=966#imgrc=QPOPS1VN_sXINM)
10. AMD Global Telemedicine. I want to “do telemedicine”: What is involved and how much does it cost. Jul 9, 2015. Available from: <http://www.amdtelemedicine.com/blog/article/i-want-do-telemedicine-what-involved-and-how-much-does-it-cost>.
11. European Commission. “Market study on telemedicine”. Luxembourg: Publications Office of the European Union, 2018. Available from: [https://ec.europa.eu/health/sites/health/files/ehealth/docs/2018\\_provision\\_marketstudy\\_telemedicine\\_en.pdf](https://ec.europa.eu/health/sites/health/files/ehealth/docs/2018_provision_marketstudy_telemedicine_en.pdf)
12. <https://medijobs.ro/blog/telemedicina-o-practica-ce-va-ramane-si-in-viitor>
13. <https://healthcare-in-europe.com/en/news/telemedicine-advances-in-europe.html>
14. Aspinall A., Strain A. “Model of mainstreaming telehealth in a rural community” in International Journal of Integrated Care –Volume 13, 20 November –URN:NBN:NL:UI:10-1-115662. Available from <http://www.ijic.org/>
15. Shields G., Chapman A.M. “Implementing home telehealth monitoring in patients with a chronic disease: a budget impact analysis.” in International Journal of Integrated Care –Volume 13, 20 November –URN:NBN:NL:UI:10-1-115708. Available from <http://www.ijic.org/>
16. Saccavini C., Mancin S. “Integration of telehealth and telecare service in the Veneto region”. In International Journal of Integrated Care –Volume 13, 20 November –URN:NBN:NL:UI:10-1-115725. Available from <http://www.ijic.org/>
17. Durand-Zaleski I., Zarca K., Charrier N., Treluyer L., Calinaud C. “Deploying and assessing telemedicine in the Paris region: progress report.” In International Journal of Integrated Care –Volume 13, 20 November –URN:NBN:NL:UI:10-1-115689. Available from <http://www.ijic.org/>
18. [www.medicalnewstoday.com](http://www.medicalnewstoday.com)

References continues on the next page

## References continues from the previous page

19. Chittim G., Pappas A., Bomba J. „The Changing Fortunes of Telemedicine in Europe – Past, Present, and Future beyond COVID-19”. Available from <https://healthadvancesblog.com/2020/05/06/the-changing-fortunes-of-telemedicine-in-europe/>
20. Health Advances analysis, OECD 2018, ASIP Sante 2019, JASEHN 2017
21. Panait L., Doarn CR, Saftoiu A., Popovici C., Valeanu V., Merrell RC. “A Review of Telemedicine in Romania”. Available from <https://pubmed.ncbi.nlm.nih.gov/15006207/>
22. <http://www.scumc.ro/telemedicina-medicina-viitorului/>
23. Legea nr. 95/2006 privind reforma în domeniul sănătății, republicată în Monitorul Oficial al României, Partea I, nr. 652 din 28 august 2015, cu modificările și completările ulterioare
24. <https://www.cms-lawnow.com/ealerts/2020/05/romania-adopts-measure-advancing-telemedicine-longdistance-care>
25. Hotărârea nr. 252/30 martie 2020 privind stabilirea unor măsuri în domeniul sănătății pe perioada instituirii stării de urgență pe teritoriul României. Publicat în M.O., Partea I nr. 266 din 31 martie 2020.
26. HOTĂRÂRE nr. 369 din 7 mai 2020 pentru modificarea și completarea Hotărârii Guvernului nr. 252/2020 privind stabilirea unor măsuri în domeniul sănătății pe perioada instituirii stării de urgență pe teritoriul României. Publicat în M.O., nr. 373 din 8 mai 2020.
27. <https://www.cms-lawnow.com/ealerts/2020/05/romania-adopts-measure-advancing-telemedicine-longdistance-care>
28. Brennan D., Tindall L., Theodoros D., Brown J., Campbell M., Christiana D....Lee A. A blueprint for telerehabilitation guidelines. *Int. J. Telerehabilitation*. 2010;2(2):31–34. doi: 10.5195/IJT.2010.6065. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
29. Tenforde A. S., Hefner J. E., Kodish-Wachs J. E., Iaccarino M. A., Paganoni S. “Telehealth in Physical Medicine and Rehabilitation: A Narrative Review” American Academy of Physical Medicine and Rehabilitation. Published by Elsevier Inc. 2017. Available from <https://pubmed.ncbi.nlm.nih.gov/28527504/>
30. Cottrell M. A, Russell T. G. “Telehealth for Musculoskeletal Physiotherapy”. Published online 2020 May 30. doi: 10.1016/j.msksp.2020.10219. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7261082/>
31. Cottrell M., Galea O., O’Leary S., Hill A., Russell T. Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective and comparable to standard practice: a systematic review & meta-analysis. *Clin. Rehabil.* 2016;31(5):625–638. doi: 10.1177/0269215516645148. [PubMed] [CrossRef] [Google Scholar]
32. Dario A.B., Moretti Cabral A., Almeida L., Ferreira M.L., Refshauge K., Simic M. Effectiveness of telehealth-based interventions in the management of non-specific low back pain: a systematic review with meta-analysis. *Spine J.* 2017;17(9):1342–1351. doi: 10.1016/j.spinee.2017.04.008. [PubMed] [CrossRef] [Google Scholar]
33. Jiang S., Xiang J., Gao X., Guo K., Liu B. The comparison of telerehabilitation and face-to-face rehabilitation after total knee arthroplasty: a systematic review and meta-analysis. *J. Telemed. Telecare.* 2018;24(4):257–262. doi: 10.1177/1357633X16686748. [PubMed] [CrossRef] [Google Scholar]
34. Bennell K., Marshall C., Dobson F., Kasza J., Lonsdale C., Hinman R. Does a web-based exercise programming system improve home exercise adherence for people with musculoskeletal conditions?: a randomized controlled trial. *Am. J. Phys. Med. Rehabil.* 2019;98(10):850–858. doi: 10.1097/PHM.0000000000001204. [PubMed] [CrossRef] [Google Scholar]
35. Lambert T.H., Harvey L.A., Avdalis C., Chen L., Jeyalingam S., Pratt C., Tatum H....Lucas B. An app with remote support achieves better adherence to home exercise programs than paper handouts in people with musculoskeletal conditions: a randomised trial. *J. Physiother.* 2017;63(3):161–167. doi: 10.1016/j.jphys.2017.05.015. [PubMed] [CrossRef] [Google Scholar]
36. Lade H., McKenzie S., Steele L., Russell T. Validity and reliability of the assessment and diagnosis of musculoskeletal elbow disorders using telerehabilitation. *J. Telemed. Telecare.* 2012;18(7):413–418. doi: 10.1258/jtt.2012.120501. [PubMed] [CrossRef] [Google Scholar]
37. Richardson B.R., Truter P., Blumke R., Russell T.G. Physiotherapy assessment and diagnosis of musculoskeletal disorders of the knee via telerehabilitation. *J. Telemed. Telecare.* 2017;23(1):88–95. doi: 10.1177/1357633X15627237. [PubMed] [CrossRef] [Google Scholar]
38. Russell T., Blumke R., Richardson B., Truter P. Telerehabilitation mediated physiotherapy assessment of ankle disorders. *Physiother. Res. Int.* 2010;15(3):167–175. doi: 10.1002/pri.471. [PubMed] [CrossRef] [Google Scholar]
39. Russell T., Truter P., Blumke R., Richardson B. The diagnostic accuracy of telerehabilitation for nonarticular lower-limb musculoskeletal disorders. *Telemed eHealth.* 2010;16(5):585–594. doi: 10.1089/tmj.2009.0163. [PubMed] [CrossRef] [Google Scholar]
40. Steele L., Lade H., McKenzie S., Russell T. Assessment and diagnosis of musculoskeletal shoulder disorders over the Internet. *Int. J. Telemed. Appl.* 2012 doi: 10.1155/2012/945745. 945745. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
41. Lawford B.J., Delany C., Bennell K.L., Hinman R.S. “I was really sceptical...But it worked really well”: a qualitative study of patient perceptions of telephone-delivered exercise therapy by physiotherapists for people with knee osteoarthritis. *Osteoarthritis Cartilage.* 2018;26(6):741–750. doi: 10.1016/j.joca.2018.02.909. [PubMed] [CrossRef] [Google Scholar]
42. Moffet H., Tousignant M., Nadeau S., Mérette C., Boissy P., Corriveau H. Patient satisfaction with in-home telerehabilitation after total knee arthroplasty: results from a randomized controlled trial. *Telemed eHealth.* 2017;23(2):80–87. doi: 10.1089/tmj.2016.0060. [PubMed] [CrossRef] [Google Scholar]
43. Tousignant M., Boissy P., Moffet H., Corriveau H., Cabana F., Marquis F., Simard J. Patients’ satisfaction of healthcare services and perception with in-home telerehabilitation and physiotherapists’ satisfaction toward technology for post-knee arthroplasty: an embedded study in a randomized trial. *Telemed. J. e Health: Off. J. Am. Telemed. Assoc.* 2011;17(5):376–382. doi: 10.1089/tmj.2010.0198. [PubMed] [CrossRef] [Google Scholar]
44. Cottrell M., O’Leary S.P., Raymer M., Hill A.J., Comans T., Russell T.G. Does telerehabilitation result in inferior clinical outcomes compared with in-person care for the management of chronic musculoskeletal spinal conditions in the tertiary hospital setting? A non-randomised pilot clinical trial. *J. Telemed. Telecare.* 2019 doi: 10.1177/1357633X19887265. 1357633X19887265. [PubMed] [CrossRef] [Google Scholar]
45. Cottrell M., Judd P., Comans T., Easton P., Chang A. Comparing fly-in fly-out and telehealth models for delivering advanced-practice physiotherapy services in regional Queensland: an audit of outcomes and costs. *J. Telemed. Telecare.* 2019 doi: 10.1177/1357633X19858036. [Epub ahead of print] [PubMed] [CrossRef] [Google Scholar]
46. Nelson M., Russell T., Crossley K., Bourke M., McPhail S. Cost-effectiveness of telerehabilitation versus traditional care after total hip replacement: a trial-based economic evaluation. *J. Telemed. Telecare.* 2019 doi: 10.1177/1357633X19869796. 1357633X19869796. [PubMed] [CrossRef] [Google Scholar]
47. Pastora-Bernal J.M., Martín-Valero R., Barón-López F.J. Cost analysis of telerehabilitation after arthroscopic subacromial decompression. *J. Telemed. Telecare.* 2017;24(8):553–559. doi: 10.1177/1357633X17723367. [PubMed] [CrossRef] [Google Scholar]
48. Tousignant M., Moffet H., Nadeau S., Mérette C., Boissy P., Corriveau H. Cost analysis of in-home telerehabilitation for post-knee arthroplasty. *J. Med. Internet Res.* 2015;17(3) doi: 10.2196/jmir.3844. e83-e83. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
49. Glasgow R., Vogt T., Boles S. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am. J. Publ. Health.* 1999;89:1322–1327. [PMC free article] [PubMed] [Google Scholar]
50. Cottrell M. A, Hill A. J, O’Leary S. P, Raymer M. E, Russell T. G. “Patients Are Willing to Use Telehealth for the Multidisciplinary Management of Chronic Musculoskeletal Conditions: A Cross-Sectional Survey”. *J Telemed Telecare.* 2018 Aug;24(7):445-452. doi: 10.1177/1357633X17706605. Available from: <https://pubmed.ncbi.nlm.nih.gov/28449620/>
51. Fisher C., Biehl E., Titmuss M. P, Schwartz R., Sekhar Gantha C. “HSS@Home, Physical Therapist-Led Telehealth Care Navigation for Arthroplasty Patients: A Retrospective Case Series”. *HSS J.* 2019 Oct;15(3):226-233. doi: 10.1007/s11420-019-09714-x. Available from: <https://pubmed.ncbi.nlm.nih.gov/31624477/>
52. Palmieri B, Iannitti T. The Web Babel syndrome. *Patient Educ Couns.* 2011;85(2):331–333.
53. Palmieri B, Iannitti T, Capone S, Fisetto G, Arisi E. Second opinion clinic: is the Web Babel Syndrome treatable? *Clin Ter.* 2011;162(6):575–583. Italian.
54. Di Cerbo A., Morales-Medina J.C., Palmieri B., and Iannitti T. “Narrative review of telemedicine consultation in medical practice”. Published online 2015 Jan 13. doi: 10.2147/PPA.S61617. Available from: <https://pubmed.ncbi.nlm.nih.gov/25609928/>
55. <https://www.profit.ro/povesti-cu-profit/farma/consultatiile-medicale-la-distanta-salvatoare-in-perioada-starii-de-urgenta-au-nevoie-de-legislatie-pentru-a-continua-si-dupa-15-mai-19347302>
56. <http://www.chbconference.ro/2013/Home.aspx>