



CATOLICA  
LISBON  
BUSINESS & ECONOMICS

# Perspectives and Possibilities of Telehealth Medical Consultations in Primary Care Practices

Maria Miguel da Cruz Fonseca de Matos

Dissertation written under the supervision of Professor Henrique Martins

Dissertation submitted in partial fulfilment of requirements for the MSc in  
Business, at the Universidade Católica Portuguesa, 04.04.2023.

## **Abstract**

**Title:** Perspectives and Possibilities of Telehealth Medical Consultations in Primary Care Practices.

**Author:** Maria Miguel da Cruz Fonseca de Matos

Telemedicine solutions have a rising importance in health systems, on the improvement of access to care and the provision of healthcare services. The COVID-19 pandemic increased its usage, as teleconsultations could help reduce the spread of the virus, however, this should be looked at as a long-term solution, since technology is increasingly present in healthcare. This thesis aims to assess the awareness and perspectives of patients regarding video-teleconsultations, and the possibility of this solution being present in Portuguese primary health care, substituting in-person consultations.

Combining evidence from literature and a sample of Portuguese patients, it was possible to analyse video-teleconsultations and non-video-teleconsultations. Patients' awareness on the video-teleconsultations was high (81,4% of the sample), and influenced by levels of education and income, differing from the general lack of awareness described in several studies. However, the need for more focused awareness campaigns was identified, which was in accordance with literature reviewed. Non-video-teleconsultations had higher levels of awareness and use, when compared to video-teleconsultations, similar to previous studies. Finally, physical interventions, consultations' purpose, hardware availability and quality and value's perception of teleconsultations had a significantly influence on the patients' opinion about the possibility of substitution of in-person consultations for this video-teleconsultations. However, demographic characteristics did not affect, which may be due to the sample size.

These findings show telemedicine's potential on the progress of the provision of care. Yet they still indicate the need for future research on patients and health professionals' perspectives, and for strategic awareness campaigns regarding teleconsultations in primary care.

**Keywords:** teleconsultations, videoconference, patients, primary care, in-person consultations, possibility, substitution, awareness, engagement.

**Resumo:**

**Título:** Perspetivas e possibilidades das teleconsultas nos cuidados de saúde primários.

**Autor:** Maria Miguel da Cruz Fonseca de Matos

A telemedicina tem um papel cada vez mais significativo nos sistemas de saúde, na amplificação do acesso e melhoria da prestação de cuidados de saúde. A pandemia COVID-19 contribuiu na adoção da telemedicina, já que as teleconsultas apoiavam o objetivo da redução da propagação do vírus. No entanto, pode ser vista como uma solução a longo prazo, pois a tecnologia está cada vez mais presente na saúde. Esta tese tem como objetivo analisar o conhecimento de pacientes e suas perspetivas, sobre vídeo-teleconsultas, bem como a possibilidade de estas substituírem consultas presenciais na saúde primária em Portugal.

Reunindo informação da literatura e de uma amostra de pacientes portugueses, foi possível estudar vídeo-teleconsultas e outras formas de telemedicina. O nível de conhecimento dos pacientes sobre teleconsultas nesta amostra foi elevado (81,4%), influenciado pela educação e rendimento dos pacientes, enquanto vários estudos revelaram uma geral falta de conhecimento. Contudo, ambas identificaram a necessidade de campanhas publicitárias sobre o tema. Outras formas de telemedicina tiveram níveis de conhecimento e uso superiores aos das vídeo-teleconsultas, como em estudos prévios. Por fim, intervenções físicas, propósito das consultas, disponibilidade de equipamento tecnológico, e perceção dos pacientes quanto ao valor e benefícios das teleconsultas, influenciaram significativamente a sua opinião na possibilidade de substituir consultas presenciais por vídeo-teleconsultas.

Estas conclusões demonstram o potencial da telemedicina no progresso dos cuidados de saúde. Sugerem também a necessidade de estudos relativamente às perspetivas dos pacientes e profissionais de saúde sobre a telemedicina, bem como a necessidade de campanhas estratégicas.

**Palavras-chave:** telemedicina, vídeo-teleconsultas, pacientes, cuidados de saúde primários, conhecimento, perspetivas, consultas presenciais, substituição.

## Table of Contents

|  |    |
|--|----|
| Abstract .....   | 2  |
| Resumo: .....  | 3  |
| Introduction .....   | 8  |
| Research question .....  | 10 |
| 2. Background .....  | 11 |
| 2.1 Framework of Telemedicine and Teleconsultations .....                                  | 11 |
| 2.2 Regulatory and policy framework of Telemedicine and Telehealth.....                    | 13 |
| 2.2.1 International level .....  | 13 |
| 2.2.2 National Level.....  | 14 |
| 2.3 Portuguese National Health Service .....   | 14 |
| 2.4 Evidence on teleconsultations and telemedicine solutions .....                         | 18 |
| 3. Methodology .....   | 29 |
| 3.1 Method .....   | 29 |
| 3.2 Instrument- online survey .....  | 29 |
| 3.3 Questionnaire Distribution and Sample respondents .....                                | 31 |
| 3.4 Justification .....  | 31 |
| 3.5 Questionnaire application .....  | 32 |
| 3.6 Data processing and analysis .....   | 32 |
| 3.7 Ethical aspects.....   | 33 |
| 4. Results.....  | 33 |
| 4.1 Demographic characteristics .....  | 33 |
| 4.4 Substitution influencing aspects: .....  | 36 |
| Substitutions' possibility of in-person consultations for a video-teleconsultations: ..... | 36 |

|   |    |
|---|----|
| Physical contacts' influence:.....                              | 36 |
| Hardware availability's influence:.....                         | 38 |
| Value, Quality and Benefits' perception's influence:.....       | 39 |
| 5. Discussion.....  | 40 |
| Conclusion.....   | 45 |
| Appendix.....   | 47 |
| SNS website- Consultas em Telemedicina.....                     | 47 |
| Patients' Associations' list:.....                              | 48 |
| R-Markdown Script Analysis.....                                 | 49 |
| Demographic's influence on patient's awareness.....             | 52 |
| Substitution's possibility - last and 10last consultations..... | 53 |
| .....   | 55 |
| Possibility influencing factors- proportion's tables.....       | 56 |
| Demographic characteristics influence.....                      | 56 |
| Physical contact influence.....                                 | 58 |
| Consultations' purpose influence.....                           | 58 |
| Time and Financial availability influence.....                  | 60 |
| Value & Benefits' influence.....                                | 61 |
| Other forms of telemedicine's awareness.....                    | 62 |
| Survey:.....  | 65 |
| .....   | 70 |
| .....   | 71 |
| .....   | 74 |
| References.....   | 75 |

## List of Tables

|   |    |
|---|----|
| Table 1- Literature's main findings ..... | 23 |
| Table 2- Patients' Associations .....     | 48 |

## List of Figures

|   |    |
|---|----|
| Figure 1- Teleconsultations - <i>SNS acumulado à data</i> [43] .....  | 47 |
| Figure 2- Teleconsultations in <i>ULS- SNS Transparência</i> [44] .....   | 47 |
| Figure 3- Demographic Characteristics .....   | 49 |
| Figure 4- Demographic Characteristics .....   | 50 |
| Figure 5- Awareness .....   | 51 |
| Figure 6- Demographic Characteristics influence on awareness .....  | 52 |
| Figure 7- Patients perspectives about video-teleconsultations .....   | 52 |
| Figure 8- Video-teleconsultations' possibility .....  | 53 |
| Figure 9- Possibility by demographic characteristics .....  | 54 |
| Figure 10- Possibility by demographic characteristics .....   | 55 |
| Figure 11- Proportions' tables of influencing factors.....  | 56 |
| Figure 12- Demographics' influence on substitution's possibility of last & last 10 consultations                  | 56 |
| Figure 13- Demographics' influence on substitution's possibility of last & last 10 consultations                  | 57 |
| Figure 14- Physical contacts' influence on video-teleconsultations' substitution's possibility ...                | 58 |
| Figure 15- Consultations' purpose influence on video-teleconsultations' substitution's possibility .....          | 58 |
| Figure 16- Chart of possibility by purpose .....  | 58 |
| Figure 17- Hardware availability influence on video-teleconsultations' substitution's possibility .....           | 59 |
| Figure 18- Time and Financial availability influence on video-teleconsultations' substitution's possibility ..... | 60 |
| Figure 19- Value and benefits influence on video-teleconsultations' substitution's possibility ...                | 61 |
| Figure 20- Awareness of non-video-teleconsultations' solutions .....  | 62 |
| Figure 21- Demographic Characteristics' influence on awareness .....  | 62 |
| Figure 23- Use and Frequency of use of non-video-teleconsultations solutions .....                                | 63 |

Figure 22- Awareness' influence on Use and Frequency of use of non-video-teleconsultations solutions ..... 63

Figure 24- Value's perception influence on use and frequency of use ..... 64

## **Introduction**

Health systems need effective and resilient primary care to avoid overburdening hospital units. In situations of increasing demand for health care, primary care is essential to provide diagnosis, treatments, and preventive solutions, improving the overall health system's functioning [1].

COVID-19 pandemic created a massive stress in health systems in all countries, having a great impact at economic, educational, and social levels [1]. Restrictions were implemented and resources were mobilised to face the rising needs, which, consequently, resulted in other unmet health care needs [1]. Primary care helped the provision of COVID-19 related care during the pandemic, however, it also had to face all other population healthcare needs [1].

Within EU countries, governments quickly supported the use of teleconsultations through enabling legislation, resulting in an increase of this type of medical consultations [1]. In Portugal, with the pandemic, from mid 2020 to the beginning of 2021, it was possible to notice a near 10% increase on the percentage of adults having medical consultations online or by telephone [1].

The limitations to health care access can also be related to factors such as distance, cost and waiting times [2], that can partly be overpassed by telehealth solutions.

The focus of this study is on telemedicine, particularly teleconsultations by videoconference in Portuguese primary care settings. It aims to analyse several face-to-face consultations' characteristics, and to assess the extent to which these could be replaced by consultations performed in a remote way or not. That is, the substitution of presential consultations for teleconsultations, whenever the conditions are favourable, in terms of patients' health condition, accessibility to the technology required, the acceptance from the caregiver, and others. With this, it may be possible to understand if the resources are being explored and if it is feasible to optimize the current operation of health centres, i.e., gauging the true potential for teleconsultations in primary care. The possibility of a telemedicine's large-scale adoption in regular healthcare practices is related to health actors' awareness and perspectives about telehealth services, which is also an important matter to study in future works.

The emphasis on primary care services is justified by its importance for the health systems as an essential way of access to health care and because it is designed to be the patients' first contact with the many health systems [3]. Primary care offers services from disease's diagnose to treatment



and follow-up, while promoting closeness between the patient and the respective general practitioner and other care team members [4].

This subject is relevant as health centres must assure the maximum accessibility possible to patients [4], and teleconsultations may be seen as an extra way of access further supporting this mission [5], easing patients' management, increasing quality of care, and the possibility of maximizing health unit's resources [6] [7]. Nevertheless, there is a lack of a structured strategy for telemedicine in the Portuguese primary care, which may hinder the accomplishment of the implementation and spread use of telehealth solutions [6].

Patients' safety and access to a quality service are a priority to any health system [8]. It is essential to implement measures that allow to provide both, and that, at the same time, follow the development of technology and its adoption by the population. Telemedicine is an indispensable resource specially when the adoption of teleconsultations can provide a more convenient service, while also offering the reduction of traveling costs and waiting times [5]. Hence, it is also crucial to identify the different factors that are needed to perform a videoconference consultation, to understand if all possibilities are being explored and whether all the available resources are being optimized.

Consultations in primary care tend to follow a certain pattern however these are always dependent on patient's characteristics and circumstances. The practitioner's analysis differs dynamically regarding the consultation development [9]. This wide heterogeneity would imply that each consultation involves different types of activities, such as physical examination, medical history, treatment prescription, treatment follow-up, results review, family history, amongst others. Within the several possible activities, physical examination is considered to occur in 64.5% of the consultations performed [9]. This may indicate that not all the in-person consultations include physical examination to the patient and, therefore, in those cases, teleconsultations may be an opportunity, as there may be no harm in conducting them via video-teleconsultation. In cases where physical examination is required, there is less of an opportunity for teleconsultations. Even so, in some cases, it may be possible to still conduct a teleconsultation when replacing physical examination by using tele-medical devices, such as tele-stethoscope, tele-dermatoscope, and others, that allow remote diagnosis support [10], [11].

This study will cover the analysis of the patients' awareness of and about video-teleconsultations, as well as their opinion and experience to understand the potential factors influencing the opportunity for replacing in-person consultations for video-teleconsultations. This substitution indicates that the remote consultation takes place, instead of the in-person one, and is relative to patients' preceptive.

Evidence has accumulated on the characteristics of teleconsultations, along with its advantages and limitations [2], [5], [12]– [14]. However, there is a lack of information regarding the extent to which in-person consultations can be replaced by consultations through videoconference in primary care settings.

### **Research questions**

This study addresses two main research questions that aims to answer. The first one, is regarding **patients' perspectives about video-teleconsultations**, which may enable a better understanding about Portuguese patients' awareness and opinion on this telehealth solution.

The second one is **“What factors can influence the patient's opinion about the substitution of in-person consultations for video-teleconsultations?”**, allowing the identification of important aspects that are facilitating, or not, patients' adherence to teleconsultations.

It is also possible to consider some subsequent research questions, such as:

- Do patients feel the need of more advertisement campaigns regarding teleconsultations?
- Can teleconsultations contribute to a better functioning of Health centres?
- What are patients' perspectives about non-video-teleconsultations?
- Do demographic characteristics influence the possibility of substitution?
- Do physical interventions affect the chance of substitution for remote consultations?
- Do consultations' purpose influence?
- Are patients able to attend video-teleconsultations and does it influence their opinion?
- Do value, quality of the service, and benefits' perception influence?

## 2. Background

### 2.1 Framework of Telemedicine and Teleconsultations

The World Health Organization defined telemedicine as:

*“The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities”* [15].

Telemedicine has several benefits as it enhances patients’ access to health care and provides a more convenient care. It reduces traveling costs, and enables time saving, more significantly, for the patients that are distant from the respective health unit. Teleconsultations also promote a self-management of each patient’s health and optimizes the resource management in the health system. An additional benefit is that it can also be used as follow-up care, where the general practitioner continues to deliver health care afterwards [2], [5], [12], [13], [16]. Within the different forms of telemedicine, there are the text messaging, email, telephone consultations and videoconference consultations, having each one its own characteristics [17]. Text messaging and email can both be used as reminders for the scheduled appointments, for tests and vaccinations, and to motivate patient’s health self-management [18]. These forms of telehealth allow the patient to receive electronic prescriptions and to exchange data with the practitioner.

Telephone consultation is done by a real time phone call between the general practitioner and the patient, focusing, for example, on the report of symptoms and on the delivery of a follow-up care. It is widely used in general practice as an alternative to face-to-face consultation due to its easiness of use, convenience, time efficiency, possible cost saving, and due to people’s familiarity with the technology. This type of consultations may contribute to the reduction of crowding in health units, which consequently reduces the risk of infection transmission [19]. Yet, research recognize that telephone consultations may be less safe, perceived as not indicated to complex situations, do not involve data exchange, and cover fewer problems [20].

A teleconsultation can be a real-time interaction, between a general practitioners and his/her patient, where information and communication technologies (ICT) are used, either by email, text message, phone call or videoconference [17].

In this study, to analyse a specific context of telehealth, teleconsultations using videoconference are considered, as it may represent a more accurate form of digital health intervention in terms of communication, engagement, and mutual eye-to-eye contact capacities [21], [22].

A video-teleconsultation requires the support of video and audio during a real-time teleconsultation. The visual element has benefits when compared to telephone consultations, as it represents a reduction of possible misunderstanding, enables a more personal contact between practitioners and patients, and improves the quality and accuracy of the consultation. For circumstances that do not require contact examination, video consultations may overcome telephone consultations. [20], [23]

It is possible to affirm that, telephone consultations are the most used type of remote consultations, however consultations by videoconference are perceived to have a better performance [12]. COVID-19 pandemic rushed the adoption of teleconsultations in Portugal and in many other countries, as they represented a practical and fast solution for the emergency [12], [24]. There was a huge concern regarding the safety of both professionals and patients, which required a quick change in the system. The health and the well-being of professionals needed to be assured so that the system could always operate without major difficulties. Telemedicine demonstrated, then, that it could really be beneficial to the performance of the health system, by allowing the reduction of pressure in care units and helping reducing contacts between people, which enabled to decrease the spread of the virus [25]. Telemedicine also helped to assure a continuous care to people who needed during the pandemic [24][19]. Such change happened as there was relaxation of regulatory frameworks and increase of its flexibility [26], as well as a quick change in financing mechanisms, facilitating the growth of this type of care in health system [27], [28].

Telemedicine services can be improved with the utilization of several types of support devices, such as blood pressure cuffs, pulse oximeters, spirometers, and others, where patients can regularly run the tests and, with the results, health professionals are able to evaluate the reported data, allowing a more precise care [23]. Digital tools and solutions increased healthcare access, and allowed patients to be examined and checked remotely, assuring a continuous care. Thus, it is possible to understand that a large-scale adoption of telemedicine solutions can have advantages in patient-management processes [29].

To take advantage from all those benefits, health professionals need to be trained to properly use the technology and need to have a capable ICT support team that guarantees a well-functioning and operation of the remote care, enhancing the delivery of the best quality service possible [5], [22], [29], [30].

Yet, telemedicine has several limitations. It cannot provide the appropriate care to more complicated and serious health conditions, as they may require a closer supervision and physical interventions from the general practitioner [5], [12]. Digital solutions may also not be feasible for those who live in deprived areas without internet, or for those who do not have the knowledge to work with technologies [14].

Telemedicine should be seen as another type of care provided by the health system to improve its quality and to optimize its operation. Therefore, economic policy solutions, and population and health professionals' training projects must be implemented to ensure an equitable access, while facilitating digital inclusion [29]. Additionally, presential consultations should be always assured for those which remote consultations are not an option.

## **2.2 Regulatory and policy framework of Telemedicine and Telehealth**

### **2.2.1 International level**

In 2018, the **World Health Assembly (WHA)** suggested the enhancement of health services' capabilities with digital technologies, the improvement of digital health strategies and legislations and others, which was an important step for telemedicine in general.

In 2012, the **eHealth Action Plan 2012-2020** [31] emphasized the cooperation between Member States and stakeholders to increase the potential and opportunities of eHealth and to create solutions for existing challenges to enable the improvement of European healthcare systems.

The main approaches of the **Global Strategy on Digital Health 2020-2025** [32] were related to the improvement of strategies and reinforcement of control for regional, national, and global levels of digital health and the promotion of collaboration and transference of digital health knowledge.

In 2008, the **Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the telemedicine for the benefit of patients, healthcare systems and society** [33], supported the achievement of a large-scale use of telemedicine services, with the creation of solutions for technical problems, the clarification of legal aspects to ensure that telemedicine beneficiaries patient care, ensures patient safety and privacy, as well as the promotion of confidence and acceptance of telemedicine by the provision of evidence on a large-scale level.

### **2.2.2 National Level**

In 2014, the *Despacho n°8445/2014* [34], reinforced the implementation of a strategy to a Telemedicine Network in the NHS, by determining that telemedicine's access should be increased, and the different health units should progressively have the equipment needed for its implementation, which could be considered one of the first steps for the adoption of telemedicine in the Portuguese health system.

In 2016, in the *Resolução do Concelho de Ministros n°67/2016* [35], the government created the National Telehealth Centre, that reinforced the strategy of the promotion of telehealth, as well as the promotion of the utilization of ICT, enabling a higher level of articulation and improvement of the quality of care.

In 2020, the *Despacho n°5314/2020* [36], ensured the identification and rescheduling of all scheduled assistance activities not performed due to the COVID19 pandemic. This was possible using, whenever possible, telemedicine resources, like teleconsultation, telemonitoring, telescreening, and teleconsulting, which contributed for the engagement on telemedicine solutions.

## **2.3 Portuguese National Health Service**

The Portuguese National Health Service is financed by Portuguese taxpayers, where it is assured the equally delivery of general health services for the population. In Portugal, the National Health Service is called *SNS (Serviço Nacional de Saúde)* and provides all kinds of services from prevention to treatment of diseases, through primary and hospital care.

The Ministry of Health is responsible for the national health policies, regulations, and management of *SNS*, making the connection of certain actions related to health with the other ministries.

This study addresses specifically primary health care, and the World Health Organization (WHO) and UNICEF defined it as:

*“a whole-of-society approach to health that aims equitably to maximize the level and distribution of health and well-being by focusing on people’s needs and preferences (both as individuals and communities) as early as possible along the continuum from health promotion and disease prevention to treatment, rehabilitation and palliative care, and as close as feasible to people’s everyday environment.”*[37]

According to Portuguese *Decreto-Lei n° 52/2022* [38], the mission of Regional Health Administrations, *ARS, I.P.*, is focused on the regional management of resources, in order to promote cohesion in the respective health area. There are five Regional Health Administrations, *ARS, I.P.*, across mainland Portugal, precisely *Norte, Centro, Lisboa e Vale do Tejo, Alentejo* and *Algarve* [38]. All of them have the responsibility of managing the human resources, allocating funds, implementing the policies of national health policy and providing support to health facilities as well as supervising their performances, in each respective region that have directive power over the *ACES*.

The mission of Health Centre Clusters, *ACES*, is to ensure the provision of primary health care to the population of a specific region of the country, performing activities from health promotion and disease prevention to treatment and health care follow-up process [38]. The *ACES* have an administrative autonomy and own patrimony, integrating one or more health centres, being these health centres considered a group of functioning units providing primary health care, by their specific location and designation. *ACES* can contain, Family Health Units, *USF*, Personalized Health Care Units, *UCC*, Public Health Units, *USP*, Shared Care Resources Units, *URAP*, and other services that may be considered crucial by the respective *ARS, I.P.*, and by the Health Minister [38]. It is also important to observe that the *ACES* have responsibilities regarding the provision of primary care with the Health System Central Administration, *ACSS, I. P.*, who is responsible for the management of financial and human resources, and on the network of equipment and facilities and in hiring care provision [38].

Additionally, there are Local Health Units, *ULS*, that are responsible for guaranteeing the integrated provision of both primary and hospital health care, in each institution, through integrated

health centers, as well as assuring the necessary means to the health authority competences, and to intervene in addictive behaviors [38].

This study's focus is on the family health units, *USF*. In 2005 was created the concept of Portuguese family health units, *USF*, that integrate a health centre. They have a decentralized structure with small teams of professionals (doctors, nurses, administrative professionals, and interns of general and family medicine specific training), organized in three possible development models, A, B and C. These models are attributed according to the level of organizational autonomy, remuneration model and incentives, as well as the financing model and legal status of each unit [39]. Some critics of the system believe that this organisational concept, with almost 20 years, might need a restructure as the professionals may be tired, which can lead to a lack of motivation from the professionals.

Data from the report of Biscaia A. et al, of September of 2022, [40] (pag<sup>35</sup> Quadro 5), indicated 603 family health units (*USF*) in activity, with 289 of them corresponding to model A and 314 corresponding to model B. Regarding the professionals, there were a total of 4 027 family doctors, 4 029 family nurses, 2 956 clinical secretaries and 1 816 interns in all Portuguese family health units [40] (pag<sup>36</sup> Quadro 6). As regarding the patients, it indicated that there were 2,86 millions of patients enrolled in model A family health units and 4,07 millions in model B, with a total of 6,93 millions of enrolled patients [40] (pag<sup>37</sup> Quadro 7).

According to 2021/2022 report on primary health care in Portugal, published by Biscaia A., et al. (2022) [40], almost 90% of the *USF*'s managers affirmed that the *USF* did not have the necessary material to perform a videoconference consultation. This might be a result of lack of investment in several areas such as consultation support, remote consultations, and others. [40]

Data regarding teleconsultations was extracted from the national data transparency portal, [41]. The data was divided by type of consultation, either first or subsequent consultation. First consultation was characterised by being a medical consultation where the patient is examined for the first time in a certain medicine specialty, in this case, general and family medicine, for a certain clinical episode. Subsequent consultation was characterized by being performed with the purpose of a follow-up of the evolution of the patient's health status, with reference to the first consultation of the clinical episode. [42]



On the SNS website (*Consultas em Telemedicina*) [43], there is a chart representing the total amount of teleconsultations per year, from 2020 to 2023, that included first and subsequent teleconsultations (seen on appendix, Figure 1). In 2021, more than 2 million teleconsultations were performed, with an increase from 2020 to 2021 of 663,5%. Most of the year of 2021 was characterised by lockdowns, which forced Portuguese population to stay at home for long periods and, therefore, there was the need to use resources like telemedicine to have access to a continuous care, justifying the increase. In the year of 2022, it was noticed a decrease of teleconsultations by -64,8%, compared to 2021, probably due to the lifting of COVID19's restrictions. Comparing 2022 with 2020, there was an increase, as Portuguese people might have adopted this resource and remain using it after the end of the restrictions. As for the beginning of 2023, the number of teleconsultations is still very low.

Also, in SNS website, in *Consultas em Telemedicina* [44], (seen on appendix, Figure 2), it was possible to analyse the difference between the number of first and subsequent teleconsultations, performed in Portuguese Local Health Units (*Unidade Local de Saúde*). First consultations had a lower number of teleconsultations compared to subsequent ones, as it might be required to perform a certain physical examination and/or to assign a specific treatment and care.

In 2022 there was the highest number of teleconsultations performed in local health units, with a total of more than 141 340 teleconsultations of both types (first and subsequent). With 67,7% subsequent teleconsultations, and 32,3% first teleconsultations. From 2019 to 2020 there was an increase in both types of consultations, presumably due to the beginning of the COVID19 pandemic. As from 2020 to 2021, a time characterized by lockdowns, subsequent teleconsultations decreased by -17%, while first teleconsultations increased by 87%. From 2021 to 2022, there was a significant increase in both types. The total of teleconsultations registered an increase of 56,8%. For the present year of 2023 there is a total of more than one thousand teleconsultations, which will vary until the end of year.

The evolution, in the past years, of both first and subsequent teleconsultations may be related to a higher adoption of telemedicine services, combined with an increasing awareness about it, enabling patients to access primary care more easily.

## 2.4 Evidence on teleconsultations and telemedicine solutions

According to O'Neill et al. (2022) [12], the majority of the practitioners did not perform non-presential consultations before the pandemic, however during the beginning of it, the scenario drastically changed. With the lockdown, presential consultations decreased (by -38%) and non-presential ones, significantly increased, by 101% [45]. With this, it was possible to notice a major change in primary health care services' approach with the use of information and communication technologies (ICT), when compared to previous years.

According to O'Neill et al. (2022) [12] the telephone consultation was the most used form of communication between doctors and patients. This may be due to this technology's easiness and people's familiarization with it [6]. Emails followed telephone consultations in this list, used mainly for the exchange of documents. Text messages and videoconference were also forms of communication used. Only 8% (n=167) of the respondents registered a teleconsultation with videoconference. Those teleconsultations were performed by several platforms such as WhatsApp, Zoom, Microsoft Teams, Skype, all of them highly used, and RSE Live, being this the official health system platform, with residual utilization, and others [12].

RSE Live is the official Portuguese platform that allows to perform teleconsultations in real time, developed by the *SPMS (Serviços Partilhados do Ministério da Saúde)*. This professional software ensures data protection and privacy, and it is available for health professionals and for any patient. RSE Live can be accessed in the patient's personal area of *SNS24 portal* [46]. This software, it is endowed with several important features within specific areas, such as informative area, with information of the patient, action area, that allows both patient and professional to control functionalities, like the microphone and video image, and others. There is also a chat area, that enables the share of documents during the consultation, as well as screensharing, where is possible to show the other participant the information on their own desktop [47]. These functionalities may enable the optimization of the conversation and the medical analysis of the professional.

Aside from that, the European Commission's Market Study on Telemedicine (2018) [29], identified that prevention and telemonitoring are the areas where telemedicine is the most used, as well as that providing primary care and home-based care are the focus of telemedicine solutions. Telemedicine can provide beneficial means for both patients and practitioners without affecting the efficiency of the provided care [29].

Several studies noticed that the implementation and adhesion to teleconsultations is associated with challenges at technical and clinical levels. Even though telemedicine improves the access to health care at lower costs, it may be associated with a higher risk of misdiagnosis. To overcome those difficulties, it is important to identify them and find suitable solutions.

Technical difficulties in remote consultations for both patients and clinicians, are usually centered in the quality of the internet connection, as it influences the interaction and communication level, as well as in the complexity of the hardware needed as patients might not have the equipment and devices required for a teleconsultation by videoconference [5], [12], [16], [21], [22], [30], [48], [49]. Documents' exchange complications can be also considered a serious challenge in remote consultations. [12]

Another factor influencing the quality of the consultation might be the little experience on using the technology and the struggle in adapting, which reflects in a less confident attitude in initial consultations [12], [16], [21]. So, it is required more training and education, at least for health professionals, regarding technologies and techniques to improve effectiveness and quality of the service [5], [22], [29].

There may be waiting times and delays, like in presential consultations, where patients may have to wait in the virtual waiting room for the clinician, which can cause uncertainty and anxiety the patient.[16]

For the patient to attend a video-teleconsultation, is required an adequate level of privacy [2], [16], with for example, use of certain equipment like headphones, as well as a convenient location available and capable of providing privacy to attend the consultation. This may present a challenge for patients attending it in the workplace [2].

For health professionals it is also important to have adequate workplaces to perform the teleconsultations, as well as to have the appropriate equipment. It is indispensable a qualified platform (like RSE Live) and a support Information Technology (IT) team to help manage and deliver the service, as the limitation of technical staff may be a major concern [49]. Besides, the addition of specific periods for teleconsultation in the schedule of practitioners, may be an important aspect to help improve services provision[5], [45], [49].

From organizations' point of view, there may be also several difficulties, according to Scott Kruse, C. et al. [49]. These difficulties may be related to the lack of financial support from

governments for telemedicine, and the cost of the technology as it is necessary to invest in the improvement of digital skills of professionals and in the improvement of technological equipment and devices [5], [29], [49]. There are also concerns regarding the resistance to change from staff [49], that the organization must create solutions and alternatives to motivate them and to enhance the acceptance of the new technology format of working [29], [48].

Moreover, measures focused on the patients should also be considered. Awareness and advertising campaigns about the new different existing options, are important so they can have the opportunity to choose the best one for them [29], [49]. In addition, it is essential to provide the equipment and technologies required for a teleconsultation to patients that do not have access to them. The systematic review of Scott Kruse, C. et al. [49], identified that the main barriers for patients are centered in their age and level of education, followed by eHealth or computer literacy, and unawareness of the service [30], as all these factors may influence their digital skills and motivation to learn and to have the equipment needed.

As for the clinical difficulties, a problematic issue is, most probably, the impossibility of doing a physical exam [12], as well as the lower level of interaction between patients and practitioners [5], [21], [30]. The exchange of information and its understanding may be also challenges, along with the quality of the care, when compared to presential consultations [12], [21].

It is also reported that the type of health problems addressed in either remote or presential forms of consultation are similar, however, less health complications are discussed during the videoconference consultation, when comparing to a presential one. This is, most probably, due to the time of consultations, as in-person consultations are considered longer than remote consultations, or due to the possibility that patients and doctors may associate teleconsultations to simple health concerns [21].

Finally, there are legislation challenges and unfavorable regulations for telemedicine and for teleconsultation, that need to be solved to correctly implement this service [49].

With the increasing interest in digital health care, there are new ethical and legal aspects arising. These can have impact in health authorities' decision-making policies. Telemedicine covers two areas, the virtual interaction between patient and doctor and treatment prescribed, and the flow of information. Data ownership is also an issue in telemedicine, and the held information regarding personal aspects of the patient must assure patient's privacy. So, these aspects need to

be considered at legal and ethical levels and must be guaranteed the protection for health information [30].

This set of complications demonstrate that there are huge opportunities of improvement to provide a better service to patients in the health system.

Despite all the challenges, according to several studies, [2], [5], [12], [16], [21], [22], [29], patients highlighted the remote consultations' benefits around the convenience, time saving and cost saving, when compared to presential consultations. These costs may be associated with work time off, public transports or gas' expenses, parking expenses, waiting times in waiting rooms, and others [2].

When compared to phone calls, videoconferences are capable of providing a higher quality service, as enables practitioners to do more accurate visual analysis of the patients. The use of video improves the diagnostic and decision-making accuracy and avoids treatment selection errors [22]. The visualization of the patient conveys a greater closeness between both, which can also be a positive aspect of videoconferences.

The video support can improve teleconsultations as enables a better communication process and rapport. Practitioners noticed that body language allows a better understanding than in telephone consultations, as it is possible to detect when the other person is missing or not understanding any part of the conversation. Videoconference is also perceived as a more personal and interactive, and, at the same time, more formal and focused approach than telephone consultation. [16]

Videoconference can add value to the health care system, particularly when physical examination is not required, as it is appreciated by patients due to its convenience and by doctors due to benefits of visual cues. [21]

It is possible that patients, in general, even prefer video consultations in primary care as they may feel more comfortable talking with the practitioner over videoconference, considering that the patient is in a private and appropriate location. There also may be patients that prefer receiving bad news through videoconferences than presentially [2]. However, it is noticed that a lot of patients and doctors considered important having an in-person consultation first and use videoconference consultation as a follow-up once it may be less comfortable to have the first contact with each-other in a remote form of consultation [12], [16].

It is important that the population is informed about the potential and benefits of telemedicine to convince people about the usefulness of this type of service [29],[5].

In order to decrease potential bias, it is crucial a larger engagement in telemedicine services in order to evaluate more complete and diverse samples in future studies, as certain problems, like the experience with videoconferences, may not arise [2].

**Table 1- Literature’s main findings**

| Author                       | Year | Main findings  |
|------------------------------|------|--|
| [5] Saigí-Rubió et al.       | 2022 | <ul style="list-style-type: none"> <li>• Main telemedicine benefits: convenience; reliable and accurate solution; more access to healthcare; frequent communication/contact with health professionals; better response time.</li> <li>• Main telemedicine challenges: internet access; need of training and up-skilling; patients’ age and type of health condition; ethics, privacy, safety, and data-security concerns; high implementation costs; accessibility to fundings; formulation of proper strategies and policies; showing evidence of the effectiveness and benefits of telemedicine.</li> <li>• Findings on telemedicine resistance: patients’ preference to personal contact with the practitioner; patients’ lack of motivation and support; lack of skills and knowledge regarding technology; others.</li> <li>• General findings: more studies needed about professionals and patients’ satisfaction and level of adoption to proper formulate strategies that counter change’s resistance; need of a financial framework implementation; transmit evidence of telemedicine’s effectiveness to increase level of adoption; need of integration of telemedicine in professionals’ workflow.</li> </ul> |
| [12]O’Neill Catarina et. all | 2022 | <ul style="list-style-type: none"> <li>• Main telemedicine benefits: higher access to health care services; convenience; reduction of travel costs and time saving; allows monitoring patient’ condition and communication between doctor and patient; capable of facing catastrophes.</li> <li>• Main challenges (technical &amp; clinical): adaptation to ICT; lack of equipment; impossibility to perform physical exam; difficulty on transmission/comprehension of clinical information; not appropriate to all type of patient’s conditions; need of facilitator legislation, financial incentives.</li> </ul>   |

|                                 |      |  |
|---------------------------------|------|--|
|                                 |      | <ul style="list-style-type: none"> <li>• Findings: presential consultations decreased and non-presential ones significantly increased; most used telemedicine form of communication between doctors and patients was telephone consultation; the platforms used for the videoconference teleconsultations were mainly WhatsApp, Zoom, Microsoft Teams and Skype (RSE Live with residual use); video support associated with less clinical difficulties; general practitioners satisfied with teleconsultations; preferable first in-person consultation and subsequent teleconsultation.</li> </ul>  |
| [21]Hammersley, Victoria et all | 2019 | <ul style="list-style-type: none"> <li>• Main technical challenges: internet connection; higher hardware complexity for clinicians.</li> <li>• Videoconference's benefits' perception for patients: convenience, no need to travel or take time off work.</li> <li>• Findings: teleconsultations associated with less health problems raised than in in-person ones, but similar type of problems addressed; telephone and videoconference consultations have similar quality between them, and lower quality (health understanding and placing problem) compared to in-person ones; registered more patient education &amp; counselling in in-person consultations than in both telephone and videoconference consultations.</li> </ul> |
| [16]Donaghy, Eddie              | 2019 | <ul style="list-style-type: none"> <li>• Telemedicine benefits' perception for patients: convenience; time saving and travel cost saving; less stress.</li> <li>• Main benefits of videoconference consultations: visual cues improve dynamic of consultation and decision making; may reduce risk miscommunication; deemed as more personal than telephone consultations and people are more focused and formal (strength).</li> <li>• Main challenges of videoconference consultations: internet connection and performance during consultation; suitable location for the patient to attend the teleconsultation.</li> </ul>  |



|   |      |  |
|---|------|--|
|   |      | <ul style="list-style-type: none"> <li>• Findings: still a low level of use of videoconference in UK; most used platforms were Facetime and Skype; good overall experience with videoconferences and people would use it again; videoconferences may also involve waiting times; preferable to have in-person consultation first; reliable technology perceived as essential for widespread implementation; higher experience performing/attending videoconferences reflects a more confident consultation.</li> </ul>   |
| [29]European Union- market study telemedicine | 2018 | <ul style="list-style-type: none"> <li>• Main benefits of telemedicine: enable health care monitoring and follow-up; time saving for both practitioners and patients; don't affect efficiency of provided care.</li> <li>• Overcome cultural barriers: GPs must be updated with ICT in healthcare; appropriate campaigns to increase awareness of benefits of telemedicine.</li> <li>• Overcome regulatory barriers: ensure interoperability and quality standards; government funding criteria; simplify and secure health data sharing with clear data protection legal framework; EU countries should harmonise legal frameworks; share the same terminology and definitions.</li> <li>• Overcome technical barriers: integrate practical technological skill's training in medical school; initiatives to facilitate knowledge.</li> <li>• Overcome knowledge barriers: promote scientific-based evidence of benefits of telemedicine; communication of main findings to population; government funding for upskilling professionals in digital technologies.</li> <li>• Overcome financial barriers: reward doctors when they meet patient satisfaction in telemedicine; decrease financial barrier; spread initial financial burden through multi-score financing and public-private partnerships; ensure interoperability standards that telemedicine solutions should meet.</li> </ul> |

|                           |      |   |
|---------------------------|------|---|
|                           |      | <ul style="list-style-type: none"> <li>• Findings: lack of large-scale evidence of telemedicine benefits; teleconsultations and telemonitoring are the main telemedicine solutions addressed; important to create solutions to increase motivation and acceptance regarding the new way of working; need to inform population about potential and usefulness of telemedicine services.</li> </ul>   |
| [45]Boateng, Daniel et al | 2021 | <ul style="list-style-type: none"> <li>• Findings: adoption of technologies and telemedicine increased number of consultations (video teleconsultations, prescription renewal, exam prescription); there was a change of scheduled face-to-face consultations to non-presential consultations; rural regions were the most affected by suspension of presential consultations; urban regions provided continuous assistance through non-presential provision of care.</li> </ul>  |
| [49] Scott Kruse et al    | 2018 | <ul style="list-style-type: none"> <li>• Main telemedicine adoption barriers for organizations: cost; reimbursement; legal liability; privacy confidentiality concerns; security of data; effectiveness.</li> <li>• Main telemedicine adoption barriers for patients: age; level of education; computer literacy; bandwidth; unawareness of telemedicine services.</li> <li>• Main telemedicine adoption barriers for staff and programmers: limitation of technically challenged staff; resistance to change; licensing issues.</li> <li>• Policymakers should consider telemedicine services as solutions to enable healthcare access in all geographic areas, especially rural areas.</li> </ul> |
| [2] Powell et al          | 2017 | <ul style="list-style-type: none"> <li>• Videoconference teleconsultations' benefits: reduced costs and travel costs; reduced need of absent from work; improved convenience, efficiency, and comfort for patients.</li> <li>• Challenges: small sample with successful experience did not rise issues regarding meeting set up or access to video technology; criteria selection associated with biased results.</li> </ul>  |

|  |      |   |
|--|------|---|
|  |      | <ul style="list-style-type: none"> <li>• Findings: patient location may affect privacy; patients perceived as feeling comfortable talking to GP over video; patients should use headphones or find a private room for a more private consultation; videoconferences may enable more timely communication of test results than in-person appointments; some patients may feel more comfortable and private receiving serious news through videoconference; patients preferred primary care teleconsultations to in-person consultations; telehealth solutions should be patient-centered based on patient' satisfaction.</li> </ul>  |
| [30] Nittari et al.  | 2020 | <ul style="list-style-type: none"> <li>• Main benefits of telemedicine: health access improvement; cost savings and greater organization of public health in the long run; quicker patient engagement</li> <li>• Main challenges of telemedicine: uniform policies in European Union and standard laws; ethical and legal concerns; data protection; use of easy and non-invasive devices.</li> <li>• Findings: need of professionals' training; telemedicine has a great impact on policy making; more studies needed regarding telemedicine's legislation; telemedicine may improve care; AI in health care may improve results and optimise telemedicine's costs.</li> </ul> |
| [22] Rush, Kathy L.; Howlett, Laura; Munro, Arlin; Burton, Lindsay | 2018 | <ul style="list-style-type: none"> <li>• Main advantages of video consultations compared to telephone consultations: fewer medication errors; higher diagnostic accuracy; better decision-making; better communication/understanding; visual cues increase assessment capabilities.</li> <li>• Main disadvantages of video consultations compared to telephone consultations: higher equipment costs; longer consultations' duration due to equipment set up and patients' assessment.</li> <li>• Findings: practitioners' training and experience influence their provision of care.</li> </ul>  |

|   |             |  |
|---|-------------|--|
| <p>[48] O'Connor et al.<br/>O'Connor, Siobhan; Hanlon, Peter; O'Donnell, Catherine A.; Garcia, Sonia; Glanville, Julie; Mair, Frances S</p> | <p>2016</p> | <ul style="list-style-type: none"> <li>• Main benefits of technology: patients motivated to self-monitor health condition; fitted technology promote patients' engagement; anonymity of digital services seen as secure and private; provision of communication channel with the health professional; fast and simple health management.</li> <li>• Main barriers of technology: lack of awareness; low perceived value of electronic solutions; concern about privacy of personal health information; lack of digital literacy; lack of equipment and internet access; lack of human interaction; difficulty in trusting in virtual health professionals.</li> <li>• Findings: need to increase public awareness of the digital solutions; more investment needed in public health education; identify more suitable engagement strategies; digital inclusion initiatives; need to have a higher digital health's perceived value; need to improve usability of digital health products and services; additional support as an effective strategy to reach individuals; health professionals' recommendation promote patients' engagement; advertisement targeting wider patients' support networks; need for more personalised products and services, as well as customised engagement strategies; easy enrolment processes; need for integrated systems; more investment in digital upskilling; greater fundings frameworks; higher awareness of digital health's risks to enable suitable and better regulations.</li> </ul> |
|---|-------------|--|

### **3. Methodology**

#### **3.1 Method**

The study's methodology consisted in a cross-sectional perspective study. The methods used involved an analysis of the literature regarding teleconsultations and telehealth solutions, as well as an informal interview with a former Primary Care leading physician to know more about health centres' functioning and organization. Taking this into account, the questionnaire was created, using Qualtrics platform, with several questions about telemedicine and videoconference teleconsultations in primary care. This was directed to patients and distributed among Portuguese patients' associations. The statistical analysis of the results was done using R-Markdown.

#### **3.2 Instrument- online survey**

The questionnaire contained interpersonal variability, once it incorporated answers from different patients, with different demographic characteristics. Was asked to 47 Portuguese patients' associations (Appendix, Patients' Associations' list) to distribute the online survey among their associates. These non-for-profit patients' organizations support and represent patients with a mutual health condition, either acute or chronic diseases [50]. The survey distribution through this channel, had the objective to reach more people with a diverse range of demographic characteristics and personal opinions, and, therefore, to have a more reliable sample with less change of biased results.

The questionnaire's structure included four diverse sections. The first section covered demographic independent variables, and the remaining sections covered dependent variables, regarding aspects such as, the last presential consultations, video-teleconsultations and the use of other forms of telemedicine (questionnaire in Appendix, Survey).

The first section aimed to gather information about the respondent, with questions on independent demographic characteristics. It contained questions related to gender, age (divided in three main groups, as "Youths", "Early-Middle Adults", "Late Adults" similar to age groups on [51] ) , respective health region, level of education (distinguished in two main groups "low-medium and high level, similar to a study [52], where it was considered low until the lower secondary education, medium with upper secondary education, and high starting with university

degrees and other higher education institutions), current professional status, and annual household income (also divided in two main groups to simplify the analysis, where from <6 000 €/year to 30 000 €/year, considered as lower income, and above 30 001 € considered higher income, similar to intervals of a study [53], where the lowest incomes are considered until 13 257 € per adult (around 26 000 € if there are two incomes) in the household, and the highest incomes are above 18 117 € per adult (around 36 000 € with two incomes), in the household), through multiple option questions with either specific dummy variables or composed by intervals.

There was also a question related to patients' availability to attend presential consultations and teleconsultations, and it was focused in three different levels, financial availability level, time availability level and at a hardware level. This set of questions regarding patients' availability presented a five-point scale, based on Likert, from "Totally unavailable", as level 1, to "Totally available", as level 5. Time availability was associated with patients' opportunity to have free time to attend an in-person consultation. Financial availability was regarding the financial costs that a presential consultation could imply, mainly transportation costs. As for the level of hardware availability, it aimed to understand more about patients having, or not, technological devices, such as computers, smartphones, tablets, and others, that could enable them to attend a teleconsultation. Here, the level of availability was towards the attendance of teleconsultations, rather than the attendance of presential consultations like in the case of both financial and time levels.

In the second section, there were quantitative and qualitative multiple choice, and open-ended questions related to the last presential consultation with the general practitioner. Such as the consultation's duration, with five increasing intervals of time, the purpose of the consultation, with four general types of consultations performed in Portuguese health centres, and the number of physical contacts between the doctor and the patient, during an in-person consultation. There was also a question related to their opinion about the possibility of that last consultation have been done in teleconsultation format, with a five-point scale, from "Strongly could be by teleconsultation", as the first level, to "Strongly justified being presential", as fifth level, as well as two open-ended questions for patients to justify their answers.

The third section aimed to understand the knowledge and experience of the patient regarding video-teleconsultation, as well as to analyse aspects regarding the attendance of several consultations in the past year.

In the fourth, and last section, there were two boxes with several statements each, where the respondent had a 5-point Likert scale response option, from “Totally Disagree”, being the first level of the scale, to “Totally Agree”, being the fifth level of the scale. The first set of affirmations was related with videoconference teleconsultations, to evaluate if the respondents understood the subject and advantages associated with it. The second set of affirmations was related with the use of other forms of telemedicine, such as email, text messaging and phone calls.

The questions of the questionnaire ranged from multiple choice based, to opened questions. The 5-point scale might be associated with a simpler and faster use, while still assuring a high level of precision, and the justifications of the answers aimed to have a more accurate understanding of respondents’ point of view [54], [55].

### **3.3 Questionnaire Distribution and Sample respondents**

An introduction email message was sent to a list of 47 patients’ organizations (seen on Appendix, Table 2) describing the purpose of my thesis and what it was required from them to collaborate in the study, along with the access link to the online Qualtrics survey. Five of those patient’s associations, were willing to collaborate and accepted to distribute the questionnaire among the respective associates, through email and social media platforms. Answers from 193 patients were collected, however, only 70 answers were used for the statistical analysis due to low level of completeness.

### **3.4 Justification**

There were a few different potential approaches to analyse if the daily work of a general practitioner involved, or not, physical touch with the patient, including literature review, observation of consultations, interviewing general practitioners and distribution of a questionnaire among patients and practitioners.

The first option was to observe and accompany several general practitioners during a certain amount of time. Consultations where there was not a necessity of any type of physical intervention to the patient, could be reported as viable teleconsultations. Having in mind the “Hawthorne effect”, being this a change in the behaviour caused by the consciousness of being observed, that can explain positive results in the studies [55], it is possible to understand that the results would,

most probably, indicate the necessity of touching and, therefore, the need for the consultations to be performed as an in-person consultation. Which would modify the results and, therefore, bias the study. [56]

The option of a hidden camera was not a viable option due to ethics and legal issues.

Another potential approach was to interview general practitioners, to better understand the usual procedures performed during consultations and to analyse their point of view regarding the possibility of performing videoconference teleconsultations in large scale. It was possible to contact one former Primary Care leading physician, that shared the respective perspective.

Regarding the questionnaires' approach, it was not possible to achieve results from both perspectives, patients, and general practitioners. The contact with doctors involves prior ethical and clinical evaluation of the study, not possible to obtain in the time space of the thesis work. Therefore, this study specifically contains respondents' answers from a patient's perspective.

In sum, the study gathered a qualitative analysis regarding literature review and an informal interview, as well as quantitative analysis, regarding the data collected in an online survey directed to patients.

### **3.5 Questionnaire application**

The questionnaire was applied using Qualtrics online platform. The statistical analysis of the data collected was done through R Markdown.

### **3.6 Data processing and analysis**

The questionnaire was organized on Microsoft Excel, for a more structured approach and to better distinguish the several aspects asked in the survey, enabling the differentiation not only between qualitative and quantitative information, but also between dependent and independent variables, for an easier, afterwards, contact with the collected data.

The statistical analysis of the respondents' answers was done in R Markdown software. There, it was possible to attribute the correct label to each type of data and to run different statistical tests to know more about the connection within different variables in our sample.

Statistical analysis, such as Pearson's Correlation tests, ANOVA tests and proportion's analysis. Pearson's Correlation tests, allow the determination of the linear dependence between



two variables [57]. ANOVA statistical tests, developed by Ronald Fisher, enable the comparison of several variables. The 1-way fixed-effects ANOVA, estimate the change in the dependent variable with the different levels of the independent variables [58].

It is important to notice that, from the questionnaire, only appropriate questions were used in this results' analysis, as they were the most appropriate ones for the study. The aim was to identify the level of awareness of Portuguese patients, as well as to analyse the possibility of in-person consultations change to teleconsultations by videoconference.

### **3.7 Ethical aspects**

The consent of respondents in was obtained in the start of the questionnaire, and it was assured that the respondent showed, or not, acceptability to the access of the collected information during the study, respecting the accessibility and communication of health information, regarding the Portuguese legislation, *lei n°26/2016, Artigo 7°* [59]. The collected information was exclusively for the analysis of results of the study, no personal information was collected. It was guaranteed confidentiality and anonymous responses for all questions in the survey, once there was assured that any individual was identified, and any response was associated to the respective respondent.

## **4. Results**

### **4.1 Demographic characteristics**

In terms of demographic characteristics of the population's sample of this survey, it was possible to observe its diversity in several proportion's tables, in terms of gender, age, respective health region, level of education, current professional status and household's income (Appendix, Figure 3 and Figure 4).

The majority of the sample was constituted by 88,6% female patients, where male patients accounted for 11,4%. Ages were quite diverse, with 24,3% with 19-35 years, 30,0% with 36-45 years, 21,4% with 46-55 years, and 15,7% with 56-65 years. Hence, it was created three large ranges of ages to simplify the analysis. Youths, with ages until 18 years, representing 2,9%, Early-Middle Adults, with ages from 19 to 55 years, accounting for 75,7%, and Late Adults, with ages above 56 years, with 21,4%.

As for patients' respective health region, 53,1% were from *Lisboa e Vale do Tejo*, with, 18,8% of patients from *Norte* and *Centro*, each one. While *Alentejo* and *Algarve* had 4,7%, each one, and *Açores/Madeira* 0,0%.

Patients' highest completed levels of education were bachelor's degree with 41,4%, and high school, with 38,6%. Patients with master's degree accounted for 11,4%, and with PhD 2,9%. Elementary school represented 4,3%. Other level of education had 1,4% of the patients. To have an easier understanding of the results, this variable was divided in low-medium, high, and other education levels. Low-medium represented 42,9%, as it englobes elementary and high school levels, and high education level represented 55,7%, with all levels starting from a university degree.

As for current professional status, 54,3% of the patients were full-time employees, 11,4% retired, and 12,9% students. Patients looking for a job or unemployed represented 2,9%, while 17,1% had another kind of professional situation.

Regarding the household's gross annual income, 23,2% had an annual income less or equal to 6 000€, 44,9% within 6 001-30 000€, and 23,2% with annual income within 30 001-75 000€. Income from 75 001 up to 100 000€ accounted for 8,7% of the sample. This variable was also converged into two main ranges, lower and higher incomes. It was considered lower incomes, until 30 000€/year, representing 68,1%, and above that were considered higher incomes, with 31,9%.

#### **4.2 Patient's perspective about video-teleconsultations**

More than half (57,1%) of the respondents strongly agreed, and 24,3% moderately agreed, with being aware of the concept of video-teleconsultations, which represented a majority of 81,4%. However, the remain 18,6% of the sample reported not agreeing, or neither agreeing nor disagreeing, with it (Appendix, Figure 5). To better understand patient's awareness, in those 57,1% who strongly agreed, the major part had a high level of education, while higher incomes had a slight larger presence.

It was important to analyse the presence of a correlation between the demographic independent variables and patients' awareness. Through several ANOVA tests, where the Null Hypothesis, H<sub>0</sub>, defended a non-correlation between variables, and where the Alternative Hypothesis, H<sub>1</sub>, stated that there was a non-zero correlation (Appendix, Figure 6). Neither gender, age, health region, nor professional status, had significant influences, as p-values were higher than

the alpha level of 0,05. As for the level of education and households' annual income, both significantly influenced patients' awareness, with p-values lower than the alpha.

Despite the great level of awareness, nearly four-fifths of the respondents (77,2%) agreed with the statement of the need for more advertisement about teleconsultations (Appendix, Figure 7).

In addition, as patients were quite aware of the concept, it was possible for them to have an opinion regarding the potential effect that teleconsultations might have in health centres functioning. It was asked the level of agreement with the statement of teleconsultations enabling a better functioning of health centres through, for example, its decongestion, and 34,3% strongly agreed, and 38,6% moderately agreed (Appendix, Figure 7).

#### **4.3 Patients' perspectives about non-video-teleconsultations:**

Most of the patients, 85,7%, reported being aware of telemedicine solutions as telephone consultations, messages, and emails' exchange with the practitioner (Appendix, Figure 20). Most of those patients were in the early-middle adults' age group, and the majority of them had a high education level, while having a strong presence of lower incomes.

With ANOVA tests, were tested possible influences of the different demographic characteristics on patients' awareness (Appendix, Figure 21). Gender and education's level had significant influences, with p-values lower than the alpha of 0,05. The other characteristics had not statistically significant influences.

Moreover, 77,1% of patients agreed with the statement of using these forms of telemedicine (Appendix, Figure 22). And more than half of patients (54,3%) reported that they somewhat, and strongly, agreed with using them quite often (Appendix, Figure 22). Here there was a stronger presence of early-middle adults, high education levels, and lower levels of income.

A Pearson's correlation test identified a significant and positive influence of awareness about these telemedicine solutions on the frequency of use of them, with p-value lower than level of 0,05 (Appendix, Figure 23). In addition, importance and value's perception also had a significant and positive influence on the use and frequency of use of these forms of telemedicine (Appendix, Figure 24).

#### **4.4 Substitution influencing aspects:**

##### **Substitutions' possibility of in-person consultations for a video-teleconsultations:**

Regarding the possibility of the last consultation being done by videoconference instead of in-person, in proportion, 27,1% of them reporting a strong, and 34,3% a slight possibility. Being in-person was probably understandable for 11,4%, and 17,1% of the patients stated that there was a solid explanation for being in-person (Appendix, Figure 8).

As for the patients' last 10 in-person consultations, it was asked patients to identify how many of those consultations were feasible for a teleconsultation format. 28,6% reported that more than half of those consultations could have been done by videoconference. In this 28,6% there was a major presence of early-middle adults, patients high education's levels, and with lower incomes. From one up to five substitutions were defended by 47,2% patients, with a higher presence of early-middle adults, although well divided between the levels of education, and a higher percentage of patients with lower incomes (Appendix, Figure 9 and 10). Nevertheless, 17,1% didn't think that any of those consultations could have been substituted (Appendix, Figure 8), with many of those patients having lower incomes.

##### **Demographic characteristics' influence:**

Demographic characteristics were also tested, through several ANOVA tests, to analyse their influence on patients' opinion about the possibility of substituting in-person consultations for teleconsultations, either the last 10 or the last in-person one. For the correlation tests performed, there were no statistically significant influences for any of the variables, with similar p-values comparing it between the last and the last ten in-person consultations. Hence, for this sample, factors as patients' age, gender, level of education, health region, current professional status, or annual households' income, did not affect their substitution's opinion (Appendix, Figure 12 and 13).

##### **Physical contacts' influence:**

One of the factors being analysed in this study was the number of physical contacts during an in-person consultation. It was asked for the patients to determine how many times did the general practitioner performed any kind of physical intervention, during the last consultation. In proportion, 38,6% reported that there were no interventions at all, and 54,3% reported from one or two physical

interventions during the consultation (Appendix, Figure 14). The remaining 7,1% reported three or more contacts.

A Pearson's correlation test analysed the influence of the number of physical contacts during a consultation with the general practitioner, on the possibility of that consultation be performed in a video-teleconsultation format (Appendix, Figure 14). The Null Hypothesis,  $H_0$ , stated that there was no correlation between variables, while the Alternative Hypothesis,  $H_1$ , affirmed that there was some correlation of any kind. It was possible to identify a p-value of  $6.1 \times 10^{-5}$ , lower than the alpha of 0,05, which meant that the Null Hypothesis was rejected. Hence, this correlation was statistically significant. With the 95% confidence interval was possible to confirm the decision of the rejection of the Null Hypothesis as it did not contain the 0, (0,2523, 0,6272). The correlation's coefficient was around 0,46. Having in mind the dependent variable scale, this coefficient indicated that, as the number of physical interventions, during a consultation, increased, the more patients confirmed that being an in-person consultation was reasonable.

Patients were, afterwards, asked to justify their answer regarding their opinion about the possibility of being teleconsultation. On one hand, there were cases where physical exams were indispensable, as it requested observation due to a certain condition, auscultation, blood pressure measurement, weight measurement, or others, which patients reported that there was the need for the consultation to be presential. There were also patients with doubts regarding the teleconsultation method and preferred the in-person consultation, for being a more personal interaction. On the other hand, there were consultations that only required the analysis of medical exams' results and adequate medication prescription, and where physical interventions were not crucial, which patients reported as a possibility to be in a remote format. Some patients also stated that it could be more practical to have a teleconsultation.

Hence, there were physical interventions reported as a justification for the consultation to be in-person, as well as statements about not being necessary to be in-person, as there was no situation, during the consultation, that prevented it from being in a remote format. Which can be confirmed by the correlation test described before, as there was a statistically significant influence of physical contact on the possibility of being, or not, videoconference.

### **Consultations' purpose's influence:**

It was also tested, by an ANOVA test, the influence of the purpose of the consultation on patients' opinion about substituting the in-person consultation for a teleconsultation. The correlation between both variables was statistically significant, as the p-value of 0,019 was less than the alpha of 0,05 (Appendix, Figure 15). The Null Hypothesis, H0, defending that there was any kind of relation between variables, was rejected. Hence, it was possible to conclude that the different purposes of consultations, such as routine, disease follow-up, emergency, and nursing care consultations, can affect patients' opinion about the possibility of replacing the in-person consultation for a teleconsultation.

Through a bar chart (Appendix, Figure 16), it was possible to notice that, for example, for routine consultations, which was the type of consultations reported by 52,9% of the patients, almost three-fourths of them believed in the possibility of switching for a teleconsultation. For follow-up consultations, it was also possible to notice more than half of patients attending them, reported that probably it could be substituted for a teleconsultation. As for emergency consultations, patients considered that, most probably, it was important being in-person.

### **Hardware availability's influence:**

It was asked patients about their hardware availability, that is, about patients' having, or not, the equipment and devices needed to substitute a presential consultation for a teleconsultation. Most of the patients, 81,4%, reported being moderately and totally available, which indicated that, in their perspective, they had what was necessary to attend a video-teleconsultation (Appendix, Figure 17).

Through a Pearson's correlation test, it was also tested the correlation between hardware availability and the possibility of substituting the last in-person consultation for a teleconsultation, and there was a statistically significant influence. The p-value of 0,01 was lower than the alpha of 0,05, and the Null Hypothesis, H0, defending a non-existing correlation, was rejected. The 95% confidence interval did not contain zero, which was consistent with the rejection of the H0. Finally, the correlation's coefficient was around -0,30, indicating that as patients were more available in terms of equipment and devices needed for teleconsultations, there was a stronger possibility of exchanging the in-person consultation for a teleconsultation (Appendix, Figure 17).

With the same reasoning, it was analysed the correlation between hardware availability and the possibility of substituting part of last ten in-person consultations, with a Pearson's correlation test. The p-value was lower than the alpha of 0,05, being possible to reject the Null Hypothesis, defending a non-correlation. The 95% confidence interval did not contain zero, being coherent with the rejection of the H0. There was a statistically significant influence with a coefficient of 0,41, hence as patients were more available in terms of equipment and devices, there was the possibility of exchanging a higher number of in-person consultations for video-teleconsultations.

Furthermore, is important to refer that time and financial availabilities did not significantly influence the possibility of substituting in-person consultations for video-teleconsultations, therefore, they were not considered influencing factors. However, in both availability' variables, more than half of the patients, 67,1% for time and 72,9% for financial aspects, reported being available (Appendix, Figure 18).

#### **Value, Quality and Benefits' perception's influence:**

It was asked patients if they agreed with teleconsultations having the same value and same service's quality as in-person consultations, and 48,6% agreed, while 35,7% disagreed. Regarding benefits' perception, 77,2% of patients agreed with video-teleconsultations being more comfortable, convenient and involving less travel costs and waiting times compared to in-person consultations.

Four Pearson's Correlation tests were used to analyse the influence of video-teleconsultations' value and benefits' perception, on the possibility of substituting the last, and the last 10, in-person consultations for remote ones (Appendix, Figure 19). The Null Hypothesis, H0, for all tests, defended a non-existing correlation, while the Alternative Hypothesis, H1, defended a correlation different from zero.

It was possible to identify statistically significant influences, as p-values were lower than the alpha of 0,05 (Appendix, Figure 19). The four Null Hypothesis, H0, were rejected, and the 95% confidence intervals confirmed the decision of rejection the H0, as neither of them contained the zero. On one hand, the correlation's coefficients, for correlations between both value and benefits' perception, and the substitution's possibility regarding the most recent consultation, were -0,380 and -0,389, respectively. Having in mind the scale of the variable of the possibility of substitution

of the last consultation, as value, quality and benefits' perceptions increased, the more patients considered the replacing it for a teleconsultation. On the other hand, for the correlations with the independent variable regarding the possibility of substituting the last 10 in-person consultations, the coefficients were 0,391 for value and 0,393 for benefits' perception. These results indicated that as value, quality and benefits' perceptions increased, the larger the number of consultations, from the last ten, that were considered as viable for a video-teleconsultation.

## **5. Discussion**

### **5.1 What are patients' perspectives about video-teleconsultations?**

In the literature review, lack of awareness was perceived as one of the main challenges of teleconsultations [48], [49].

However, in this study, most patients showed to be aware of the concept. This difference might be explained by the reduced size of this sample, nevertheless, patients being aware can be considered a positive aspect, as it is important for the population to know about their possibilities as patients.

Levels of education and income, in this sample, had a significant influence on patients' awareness, which is important to be taken into account, in future studies, to enable the creation of solutions to empower equal telehealth access to the population.

### **Do patients feel the need of more advertisement campaigns regarding teleconsultations?**

Advertisement campaigns not only may improve awareness but may also enable people's engagement on video-teleconsultations, as it can have the role of advising people and even persuading them. According to several studies, there is the need to increase public awareness of teleconsultations and its benefits, with, for example, advertisement campaigns [13], [48].

In this study, patients indicated that teleconsultations should be more advertised.

Hence, the necessity of a more visible and accessible information, regarding teleconsultations' advantages, showed that literature and this study are in harmony. It might indicate that there is a lack of campaigns and reachable information regarding this telehealth solution.



## **Can teleconsultations contribute to a better functioning of Health centres?**

In the literature, telemedicine may enable improved quality care, maximization of the resources in the health system, as well as a better management of patients [6] [7].

From this sample's respondents' point of view, yes. Most patients agreed with teleconsultations influence on empowering a better Health Centre's functioning, with one of the benefits as the contribution for less gatherings of people in the facility at the same time.

With this, is possible to conclude that a telemedicine's large-scale implementation can have benefits on a level of performance of these health units. This is crucial for healthcare services' quality and patients' satisfaction as clients of these services, as it can motivating people to become more involved and interest with their health's management.

### **5.2 What are patients' perspectives about non-video-teleconsultations?**

In the literature review, telemedicine solutions as telephone consultations, text messaging, email exchange, and others, had higher levels of awareness and use when compared to video-teleconsultations, with telephone consultation being the most used telemedicine's resource [6], [12].

In this sample, it was also possible to also notice a higher level of awareness, of 85,7%, compared to video-teleconsultations' awareness, of 81,4%. The level of awareness of other forms of telemedicine was influenced by patients' gender and level of education. In addition, most patients agreed with using these solutions. As, most probably, expected, the level of awareness and patients' value's perception significantly influenced the use and its frequency. Hence, the results are in line with the literature on a level of awareness and use.

The use of these forms of telehealth may be associated with more common used technologies and, therefore, a greater ease on adopting and using it, compared to videoconferences. Even though video-teleconsultations have a greater efficiency [16], [22], it is also important for patients to have a simpler way to contact the health professional, improving proximity on a patient-caregiver's level.

### **5.3 What factors can influence the patient's opinion about the substitution of in-person consultations for video-teleconsultations?**

There are studies defending that aspects, as physical examination, patients' age and health condition, equipment needed and digital literacy, as well as perceived benefits of teleconsultations, may have an impact on how people think about the possibility of changing from in-person consultations to videoconference ones [2], [5], [12], [16], [21], [22], [29], [49].

In this study, it was found that physical contacts and the purpose of the consultation influenced significantly, the perceived benefits and value or quality of teleconsultations could also influence significantly, as well as having, or not, the right equipment needed to attend a teleconsultation. Despite these influencing aspects, demographic characteristics did not affect patients' opinion regarding the possibility of substitution. That is, people's age, gender, or education level, and others, were not statistically significant aspects.

Therefore, it was possible to conclude that this study might differ from other studies, in for example, the influence of demographic characteristics of the patients, however it can be related with the sample's respondents. Hence, future studies are needed to evaluate the clinical and non-clinical's aspects that are really influencing the possibility of in-person consultations being substituted for remote ones, from patients and health professionals' point of view. With this, it is possible to create suitable solutions to increase the opportunity of substitution.

#### **5.4 Do demographic characteristics influence the possibility of substitution?**

According to the literature overview, patients' age and even level of education can be seen as a challenge for teleconsultations [5], [49]. So, for this study, it was important to understand to what extent different demographic characteristics influenced or not, patients' answers.

For this sample, no. None of the studied characteristics, as patients' age, gender, level of education, respective health region, current professional status, and households' income, had an impact on patients' opinion. Even though the results did not agree with the literature, that can be explained with the size of the sample, and the respective respondents.

#### **5.5 Do physical interventions affect the chance of substitution for remote consultations?**

In the literature review, it was possible to notice that not being possible to perform a physical exam could be considered a challenge for teleconsultations [12].

In this study, it was found a statistically significant influence, as more physical contacts constrained the possibility of replacing the in-person consultation for a videoconference one. And with the same reasoning, the less contacts during the consultation, the less it was justified being in-person. Hence, yes, physical interventions affect the chance of substitution of in-person consultations for remote video-teleconsultations, as it was expected in the literature review.

Patients may associate the need for medical interventions to in-person consultations, not considering any possible tele-medical devices. Tele-dermatoscope, tele-stethoscope, and others, [10], [11], may enable certain distanced medical interventions as professionals can monitor the results and provide assistance and support. To increase patients' engagement, it is important to educate them regarding these possibilities and how to use this type of devices. With this, the influence of physical contacts on the possibility of substitution in-person consultations for remote ones could decrease.

### **5.6 Do consultations' purpose influence?**

Studies affirmed that not all health conditions were appropriate to engage teleconsultations [5], [12]. Which induced me to try to understand the influence of the consultations' purpose on engagement on teleconsultations once different health problems may be associated with different type consultations in health centres, either routine, disease follow-up, emergency, or nursing care.

In this study, it was found that consultations' purpose had, indeed, a significant impact on patients' opinion about the possibility of replacing the consultation with a teleconsultation, as each type of consultation may have its own features and concerns.

Therefore, as in the literature, the different health conditions might influence, for this sample, the consultations' purpose also influenced significantly, as expected.

### **5.7 Are patients able to attend video-teleconsultations and does it influence their opinion?**

Regarding technological requirements, it was possible to notice that the lack of equipment, hardware complexity, and digital literacy were challenges for patients' engagement on teleconsultations [5], [12], [21].

As for this sample, yes. Patients affirmed being able to attend a remote video-teleconsultation, as they had the equipment and devices needed. Also, there were statistically

significant correlations between the availability and their opinion about the possibility of substituting the most recent consultation, and the last ten consultations for remote ones. In both cases, the more patients affirmed having the equipment and devices needed, the more they considered possible to change them for remote consultations.

For the patients of this sample, hardware availability was a positive factor influencing the chance of teleconsultations. This aspect may need future research to analyse the equipment's accessibility for patients and health units, to better understand this influence.

### **5.8 Do value, quality of the service, and benefits' perception influence?**

In the literature review, it was found that convenience, increased access to health care services, and time and cost saving were, most probably, the main perceived benefits of telemedicine. [2], [5], [12], [16], [21], [22], [29]

In this sample, patients considered that there was, indeed, an influence. As patients' perception regarding teleconsultations' value and service's quality increased, the possibility of replacing in-person consultations of teleconsultations also increased. As well as with the benefits' perception, as patients affirmed that teleconsultations could be more comfortable, convenient and could involve less travel costs and waiting times.

Thus, similarly to the literature, benefits and value's perception can be considered significant factors motivating patients' opinion about teleconsultations engagement. Furthermore, it is important to analyse and clarify the actual benefits and telehealth's value on a large-scale point of view.

### **5.9 Limitations and future work**

There were limitations in this study regarding the sample, due to its small size and the non-participation of general practitioners. The second was attempted but time available was not considered sufficient to obtain necessary authorizations from a range of primary care entities. Evaluating the opinion and perspectives of health professionals about telemedicine directly, can be important to analyse the effectiveness of telehealth solutions in healthcare practices.

Even though this sample may not be representative of the population, findings point to an influence of the levels of income and education on patients' awareness telemedicine. Exploring

this more deeply may prove to be crucial in future targeted strategies. Furthermore, is important, in the future, to create accessible solutions in the public telehealth, in terms of easiness and lower costs, to avoid asymmetric access to technologies in the population.

## **Conclusion**

The COVID-19 pandemic has significantly impacted the healthcare industry, leading to a shift towards the use of information and communication technologies (ICT) on healthcare services. Teleconsultations have become a popular alternative to in-person consultations, with telephone consultations being the most used form of communication.

Telemedicine has the potential to improve the access to health care at lower costs, while improving convenience and comfort for patients, but it may be associated with several technical and clinical challenges. Some of those difficulties may be need for suitable equipment and location to attend the teleconsultation, lack of experience on using the technology, lack of investment on remote consultations support, and others. Additionally, it is essential more preparation, at least for health professionals, on technologies to improve the efficiency and quality of the service. It is important to create solutions to motivate staff about the new technology format of working, as well as to expand awareness and build proper advertising campaigns concerning the options available, to help patients make informed choices.

This thesis focused on patients' perspectives of video-teleconsultations and non-video-teleconsultations, as well as on how different factors could influence their opinions about the substitution of in-person consultations for teleconsultations. The study found that most patients were aware of teleconsultations, which was influenced by levels of education and income. However, believed that they should still be more advertised. In addition, patients agreed that teleconsultations could contribute to a better functioning of health centres in Portugal. Non-video-teleconsultations had a higher level of awareness and use, when compared to video-teleconsultations.

The study also found that physical contacts and the purpose of the consultation significantly influenced patients' opinion regarding the substitution of in-person consultations for remote ones. In addition, equipment and devices accessibility, and value and benefit's perception had also significant effects on their opinion. However, demographic characteristics did not affect, which

may be due to the sample size. Hence, it is possible to suggest that clinical context specific variables have a greater importance relatively to the possibility of substitution.

In conclusion, telemedicine may provide beneficial means for both patients and practitioners without affecting the efficiency of the provided care. The results of this study were aligned with previous literature on the topic and provided valuable insights into the patients' perspectives on teleconsultations, that can be useful for Portuguese healthcare providers and policymakers to improve its implementation and better meet patient's needs and expectations. Future studies are required to better analyse patients and professionals' telemedicine's perceptions and influencing aspects on its large-scale adoption.

## Appendix

### SNS website- *Consultas em Telemedicina*

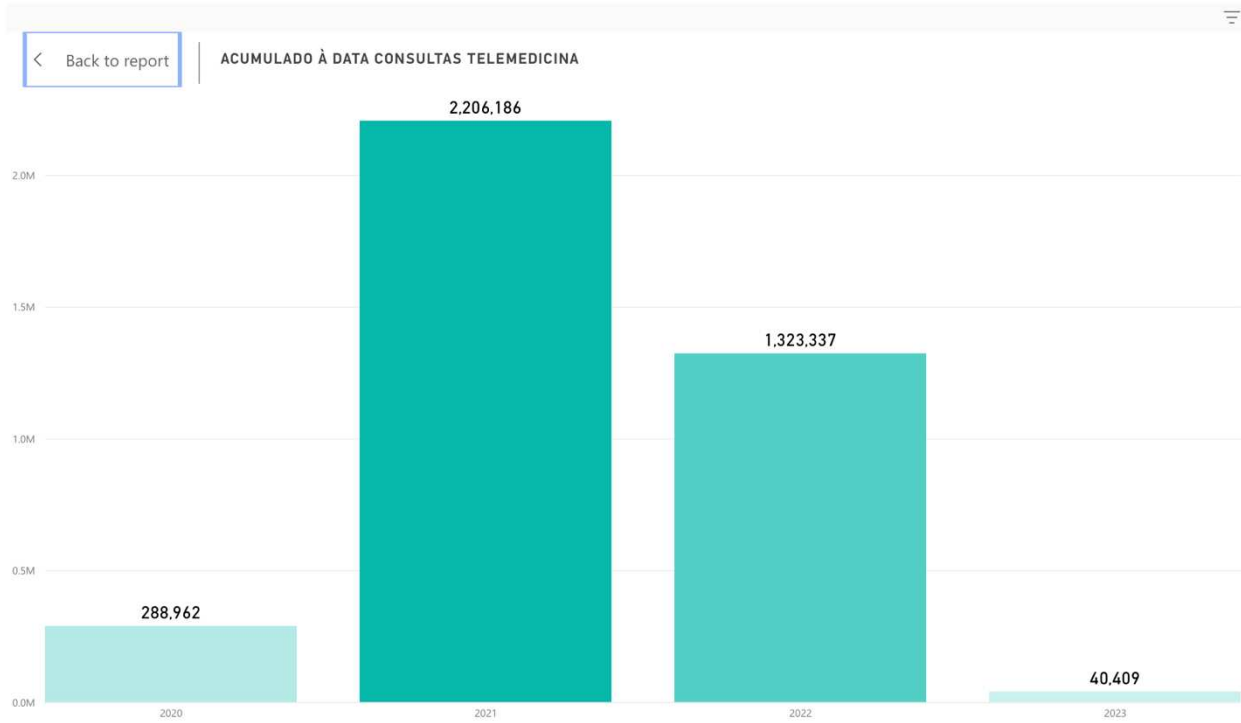


Figure 1- Teleconsultations -*SNS acumulado à data* [43]

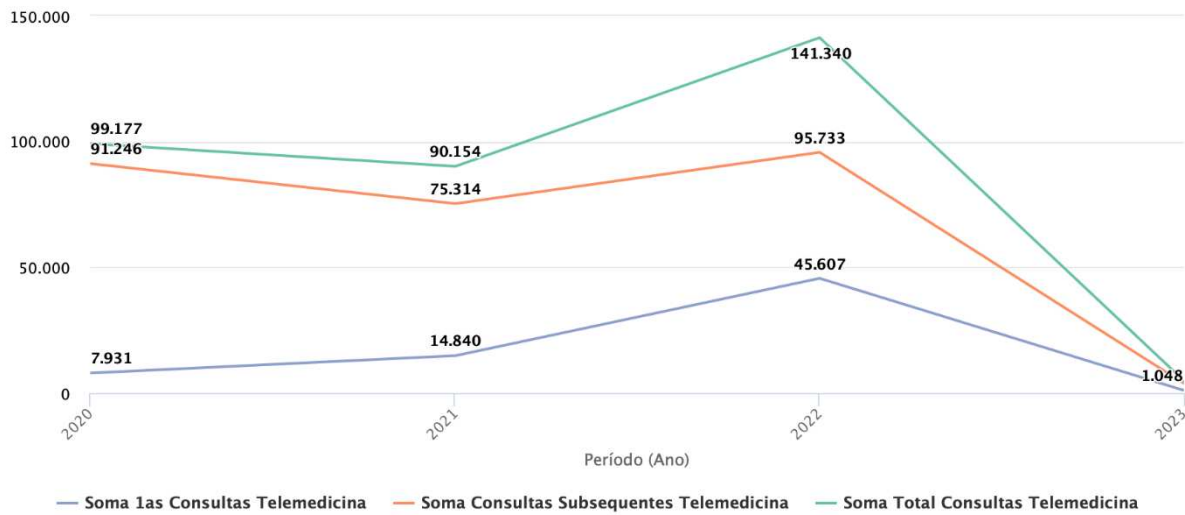


Figure 2- Teleconsultations in *ULS- SNS Transparência* [44]

## Patients' Associations' list:

From 47 contacts, 5 agreed to distribute among their patients.

Table 2- Patients' Associations

| Organizations' names   | Agreed to distribute the survey among associates |
|--|--|
| Associação de Pais e Amigos das Crianças com Cancro (ACREDITAR)                                      | NO   |
| Associação Apoio a Doentes com Sida (ABRAÇO)   | NO   |
| Associação de Apoio a Portadores de Alterações nos Genes relacionados com Cancro Hereditário (EVITA) | NO   |
| Associação de doentes com LUPUS (ADL)  | YES  |
| Associação de Hipnose Clínica de Portugal (AHCP)   | NO   |
| Associação de Insuficientes Respiratórios Crónicos (AIRC)  | NO   |
| Associação do Cidadão Portador de Deficiência e Amigos (ACFDA)                                       | NO   |
| Associação Nacional contra a Fibromialgia e Síndrome de Fadiga Crónica (Myos)                        | NO   |
| Associação Nacional contra a Osteoporose (APOROS)  | NO   |
| Associação Nacional da Espondilite Anquilosante (ANEA)   | NO   |
| Associação Nacional de Doentes com Artrite e outros Reumatismos Infantis e Juvenis (ANDAI)           | NO   |
| Associação Nacional de Doentes com Artrite Reumatóide (ANDAR)  | NO   |
| Associação Nacional de Doentes Linfáticos (andLINF)  | NO   |
| Associação Nacional de Esclerose Múltipla (ANEM)   | NO   |
| Associação Nacional de Tuberculose e Doenças Respiratórias (ANTDR)                                   | NO   |
| Associação Nacional dos Transplantados Hepáticos (ANTH)  | NO   |
| Associação Nacional de Deficiências Mentais e Raras ( Raríssimas )                                   | NO   |
| Associação para a Promoção da Saúde Mental na Infância e Juventude (Developmind)                     | NO   |
| Associação Portuguesa Contra a Leucemia (APCL)   | NO   |
| Associação Portuguesa da Doença Inflamatória do Intestino, Colite Ulcerosa, Doença de Crohn (APDI)   | NO   |
| Associação Portuguesa da Psoríase (PSOPortugal)  | YES  |
| Associação Portuguesa de Apoio a Mulheres com Endometriose (MulherEndo)                              | NO   |
| Associação Portuguesa de Celíacos (APC)  | YES  |
| Associação Portuguesa de Portadores de Trissomia 21 (APPT21)   | NO   |
| Associação Portuguesa de Deficientes (APD)   | NO   |
| Associação Portuguesa de Diagnóstico Pré-Natal (APDPN)   | NO   |
| Associação Portuguesa de Doentes com Enxaqueca e Cefaleias (MiGRA)                                   | NO   |
| Associação Portuguesa de Doentes da Próstata (APDP)  | NO   |
| Associação Portuguesa de Doentes de Parkinson (APDPK)  | NO   |
| Associação Portuguesa de Doentes Neuromusculares (APN)   | NO   |
| Associação Portuguesa de Esclerose Lateral Amiotrófica (ELA)   | NO   |
| Associação Portuguesa de Fibrose Quística (APFQ)   | NO   |
| Associação Portuguesa de Insuficientes Renais (APIR)   | NO   |
| Associação Portuguesa de Jovens com Fibromialgia ( APJOF)  | NO   |



|  |     |
|--|-----|
| Associação Portuguesa de Leucemias e Linfomas (APLL)                                   | NO  |
| Associação Portuguesa de Neurofibromatose (APNF)                                       | NO  |
| Associação Portuguesa de Osteogénese Imperfeita (APOI)                                 | NO  |
| Associação Portuguesa de Osteoporose (APO)   | NO  |
| Associação Protectora dos Diabéticos De Portugal (APDP)                                | NO  |
| Federação Portuguesa de Autismo (FPDA)   | NO  |
| Liga Portuguesa Contra as Doenças Reumáticas ( LPCDR)                                  | YES |
| Plataforma Saúde em Diálogo  | NO  |
| Sociedade Portuguesa de Diabetologia (SPD)   | NO  |
| Sociedade Portuguesa de Esclerose Múltipla (SPEM)                                      | NO  |
| Associação Portuguesa para as Perturbações do Desenvolvimento e Autismo (APPDA) Lisboa | NO  |
| Associação Portuguesa para as Perturbações do Desenvolvimento e Autismo (APPDA) Norte  | NO  |
| Centro ABCReal Portugal  | YES |

## R-Markdown Script Analysis

### Demographic characteristics

```
#Gender
```

```
round(prop.table(table(Results$Gender)),3)
```

```
##
```

```
## Female Male
## 0.886 0.114
```

```
#Age
```

```
round(prop.table(table(Results$Age)),3)
```

```
##
```

```
## ≤18y 19–35y 36–45y 46–55y 56–65y 66–75y ≥76y
## 0.029 0.243 0.300 0.214 0.157 0.057 0.000
```

```
#Age Group
```

```
round(prop.table(table(Group.Age)),3)
```

```
## Group.Age
```

```
## Youths Early-Middle Adults Late Adults
## 0.029 0.757 0.214
```

```
#Health Region
```

```
round(prop.table(table(Results$Health_Region)),3)
```

```
##
```

```
## Norte Centro Lisboa e Vale do Tejo
## 0.188 0.188 0.531
## Alentejo Algarve Açores/Madeira
## 0.047 0.047 0.000
```

Figure 3- Demographic Characteristics

```

#Level of Education
round(prop.table(table(Results$Education_Level)),3)

##
##   Elementary School      High School  Bachelor's Degree
##           0.043             0.386         0.414
##   Master's Degree          PhD          Other
##           0.114             0.029         0.014
## Prefer not to answer
##           0.000

# 2 main Levels of Education
round(prop.table(table(EducLevel)),3)

## EducLevel
## Low-Medium EducLevel      High_EducLevel      Other
##           0.429             0.557             0.014

#Current Professional Situation
round(prop.table(table(Results$Professional_Status)),3)

##
##           Full-Time Employee      Part-Time Employee
##           0.543                     0.014
##           Retired                     Student
##           0.114                     0.129
## Unemployed/ Looking for a Job      Other
##           0.029                     0.171

#Household's Income
round(prop.table(table(Results$Household_Gross_Annual_Income)),3)

##
##   Until 6000€      6001-30000€      30001-75000€      75001-100000€
##           0.232             0.449             0.232             0.087
## More than 100000€
##           0.000

#2 large ranges of Income
round(prop.table(table(Income)),3)

## Income
## LowerIncome HigherIncome
##           0.681             0.319

```

Figure 4- Demographic Characteristics

## Awareness about video-teleconsultations

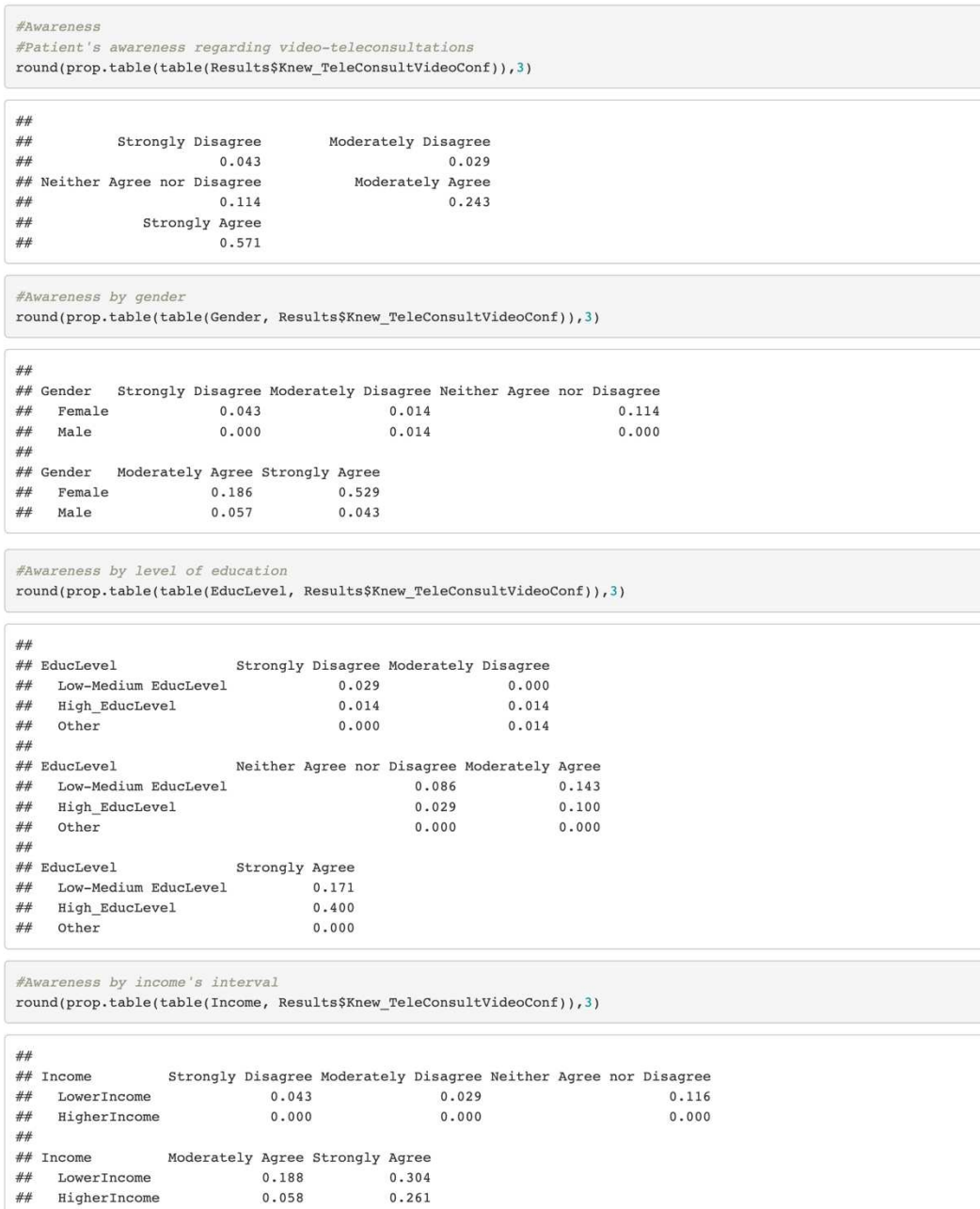


Figure 5- Awareness

## Demographic's influence on patient's awareness

```
##          Df Sum Sq Mean Sq F value Pr(>F)
## Gender    1  0.19  0.1937    0.17  0.682
## Residuals 68 77.65  1.1419

##          Df Sum Sq Mean Sq F value Pr(>F)
## Age       5  2.92  0.5833    0.498  0.776
## Residuals 64 74.93  1.1707

##          Df Sum Sq Mean Sq F value Pr(>F)
## Group.Age  2  0.44  0.2199    0.19  0.827
## Residuals 67 77.40  1.1553

##          Df Sum Sq Mean Sq F value Pr(>F)
## EducLevel  2 10.15  5.075    5.023 0.00927 **
## Residuals 67 67.69  1.010
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##          Df Sum Sq Mean Sq F value Pr(>F)
## Health_Region 4  7.88  1.971  1.734  0.155
## Residuals    59 67.05  1.137
## 6 observations deleted due to missingness

##          Df Sum Sq Mean Sq F value Pr(>F)
## Professional_Status 5  2.38  0.4765  0.404  0.844
## Residuals        64 75.46  1.1791

##          Df Sum Sq Mean Sq F value Pr(>F)
## Income     1 10.03 10.032  9.991 0.00236 **
## Residuals  67  67.27  1.004
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 1 observation deleted due to missingness
```

Figure 6-Demographic Characteristics influence on awareness

## Perspectives about video-teleconsultations

```
#Teleconsultations should be more advertised.
round(prop.table(table(Results$Advertise_TeleConsult)),3)

##
##          Strongly Disagree          Moderately Disagree
##                0.057                0.057
## Neither Agree nor Disagree          Moderately Agree
##                0.114                0.286
##          Strongly Agree
##                0.486

#Teleconsultations enable a better functioning of Health Centers by contributing to their decongestion.
round(prop.table(table(Results$BetterFunctHC_TeleConsult)),3)

##
##          Strongly Disagree          Moderately Disagree
##                0.057                0.086
## Neither Agree nor Disagree          Moderately Agree
##                0.129                0.386
##          Strongly Agree
##                0.343
```

Figure 7- Patients perspectives about video-teleconsultations

## Substitution's possibility - last and 10last consultations

```
#From the last 10 in-person consultations, how many could be done by video-teleconsultation.  
(round(prop.table(table(Results$Last10Consult_Possibility_VideoConf)),3))
```

```
##  
##           None           1-2 could  
##           0.171           0.343  
##           3-5 could           >5 could  
##           0.129           0.286  
## Don't Know/Prefer Not To Answer  
##           0.071
```

```
#Patients' opinion regarding the possibility of the last consultation being, instead, in a remote format.  
round(prop.table(table(Results$Possibility_VideoConf)),3)
```

```
##  
##           Strongly could be VC           Perhaps it could be VC  
##           0.271           0.343  
##           Indifferent / Don't Know           Perhaps FTFC was Justified  
##           0.100           0.114  
## Strongly Justified being FTFC  
##           0.171
```

Figure 8- Video-teleconsultations' possibility

```

#Possibility last 10consult per gender
round(prop.table(table(Gender, Results$Last10Consult_Possibility_VideoConf)),3)

##
## Gender      None 1-2 could 3-5 could >5 could Don't Know/Prefer Not To Answer
## Female 0.157    0.314    0.100    0.257                                0.057
## Male 0.014     0.029    0.029    0.029                                0.014

#Possibility per gender
round(prop.table(table(Gender, Results$Possibility_VideoConf)),3)

##
## Gender      Strongly could be VC Perhaps it could be VC Indifferent / Don't Know
## Female      0.243                                0.286                                0.100
## Male        0.029                                0.057                                0.000
##
## Gender      Perhaps FTFC was Justified Strongly Justified being FTFC
## Female      0.100                                0.157
## Male        0.014                                0.014

#Possibility last 10consult per Age
round(prop.table(table(Group.Age, Results$Last10Consult_Possibility_VideoConf)),3)

##
## Group.Age      None 1-2 could 3-5 could >5 could
## Youths          0.000    0.014    0.000    0.014
## Early-Middle Adults 0.157    0.214    0.100    0.229
## Late Adults     0.014    0.114    0.029    0.043
##
## Group.Age      Don't Know/Prefer Not To Answer
## Youths          0.000
## Early-Middle Adults 0.057
## Late Adults     0.014

#Possibility per Age
round(prop.table(table(Group.Age, Results$Possibility_VideoConf)),3)

##
## Group.Age      Strongly could be VC Perhaps it could be VC
## Youths          0.014                                0.014
## Early-Middle Adults 0.200                                0.243
## Late Adults     0.057                                0.086
##
## Group.Age      Indifferent / Don't Know Perhaps FTFC was Justified
## Youths          0.000                                0.000
## Early-Middle Adults 0.071                                0.100
## Late Adults     0.029                                0.014
##
## Group.Age      Strongly Justified being FTFC
## Youths          0.000
## Early-Middle Adults 0.143
## Late Adults     0.029

```

Figure 9- Possibility by demographic characteristics

```

#Possibility last 10consult per Education Level
round(prop.table(table(EducLevel, Results$Last10Consult_Possibility_VideoConf)),3)

##
## EducLevel      None 1-2 could 3-5 could >5 could
## Low-Medium EducLevel 0.086 0.171 0.043 0.100
## High_EducLevel 0.086 0.171 0.086 0.186
## Other 0.000 0.000 0.000 0.000
##
## EducLevel      Don't Know/Prefer Not To Answer
## Low-Medium EducLevel 0.029
## High_EducLevel 0.029
## Other 0.014

#Possibility per Education Level
round(prop.table(table(EducLevel, Results$Possibility_VideoConf)),3)

##
## EducLevel      Strongly could be VC Perhaps it could be VC
## Low-Medium EducLevel 0.143 0.100
## High_EducLevel 0.129 0.243
## Other 0.000 0.000
##
## EducLevel      Indifferent / Don't Know Perhaps FTFC was Justified
## Low-Medium EducLevel 0.057 0.071
## High_EducLevel 0.029 0.043
## Other 0.014 0.000
##
## EducLevel      Strongly Justified being FTFC
## Low-Medium EducLevel 0.057
## High_EducLevel 0.114
## Other 0.000

#possibility last 10consult per large ranges of income
round(prop.table(table(Income, Results$Last10Consult_Possibility_VideoConf)),3)

##
## Income      None 1-2 could 3-5 could >5 could
## LowerIncome 0.159 0.232 0.087 0.159
## HigherIncome 0.014 0.116 0.043 0.116
##
## Income      Don't Know/Prefer Not To Answer
## LowerIncome 0.043
## HigherIncome 0.029

#possibility per large ranges of income
round(prop.table(table(Income, Results$Possibility_VideoConf)),3)

##
## Income      Strongly could be VC Perhaps it could be VC
## LowerIncome 0.145 0.203
## HigherIncome 0.130 0.130
##
## Income      Indifferent / Don't Know Perhaps FTFC was Justified
## LowerIncome 0.101 0.116
## HigherIncome 0.000 0.000
##
## Income      Strongly Justified being FTFC
## LowerIncome 0.116
## HigherIncome 0.058

```

Figure 10- Possibility by demographic characteristics

## Possibility influencing factors- proportion's tables

```

#Number of physical contacts between the GP and the patient in the last consultation
round(prop.table(table(Results$Number_Physical_Contact)),3)

##
##      None 1-2 times 3-4 times 5-6 times >6 times
##      0.386   0.543   0.043   0.014   0.014

#Last consultation purpose
round(prop.table(table(Results$Last_Cons_Purpose)),3)

##
##      Routine      Emergency Disease Follow-up      Nursing care
##      0.529      0.129      0.329      0.014

#Hardware availability
round(prop.table(table(Results$Hardware_Availability)),3)

##
##      Totally Unavailable      Moderately Unavailable
##      0.071      0.014
## Neither Available nor Unavailable      Moderately Available
##      0.100      0.243
##      Totally Available
##      0.571

```

Figure 11- Proportions' tables of influencing factors

## Demographic characteristics influence

Age vs last consult

```

##      Df Sum Sq Mean Sq F value Pr(>F)
## Group.Age  2  3.16  1.578  0.755  0.474
## Residuals 67 139.99  2.089

```

Age vs last10 consult

```

##      Df Sum Sq Mean Sq F value Pr(>F)
## Group.Age  2  0.23  0.1134  0.071  0.932
## Residuals 67 107.14  1.5992

```

Gender vs last consult

```

##      Df Sum Sq Mean Sq F value Pr(>F)
## Gender  1  0.35  0.3485  0.166  0.685
## Residuals 68 142.79  2.0999

```

Gender vs last10 consult

```

##      Df Sum Sq Mean Sq F value Pr(>F)
## Gender  1  0.6  0.5972  0.38  0.539
## Residuals 68 106.8  1.5702

```

Education Level vs last consult

```

##      Df Sum Sq Mean Sq F value Pr(>F)
## EducLevel  2  0.24  0.1201  0.056  0.945
## Residuals 67 142.90  2.1329

```

Education Level vs last10 consult

```

##      Df Sum Sq Mean Sq F value Pr(>F)
## EducLevel  2  6.26  3.131  2.074  0.134
## Residuals 67 101.11  1.509

```

Figure 12- Demographics' influence on substitution's possibility of last & last 10 consultations



Health Region vs last consult

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Health_Region  4   7.89   1.972   0.926  0.455
## Residuals    59 125.72   2.131
## 6 observations deleted due to missingness
```

Health Region vs last10 consult

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Health_Region  4  13.08   3.271   2.22 0.0776 .
## Residuals    59  86.92   1.473
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 6 observations deleted due to missingness
```

Current Professional Status VS last consult

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Professional_Status  5   3.16  0.6324   0.289  0.917
## Residuals          64 139.98  2.1872
```

Current Professional Status VS last10 consult

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Professional_Status  5  14.49   2.897   1.996 0.0911 .
## Residuals          64  92.88   1.451
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Household's Gross Annual Income VS last consult

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Income       1   6.35   6.348   3.117  0.082 .
## Residuals    67 136.46   2.037
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 1 observation deleted due to missingness
```

Household's Gross Annual Income VS last10 consult

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Income       1   4.33   4.333   2.862 0.0953 .
## Residuals    67 101.44   1.514
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 1 observation deleted due to missingness
```

Figure 13- Demographics' influence on substitution's possibility of last & last 10 consultations

## Physical contact influence

```
##
##      None 1-2 times 3-4 times 5-6 times >6 times
##      0.386   0.543   0.043   0.014   0.014

##
## Pearson's product-moment correlation
##
## data: Number_Physical_Contact_NUMERIC and Possibility_VideoConf_NUMERIC
## t = 4.2723, df = 68, p-value = 6.162e-05
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.2523159 0.6271958
## sample estimates:
##      cor
## 0.4600166
```

Figure 14- Physical contacts' influence on video-teleconsultations' substitution's possibility

## Consultations' purpose influence

```
##
##      Df Sum Sq Mean Sq F value Pr(>F)
## Last_Cons_Purpose 3 19.91 6.636 3.554 0.0189 *
## Residuals      66 123.24 1.867
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure 15- Consultations' purpose influence on video-teleconsultations' substitution's possibility

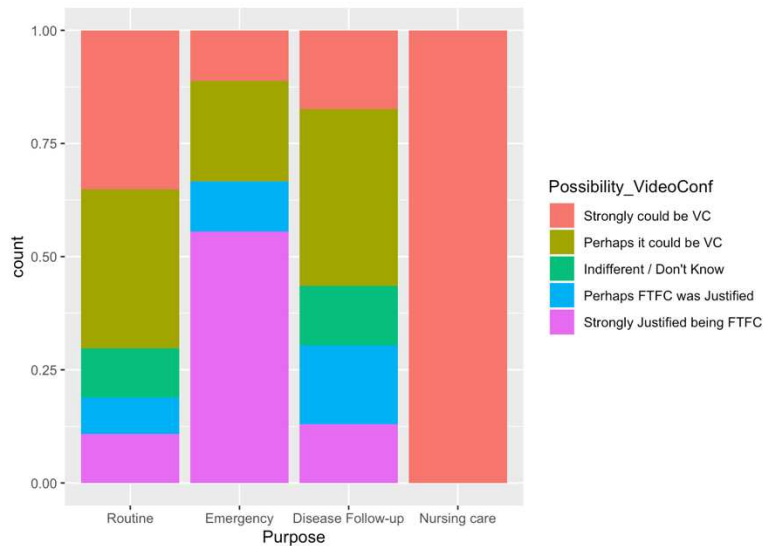


Figure 16- Chart of possibility by purpose

## Hardware's availability influence

```
(round(prop.table(table(Results$Hardware_Availability)),3))
```

```
##
##           Totally Unavailable           Moderately Unavailable
##                   0.071                   0.014
## Neither Available nor Unavailable           Moderately Available
##                   0.100                   0.243
##           Totally Available
##                   0.571
```

```
(Hardware.Possibility <- cor.test(Hardware_Availability_NUMERIC, Possibility_VideoConf_NUMERIC))
```

```
##
## Pearson's product-moment correlation
##
## data: Hardware_Availability_NUMERIC and Possibility_VideoConf_NUMERIC
## t = -2.5646, df = 68, p-value = 0.01254
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.49724652 -0.06664718
## sample estimates:
##           cor
## -0.2969705
```

```
(Hardware.Possibility <- cor.test(Hardware_Availability_NUMERIC, Last10Consult_Possibility_VideoConf_NUMERIC))
```

```
##
## Pearson's product-moment correlation
##
## data: Hardware_Availability_NUMERIC and Last10Consult_Possibility_VideoConf_NUMERIC
## t = 3.7384, df = 68, p-value = 0.0003819
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.1970453 0.5905773
## sample estimates:
##           cor
## 0.4129018
```

Figure 17- Hardware availability influence on video-teleconsultations' substitution's possibility

## Time and Financial availability influence

```
(Time.Possibility <- cor.test(Time_Availability_NUMERIC, Possibility_VideoConf_NUMERIC))
```

```
##  
## Pearson's product-moment correlation  
##  
## data: Time_Availability_NUMERIC and Possibility_VideoConf_NUMERIC  
## t = 0.83397, df = 68, p-value = 0.4072  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1376069 0.3278433  
## sample estimates:  
## cor  
## 0.1006206
```

```
(Time.Possibility <- cor.test(Time_Availability_NUMERIC, Last10Consult_Possibility_VideoConf_NUMERIC))
```

```
##  
## Pearson's product-moment correlation  
##  
## data: Time_Availability_NUMERIC and Last10Consult_Possibility_VideoConf_NUMERIC  
## t = -0.14979, df = 68, p-value = 0.8814  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.2520597 0.2177419  
## sample estimates:  
## cor  
## -0.0181613
```

```
(Financial.Possibility <- cor.test(Financial_Availability_NUMERIC, Possibility_VideoConf_NUMERIC))
```

```
##  
## Pearson's product-moment correlation  
##  
## data: Financial_Availability_NUMERIC and Possibility_VideoConf_NUMERIC  
## t = 0.20771, df = 68, p-value = 0.8361  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.2110422 0.2586243  
## sample estimates:  
## cor  
## 0.02518047
```

```
(Financial.Possibility <- cor.test(Financial_Availability_NUMERIC, Last10Consult_Possibility_VideoConf_NUMERIC))
```

```
##  
## Pearson's product-moment correlation  
##  
## data: Financial_Availability_NUMERIC and Last10Consult_Possibility_VideoConf_NUMERIC  
## t = 0.49718, df = 68, p-value = 0.6207  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1772982 0.2910414  
## sample estimates:  
## cor  
## 0.06018311
```

Figure 18- Time and Financial availability influence on video-teleconsultations' substitution's possibility

## Value & Benefits' influence

```
##  
## Pearson's product-moment correlation  
##  
## data: ValueQuality_TeleConsult_NUMERIC and Possibility_VideoConf_NUMERIC  
## t = -3.3922, df = 68, p-value = 0.001159  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.5649121 -0.1597431  
## sample estimates:  
##      cor  
## -0.3804372
```

```
##  
## Pearson's product-moment correlation  
##  
## data: ValueQuality_TeleConsult_NUMERIC and Last10Consult_Possibility_VideoConf_NUMERIC  
## t = 3.5113, df = 68, p-value = 0.0007969  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## 0.1726896 0.5739095  
## sample estimates:  
##      cor  
## 0.3917667
```

```
##  
## Pearson's product-moment correlation  
##  
## data: Benefits_TeleConsult_NUMERIC and Possibility_VideoConf_NUMERIC  
## t = -3.4851, df = 68, p-value = 0.0008659  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.5719457 -0.1698520  
## sample estimates:  
##      cor  
## -0.3892892
```

```
##  
## Pearson's product-moment correlation  
##  
## data: Benefits_TeleConsult_NUMERIC and Last10Consult_Possibility_VideoConf_NUMERIC  
## t = 3.529, df = 68, p-value = 0.0007531  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## 0.1746075 0.5752342  
## sample estimates:  
##      cor  
## 0.3934394
```

Figure 19- Value and benefits influence on video-teleconsultations' substitution's possibility

## Other forms of telemedicine's awareness

```
#I was already aware of these telemedicine services.
round(prop.table(table(Results$Knew_OtherTelemedicine)),3)
```

```
##
##      Strongly Disagree      Moderately Disagree
##              0.014              0.057
## Neither Agree nor Disagree      Moderately Agree
##              0.071              0.357
##      Strongly Agree
##              0.500
```

Figure 20- Awareness of non-video-teleconsultations' solutions

## Demographic characteristics' influence on patients' awareness

```
##      Df Sum Sq Mean Sq F value Pr(>F)
## Group.Age  2  0.83  0.4133  0.469 0.628
## Residuals 67 59.02  0.8808
```

```
##      Df Sum Sq Mean Sq F value Pr(>F)
## Gender  1  3.77  3.774  4.577 0.036 *
## Residuals 68 56.07  0.825
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##      Df Sum Sq Mean Sq F value Pr(>F)
## Health_Region 4  2.26  0.5640  0.609 0.658
## Residuals  59 54.68  0.9268
## 6 observations deleted due to missingness
```

```
##      Df Sum Sq Mean Sq F value Pr(>F)
## EducLevel  2  6.24  3.12  3.9 0.025 *
## Residuals 67 53.60  0.80
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##      Df Sum Sq Mean Sq F value Pr(>F)
## Professional_Status 5  2.63  0.525  0.587 0.71
## Residuals  64 57.22  0.894
```

```
##      Df Sum Sq Mean Sq F value Pr(>F)
## Income  1  1.85  1.8469  2.154 0.147
## Residuals 67 57.46  0.8576
## 1 observation deleted due to missingness
```

Figure 21- Demographic Characteristics' influence on awareness

## Use and Frequency of use of non-video-teleconsultations solutions

```
#I use these services to, for example, request credentials for medication and exams.
round(prop.table(table(Results$Use_OtherTelemedicine)),3)
```

```
##
##      Strongly Disagree      Moderately Disagree
##              0.100              0.029
## Neither Agree nor Disagree      Moderately Agree
##              0.100              0.271
##              Strongly Agree
##              0.500
```

```
#I use these services quite often.
round(prop.table(table(Results$FrequencyUse_OtherTelemedicine)),3)
```

```
##
##      Strongly Disagree      Moderately Disagree
##              0.143              0.114
## Neither Agree nor Disagree      Moderately Agree
##              0.200              0.229
##              Strongly Agree
##              0.314
```

Figure 23- Awareness' influence on Use and Frequency of use of non-video-teleconsultations solutions

```
##
## Pearson's product-moment correlation
##
## data: Use_OtherTelemedicine_NUMERIC and Knew_OtherTelemedicine_NUMERIC
## t = 3.382, df = 68, p-value = 0.001197
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.1586215 0.5641281
## sample estimates:
##      cor
## 0.3794526
```

```
##
## Pearson's product-moment correlation
##
## data: FrequencyUse_OtherTelemedicine_NUMERIC and Knew_OtherTelemedicine_NUMERIC
## t = 2.7107, df = 68, p-value = 0.008491
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.08343331 0.50984710
## sample estimates:
##      cor
## 0.3122851
```

Figure 22- Use and Frequency of use of non-video-teleconsultations solutions

```
##  
## Pearson's product-moment correlation  
##  
## data: Use_OtherTelemedicine_NUMERIC and ImportanceValue_OtherTelemedicine_NUMERIC  
## t = 4.3306, df = 68, p-value = 5.011e-05  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## 0.2581781 0.6309848  
## sample estimates:  
##      cor  
## 0.4649461
```

```
##  
## Pearson's product-moment correlation  
##  
## data: FrequencyUse_OtherTelemedicine_NUMERIC and ImportanceValue_OtherTelemedicine_NUMERIC  
## t = 4.5348, df = 68, p-value = 2.405e-05  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## 0.2784171 0.6439311  
## sample estimates:  
##      cor  
## 0.481867
```

Figure 24- Value's perception influence on use and frequency of use



## Survey:



\* Dear participant,

I would like to obtain your collaboration by filling out this questionnaire, developed within the scope of the Master's thesis in Management that I am carrying out at the Catholic University of Portugal, Catholic Lisbon School of Business & Economics, supervised by Professor Henrique Martins.

This questionnaire aims to understand the percentage of work performed by a family doctor that does not involve physical contact with the patient. With this, it is possible to assess the feasibility of telemedicine (in particular, teleconsultations by videoconference) and to what extent it can contribute to the better functioning of health centers in Portugal.

For the purpose of this questionnaire, consider a teleconsultation via videoconference, such as a call through internet connection, held between the family doctor and the user, through electronic devices using audio and video support, where it is possible to see the other person during the procedure.

This questionnaire will take less than 10 minutes to complete. In accordance with the General Data Protection Regulation (RGPD), this questionnaire ensures the security, confidentiality and anonymity of the data provided. The data collected are exclusively intended for the development of an analysis of results for the thesis in question, and no personal information is collected. All information collected will be processed in compliance with current data protection laws.

In case of doubt during the questionnaire, or about the study itself, you can contact me via email: s-mmcmatos@ucp.pt

Thank you,  
Maria Miguel Matos

Then, I ask that, while you are of legal age, you give your consent in how you accept, or not, to voluntarily participate in this investigation.

- I give my consent.
- I don't give my consent and I don't intend to answer.

[Next page >](#)



\* Please identify which type of participant you are.

- Patient
- General Practitioner

[< Página anterior](#)

[Next page >](#)

\*Q1. What gender do you identify as?

- (q1.1) Female
- (q1.2) Male
- (q1.3) Other

\*Q2. What is your age?

- (q2.1)  $\leq 18$
- (q2.2) 19 – 35
- (q2.3) 36 – 45
- (q2.4) 46 – 55
- (q2.5) 56 – 65
- (q2.6) 66 – 75
- (q2.7)  $\geq 76$

\*Q3. What is the Health Region you are in?

- (q3.1) Norte
- (q3.2) Centro
- (q3.3) Lisboa e Vale do Tejo
- (q3.4) Alentejo
- (q3.5) Algarve
- (q3.6) Açores/Madeira

Q4. What is the highest education level you have completed?

- (q4.1) Middle School
- (q4.2) High School
- (q4.3) Bachelor's Degree
- (q4.4) Master's Degree
- (q4.5) PhD
- (q4.6) Other
- (q4.7) Prefer not to answer

\*Q5. What is your current professional status?

- (q5.1) Full-Time Employee
- (q5.2) Part-Time Employee
- (q5.3) Retired
- (q5.4) Student
- (q5.5) Unemployed/ Looking for a Job
- (q5.6) Other

\*Q6. What is your household's gross annual income?

- (q6.1) Until 6 000€
- (q6.2) 6 001€ - 30 000€
- (q6.3) 30 001€ - 75 000€
- (q6.4) 75 001€ - 100 000€
- (q6.5) More than 100 000€

\*Q7. Please indicate the extent of availability to attend an in-person consultation

with your GP at the respective Health Center, according to the levels presented below.

|  | Totally Unavailable   | Moderately Unavailable | Neither Available nor Unavailable | Moderately Available  | Totally Available     |
|--|-----------------------|------------------------|-----------------------------------|-----------------------|-----------------------|
| (q7.1) Availability at a level of time   | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/>             | <input type="radio"/> | <input type="radio"/> |
| (q7.2) Availability at a financial level   | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/>             | <input type="radio"/> | <input type="radio"/> |
| (q7.3) Availability at a level of equipment and devices needed to substitute a presential consultation for a teleconsultation (videoconference). | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/>             | <input type="radio"/> | <input type="radio"/> |

Focusing now on your last in-person consultation with your GP, please answer the questions below.

\*Q8. How long was your appointment with your GP?

- (q8.1) < 15 min
- (q8.2) 15 – 20 min
- (q8.3) 21 – 30 min
- (q8.4) 31 – 45 min
- (q8.5) > 45 min

\*Q9. Qual foi o propósito da sua última consulta com o seu médico de família?

- (q9.1) Routine (ask/show medical exams, complaints of non-acute symptoms, others)
- (q9.2) Emergency
- (q9.3) Disease Follow-up
- (q9.4) Nursing care

\*Q10. How many times, during the consultation, did your GP establish any kind of physical contact with you a professional context (eg. auscultation, measurement of blood pressure, others)

- (q10.1) None
- (q10.2) 1 - 2 times
- (q10.3) 3 - 4 times
- (q10.4) 5 - 6 times
- (q10.5) > 6 times

Q10.6. If yes, what type of intervention?

---

Considering that a videoconsultation is a call with audio and video support (where it is possible to see the other person, and be seen by the other person, through the electronic device used), between the patient and the GP, answer the questions presented below.

\*Q11. To what extent do you think your last in-person consultation with your GP could have been via videoconference teleconsultation (VC)?

- (q11.1) Strongly could be VC
- (q11.2) Perhaps it could be VC
- (q11.3) Indifferent / Don't Know
- (q11.4) Perhaps FTFC was Justified
- (q11.5) Strongly Justified been presential

Q11.6. Please justify your answer.

---

\*Q12. What is a videoconference teleconsultation?

- (q12.1) TV show
- (q12.2) Distance meeting with Video support, between Pacient and Doctor
- (q12.3) Phone call with a friend

\*Q13. Have you ever resorted to the health center's videoconference teleconsultations?

- (q13.1) Yes, and higly recommend it
- (q13.2) yes, and moderately recommend it
- (q13.3) Don't recommend/Don't intend to do it
- (q13.4) Never, but moderately intend to
- (q13.5) Never, but strongly intend to

\*Q14. If so, please, indicate which platform was used to perform the videoconsultation.

- (q14.1) Zoom
- (q14.2) Skype
- (q14.3) WhatsApp
- (q14.4) Microsoft Teams
- (q14.5) RSE Live
- (q14.6) Other

\*Q15. In the last year, how many times did you attend a consultation with your GP?

- (q15.1) None
- (q15.2) 1 - 3 times
- (q15.3) 4 - 6 times
- (q15.4) 7 - 9 times
- (q15.5)  $\geq 10$  times

\*Q16. Consider now your 10 last consultations with your GP. How many of those 10 do you think could have been performed by videoconference teleconsultation?

- (q16.1) None
- (q16.2) 1-2 could
- (q16.3) 3 - 5 could
- (q16.4) > 5 could
- (q16.5) Don't Know/Prefer Not To Answer



\*Q17. Please indicate how much you agree or disagree with the statements presented below.

|   | Strongly Disagree     | Moderately Disagree   | Neither Agree nor Disagree | Moderately Agree      | Strongly Agree        |
|---|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| (q17.1) I was already aware of the concept of teleconsultations by videoconferenece.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q17.2) Teleconsultations should be more advertised.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q17.3) Teleconsultations are advantageous as they can give patients more comfort, convenience and less travel costs and waiting times. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q17.4) Teleconsultations can have the same value and a service with the same quality as in-person consultations.                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q17.5) Teleconsultations enable a better functioning of Health Centers by contributing to their decongestion.                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |

\*Q18. Regarding telemedicine services provided by email, text message and phone call, please indicate how much you agree or disagree with the statements presented below.

|  | Strongly Disagree     | Moderately Disagree   | Neither Agree nor Disagree | Moderately Agree      | Strongly Agree        |
|--|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| (q18.1) I was already aware of these telemedicine services.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q18.2) I use these services to, for example, request credentials for medication and exams.                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q18.3) I use these services quite often.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q18.4) I consider that these services have a great importance and value for patients.                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |
| (q18.5) The easiness with which patients have access to these services, leads to the abuse and undervaluation of them. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> |



We thank you for your time spent taking this survey.  
Your response has been recorded.

## References

- [1] “Health at a Glance: Europe 2022,” Dec. 2022, doi: 10.1787/507433B0-EN.
- [2] R. E. Powell, J. M. Henstenburg, G. Cooper, J. E. Hollander, and K. L. Rising, “Patient Perceptions of Telehealth Primary Care Video Visits,” *Ann Fam Med*, vol. 15, no. 3, pp. 225–229, 2017, doi: 10.1370/afm.2095.
- [3] “ENTIDADE REGULADORA DA SAÚDE ESTUDO DO ACESSO AOS CUIDADOS DE SAÚDE PRIMÁRIOS DO SNS,” 2009.
- [4] Entidade Reguladora da Saúde, “Direitos e Deveres dos Utentes dos Serviços de Saúde,” 2021. [Online]. Available: [www.ers.pt](http://www.ers.pt)
- [5] F. Saigí-Rubió *et al.*, “The Current Status of Telemedicine Technology Use Across the World Health Organization European Region: An Overview of Systematic Reviews,” *J Med Internet Res* 2022;24(10):e40877 <https://www.jmir.org/2022/10/e40877>, vol. 24, no. 10, p. e40877, Oct. 2022, doi: 10.2196/40877.
- [6] P. Amorim *et al.*, “Telehealth Opportunities in the COVID-19 Pandemic Early Days: What Happened, Did Not Happen, Should Have Happened, and Must Happen in the near Future?,” *Telemedicine and e-Health*, vol. 27, no. 10, pp. 1194–1199, Oct. 2021, doi: 10.1089/TMJ.2020.0386/ASSET/IMAGES/LARGE/TMJ.2020.0386\_FIGURE2.JPEG.
- [7] S. Omboni *et al.*, “The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future,” *Health N Hav*, vol. 1, pp. 7–35, 2022, doi: 10.20517/ch.2021.03.
- [8] “Global action on patient safety”.
- [9] A. Baki Kocaballi *et al.*, “A network model of activities in primary care consultations,” *Journal of the American Medical Informatics Association*, vol. 26, no. 10, pp. 1074–1082, 2019, doi: 10.1093/jamia/ocz046.
- [10] I. Foche-Perez *et al.*, “An open real-time tele-stethoscopy system,” *Biomedical engineering online*, vol. 11, no. 1, 2012, doi: 10.1186/1475-925X-11-57.
- [11] L. Camaj Deda, R. H. Goldberg, T. A. Jamerson, I. Lee, and T. Tejasvi, “Dermoscopy practice guidelines for use in telemedicine,” *NPJ Digit Med*, vol. 55, 2022, doi: 10.1038/s41746-022-00587-9.
- [12] C. O’Neill, M. V. Matias, V. R. Peixoto, H. O’Neill, P. Aguiar, and E. Castela, “Teleconsultation in the Portuguese National Health Service during the COVID-19 Pandemic: A Survey of Physicians’ Views and Future Implications,” *Acta Med Port*, vol. 35, no. 6, pp. 455–467, Jun. 2022, doi: 10.20344/amp.16724.
- [13] European Union, “Market study on telemedicine,” 2018. Accessed: Nov. 25, 2022. [Online]. Available: <http://europa.eu>
- [14] K. Salemink, D. Strijker, and G. Bosworth, “Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas,” *J Rural Stud*, vol. 54, pp. 360–371, Aug. 2017, doi: 10.1016/J.JRURSTUD.2015.09.001.
- [15] “Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009,” 2010.
- [16] E. Donaghy *et al.*, “Acceptability, benefits, and challenges of video consulting: A qualitative study in primary care,” *British Journal of General Practice*, vol. 69, no. 686, pp. E586–E594, 2019, doi: 10.3399/bjgp19X704141.
- [17] C. L. Snoswell *et al.*, “The clinical effectiveness of telehealth: A systematic review of meta-analyses from 2010 to 2019”, doi: 10.1177/1357633X211022907.

- [18] S. Ganapathy, B. Bao, D. F. de Korne, N. K. Chong, and J. Car, “The Role of Text Messaging and Telehealth Messaging Apps,” *Pediatric Clinics of NA*, vol. 67, pp. 613–621, 2020, doi: 10.1016/j.pcl.2020.04.002.
- [19] S. Ahmed, A. Hasani, T. Alghafri, and F. Al-Ajmi, “The Use of Telephone Consultation in Primary Health Care During COVID-19 Pandemic, Oman: Perceptions from Physicians”, doi: 10.1177/215013272097648.
- [20] V. Hammersley *et al.*, “Comparing the content and quality of video, telephone, and face-to-face consultations: A non-randomised, quasi-experimental, exploratory study in UK primary care,” *British Journal of General Practice*, vol. 69, no. 686, pp. E595–E604, 2019, doi: 10.3399/bjgp19X704573.
- [21] V. Hammersley *et al.*, “Comparing the content and quality of video, telephone, and face-to-face consultations: A non-randomised, quasi-experimental, exploratory study in UK primary care,” *British Journal of General Practice*, vol. 69, no. 686, pp. E595–E604, 2019, doi: 10.3399/bjgp19X704573.
- [22] K. L. Rush, L. Howlett, A. Munro, and L. Burton, “Videoconference compared to telephone in healthcare delivery: A systematic review,” *Int J Med Inform*, vol. 118, pp. 44–53, Oct. 2018, doi: 10.1016/J.IJMEDINF.2018.07.007.
- [23] S. Gharib. Lee, A. Blood, W. Gordon, and B. Scirica, “Disruptive and Sustaining Innovation in Telemedicine: A Strategic Roadmap,” *NEJM Catalyst Innovations in Care Delivery* 2.6, 2021. <https://catalyst.nejm.org/doi/full/10.1056/CAT.21.0311> (accessed Nov. 25, 2022).
- [24] U. Grata-Borkowska, M. Sobieski, J. Drobnik, E. Fabich, and M. M. Bujnowska-Fedak, “Perception and Attitude toward Teleconsultations among Different Healthcare Professionals in the Era of the COVID-19 Pandemic,” *Int J Environ Res Public Health*, vol. 19, no. 18, Sep. 2022, doi: 10.3390/ijerph191811532.
- [25] T. Greenhalgh, J. Wherton, S. Shaw, and C. Morrison, “Video consultations for covid-19,” *The BMJ*, vol. 368, Mar. 2020, doi: 10.1136/BMJ.M998.
- [26] A. Pandya, M. Waller, and J. M. Portnoy, “The Regulatory Environment of Telemedicine After COVID-19,” *J Allergy Clin Immunol Pract*, vol. 10, no. 10, pp. 2500–2505, Oct. 2022, doi: 10.1016/J.JAIP.2022.07.001.
- [27] C. Botrugno, “Telemedicine in daily practice: Addressing legal challenges while waiting for an EU regulatory framework,” *Health Policy Technol*, vol. 7, no. 2, pp. 131–136, Jun. 2018, doi: 10.1016/J.HLPT.2018.04.003.
- [28] “Health at a Glance: Europe 2022,” Dec. 2022, doi: 10.1787/507433B0-EN.
- [29] “Market study on telemedicine,” 2018. Accessed: Nov. 25, 2022. [Online]. Available: <http://europa.eu>
- [30] G. Nittari *et al.*, “Telemedicine Practice: Review of the Current Ethical and Legal Challenges,” *Mary Ann Liebert, Inc.*, vol. 26, no. 12, 2020, doi: 10.1089/tmj.2019.0158.
- [31] “EUR-Lex - 52012DC0736 - EN - EUR-Lex.” <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52012DC0736&qid=1667319343299> (accessed Nov. 25, 2022).
- [32] “Global strategy on digital health 2020-2025,” 2021, Accessed: Nov. 25, 2022. [Online]. Available: <http://apps.who.int/bookorders>.

- [33] “EUR-Lex - 52008DC0689 - EN - EUR-Lex.” <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52008DC0689&qid=1667317397453> (accessed Nov. 25, 2022).
- [34] “Desp8445\_2014”.
- [35] “Resolução do Conselho de Ministros n.º 67/2016 | DRE.” <https://dre.pt/dre/detalhe/resolucao-conselho-ministros/67-2016-75606250> (accessed Nov. 25, 2022).
- [36] “Despacho n.º 5314/2020 | DRE.” <https://dre.pt/dre/detalhe/despacho/5314-2020-133226622> (accessed Nov. 25, 2022).
- [37] World Health Organization and United Nations Children’s Fund (UNICEF), “A VISION FOR PRIMARY HEALTH CARE IN THE 21ST CENTURY: Towards universal health coverage and the sustainable development goals,” 2018.
- [38] “Decreto-Lei n.º 52/2022 | DRE.” <https://dre.pt/dre/detalhe/decreto-lei/52-2022-187049881> (accessed Nov. 27, 2022).
- [39] P. Alexandra, D. Gonçalves, and D. Santos, “O FUNCIONAMENTO DAS UNIDADES DE SAÚDE FAMILIAR (USF) EM PORTUGAL: ESTUDO DE CASO NA REGIÃO CENTRO.”
- [40] A. R. Biscaia, A. Pereira, A. M. Alves, R. Cardeira, and L. Rocha, “O Momento Atual da Reforma dos Cuidados de Saúde Primários em Portugal 2021/2022,” Lisboa, 2022. Accessed: Nov. 25, 2022. [Online]. Available: [https://app.box.com/s/hgqj72ajjfjrsr4uglqv5ez2wxdbomts?utm\\_term=Dados+do+Estudo+Momento+Atual+da+Reforma+dos+Cuidados+de+Saude+Primarios+em+Portugal+2021%2F2022++USF-AN&utm\\_campaign=S%3Fcios+USF-AN\\_17novembro2021&utm\\_source=e-goi&utm\\_medium=email](https://app.box.com/s/hgqj72ajjfjrsr4uglqv5ez2wxdbomts?utm_term=Dados+do+Estudo+Momento+Atual+da+Reforma+dos+Cuidados+de+Saude+Primarios+em+Portugal+2021%2F2022++USF-AN&utm_campaign=S%3Fcios+USF-AN_17novembro2021&utm_source=e-goi&utm_medium=email)
- [41] “Consultas em Telemedicina – SNS.” <https://www.sns.gov.pt/monitorizacao-do-sns/consultas-em-telemedicina/> (accessed Nov. 25, 2022).
- [42] “Circular-Normativa\_15\_2019\_DPS\_ACSS”.
- [43] E. P. E. SPMS – Serviços Partilhados do Ministério da Saúde, “Consultas Telemedicina-Acumulado à data.” <https://www.sns.gov.pt/monitorizacao-do-sns/consultas-em-telemedicina/> (accessed Mar. 29, 2023).
- [44] E. P. E. SPMS – Serviços Partilhados do Ministério da Saúde, “SNS Transparência - Consultas em Telemedicina.” <https://transparencia.sns.gov.pt/chart/embed/?dataChart=eyJxdWVyaWVzIjpbeyJjaGFydHMiOlt7InR5cGUiOiJsaW5lIiwic2NpZW50aWZpY0Rpc3BsYXkiOnRydWUsImNvbG9yIjoiI2ZjOGQ2MiIsImRpc3BsYXkiOnRydWV9LHsiYWxpZ25Nb250aCI6dHJ1ZSwidHlwZSI6ImxpbnUiLCJmdW5jIjoiU1VNIiwieUF4aXMiOiJ0b3RhbF9jb25zdWx0YXNfdGVsZW50aWZpY0Rpc3BsYXkiOnRydWUsImNvbG9yIjoiIzY2YzJhNSIsImRpc3BsYXkiOnRydWV9XSwieEF4aXMiOiJ0ZW1wbyIsIm1heHBvaW50cyI6bnVsbCwidGltZXNjYWxlIjoieWVhciIsInNvcnQiOiIiLCJjb25maWciOnsiZGF0YXNldCI6ImNvbN1bHRhcy1lbS10ZWxlbWVkaWNpbmEiLCJvcHRpb25zIjpb7ImRpc2p1bmN0aXZlLnJlZ2lhbY16dHJ1ZSwiZGlzanVuY3RpdmdUuaW5zd>

- G10dWljYW8iOnRydWUsInNvcnQiOiJ0ZW1wbyIsInEudGltZXJhbmdlLnRlbXBvIjoidG VtcG86WzIwMTktMTItMzEgVE8gMjAyMy0wMy0yOF0iLCJxIjoidW5pZGFkZSBsb2 NhbCBkZSBzYVx1MDBGQWRlIn19fV0sInRpbWVzY2FsZSI6InllyXIiLCJzaW5nbGV BeGlzIj0cnVILCJkaXNwbGF5TG5nZW5kIj0cnVILCJhbGlnbk1vbnRoIj0cnVlfQ%3 D%3D (accessed Mar. 29, 2023).
- [45] D. Boateng *et al.*, “COVID-19 pandemic impact on Primary Health Care Accessibility in Portugal,” *Eur J Public Health*, vol. 31, no. Supplement\_3, Oct. 2021, doi: 10.1093/EURPUB/CKAB165.361.
- [46] “Área Pessoal do SNS24 - Login.” <https://servicos.min-saude.pt/utente/> (accessed Nov. 25, 2022).
- [47] “Manual Aplicacional do Utente”.
- [48] S. O’Connor, P. Hanlon, C. A. O’Donnell, S. Garcia, J. Glanville, and F. S. Mair, “Understanding factors affecting patient and public engagement and recruitment to digital health interventions: A systematic review of qualitative studies,” *BMC Med Inform Decis Mak*, vol. 16, no. 1, pp. 1–15, Sep. 2016, doi: 10.1186/S12911-016-0359-3/FIGURES/2.
- [49] C. Scott Kruse, P. Kareem, K. Shifflett, L. Vegi, K. Ravi, and M. Brooks, “Evaluating barriers to adopting telemedicine worldwide: A systematic review,” *Journal of Telemedicine and Telecare*, vol. 24, no. 1. SAGE Publications Ltd, pp. 4–12, Jan. 01, 2018. doi: 10.1177/1357633X16674087.
- [50] E. Medicines Agency, “Criteria for patient, consumer and healthcare professional organisations”, Accessed: Nov. 25, 2022. [Online]. Available: [www.ema.europa.eu/contact](http://www.ema.europa.eu/contact)
- [51] P. Cuijpers *et al.*, “Psychotherapy for Depression Across Different Age Groups: A Systematic Review and Meta-analysis,” *JAMA Psychiatry*, vol. 77, no. 7, pp. 694–702, Jul. 2020, doi: 10.1001/JAMAPSYCHIATRY.2020.0164.
- [52] “Educational attainment statistics - Statistics Explained.” [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational\\_attainment\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational_attainment_statistics) (accessed Mar. 21, 2023).
- [53] B. P. Carvalho, M. Esteves, and S. Peralta, “Despesas essenciais e rendimento das famílias: efeitos assimétricos da inflação Portugal, Balanço Social 2022-Nota intercalar”.
- [54] A. Joshi, S. Kale, S. Chandel, and D. Pal, “Likert Scale: Explored and Explained,” *Br J Appl Sci Technol*, vol. 7, no. 4, pp. 396–403, Jan. 2015, doi: 10.9734/bjast/2015/14975.
- [55] M. Dalmoro and K. Mendes Vieira, “DILEMAS NA CONSTRUÇÃO DE ESCALAS TIPO LIKERT: O NÚMERO DE ITENS E A DISPOSIÇÃO INFLUENCIAM NOS RESULTADOS? \* DILEMMAS OF THE TYPE LIKERT SCALES CONSTRUCTION: DOES THE NUMBER OF ITEMS AND THE DISPOSITION INFLUENCE RESULTS?”.
- [56] G. Wickstrom and T. Bendix, “The ‘Hawthorne effect’-what did the original Hawthorne studies actually show?,” *Stand J Work Environ Health*, vol. 26, no. 4, pp. 363–367, 2000.
- [57] K. H. Zou, K. Tuncali, and S. G. Silverman, “Correlation and Simple Linear Regression 1 Statistical Concepts Series”, doi: 10.1148/radiol.2273011499.
- [58] M. G. Larson, “Analysis of variance,” *Circulation*, vol. 117, no. 1. pp. 115–121, Jan. 2008. doi: 10.1161/CIRCULATIONAHA.107.654335.
- [59] “Lei n.º 26/2016 | DRE.” <https://dre.pt/dre/detalhe/lei/26-2016-75177807> (accessed Dec. 12, 2022).