Telehealth opportunities in early COVID-19 pandemic times: What happened, did not happen, should have happened and must happen in the near future?

SITT GT3D Autumn Report

20th October 2020

The GT3D Working Group of the SITT society is a multidisciplinary group of academics, practitioners, clinicians, Information Technology (IT) professionals and patients interested in tele-health and digital transformation in the Iberic Peninsula. The group was formed in July 2020 and is currently lead by Prof Henrique Martins. It develops its activity on different aspects of tele-health promotion, advocacy, and education.

The Autumn Reports

The Autumn Reports try to capture the groups reflections on controversies and contemporary topics, it is not an in-depth data driven report, but its views reflect participants daily experience and access to data in their institutions as well as their understanding and critical view on critical issues in tele-health. Numbers and figure do not aim to be fully representative of indicators, as these, the group members believe should be made public but public and private entities about their regular practices of tele-health for the sake of transparency and citizenship.

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Abstract

The objective of this report is to contribute to a better understanding of the value of telemedicine in healthcare, particularly its role in creating opportunities for continuity of care to patients in a complex and novel setting as were the circumstances of the early COVID-19 pandemic times. The final aim is to launch the debate and foster useful ideas throughout the remains of the pandemic. This article covers the experiences of physicians and other healthcare professionals in the Iberian Peninsula (Spain and Portugal), in order to give a clearer picture of what has happened and how it can be improved considering the possibilities provided by telemedicine.

A set of recommendations is advanced:

1. Launch urgently organized strategies and implementation plans for tele-assistance;
2. Involve patient association in literacy efforts and invest strongly in making citizens, patients and families aware of what is “proper” tele-health;
3. Finish infrastructural upgrade of the NHS urgently in next 6 weeks;
4. Using low-tech solutions, needs to be always a second alternative and not become the “main” way to offer telehealth;
5. Total replacement of physical appointments for tele-appointments is not advisable, hybrid models are safer and recommended;
6. Home-care IT solutions and commercial offers are too expensive. Governmental and non-governmental consortiums could be created to offer low-cost high-tech home-care solutions to selected groups of risk patients/families;
7. Tele-health needs to be deployed by all levels of care in an integrated way;
8. When revising guidelines for conventional diseases or approaches to care plans, tele-health should be an integral component.

At the same time, it should be put in evidence the idea that public health systems need to be rethought to provide adequate solutions to situations such as the one we are experiencing.

Key Words: *Covid-19, Outbreak, Technology Transfer, Telemedicine, Telehealth, Public Health, Policy.*

Introduction

COVID-19 pandemic has placed public health and tele-health on the frontstage. These have too often been neglected or downplayed by economical interest and healthcare organizational inertia as health is seen from a business perspective only and not as the citizen's most fundamental right. This difficult situation has once more highlighted the importance of health systems organized and provided under public principles, by Social States policies if one is to ensure universal citizenship. Examples from the United States (with weak social state) or Brazil (with an underfunded national health system (SUS)) contrast with countries that, albeit their difficulties, could rely on strong social state and public healthcare provision like Spain or the Nordic countries. eHealth, and in particular, telehealth solutions, had the potential to be decisive tools to bring patients (especially chronic patients) and the care they need and that cannot be interrupted closer to each other. The best of such examples is telemonitoring and remote care of the elderly, frail chronic patients. By keeping them at home, futile travel to potentially infected settings of care could be avoided. Such hospitals and other sites have now become more hostile than friendly battlegrounds for their ongoing diseases, which, albeit all COVID-19 rhetoric and discourse, did not diminish or got any better. If COVID-19 has had a significant death toll in all human societies, lesser care for chronic patients and unnecessary face-to-face care for all, might have represented an even higher burden often not hitting primetime news bulletins. Technology usage (telehealth) could simultaneously be the bridge, and the barrier from risky traditional healthcare. We have had few months to collectively learn about its usage and potential it is now time to reflect and aim to future days. The next few months, or even years, may still require significant efforts and paradigm shifts if we are to win this battle against COVID-19 without losing on many other healthcare battles.

A generic concept of telehealth is used in this paper as both high-tech (video-supported/dedicated platform), as well as low-tech (just regular phone-based practice) telehealth because both seem to have been key/relevant for the continuation of care provision in Covid-19 times. Value added activities using telemonitoring and tele-care have equally guided our opinion as these were found to be crucial to avoid health status worsening in many chronic patients. Medical education, and that of all other healthcare professionals, also saw significant challenges and opportunities as COVID-19 pandemic consequences in healthcare facilities meant radical challenges in the traditional, perhaps paradigmatic ways of educating students in wards and other health settings. Tele-education and how to ensure the best clinical experience in these new times was discussed by the group. The topic was elected for a later report dedicated to this emerging tele-university topic in the crossroad of education, health, distance learning.

1. What happened and did not happen

1.1 Telehealth and primary care in the Iberian Peninsula

Since the beginning of the Covid-19 pandemic in Portugal (March 2020), a strategy has been adopted to hospitalize only those infected with severe symptoms, opting for a home control managed by primary health care, using massive telephone consultations in cases with no symptoms or only mild symptoms[1]. The idea, which seems to have worked, was to reduce the number of people going to hospitals, avoiding overloading services, and also reducing the chances of hospital infections. Thus, more than 85% of those infected with Covid19 were monitored and treated at home[2] and they continued their contacts of suspected cases, which undoubtedly contributed to the general hospital intensive care would never have exceeded its capacity.

Moreover, considering the need to reduce the chance of spreading the virus this meant significant restrictions on appointment sessions in primary care. There were instructions to users (except for emergency situations) to contact patients by telephone but leaving it down to health professionals to decide whether and when face-to-face appointments should happen. Priority was given to problem-solving through telephone consultation and sending prescriptions electronically (SMS or email). In our experience, there was a reduction of more than 75% in face-to-face consultations, and the procedures of telehealth allowed the follow-up of most patients. The total decrease in consultations, according to DGS (Directorate General of Health), was therefore only 6.6% compared to the same period last year[3]. In conclusion, not only in the follow-up of patients with Covid-19 but also in regard to patients with other illnesses, the method of teleconsultations, although in a very basic way (mainly by telephone), was decisive to avoid a collapse of the health care system and allowed the maintenance of a minimum of control and support to the general population that needed medical and nursing care.

Meanwhile in Spain, health providers in primary care were equally very busy. The reason was that there were many public and private health services, even outside the health sector, that asked for medical-grade video consultation services.

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[1] COVID-19: Mitigation Phase. Mental Health. N: 011/2020. 18/04/2020 https://www.dgs.pt/directrizes-da - dgs / norma-e-circulares-normativas / norma-n-0112020-de-18042020-pdf.aspx

[2] Majority of patients treated from home. DGS. Portugal. https: //covid19.min-sau d e.pt/maioria-dos-doentes-tratados-a-partir-de-casa/

[3] Covid-19: Less than 6.6% of queries ourselves health centers and 5.7% in Hospitals 23-04-2020. https://www.saudemais.tv/noticia/1 5 993-covid-19-menos-6-6-de-consultas-nos-centros-de-saude-e-5-7-nos-hospitais

The key for healthcare providers was to have a fast, robust, and affordable video-consultation tool. One of the applicants for this tool was the Catalan Institute of Health (ICS). They request a video consultations tool integrated with the clinical workstations, eCap (the tool used in primary care), that was implemented in mid-April 2020. It is important to note that ICS clinicians were using other teleconsultation tools, such as teledermatology or even eConsulta, a bidirectional, B2C [4] asynchronous secure messaging system.

At the same time, the Catalan Department of Health allowed the use of eCap on the personal computers of doctors and nurses, allowing video consultation from home.

In this context, from mid-April to mid-July, clinicians performed 11,000 video-consultations. However, video consultations had a lower use than expected. The main reasons include:

1) Lack of infrastructure in primary care centers, such as webcam, headphones, and microphones, with only a fraction of the centers being able to carry a video-consultation, an issue that has since been resolved;
2) Communication problems, both in the primary care center and next to the patient; and
3) Clinicians need to ask for some support material, such as user manuals or short videos, to get the most out of video query tools.

What happened?

In Spain, the confinement of the population due to the state of alarm by COVID-19 was decreed on March 15 and lasted until May 10. The first confirmed cases of patients with COVID-19 were reported in February 2020. Since that date, the health centers of Extremadura implemented contingency plans to contain the pandemic, including the interruption of non-essential visits and the adjustment of clinical services for outpatients and inmates, as well as the progressive opening of quarantine rooms according to healthcare needs. The activity of Emergencies, COVID and non-COVID, and oncology care (consultations, surgery, tests, etc.) were considered essential activities. Other face-to-face care was cancelled and, if possible, it was developed in a non-presential way.

During this period, the Extremadura Health Service (SES) has promoted non-presential care in all areas of health care intending to minimize the spread of the SARS-CoV-2 virus. The SES has implemented some functionalities in the corporate information systems

[4] *B2C stands for Business to Consumer (i.e., Doctor to Patient) and B2B stands for Business to Business (i.e., Doctor to Doctor).*

that had been previously tested and which, due to the pandemic, have been extended to all services and levels of care:

1) Telephone teleconsultation. Although telephone consultations have always been a tool of health care, during the pandemic, the SES has facilitated its scheduling and registration in the information system as a type of consultation.
2) Video consultations. This functionality allows a consultation, scheduled by the doctor, by videoconference to the patient's smartphone. The videoconference system is integrated into the institutional app "Online Health Center". This functionality had previously been tested in services such as palliative care and has been extended to all services and levels of care.
3) e-Consultation. The SES uses the term e-Consultation to define a bidirectional written communication system between doctors for the request of first consultation with a specialist doctor. This request can be made by a primary care doctor, a nursing home doctor, or another specialist. The request can be accepted, becoming an appointment for a face-to-face consultation, or it can be previously resolved thanks to the communication between doctors. The pilot tests carried out in the SES with various services have reduced in-person consultations by more than 30%.

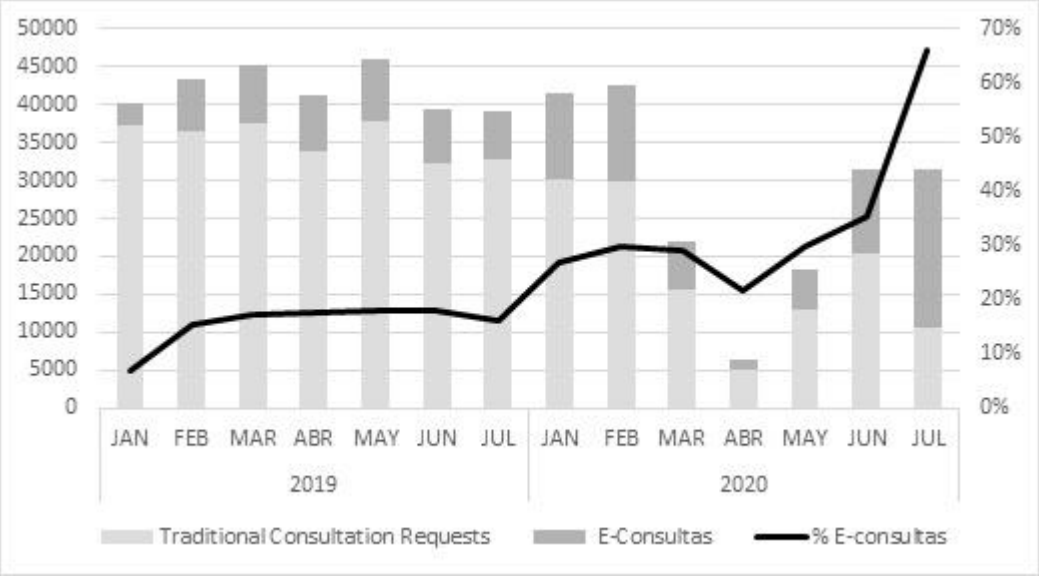

Figure 1. *Tele-health Statistics for Estremadura (SP)[8]. Legend: E-Consults Jan 2019-jul 2020. (October 2020)*

4) e-Derma. This is an e-Consultation to the Dermatology service in which images of a dermatological lesion taken from an SES photo camera can be attached.
5) e-Dialogue. It is a bidirectional written communication system between healthcare professionals to deal with a case. It facilitates the continuity of care for patients thanks to the resolution of doubts from the professionals involved in the case.

6) Non-presential prescription. The renewal of chronic patient treatments has been enabled without the need for a face-to-face consultation with the patient.
7) Non-presential administrative procedures. Renewal of administrative procedures for patients (sick leave, certificates, etc.) has been enabled without the need for a face-to-face consultation with the patient.

In relation to hardware, practically all SES computers have a webcam and an audio system; as well as the videoconferencing systems included in Windows 10 (Teams and Skype).

The total decrease in primary care level consultations was 9.13% compared to the same period last year (January to July). Non-face-to-face consultations has grown 5,000% between January to July 2020 compared to the same period in 2019.

During the pandemic, consultations were carried out face-to-face only in special, delicate or essential cases and on demand. Most were made by telephone contact. The coordination and training of health professionals has been carried out mainly through videoconferencing systems installed in the professionals' individual computer equipment or in telemedicine equipment. On the other hand, the use of non-institutional tools to make non-presential consultations that require images has been explored.

What did not happen?

The massive implementation of the non-presential care functionalities did not start at the same time of the confinement, as it took several weeks from the state of alarm for the professionals to have the adequate tools mentioned above.

After 7 months of COVID-19 pandemic it becomes evident that the number of face-to face consultations have decreased compared to previous years and, judging by strategies currently outlined, do not show a tendency to increase significantly, at least in primary care - the decrease was about a half a million since March. On the other hand, there was a significant increase in average mortality in 2020 compared to previous years and it is clear that the vast majority of deaths in excess were not due to Covid-19 but due to other pathologies (Fig 2).

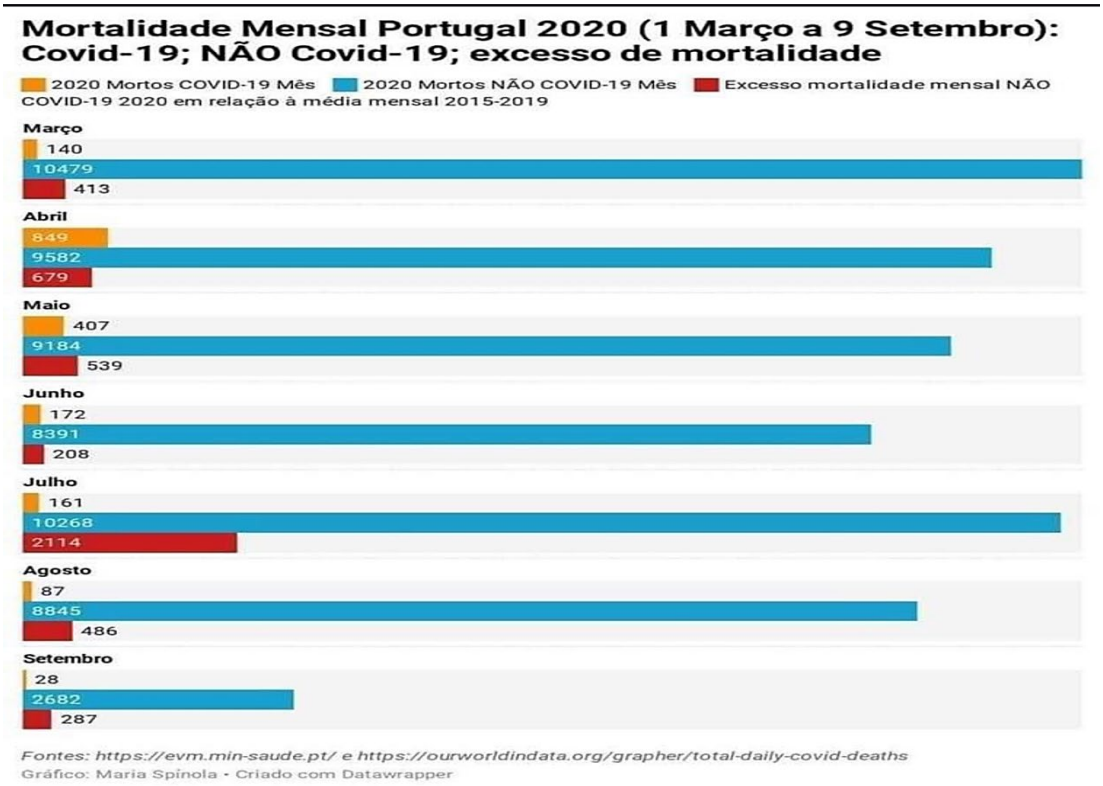

Figure 2. *Causes of mortality in Portugal 2020 (1st of March to 9th of September. Source: ourworidindata.*

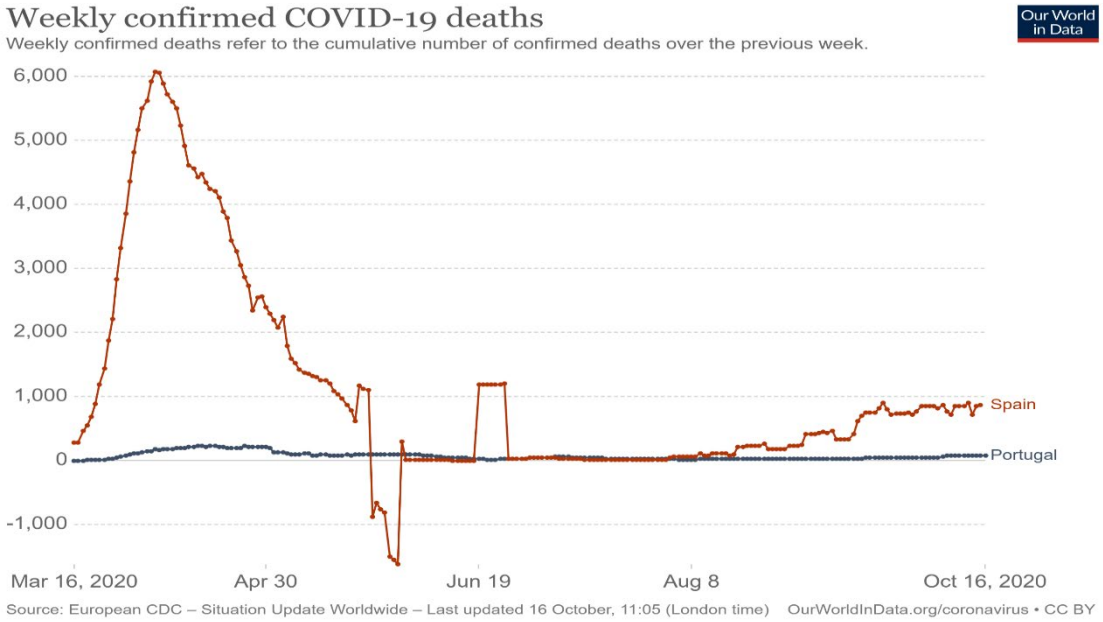

Figure 3*. Mortality in Spain and Portugal 2020 (1st of March to 16th of September) Fonte:* https://ourworldindata.org/covid-deaths?country=~PRT *Source: 17 October 0220*

Explanations for what happened could be diverse:

1) In health institutions initial lack of control and panic in the face of an unknown disease and unpredictable evolution led to an understandable initial limitation of patient health care access in order to eliminate the concentration of infected people and the potential for increased dissemination, as well as the contagion of professionals. Healthcare providers, following higher-level guidance, focused almost all their efforts on COVID-19 combat. Choosing, or being forced to postpone (as it appears now, much more than advisable), most other clinical situations, therapeutic or diagnostic. Mention should be made of media, political and economic pressures as determining factors in these decisions, which often overlapped the logic and good practices of medical science that should have prevailed.
2) On the other hand, patients, who usually are very sensitive to pressures from the media and social networks, were afraid to go to health institutions. About 31% of those feeling sick, did not resorted to health services for fear, and 692.000 saw their consultations canceled.[5]

One of the alternative solutions, the only one with some weight, advanced to fill the decrease in accessibility, was what was called "tele-health" or "telemedicine", but which, with very few exceptions (at least in Portugal and in Spain, according to the data we have), was nothing more than phone calls. In Portugal, 775.000 patients reported having an appointment for a medical appointment in this format and 90% completed it. However, in 95% of the situations the consultations were by telephone and only 4% involved an image (video call).

In a broad sense, it was effectively tele-health because people were talking from a distance using a low-tech telecommunication. However, someone who has some information and training in tele-health and, above all, who defends it as a valid, safe method, highly promoter of equity and speed of access and global improvement in the quality of service provided, cannot accept that this concept of tele-health services continue to be accepted as correct and worst that it becomes the *de facto* method applied in every situation.

While we understand that in an initial and emergency phase, using the telephone was better than nothing, it is necessary to recognize that this procedure has doubtful legality, lacks security and confidentiality, is able to assist in making diagnosis and, finally, promotes insecurity feelings in patients. It is not, nor can it be, a procedure recommended as a routine to substitute all forms of heath care and to make up for the lack of face-to-face access.

[5] https://www.jn.pt/nacional/covid-19-210-mil-sentiram-se-doentes-mas-nao-procuraram-cuidados-de-saude-12770582.html?fbclid=IwAR2Huuubbmnakh4Wt_at9sS8fYJZd3qIXqlr9ReTWVCu4BzIg-WE8YFzP5U

2. Telehealth in hospital and home care

The Sant Joan de Déu Maternal and Child Hospital in Barcelona is a private high-tech university center that is part of the public health system. The work philosophy can be expressed in three concepts:

Flexible (flowing beyond the walls. Adaptation to the environment). Accessible (open and attentive to what patients, other centers, and society say) and Collaborative (collaborating with patients and other institutions).
It has a series of Tele-assistance services, online consultation, Teleconsulting, Telemonitorization, Telerehabilitation and telematics care for diabetes. Telemedicine video conferences are held to:

1) Improve outcomes in patients
2) Streamline the collaboration of specialists and hospital staff for patient care with real-time video communications
3) Maximize our resources

Using the resources and hardware we already have and expanding its telemedicine capabilities and solutions. Boost our internal communications. Work with collaboration and the meetings and the training, participants anywhere in the world.

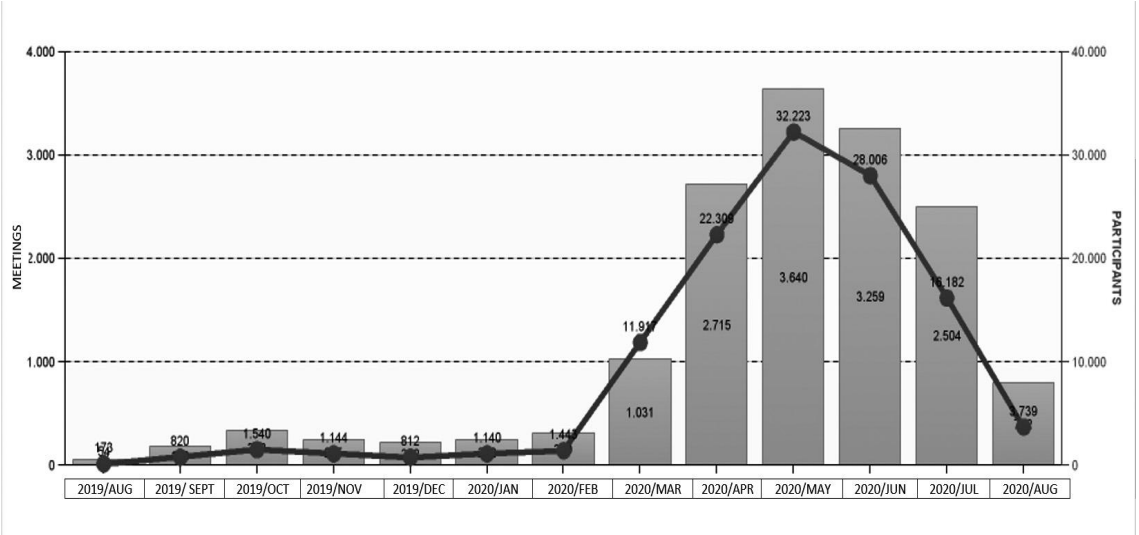

***Figure 4**. Telemedicine evolution in Hospital Sant Joan de Déu (HSJD). Source: https://www.sjdhospitalbarcelona.org/es (September 2020)*

	MONTHLY				ACCUMULATED ANNUALLY			
	2019/Aug	2020/Aug	Dif.	%Var.	Previous	Current	Dif.	%Var.
Scheduled Telephone Visits	1.137	5.867	4.730	416,0%	13.876	86.057	72.181	520,2%
Unscheduled Telephone Visits	376	1.502	1.126	299,5%	5.105	17.507	12.402	242,9%
Dating Portal	730	897	167	22,9%	11.152	13.679	2.527	22,7%
ECAP Interconsultations	**2.243**	**8.266**	**6.023**	**268,5%**	**30.133**	**117.243**	**87.110**	**289,1%**
APS Link Queries								
Non-Contact Visits	**9.654**	**7.793**	**-1.861**	**-19,3%**	**162.798**	**99.703**	**-63.095**	**-38,8%**
Face-to-face visits	**11.897**	**16.059**	**4.162**	**35,0%**	**192.931**	**216.946**	**24.015**	**12,4%**
Total Visits	**18,9%**	**51,5%**	**32,6%**		**15,6%**	**54,0%**	**38,4%**	
% Visits Not Present. vs Total Visits								
Nurse Consultations	471	1.003	532	113,0%	7.194	9.764	2.570	35,7%

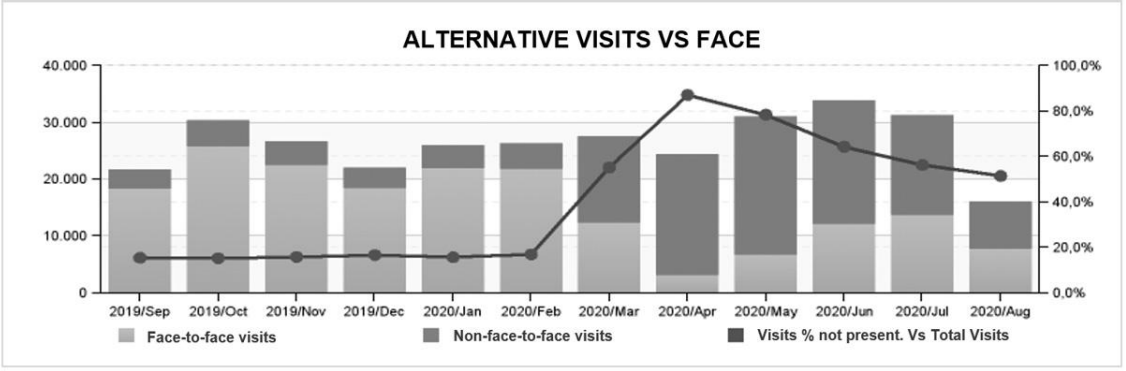

***Figure 5**. Telehealth in HSJD Alternative site visits from September 2019 to August 2020. Source: https://www.sjdhospitalbarcelona.org/es (September 2020)*

During the pandemic, consultations were carried out face-to-face only in special, delicate or essential cases and on demand. Most were made by telephone contact. The coordination and training of health professionals has been carried out mainly through videoconferencing systems installed in the professionals' individual computer equipment or in telemedicine equipment.

Since 2003, the SES has a telemedicine service that allows non-presential scheduled and urgent consultations to be conducted using a videoconference system and the possibility of sharing medical images not integrated into the patient's electronical medical record. (retinography images, dermatological images, cardiac ultrasounds, electrocardiograms, etc.). The aim of this service is to improve accessibility to specialized medical care in a dispersed, rural and very aged region. For this reason, teleconsultations are carried out between health centers, in one the consulting doctor is found and in the other the patient is accompanied by a health professional who supports the diagnostic process, prescription or follow-up. During the pandemic, only essential teleconsultations (Telestroke), teleconsultations with external centers (nursing homes, prisons and guardianship centers for minors) and tele-training related to COVID-19 have been maintained through the telemedicine service. Non-essential scheduled

teleconsultations have been transformed into telephone consultations. On the other hand, the use of non-institutional tools to make non-presential consultations that required images has been explored detected, such as the WhatsApp app or email.

In Portugal, during the first months of the pandemic, hospitals made a remarkable effort in organizational terms to adapt to the pandemic reality, both in the emergency departments (ED) and in the wards. In hospitals with EDs open to the outside, specific circulation circuits were created for the initial observation of patients and, in the event that hospitalization was necessary, conducting the screening test for COVID- 19 became mandatory before, awaiting the patient for the test result in designated areas.

The invasive emergency procedures continued to be performed as usually, considering the patient as "positive" until the result of the screening and all appropriate safety measures were taken. The various departments were also subdivided into specific areas with the separation of infected and non-infected patients, with no communication in the circulation of spaces between the different areas. Access to the hospital was (and it is still) restricted and strictly monitored, limited to staff and patients with confirmed appointments or procedures.

However, most consultations and elective procedures were interrupted for a certain period of time, with the exception of some specialties (e.g., oncology). Telemedicine is not institutionalized in most departments, so the management of outpatients was individualized in each one according to their specialization, to the services usually provided and in accordance to the technical and human resources available.
In the initial phase the teams were divided for the possibility of always having a reinforcement if necessary. Internal Medicine departments were the most exposed in all aspects and those that received the most patients in the most critical phase. With regard to individual outpatient care, each doctor or team will have tried to use simple means of direct remote communication with their patients, either by phone / via WhatsApp / video call or even by email.

After the first phase, all hospital assistance activity is returning to a “new different normal”, with different facilities, logistics and organization but a little more prepared to try to successfully overcome a new crisis. However, creating conditions for telemedicine in all its potentialities to actually install itself in the hospital health network should be a major objective in this process that we are experiencing.

In university hospitals, an additional major problem arose during the school period: the maintenance of teaching, internships and knowledge assessments. However, for example, at the Faculty of Medicine of Universidade de Lisboa, with the full commitment of the audio-visual team and the entire teaching staff, an adequate strategy for maintaining remote medical education was established very quickly, which also is well working in the new academic year.

Different areas of hospital care provide illustrations of what happened and did not happen in Portuguese NHS hospitals during this period. These are not exclusive but rather illustrative examples.

2.1. Telemonitoring of COPD patients

This pandemic has brought an unprecedented new reality to Portugal and the National Health Service, which impacted on both hospital and primary health care activities and on the lives of patients, particularly those suffering from chronic respiratory disease (COPD). The compulsory lockdown of people encouraged food maladjustment, and less physical activity associated with less preventive measures such as the suspension of respiratory rehabilitation and certainly less adherence to maintenance therapy, have certainly contributed to a greater lack of control of the disease.

In the Alto Minho Local Health Unit (ULSAM), through the DPOC Telemonitoring Program that began in 2014 and currently includes 97 patients (130 in total), clinical surveillance of all patients has been possible. Remote monitoring of clinical parameters and real-time clinical intervention (doctor and nurse) has enabled control of most situations with no positive COVID-19 cases. There were 3 deaths due to different pathologies (1. stroke, 1. gastric neoplasia, and 1. decompensated heart disease).
In addition to all the telemonitoring work that allowed the chronic disease to be managed, the team also conducted a remote awareness campaign for all Telemonitored patients focusing on containment measures.

The insufficient health literacy and a low level of education initially created some apprehension, which was quickly overcome by the intervention of the Project's multidisciplinary team, by promoting a relationship of trust with the patient and family/caregivers. The adaptation of technology to the patient, and not the other way around, as well as the human relationship established between both parties, facilitated the entire integration process, with 100% adherence and frequent contacts of patients with the clinical team, namely nursing, to date. Patients are instructed to make a mandatory daily assessment of available vital parameters. If there is a worsening of his clinical situation, the patient can monitor himself as often as necessary to monitor the instability episode. Nursing is responsible for monitoring the monitoring of the various patients 24 hours a day and making telephone contact with the patient/caregiver in the event of an alarm. After assessing the situation, the nurse proceeds or not with a therapeutic indication as prescribed in SOS in the patient's therapeutic protocol and whenever necessary with the doctor's collaboration. This model that proved to be highly effective in the 1st phase of the COVID-19 pandemic may be crucial in the period ahead of the autumn/winter months when the COVID- 19 pandemic will be confronted with

the impact of seasonal influenza and greater COPD instability with most frequent exacerbations.

In Portugal, during the first phase of the pandemic, there was an aggravation of the health status of the chronically ill due to the fear of going to the health institutions and the decrease in their response capacity.

Comparing the activity of the COPD telemonitoring program in relation to the containment period (1 March to 30 June 2020) with the same period of 2019, there is a reduction in clinical interventions (46 in 2019 to 43 in 2020), in the number of episodes of urgency (26 in 2019 to 15 in 2020), the number of hospitalizations (4 in 2019 and 3 in 2020) and the number of hospitalization days (25 in 2019 and 21 in 2020). These results reinforce the importance of this program. It was possible to maintain the level of clinical availability for telemonitored patients and their guidance whenever necessary. During the pandemic period, there were patients in the program who were sent to the Emergency Department in the same way as during a non-pandemic period.

2.2. Cardiology Perspective

The pandemic crisis due to COVID-19 led to an abrupt change in the organization of medical care, leading to the displacement of resources towards "acute" patients with suspected infection and delaying face-to-face medical appointments with chronic patients considered "stable". In addition, social isolation, considered necessary and protective, and fear of contamination in hospitals also contributed to this outcome. Regarding chronic heart failure (HF), a condition with particular vulnerability to infection and consequent decompensation of the syndrome - due to the age of patients, co-morbidities, underlying cardiovascular diseases, and particular pulmonary susceptibility to respiratory disease [6] — surveillance by telemonitoring has been, in the Centro Hospitalar Universitário Lisboa Norte (CHULN) experience, an added value to maintain the quality of medical care during the pandemic phase. Established at the end of 2017 and currently with 30 patients in an active program (patients with severe chronic HF), there was no increase in decompensation or hospital admissions between February 2020 and July 2020, and there were no cases of infection by COVID-19. The access and quality of medical care did not change in this population precisely due to the organization of the program that allows continuous surveillance of patients with chronic HF. The use of new technologies available for remote monitoring enabled contact between healthcare professionals and patients, ensuring education about the disease and promoting self-surveillance and self-control measures. This methodology

[6] Mehra MR, Ruschitzka F. Covid-19 illness and heart failure. Is a link missing? JACC 2020 Heart Failure; 8 (6): 512-4. Doi : 10.1016 / j.jchf.2020.03.004 . https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7151428/

demonstrated to be effective in reducing hospitalizations and mortality in patients with chronic HF at greater risk of decompensation[7,8,9], In fact, during a pandemic situation like the one we currently live in, telemonitoring can become particularly useful for rapid detection of clinical hemodynamic worsening, leading to an early effective intervention and reducing hospital admissions.

Ischemic heart disease continues to be the leading cause of death worldwide[10] and the burden it represents for health systems leads to an increasing need to improve secondary prevention strategies. The telemonitoring of symptoms, electrocardiogram, and parameters such as blood pressure, heart rate, and blood glucose have allowed an improvement in the provision of care, with correction of modifiable risk factors and earlier detection of exacerbations, particularly in selected high-risk patients. Telemedicine may also play a role in cardiac rehabilitation programs, bringing them closer to homes and community structures.[11]

The contingency plans stemming from the current SARS-CoV-2 pandemic have significantly limited the close surveillance that many of these patients require, particularly in the early post-acute myocardial infarction period. The telemonitoring program at Centro Hospitalar Universitário de Coimbra (CHUC) ensured an adequate level of care for patients identified as being at high risk after the index event. With a total of 15 patients being followed at any time, this home surveillance combined with a close connection to health professionals allowed not only adequate control of cardiovascular risk factors but early identification of clinical or electrocardiographic changes for faster guidance potential decompensations. During the state of emergency, several potential "alarm" situations were recorded, all of which could be remotely resolved, avoiding unnecessary travel to hospital structures and minimizing the risk of exposure in particularly vulnerable patients, given the increased risk of acute events that

[7] Home-care IT solutions and commercial offers are too expensive, governmental and non-governmental consortiums could be created to offer low-cost high-tech home-care solutions to selected groups of risk patients/families.

[8] Nunes-Ferreira A, Agostinho JR, Rigueira J, et al. Non-invasive telemonitoring improves outcomes in heart failure with reduced ejection fraction: a study in high-risk patients. ESC Heart Fail. 2020. doi:10.1002/ehf2.12999. https://onlinelibrary.wiley.com/doi/10.1002/ehf2.12999

[9] Volterrani M, Married B. Remote control and telemedicine. Eur Heart J Supplement.2019; M54-M56 https://doi.org/10.1093/eurheartj/suz266

[10] Benjamin EJ, Muntner P, Alonso A, et al. Statistical Update on Heart Disease and Stroke-2019: A Report from the American Heart Association . Circulation 139: e56–e528 https://doi.org/10.1161/CIR.0000000000000659

[11] Rawstorn JC, Gant N, Right A, et al. Cardiac rehabilitation based on telehealth exercises: a systematic review and meta-analysis. Cor 2016; 102: 1183–1192. DOI: 10.1136/heartjnl-2015-308966

patients with coronary heart disease (and with the comorbidities often associated) present with an infection for SARS-CoV-2[12].

2.3. Perspective of Dermatology

The restriction of face-to-face dermatology appointments worldwide.[13,14] As such, and to avoid further deterioration of severe skin conditions, our department implemented strict Teletriage measures to properly prioritize our clinical activity.

For external patients, we developed a new dermatology consultation system based on clinical and photographic data collected at the original point-of-care by local attending physicians. Then, this information was remotely analyzed by our department and suitable patients were Teletreated (avoiding further COVID-19 potential exposure), granting that in-person observations were mainly reserved for severe and emergent cases. As for our patients, improved follow-up measures were taken, allowing Tele Prescription renewal for chronic conditions and telecommunication of diagnostic test results. These measures, although taken under a very specific context, have shown us that telemedicine can improve our patient experience while not jeopardizing the quality of our medical practice. As our elective in-person activity begins to re-open, we will continue to integrate Teledermatology in our in-office care to build a renewed Dermatology department that truly fulfils our patients' needs.

2.4. Perspective on Rehabilitation

This Pandemic forced the change, delay, or discontinuity in Rehabilitation care in Portugal as across the rest of Europe. According to a questionnaire that was sent to European countries between the 31st of March and the 3rd of April, during a lockdown,

[12] Maddox TM, Stecker EC, Bozkurt B, et al. ACC Clinical bulletin COVID-19 – Clinical guidance for the CV care team. https://www.acc.org//~/media/Non-Clinical/Files-PDFs-Excel-MS-Word-etc/2020/02/S20028-ACC-Clinical-Bulletin-Coronavirus.pdf

[13] Lichtman, G. and Rigel, D., 2020. The immediate impact of COVID-19 on U.S. dermatology practices. Journal of the American Academy of Dermatology, 83 (2), pp.685-686. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7228885/

[14] Gisondi, P., Piaserico, S., Conti, A. and Naldi , L., 2020. Dermatologists and SARS - CoV - 2: the impact of the pandemic on daily practice. Journal of the European Academy of Dermatology and Venereology, 34 (6), pp.1196-1201. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7264567/

around 2.2 million people were deprived of outpatient Rehabilitation care each day.[15] There was also a decrease in admissions for non-urgent inpatient rehabilitation, as well as a decrease in the average delay of patients who needed urgent rehabilitation.[16]

This reality has implications for the present and the future: deterioration in the functionality of people who already suffered from a disability and an increase in the number of people with disabilities, namely the survivors of COVID-19 in its most serious variants -in the short-medium term a greater number of people will need Rehabilitation care. The limitations imposed by social distancing and the rules for the functioning of treatment facilities make it difficult to increase the response of conventional rehabilitation (person-to-person). There is an urgent need to find other approaches that aim to complement conventional Rehabilitation. In these last months, the recommendations on including Telehealth in the future of Rehabilitation have become common.[17]

During the emergency state, most rehabilitation consultations were made only by phone, without video. Telerehabilitation in all forms (evaluation, intervention, monitorization, education) is not yet implemented in Portugal, despite the fact that many advances have already been made in terms of Information and Communication Technologies, namely the recent implementation of RSE Live, which allows consultations with patients at home.

The Portuguese Society of Physical and Rehabilitation Medicine created an area for patients in its website, with several home exercise brochures, but more has to be done to complement/improve access to Rehabilitation care and to improve the integration of care, ensuring its continuity through citizens' lives as a fundamental right. This will require the contribution of doctors, citizens, and policymakers. Interoperability between systems, cybersecurity, and privacy protection are basic requirements. Academic research, in conjunction with health professionals, is fundamental for the development of easy-to-use solutions that allow scalability of the level of difficulty and adaptability to

[15] Negrini S, Grabljevec K, Boldrini P, et al. Up to 2.2 million people with disabilities suffer collateral damage every day from the Covid-19 blockade in Europe. Cover - 10.23736 / S1973-9087.20.06361-3 [doi]. 2020. https://pubmed.ncbi.nlm.nih.gov/32383576/

[16] Prvu Bettger JA-O, Thoumi A, Marquevich V, et al. Covid-19: maintenance of services essential to rehabilitation in the continuum of care. Tapa - e002670 [pii] Tapa doi: 10.1136 / bmjgh-2020-002670 FAU - Prvu Bettger, Janet. 2020. https://www.researchgate.net/publication/341182378_COVID-19_Maintaining_essential_rehabilitation_services_across_the_care_continuum

[17] Ceravolo MG, De Sire A, Andrenelli E, et al. Rapid "life" systematic review of COVID-19 rehabilitation needs update to 31 March 2020. LID - doi: 10.23736 /S1973-9087.20.06329-7. 2020. https://pubmed.ncbi.nlm.nih.gov/32316718/

the needs and preferences of patients. Finally, the training of doctors will be crucial for the success of the implementation, as the training of patients and their informal caregivers will depend on them.

COVID-19 pandemic has exposed people to the hazard of physical inactivity and sedentary behavior due to stay-at-home guidance. [18] For patients with chronic pulmonary diseases, pulmonary rehabilitation (PR) is an integral part of the clinical management and health maintenance, with psychological as well as physical benefits, reducing symptoms of anxiety and improving dyspnea, health status and exercise tolerance.[19] However, the pandemic impact is even greater for these patients since they belong to one of the main diseases at risk for COVID-19. Patients fear of contracting coronavirus may keep many away from hospitals even in cases of acute exacerbations.

Home-based programmes are a safer option, but patients must contend with conditions they were not prepared for, including environmental factors, distress, frustration and stress.[20] Motivational for PR is usually low, as well patient compliance. Telehealth could be an option to increase motivation, but a well-designed, structured, organized network is still lacking for provide telerehabilitation customized according to the patient's motivational profile and needs, considering other determinants like social support, cultural practices and environmental factors. This should be the way in the future.

3. What should have happened and must happen in the near future?

However, given the technologies, systems, devices, and applications available today so you can make Teleconsultations more advanced and conclusive, and the possibility of Telemonitoring chronic patients in general, it would be highly desirable to take advantage of current experience and without wasting time, implement field equipment,

[18] Hall G, Laddu DR, Phillips SA, et al. A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another? *Prog Cardiovasc Dis* 2020: S0033-0620(0020)30077-30073. doi: 10.1016/j.pcad.2020.04.005. https://pubmed.ncbi.nlm.nih.gov/32277997/

[19] Singh D, Agusti A, Anzueto A, et al. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease: the GOLD science committee report 2019. *Eur Respir J* 2019; 53 2019/03/09. doi : 10.1183/13993003.00164-2019. https://pubmed.ncbi.nlm.nih.gov/30846476/

[20] Russell KL and Bray SR. Self-determined motivation predicts independent, home-based exercise following cardiac rehabilitation. *Rehabil Psychol* 2009; 54: 150-156. 2009/05/28 doi: 10.1037/a0015595. https://pubmed.ncbi.nlm.nih.gov/19469604/

applications, action programs, and articulation that, contrary to what has happened so far, significantly benefit from the existing technological and organizational potential.

3.1. What should have happened?

The Integrated Management of the patient with chronic obstructive pulmonary disease, which is already a reality in Alto Minho, is a direct consequence of the Telemonitoring Program and allows the opening of intervention conditions in the patient's natural habitat through the teams of the Community Care Unit, ECCI and Health Center.

Promoting good clinical practices for the control and treatment of COPD, respiratory rehabilitation should be maintained at home, always safeguarding the conditions of safety and protection of the patient and health professional, thus avoiding greater exposure to increased risk factors, inherent patients' travel to Rehabilitation Centers.

Other, no less important interventions can also be made by health professionals at the patient's home, namely teaching, encouraging and certifying the correct use of inhalers, performing some techniques like vaccination or collecting blood sample for laboratory regular testing. The necessary medical evaluation is also possible. Training and bringing up awareness to respiratory patients and their families about indoor protection from exposure to biomass burning, and in the adequate food should taking advantage of existing resources.

3.2. What must happen in near future?

Technical and process perspectives

In terms of technology, there are many secure telecommunication applications adapted and designed to put in contact professionals and patients at home or anywhere patients desire (through smartphones for instance). They are easy to install, inexpensive and are available in Portuguese NHS. There is even a dedicated application in conjunction with the electronic files of the NHS made available by the Ministry of Health (RSE Live). In the Spanish regions equally, there are software services available.
On the other hand, telemonitoring, which consists of regular and programmed assessment of bio-physiological data of patients, such blood pressure, glucose, weight, percentage of fat, hydration, ECG, oxygen level, movement and other parameters, is already available in Portugal for control of risk patients. Some HNS hospitals already do it routinely, although only in a limited number of cases, mainly in cardiac patients and those with severe respiratory diseases. In the future it should also be used in primary care for diabetic, hypertensive, obese or hypo coagulated patients. This future should be the autumn 2020 and winter 2021, not in many years from now. There are already several commercialized devices that allow cardiac and pulmonary auscultation, ECG, real-time eyes, ears and throat observation, temperature measuring and

macro images of the skin in real time. It may not yet be justified to trivialize it for common citizens in their homes, but knowing what it is happening in old age homes and continuous care centers, it would be an interesting investment in those places, highly advantageous, and whose adequate use could be easily learned by local caregivers.
The usage of these technologies can and should be a relevant factor for real control, support, diagnosis and prevention in many situations. Il will not replace face-to-face contacts, but it is able to avoid many of them without increasing the risk of harming the patients by exposing them to unnecessary travels and presence in infected places (not just risk of COVID-19 infection, but equally long-standing nosocomial and healthcare service related infections).

In many cases, as in telemonitoring, there are even additional advantages as data can be scrutinized in real time and with a much higher frequency than it would be done in scheduled medical appointments. In the current pandemic situation, these capabilities become even more evident and non-ignorable.

We have the necessary technologies and techniques, knowledge and some devices. We have a circumstance that justifies and greatly reinforces the need. We have formal support from health authorities. What is missing then? In addition of the usually resistance to change and corporative and economic conveniences, the best fight against which is corrosion over time and the progressive exclusion of those who refuse to cooperate, there are other, more relevant causes, in which we must intervene as soon as possible: now!

Work methodology

Although with many years of experience and success stories, health systems, namely the NHS, never implemented telemedicine in much the same paradigms as traditional organization of work in healthcare facilities. Health institutions and their services are, in general, organized according to a scheme designed for face-to-face contact. Funding and productivity measures often still consider only this type of consultations and medical acts. Situations such as monitoring patients at home, remote consultations and prescriptions, remote peer consultancy on clinical cases, or referrals to e-services still cause great administrative, financial and statistical disruption.

Scheduled and routine activity must include tele-heath. Only with schedules, professionals, dedicated areas and circuits and statistical/productivity outputs of its own, will tele-health be possible in a professional, serious and accountable manner.

Probably, as it is common in the initial stages of any new procedures, there is a need for compensation and recognition of the work carried out, for example rewarded productivity, supporting services and restating advantages. Premium payment for tele-consultations, has exists in Portugal or other financial incentives should be maintained, but with more rigor and without excluding primary health care.

Finally, we must consider the real driver of all major changes in procedures and relationships in the different types of health services aimed at the public. The population awareness that these services exist, realizing their usefulness and scope, trusting in their safety, and appreciating the

comfort. Even more importantly citizens need to be made to understand that telehealth is no longer an experience for some, but a everyone's right in our pursuit for better health.

Policy perspectives

A Telemedicine and Telehealth strategy, with specificities for COVID-19 pandemic challenges, is urgently required. This strategy should establish the organizational models and valid tools of Telemedicine and Telehealth in various scenarios:

1) Pandemic scenario. Design and development of organizational and technological models that allow non-presential healthcare for the entire population or semi-presential with minimal and controlled face-to-face contacts. The models must guarantee the safety of the patient and the professionals and the quality of care of the consultations, making available to professionals as much information as possible (videoconference, telemonitoring, uploading of images and files to the patient's electronic health records, accessible electronic health records for the patient, etc). Likewise, telehealth models must guarantee equity in access to the health system, that is, non-presential healthcare models must not establish or widen the existing digital and economic gap in the population.
2) Scenario of "new normality". Design and development of organizational and technological models that allow mixed healthcare. In this new model, non-presential care must occupy the position of relevance that corresponds to it in a digitized society, guaranteeing standards of safety, quality and equity.

The strategy should contemplate the health improvement of centers with institutionalized populations (nursery care centers for the elderly, nursery care centers for disabled people, prisons, centers for minors, etc.) using telemedicine and telehealth systems. These systems contribute to the continuity of patient care, to the dissemination and updating of health care protocols, to continuous communication and coordination between managers in the health and social field, to the early organization of admissions in health centers, etc.

Another aspect to include in the regional strategy could be telerehabilitation and telemonitoring of patients. Telemonitoring must serve in particular specific high-risk populations, according to predefined objectives, as it is not possible (and probably not desirable, neither for the system nor to the patients) to telemonitoring everybody. Also, the periodicity of telemonitoring shall be performed according to the clinical profile of the patients.

4. Patients perspectives on telehealth, COVID-19 pandemics and opportunities

Patients associations that participated in this report expressed the following experiences. A sense of loss. That tele-health was not offered as a solution, rather phone calls were a sort of "last resource" not always available, but better than no contact. Patient associations did not feel involved in the beginning of the crisis by public

authorities. This was similar in Portugal and in the Spanish regions, although progressively more informed and involved in Spain than in Portugal. Associations are capable of communicating effectively with large numbers of patients and feel they could have been used as a "tele" resource. Also, knowledge of available tele-health efforts or initiatives was not made known to them. Not the risks or alternatives to the use or mis use of general consumer solutions such as WhatsApp/ZOOM for conduction tele-consultations.

Regarding telemonitoring, CPOD patients' association refers that this should have been more broadly used and is an effective tool that could better prepare for the winter to come. In the webinar organized by RESPIRA and SITT, on the past 30th September, to obtain feedback and participation from patients regarding these issues, a strong support for the idea of expanding the good experiences in different hospitals into a National Tele-Assistance program.

5. Recommendations

1. Launch urgently organized strategies and implementation plans for tele-assistance;
2. Involve patient association in literacy efforts and invest strongly in making citizens patients and families aware of what is "proper" tele-health and what are quick-/fast- solutions for immediate urgent answers but that do not fully comply with telehealth regulation and good practices.
3. Finish infrastructural upgrade of the NHS urgently in next 6 weeks, all PCs need to have webcam, microphone and speakers – to become tele-health/tele-consultation touch points
4. Using low tech solutions, needs to be always a second alternative and not to become the "main" way to offer telehealth
5. Total replacement of physical appointments for tele-appointments is not advisable, hybrid models are safer and, even in COVID-19 times, are strongly recommended. If implemented broadly they reduce enough the number of patients going to the outpatient clinics.
6. Home-care IT solutions and commercial offers are too expensive, governmental and non-governmental consortiums could be created to offer low-cost high-tech home-care solutions to selected groups of risk patients/families.
7. Tele-health needs to be deployed by all levels of care in an integrated way, in crisis and after, focus on hospitals should be extended to primary care. This is happening in some regions in Iberia but needs to be generalized.
8. When revising guidelines for conventional diseases or approaches to care plans, tele-health should be an integral component. Technical guidelines, like for tele-dermatology or tele-radiology, may make sense, but having components of tele-health in all other clinical guidelines (e.g. Portuguese NOCs) is fundamental for professionals participation and internalization in the process of care, rather then it being a technology, imposed or suggested by top management, if at all.

6. Conclusions

The COVID-19 pandemic has brought to the forefront two larval and dormant themes, as a result of the inertia caused by economic-financial interests that bloc transformation in healthcare, considering it as another business and not as a right of Citizenship. These themes are public health and e-health (telehealth).

It has been proven that it is essential that Social States with public health systems that allow confronting this epidemic as well as others to come more effectively are fundamental for universal Citizenship. These helps avoiding devastating examples such as that of the United States of America (inexistence of a Social State and inefficiency of Public Health) and Brazil (incapacity of the SUS and prevalence of profitable private health services that serve few people). E-Health has proved to be a decisive vector in bringing patients closer to the health services, a good example being the monitoring of chronic, more fragile and older patients through telemonitoring processes, keeping them at home avoiding unnecessary travel to the health services, namely hospitals making them more exposed to undesirable contacts in the context of a pandemic or also in a usual situation to avoid transmission of bacterial diseases, not forgetting that chronic diseases are prevalent in NHS.

Telemedicine supports traditional/presential medicine by providing clinical services when the distance is a critical factor. Although this tool does not replace a medical examination, during the COVID-19 pandemic, it has contributed to reducing the spread of infection and has avoided the need for face-to-face patient visits. Even after the COVID-19 emergency, telemedicine will be critical to expediting outpatient visits, while limiting costs, to both the patient and the health system which is critical as declining budgets the National Public Health Services in countries are likely to follow this pandemic and economic crisis. Telehealth and telemedicine in particular can offer valuable support to the activity of the physician by rationalizing and facilitating his work. In this sense, the COVID-19 pandemic represents a positive advantage for the acceleration and improvement of the tools that constitute telemedicine.

A set of recommendations has been outlined and these will be presented to Governmental authorities in both countries.

A National strategy on tele-assistance was proposed by Portuguese professionals and supported by patients. In Spain, larger adoption and equipment of existing programs,such as in Estremadura is said to be the future and was discussed as a good practice. In Catalonia, COVID-19 is said to have pushed ongoing projects further in some Catalan hospitals which is something that is not so obvious for now in Portugal.

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