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IMPACT OF TELEMEDICINE DURING THE COVID-19 PANDEMIC – THE EXPERIENCE OF A PRIVATE MEDICAL CENTER IN ROMANIA

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ABSTRACT

The use of telemedicine has been steadily increasing over the past two decades, with a significant surge during the COVID-19 pandemic. This paper presents the experience of Romania's largest private healthcare provider, Regina Maria Network, which implemented telemedicine within just 10 days during the first COVID-19 lockdown in March 2020. Notably, the Romanian Government acted swiftly during the State of Emergency to amend legislation, enabling the use of telehealth. The purpose of this research is to examine the main characteristics of patients who utilized the service, the number of resolved cases, the frequency of in-person referrals, and the impact of telemedicine on the redistribution of medical resources. This study evaluates the experience of the Regina Maria Virtual Clinic from its launch in March 2020 to the end of December 2021, offering a descriptive analysis of data related to patient access, service development, and satisfaction across 394,715 appointments. The majority of consultations (19.27%) were in Occupational Medicine, followed by General Medicine (12.75%) and Internal Medicine (9.27%). The distribution of cases by age and gender shows the highest number of cases among individuals aged 26-45, for both women and men, with the lowest numbers in the 11-18 and over 65 age groups. Patient satisfaction was notably high, with an average rating of 9.48/10. The telemedicine model employed by the Regina Maria Private Network proved effective during a particularly challenging time for the healthcare system. The consistently high number of appointments and strong patient satisfaction underscore the importance of further developing and expanding telemedicine services.

Keywords: Telemedicine, Telehealth, National Health Interview Survey, Pandemic, COVID-19

INTRODUCTION

The use of telemedicine has been growing steadily over the past two decades [1], with a significant surge during the COVID-19 pandemic [2, 3]. Even before then, its high potential for use in catastrophic situations had already been demonstrated [4]. As a result, when faced with the unprecedented challenges of the current pandemic, telemedicine was primed for rapid implementation across multiple medical centers from the outset.

Telehealth holds the promise of improved and rapid access to medical care, increased patient satisfaction, flexibility for physicians and reduced costs for the healthcare system. Thus, its supposed

advantages could make it suitable for long-term use, beyond isolated hazards. Common modalities of telemedicine include video conferencing, remote patient monitoring, and mobile health applications. While the medical community is in general very enthusiastic about providing medical care remotely [5], there are still various challenges and risks imposed by telemedicine, such as concerns about the quality and security of the medical act. Another challenge could be the variations in national laws, impacting the establishment of a standard worldwide-used platform.

In this paper, we report the experience of the largest Romanian private healthcare provider, Regina Maria Network, which implemented telemedicine within only 10 days during the first COVID-19 pandemic lockdown in March 2020. Notably, the Romanian Government acted rapidly during the declared State of Emergency in order to change the law which allowed the use of telehealth [6]. We identified which medical specialties benefited most from telemedicine. Furthermore, we inquired the main characteristics of the patients who used the service, how many cases have been resolved, how many needed in-person referral, and what impact telemedicine had on medical resources redistribution. Further, we were interested how relevant for the medical act is an extended implementation of more than just video conferencing.

MATERIALS AND METHODS

This study assesses the experience of the Regina Maria Virtual Clinic from its inception in March 2020 to the end of October 2021, providing a descriptive analysis of data on patient access, service development, and satisfaction. The Virtual Clinic has recorded over 430.000 appointments, with an average of approximately 25.000 online consultations per month. Medical services are delivered by a team of over 470 physicians, spanning more than 30 medical and surgical specialties.

Appointments can be scheduled either online (via desktop, laptop, or mobile devices) or through a call center. Confirmation of the appointment is sent via email, including a meeting invitation through the Microsoft Teams application. At the scheduled time, both physicians and patients engage in a real-time, face-to-face interaction by simply accessing the provided invitation link. The Microsoft Teams application is free and can be downloaded by any user on a computer or mobile device. All consultations conducted through the virtual clinic are recorded in the patients' electronic medical records, including recommendations and comprehensive medical reports, similar to in-person consultations. Additionally, patients receive treatment instructions that are valid at pharmacies for filling prescribed medications. The integration of these services into the same system as physical consultations facilitates seamless transitions between online and in-person appointments for both patients and physicians.

The online platform has proven effective for various purposes, including routine check-ups, laboratory analyses, second opinions, and telemonitoring of specific conditions – particularly chronic or autoimmune diseases that necessitate ongoing evaluation or interdisciplinary consultations. It is also utilized for occupational medicine and the issuance of medical certificates, prescriptions, and referrals that do not require a physical presence in outpatient clinics.

In cases where there is a suspicion of conditions requiring emergency care, physicians can direct patients to a physical location for diagnosis and treatment; for example, clinically recognized acute appendicitis was confirmed by ultrasound and operated on the same day.

Patients utilizing the service are both residents of Romania and individuals residing abroad.

RESULTS

Between March 2020 and October 2021, a total of 434.060 appointments were recorded at the Regina Maria Network Virtual Clinic. The distribution of cases is detailed in Table 1 and illustrated in Figure 1. Notably, the volume of appointments surged significantly following the launch, with over 20.000 appointments occurring in the second month of operation. Over time, the number of monthly appointments consistently ranged between 15.000 and 20.000, with a notable decline during the summer months.

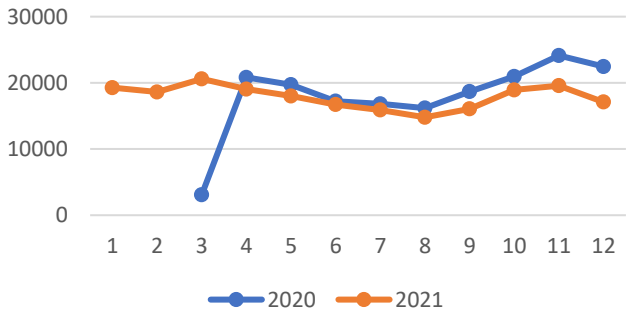

Figure 1 - Distribution of the number of appointments

Month	2020	2021	Total
1		19272	19272
2		18618	18618
3	3,087	20596	23683
4	20,817	19047	39864
5	19,721	18009	37730
6	17,226	16719	33945
7	16,825	15889	32714
8	16,185	14797	30982
9	18,671	16069	34740
10	20,964	18933	39897
11	24,130	19571	43701
12	22,461	17108	39569
Total	180087	214628	394715

Table 1 - Distribution of the number of appointments

The majority of the patients were from Bucharest (55.9%), Cluj (10,7%), Ilfov (5.7%), Brașov (3,6%), Timiș (3%), Prahova (2.5%), Iași (2.3%) and Argeș (1.3%).

Most consultations - 19.27% pertained to Occupational Medicine, followed by General Medicine - 12.75% and Internal Medicine - 9.27%. The proportion of consultations by specialty in relation to the specialty is presented in Table 2 (if it represents at least 1%).

Specialty	%
Occupational Medicine	19.27
General Medicine	12.75
Internal Medicine	9.27
Pediatrics	8.14
Endocrinology	6.94
Obstetrics - Gynecology	6.88
Dermatovenereology	5.28
Psychology	4.35
Gastroenterology	2.86
ENT (Otorhinolaryngology)	2.82
Neurology	2.82
Urology	2.77
Allergology and Immunology	1.98
Pneumology	1.74
Diabetes, Nutrition and Metabolic Diseases	1.53
Orthopedics and Traumatology	1.44
Neonatology	1.34
Hematology	1.16
Cardiology	1.10
Rheumatology	1.10

Table 2 - Distribution of the number of appointments in relation to the specialty (over 1%)

The distribution of cases by age and gender, relative to the month of presentation, reveals a peak in cases within the 26-45-year age range for both sexes, with the lowest number of cases observed in the 11-18 year and over 65-year age groups (see Table 3 and Figure 2).

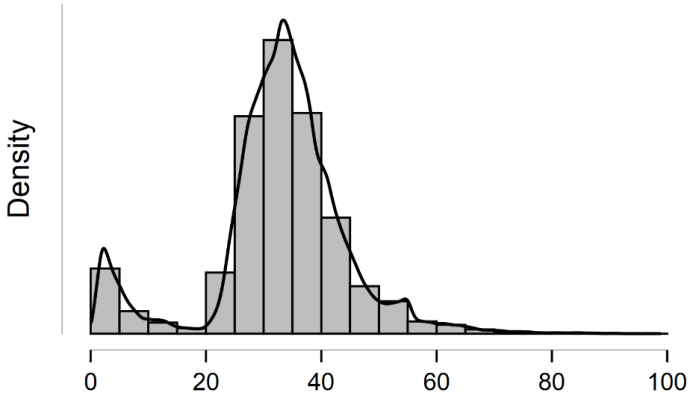

Figure 2 – Distribution of presentations in relation to age

Additionally, the gender distribution indicates that women aged 19-45 are nearly twice as represented in the dataset compared to men in the same age range (refer to Figures 3 and 4).

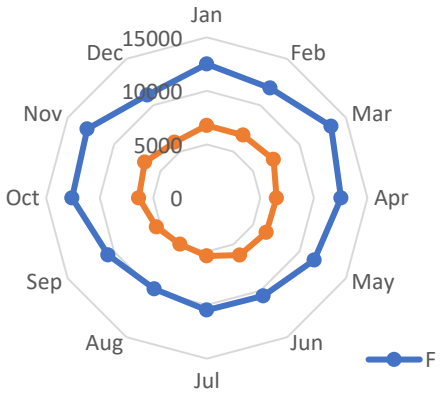

Figure 3 - Distribution of presentations in relation to gender on every month

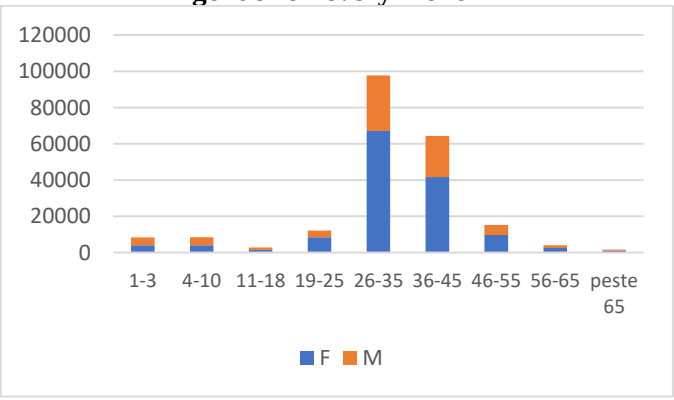

Figure 4 – Distribution of cases in relation to age and gender

	AGE (years)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Male	1-3	313	330	345	336	268	341	382	345	374	423	436	458	**4.351**
	4-10	316	311	419	379	356	360	338	347	412	407	357	366	**4.368**
	11-18	92	94	121	82	92	113	102	68	113	138	130	105	**1.250**
	19-25	289	291	266	241	290	350	292	302	329	321	383	356	**3.710**
	26-35	2.724	2.736	2.854	2.725	2.693	2.466	2.285	2.071	2.220	2.572	2.772	2.480	**30.598**
	36-45	2.241	2.103	2.335	2.099	2.069	1.893	1.547	1.387	1.486	1.929	1.985	1.685	**22.759**
	46-55	567	618	609	469	467	489	351	353	366	436	469	398	**5.592**
	56-65	146	221	178	138	122	104	78	93	87	89	108	110	**1.474**
	over 65	82	68	70	44	61	46	43	26	38	37	42	48	**605**
	TOTAL	**6.770**	**6.772**	**7.197**	**6.513**	**6.418**	**6.162**	**5.418**	**4.992**	**5.425**	**6.352**	**6.682**	**6.006**	
Female	1-3	292	270	310	304	270	303	314	311	411	398	406	411	**4.000**
	4-10	287	345	349	293	320	311	298	319	391	420	353	362	**4.048**
	11-18	125	109	156	118	139	100	86	94	140	162	135	126	**1.490**
	19-25	515	589	677	670	608	662	654	673	747	821	960	823	**8.399**
	26-35	5.824	5.599	6.374	6.170	5.604	5.116	5.195	4.770	5.115	5.963	6.133	5.229	**67.092**
	36-45	4.101	3.675	4.068	3.822	3.589	3.133	2.975	2.808	2.946	3.687	3.701	3.108	**41.613**
	46-55	983	923	1050	798	779	699	706	606	653	833	869	772	**9.671**
	56-65	247	228	281	246	189	170	172	168	184	208	250	209	**2.552**
	over 65	128	108	134	113	93	63	71	56	57	89	82	62	**1.056**
	Total	**12.502**	**11.846**	**13.399**	**12.534**	**11.591**	**10.557**	**10.471**	**9.805**	**10.644**	**12.581**	**12.889**	**11.102**	

Table 3 - Distribution of presentation on every month in relation to age and gender (gradient for each column from Blue – most cases, Red – fewest cases)

DISORDER/AGE (YEARS)	1-3	3-18	18-25	25-35	35-45	45-55	55-65	over 65
Preventive services	3.136	7.677	4.217	48.894	38.495	9.151	2.811	766
Endocrine, metabolic, nutritional	35	229	311	6.811	6.046	1.624	609	237
Administrative services	234	579	505	7.067	5.015	1.092	256	16
Dermatovenereological	631	1.040	654	4.914	2.769	414	97	46
Osteoarticular and rheumatological	46	199	278	3.535	3.638	1.023	341	127
Urogenital	34	291	381	3.866	2.551	541	143	98
Digestive	378	783	183	2.476	2.254	525	158	80
ENT and OMF	306	1.193	134	2.019	1.822	362	107	52
Hematological	129	207	84	1.699	1.739	334	58	39
Mental or behavioral	25	127	267	2.218	1.114	291	50	100
Neurological	11	91	109	1.554	1.194	323	73	64
Allergies	170	486	74	1.248	957	195	29	15
Fertility, Pregnancy, Postpartum	6	10	15	1.646	1249	34	4	1
Infectious and parasitic diseases	117	356	47	832	898	227	89	37
Ophthalmological	112	198	65	1.069	802	186	48	19
Cardiovascular	6	16	40	646	810	360	224	200
Others	20	137	23	397	346	71	17	10
Injuries, Trauma	36	153	30	341	217	59	23	4
Pulmonary	10	102	17	177	210	46	36	5
Breast	0	3	1	81	80	21	12	3
Cancer	0	2	0	28	72	34	40	19

Table 4 - Contingency table of cases in relation to the reason of prevention and the month in 2021 (gradient for each row from Blue – most cases, Red – fewest cases)

Table 4 presents the monthly distribution of cases in 2021, categorized by type of consultation. Notable variations are observed among different specialties. For instance, preventive services saw the highest number of consultations in March, October, and November. Consultations for digestive pathologies were most frequent in January and March, while mental health consultations peaked during the winter months.

Regarding the reasons for presentation across different age groups, preventive services represented the highest percentage overall. Excluding preventive services, dermatological pathologies were the most common for the 1-3 and 18-25-year age groups. For the 3-18 year age group, ENT and dermatological pathologies were most prevalent. In the 18-25-year age group, administrative issues were most common, while in the 25-35 year age group, administrative issues again predominated. For other age groups, endocrinological, metabolic, and nutritional issues were more frequently encountered (Table 5).

	Q1 (%)	Q2(%)	Q3(%)	Q4(%)	Q5(%)	Q6(%)	Q7(%)	Q8(%)
1	1.54	1.74	1.62	2.29	1.71	1.75	1.54	1.81
2	0.07	0.20	0.34	0.08	0.62	0.35	0.07	0.60
3	0.40	0.34	0.81	0.61	0.21	0.21	0.44	0.40
4	0.20	0.34	0.27	0.38	0.48	0.28	0.29	0.20
5	1.01	0.94	1.21	1.14	1.98	0.70	0.66	1.27
6	0.34	0.34	0.47	0.46	0.75	0.21	0.29	0.60
7	0.74	1.01	1.55	1.60	2.40	1.12	0.81	1.27
8	3.15	2.21	3.70	3.74	6.23	3.42	3.89	4.35
9	11.27	6.97	11.44	8.09	12.87	10.96	9.32	10.57
10	81.29	85.92	78.60	81.62	72.76	81.01	82.67	78.93
Total	**1491**	**1492**	**1486**	**1311**	**1461**	**1432**	**1362**	**1495**
Missing	**105**	**104**	**110**	**285**	**135**	**164**	**234**	**101**
Mean	**9.55**	**9.57**	**9.44**	**9.44**	**9.29**	**9.52**	**9.56**	**9.43**

Table 5 – Distribution and mean of answers for the satisfaction questionnaire

In October 2021, a patient satisfaction survey was distributed and completed by 1,595 individuals who had utilized the services of the Virtual Clinic. The survey comprised eight questions, each rated on a scale from 1 to 10, as outlined below.

1. How clear, accurate, and comprehensive was the information provided for accessing the service?
2. How satisfied were you with the physician's engagement and professionalism in the evaluation, diagnosis, and recommended treatment?
3. How satisfied were you with your overall experience of the consultation, including scheduling, the consultation itself, and the payment process?
4. How would you rate the value of the service you received relative to the cost paid?
5. How likely are you to recommend the services of Regina Maria Network to friends or family?
6. How would you assess the quality of the medical report received in My Account / REGINA MARIA Mobile Application within the Consultations Section?
7. How clear was the communication regarding the pricing of the medical services provided?
8. How do you evaluate the time and effort required to access the service?

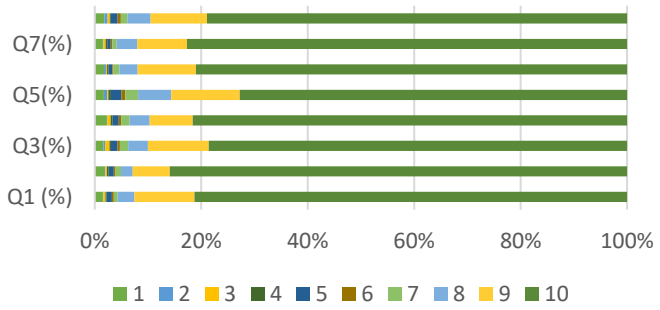

Figure 5 – Distribution of answers for the satisfaction questionnaire

Patient satisfaction was exceptionally high, with an average response score of 9.48 out of 10. The distribution of responses shows a predominant proportion of maximum scores (10), ranging from 72.76% to 85.92%. Responses with a score of 9 constituted 6.97% to 12.87%, while those with a score of 8 ranged from 2.21% to 6.23% (see Figure 5).

DISCUSSIONS

The beginning of telemedicine goes back to a surprisingly distant past. Its development is closely intertwined with technological breakthroughs and key historical events, which gradually made long distances seem smaller and thus more manageable. Such an example is the invention of the printing press in the 15th century, which allowed information of importance on the subject of public health to be disseminated to large groups of people [7]. Four centuries later, the first device used in direct medical care has been the telegraph, providing doctors with medical data on wounded soldiers during the Civil War in the USA [8]. Paired with the creation of the telephone a decade later, the use of these communication tools promptly facilitated broader access to healthcare, as well as better cooperation between physicians [7]. A clinical report published in 1879 serves as the first evidence for telemedicine, comprising of a correct pediatric diagnosis made over a phone conversation [9].

Willem Einthoven, the inventor of the electrocardiograph machine, took the telephone network development even further. Over a hundred years ago, he manager to record and transmit the electrical cardiac signals of patients between his laboratory and a hospital more than 1 kilometer away [10]. Later, the radio started being used worldwide in order to provide medical care to ship crew members while at sea. Moreover, as television grew more popular, it was used in mainstream medical education for the large public, and even in close-circuit broadcasts of particular medical procedures or surgeries, destined for physicians only [8]. One of the first examples of telehealth as we define it today is comprised of a NASA program started during the 1960s, in order to facilitate remote monitoring of astronauts' health. At first, it allowed the evaluation of their cardiopulmonary functions, as well as important parameters of the cabin environment, such as pressure, oxygen and carbon dioxide levels. Over time, the complexity of these assessments evolved in both depth and duration, bringing an important contribution to the increasingly longer space missions [11].

The actual term of 'telemedicine' was used for the first time in 1974, in a scientific paper describing a pioneering project initiated by the Massachusetts General Hospital, which consisted of a live collaboration between the Emergency Room doctors and the clinician nurses from the Logan International Airport Medical Station, 2.4 miles away. The patient population was comprised of airport employees and travelers, and the interaction was facilitated by television screens at both locations, along with audio connection by phone. The promising results showed the great potential of this type of medical care, as well as the advantages of its implementation, only to be perfected in the future [12]. Not long after this moment, the USA conducted another similar project, destined to rural populations with limited access to immediate health services. Although it was deemed a success, it faced multiple logistical challenges, pertaining to an underdeveloped framework and IT limitations [8]. More such medical models have later been tested in specific settings (faculties of medicine, psychiatry hospitals, nursing facilities, prisons, airports or isolated sites), but the technological, financial and administrative barriers led to minimal acceptance and early dismissal of these programs, as they were considered underperforming [13].

Over the years, technological advances in computing power, fiber optics engineering, satellite communication and widespread access to the Internet, along with continuously decreasing costs, all led to the development of both healthcare and telehealth [7], which covered longer distances and sustained and increased speed of information, in a ceaseless quest of digitalization.

One of the first medical specialties to adopt telemedicine has been radiology, due to its close link to technology, which supported an evidence-based, natural transition from analogue to digital, in order to improve workflow and efficiency. As this type of medical service only involves radiologists and doesn't differ significantly from their classical practice model, it has been encouraged early on by both physicians and legislators [14,15]. In 2014, in the United States, teleradiology was reported to constitute over 50% of all telehealth services performed in the country [16].

However, the widespread adoption of telehealth in specialties with direct human contact has proved more challenging. The pioneering paper published on this topic in 1974 by Murphy RL and Bird KT, centered on the anteriorly-mentioned project at the Logan International Airport Medical Station, still relied heavily on clinician nurses to take history, perform a clinical examination and treat the simpler cases. Over half of the complaints brought to physicians through the telemedicine system consisted of orthopedic problems, such as pain of the extremities, sprains, contusions, back pain, as well as general check-ups. The relative frequency of these afflictions mimicked their frequency in the hospital and in an outpatient clinic. In order to assess the validity of the telediagnosis, the patients were later

transferred to Massachusetts General Hospital and examined again by a different doctor, with overwhelmingly similar conclusions, which underlined the validity of this healthcare model. At the same time, black and white images of skin lesions, eye disorders and pathology slides have also been interpreted, with satisfactory results [12].

Over the last 30 years, the feasibility of telehealth increased exponentially, becoming an important addition to everyday medical practice and branching into multiple frameworks, comprised of remote consultations and monitoring, specialty care, medical education, with many cost-efficient and evidence-based applications [13]. Some of the most suitable specialties or even subspecialties to this kind of practice are outpatient-based, such as psychiatry, oncology, cardiology, pulmonology, diabetes, rheumatology, orthopedics, dermatology, ophthalmology and infectious diseases [2]. Another well-established service is telestroke, facilitating the identification of the window of pharmacological treatment for acute ischemic stroke, in order to prevent permanent neurological sequelae [2,17]. On the other hand, the specialties which use telemedicine the most in order to connect to other health providers are emergency medicine, pathology and radiology [16]. Several comprehensive reviews of telemedicine papers underline that the overwhelming evidence from rigorous studies points towards the fact that telemedicine brings positive, medically beneficial and cost-effective results over time, with improvements in chronic disease control, diet, physical shape, pain management, mental health, as well as reduced mortality, hospitalization and exacerbations, lessening the burden on emergency departments and inpatient wards. However, it is important to take note of the mixed conclusions and special considerations, as telehealth might not be suitable for all sorts of disorders or patient populations [18-20].

As of 2016, 76% of hospitals in the United States were employing telemedicine services in order to connect with patients, but only 15% of the practicing physicians were actively involved [16][21]. Developing countries, however, face much greater challenges in implementing digital medical systems, but still register continuous progress, in order to facilitate access to isolated areas, to attract specialists, and to bring healthcare to a higher number of people [22]. In pre-pandemic Romania, a single paper published in 2004 highlighted several pilot studies and future projects on the subject of medical digitalization, but, at the time, there didn't exist any established telemedicine networks yet, nor the necessary infrastructure [23]. Today, almost two decades later, the social and economic reality paint a different picture, with a modern healthcare system, held at international standards, with notable advancements such as the telemedicine system described in the present study.

As stated above, the COVID-19 pandemic served as a fuel to the growth of telehealth. Due to lockdowns and social distancing measures, which were imposed for epidemiological reasons in most countries over the globe, the technological infrastructure has been growing accelerated not only in medicine, but across most fields. This new world context generated a quick adoption of remote solutions, either as a smooth, quick transition or as a forced process of expansion of the existing digital framework, in order to allow human interactions to continue with as little social and economic consequences as possible [24].

However, an unfortunate consequence of these imposed quarantines was the abrupt reduction in access to otherwise routine healthcare services for the non-COVID, non-emergency patients. The affected populations included people suffering from various chronic disorders which normally require periodic appointments, with the biggest impact among oncology patients [25]. A comprehensive review of the matter in the US found a reduction of 37% in overall medical services, the greatest disruptions being registered among patients with less severe conditions [26]. Another study cited a decline as high as 70% regarding ambulatory visits, specifically in the first month of the pandemic [27]. The greatest decline has been seen in ophthalmology, ENT and dermatology (specialties with an important outpatient, non-emergent, and elective component), while the smallest decline has been reported in behavioral health (possibly because history-taking and discussion-based therapies are easier to transfer in a telemedicine system), followed by rheumatology, endocrinology, obstetrics and gynecology, or oncology (presumably as they require to constantly monitor and evaluate the patient). Interestingly, a high decline has been seen in pneumology consults, which might be explained by the fact early in the pandemic respiratory concerns were automatically attributed to COVID-19 until proven otherwise, and were thus directed to hospitals [28].

On the other hand, this sudden decline of in-patient ambulatory visits must be assessed in the context of decreasing the exposure of vulnerable patients to the potentially-contaminated medical environment, thus decreasing their risk of COVID-

19, which was of utmost importance especially for the immunosuppressed [29]. The appropriate solution to this dilemma has been a widespread adoption of telehealth [30], and this is supported by the fact that telemedicine consults were most in-demand at the same time when Emergency Room visits reached their lowest numbers [31].

In developed countries, the transition to telehealth has been smooth. For instance, in April 2020, slightly more than one month into the pandemic, there were over 50 such programs active in the USA, along with outsourcing solutions already available to the clinics which lacked this kind of teleservices [32]. In contrast, in Europe there was a high grade of variation among countries, with some of them (e.g., France) already having a functioning telehealth system in place, while others (e.g., Italy, Spain) lacked the necessary framework and were too overwhelmed by a surge of COVID-19 cases in order to focus properly on this aspect, at the beginning of the pandemic [33]. In contrast, back in Romania, Regina Maria Network has been one of the pioneers of telehealth, as it managed to implement a working system within the first 10 days of the first month of the pandemic. This came as a direct result of governmental regulation under the State of Emergency situation imposed by the epidemiological conditions, which allowed such services to materialize in our country, in order to facilitate access to healthcare during the lockdown [6]. Fortunately, the existing digital infrastructure in the Regina Maria Network, consisting both of hardware and software, such as an Electronic Medical Record System and purchased license to Microsoft Teams, as well as an established call-center, were already in place, and only needed official regulations before launching. However, the great discrepancies in European legislation regarding telehealth make it impossible to convey a pan-European framework or to implement an intra-European outsourcing system, at least for now [33].

Our study showed an abrupt rise of telemedicine consultation in March 2020, followed by a slight decrease and then a plateau in April 2020. This is very similar to other findings in literature, and it has been an explained as a direct effect of the sudden lockdowns, and then, over several weeks, by the resuming of in-person visits to some capacity [28]. As the pandemic progressed, there was a better understanding of the disease process and transmission, which allowed office consults to slowly begin again and to match the previous year's statistics by July 2020[27].

After the plateau period in the USA, telemedicine consultations steadily dropped until October 2020, and started to rise again in the cold months[34]. On the other hand, our study showed that the lowest point has been in August 2020 (possibly correlated with vacation), and then continuously increased over the course of the year (possibly related to different timelines of the spreading of COVID-19 strains).

An interesting observation is that the majority of telehealth appointments in the USA (approximately 30% to 50% in various reports) have been related to behavioral health [31,34], whereas, back in Romania, psychology consults accounted for only 4.25% of the total visits, which might be a consequence of major discrepancies in mental health awareness and stigma, as well as financial factors. In our study, the specialty with the most tele-consultations has been occupational health, underlining a significant difference in administration procedures and bureaucracy.

In regards to patient population, literature shows that age, gender, race, language, income, medical insurance and medical history bear great influence over the use of telemedicine, and it has been shown that younger, white, female patients are more likely to make the transition [35-36]. This is also the case for wealthier and healthier people [36], which might be explained by the fact that sicker patients are more likely to prefer or to need in-person consultations, to go to the Emergency Room or to be hospitalised. We observed the same patterns in our study: the number of female patients is approximately double of that of men, the 26-45 age group is the most open to participate in telehealth, while patients over 65 years old are most reluctant, possibly due to difficulty in the use of modern technology, lack of social support, or disability [2]. For instance, older people are shown to significantly prefer telephone consults over video consults [36]. Regarding disparity of care, literature findings are actually conflicting, with some studies showing that telemedicine helps to alleviate inequality by broadening access to health services, while others underlined those disparities kept increasing in certain communities [2]. It is important to take note of this aspect, in order to find the best ways to reach as many people as possible and to offer them high-quality, personalized care.

Patient satisfaction has been assessed from the beginning of telemedicine practice. Even back in 1974, the general consensus has been that the outcomes are satisfactory, with adequate care and similar experiences to in-person consultations [12]. More recent surveys showed that the sentiment remains the same, and that patients considered

telemedicine necessary during the pandemic [5], which is similar to our findings. Notably, the highest appraisals were that of doctor's involvement and professionalism in the evaluation, diagnosis and recommended treatment. A study of patient trust in telemedicine highlighted a similar idea, that the determining factor to trust a physician is his/her competence, while the determining factor to trust a medical center is its reputation. As far as the interface in concerned, a secure HTTPS connection, a familiar logo and personalized login details (e.g., name/e-mail instead of automatically-generated codes) were preferred. On the other hand, disclaimers and a perceived lack of control over personal data were concerning [37].

Interestingly, an infodemiology study of the language and attitudes regarding COVID-19 on Twitter showed that the majority of tweets about telemedicine have been positive, while the majority of tweets about the pandemic have been negative [38]. Another internet-based study on telehealth acceptance underlined four main reasons for the use of this service: the belief that it can be full substitute for an outpatient, physical consult; the comfort and perceived easiness to operate common technology devices and software; time and comfort considerations; previous examples of successful appointments for family and friends [39]. It is worth mentioning that multiple patient surveys showed that the majority of patient would recommend telemedicine services to other persons, including our study [5].

As far as physicians are concerned, the majority of them are satisfied with telemedicine services [5,40], and almost 90% are willing to incorporate them into their practice, especially if training is offered[40]. In a US survey, doctors declared that the use of telemedicine has accounted for less than 4% of their time before the pandemic, over 45% during the pandemic, and is predicted to be 25% after the pandemic [41]. The most cited reasons for the willingness to embrace telemedicine are not personal, but rather connected to the increased level of comfort for the patient, the better redistribution of resources, as well as the improved quality of care [40]. The actual adoption of telehealth was associated with seniority, supportive policies from the medical centers, expectations of an increase in appointment numbers [41].

Despite of many advantages, using medical information over open network involves also a lot of challenges regarding security, confidentiality and GDPR restrictions. In this connection, RM has established several mandatory rules strictly respected:

- Each patient must consent to GDPR rules before the meeting;
- The connection is encrypted using latest security standards;
- Software used for connection (Microsoft Teams) is GDPR compliant and the connection is encrypted using the latest security standards;
- The meeting is not recorded;
- All the files uploaded by the patient are stored using highest medical standards and the access to all information is restricted and monitored.

CONCLUSIONS

The telemedicine model used by the Regina Maria Private Network proved to be effective at a time when the medical system was going through a very difficult period. Patients' satisfaction and the continued high level of appointments lead us to say that telemedicine services must be further developed and used. This process will take much time and many resources, it promises to leave us more prepared in fighting future crises.

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