TELEMEDICINE

WHAT ARE THE NEW CHALLENGES?

OCCAM-
OBSERVATORY ON
DIGITAL
COMMUNICATION

AFFILIATED TO THE UNITED NATIONS

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How can an internationally stable health system be achieved?

The pandemic has made undoubtedly clear the necessity of collaborations between several institutions at an international and supranational levels so to solve the biggest challenges of today. In particular, Covid-19 has accentuated not only the need for more investments and adequate health systems, but also, and more importantly, the increasingly urgent request to provide medical support at distance. It is in this context that telemedicine has become essential for the correct functioning of a frail and deficient system. Made possible by information and communication technologies (ICTs) applied to the medical sector, telemedicine is bound to be the next best practice facilitating our lives and without which we won't live without.
It is of common knowledge how digital tools such as telephones, computers, stable internet connections and specialized equipment can revolutionize not only the way we communicate, but also the transfer of knowledge and practices guaranteeing widespread accessibility to public health. Telemedicine and all its technologies have great potentials for optimizing the health system at the national and international level, making use of equipment allowing doctors and nursing teams to interact with remote colleagues and patients. As a result, updates and information, discoveries and innovations are much more easily exchanged and discussed so to break those geographical barriers that would deprive many disadvantaged areas of health care as well.

"Telemedicine creates a university without borders that fosters academic growth and independence because the local participating surgeons have direct access to experts in the developed world." (WHO)

Due to the COVID-19 Pandemic and the ever-increasing needs, the health care industry has adapted relatively quickly, adopting tools that were already existing on the market but in many cases snubbed in favour of more traditional ones. Fortunately, things are changing. According to the Centres for Disease Control and Prevention (CDC), in July 2021 telehealth utilization has stabilized at 38 times higher than pre-pandemic levels. Moreover, the market is expected to rise to over $397 billion USD by 2027 and 76% of patients said they would be interested in using telehealth in the future.
Despite its numerous advantages brought by the development telemedicine and its enormous spread, many obstacles still persist. Among others, access, equity, quality, and cost-effectiveness, which are problems that both developed and developing countries share. Furthermore, there are still many specialists who do not have the right knowledge to manage these tools. In addition, in more conservative countries, this practice is still considered too remote and difficult to apply resulting in an evident preference towards traditional or natural remedies, which in many cases are also outdated.

As Observatory on Digital Communication affiliated with the Economic and Social Council of the United Nations, OCCAM is actively working in this field by collaborating with the International Institute of Telemedicine, by participating to Conferences and Think Thank initiatives and by realizing projects like the ICT Villages and eMedMed Project. Every year, OCCAM discusses the progresses achieved by inviting experts to attend the Infopoverty World Conference, whose results always outline the urgency to further develop telemedicine tools and best practices.

"Actually, when we look at the SDG goals, they are all, either directly or indirectly, related to health and to the need of achieving universal health coverage. So, equity in health is a significant key for including diverse population and achieving global inclusiveness in digital equity. No one should be left behind".

The future prospects of telemedicine are ambitious and give hope to overcome the access gap that several countries are still experiencing. Despite its rapid growth, there are still improvements to be made to guarantee stability, accessibility, and affordability, including the provision of professional

training of those involved and the need of investments required to carry out these treatments, which still remains very high.

What is Telemedicine?

Telemedicine refers to the provision of remote clinical services, via real-time two-way communication between the patient and the healthcare provider, using electronic audio and visual means. It is the distribution of health-related services and information via electronic information and telecommunication technologies. The most positive aspect of telemedicine is that it shortens the distances between experts and patients as well as of clinician contact, care, advice, reminders, education, intervention, monitoring, and remote admissions.
Telemedicine is sometimes used as a synonym or in a narrower sense to describe remote clinical services, such as diagnostics and follow-up. When rural settings, lack of transport, conditions due to outbreaks, epidemics or pandemics, decreased funding, or a lack of staff restrict access to care, telehealth may bridge the gap as well as provide distance learning; online information, health data management, and integrating the health system. On the other hand, Telehealth could include other practices such as a robotic surgery through remote access, physical therapy via digital monitoring instruments, videophone interpretation during a consult and similar practices. It is sometimes considered to be interchangeable with telemedicine, the latter being more common than the former. However, the Health Resources and Services Administration distinguishes telehealth from telemedicine in its scope, defining telemedicine only as describing remote clinical services, such as diagnosis and monitoring, while considering telehealth as including preventative, promotive, and curative care delivery.

The new frontier of Medicine

In the past century, doctors and nurses have introduced a new dimension of medicine: one that does not know space and distances, thanks to the aid of new technological devices. As we already defined, Telemedicine is a new way to deliver care at distance and its improvement would benefit patients and doctors.

In the broad spectrum of telemedicine, there are both positive and negative factors. For what concerns the territory of the Lombardy region, considering the diminishing numbers of family doctors and the increasing number of assisted people who can benefit from public health care as well as how the COVID-19 pandemic led to a decreasing tendency to physically go to a medical office, preferring remote services or telephone calls to request the supply of recipes, expanding the Telemedicine sector and disseminating its knowledge is of crucial importance as it would enhance home health services thus reaching a wider portion of society. For instance, developing countries do not have the basic technologies to promote telematic medical examinations. Their national income cannot cover the costs of providing a rapid and efficient service to citizens. It is precisely the economic and cost issue that worries national governments and poses obstacles to the standardization of telemedicine. In Italy alone, the cost of expanding the telemedical service would amount to over 100 billion €, a cost that can be much higher for countries without a starting technological and cognitive base. However, is such cost the real obstacle preventing countries to move forward?

Different experts hold that adopting the latest telemedicine initiatives can help achieve numerous benefits, that include: lowering the overall healthcare costs, driving up efficiency and revenue, providing your patients with better access to healthcare services, and ultimately getting happier, healthier patients who have a facilitated access to their medical report. Moreover, a Cisco global survey showed that 74% of patients prefer easy access to healthcare services over in-person interactions with providers. Such data highlight how people are willing to take advantage of the telemedicine service, which would promote economic growth and repay the initial investment. In today’s healthcare world, convenience is key, it being one of the advantages of telemedicine.

Furthermore, Telemedicine also reduces unnecessary non-urgent ER visits and eliminates transportation expenses for regular check-ups.

Beyond these general cost-savings, telehealth can help boost revenue by turning on-call hours into billable time, attracting new patients, reducing no-shows, and even reducing overhead for physicians who decide to switch to a flexible work-from-home model for part of the week. Not only do virtual visits reassure patients that their providers are available and involved in their care, but it also makes it much easier for them to reach out with questions, report early warning signs, and make a follow-up appointment to make sure they are on track.

Thankfully, there are several institutions and non-profit organizations, such as OCCAM – Observatory on Digital Communication, that work hard to spread the knowledge of telemedicine, proposing new technologies and strategies, to allow a greater part of the international society to take advantage of this service and improve their social health system. OCCAM itself has proposed, and continues to work on, several projects as the eMedMed Project, the ICT Village Project, the Smart-box project, the e-Services, and e-Learning programmes, which can help bring individuals closer to technology.

The eMedMed Project

The eMedMed Project was born in the wake of the creation of the Mediterranean Platform of e-Services, validated by the UN during the ECOSOC Ministerial Review. It was presented during the First Economic Forum of the Western Mediterranean in 2013 by the Italian vice-minister of the Foreign Affairs Lapo Pistelli to the Union for the Mediterranean General Secretary Sijilmassi.
During the XXI Euromediterranean Conference held in Catania in February 2016 an agreement was signed by the Mayor of Catania Enzo Bianco and the President of OCCAM, in order to create in Catania the “Hub Centre of Catania for Health security, migrant’s emergency and supportive development in the Mediterranean area” to monitor the health security in the Mediterranean Area.
EMedMed was then validated at the XVI Infopoverty World Conference held at UNHQ in New York in April 2016. The main focus of the eMedMed Project is to improve the health conditions of the Southern Mediterranean Countries thanks to the new technologies of Telemedicine
It aims at providing e-services through an innovative platform system that links main, local, and peripheral hubs, overcoming a large amount of healthcare problems, such as malnutrition, obesity, and the chronic diseases brought on by sedentary lifestyles and tobacco smoking. Moreover, the project is specifically devoted to face the health security challenges that the migrant emergency might provoke.
Fully aware of the fact that the potential of digital services in the field of education and healthcare is still largely unexploited and that it would be a fundamental catalyst in the economic and social development of the Southern Mediterranean shore, the eMedMed project will use Information and Communication Technologies (ICTs) to solve healthcare gaps afflicting these countries.
The area of intervention of the eMedMed project is the Southern Mediterranean shore. In particular, it will be implemented in Egypt, Libya, Morocco, and Tunisia. The main tasks are:

- Boosting the capacity of national health-care systems to make health services accessible to the population at large with the use of telemedicine;
- Increasing medical and paramedical professionalism and performance through continuous e-training;
- Giving remote assistance in the delivery of health-care;
- Integrating knowledge in the region via the e-Services Mediterranean Platform, linking service users and service providers, as the Italian hospitals and centres of excellence;
- Giving assistance during the migrants landing on the Mediterranean shores.

The eMedMed Project will address four tiers of beneficiaries:

- The first is the tier of medical institutions involved at the country level that will benefit from professional advancement of staff, upgrading of existing technology, and enhancement of services quality and accessibility.
- The second is the tier of assisted population, with an emphasis on patients located in remote communities or communities with scarce presence of healthcare structures and services.
- The third is the tier of national health systems where the capacity installed is meant to be replicated at a larger scale.
- The fourth is the regional tier where a platform for sector integration will be launched.

The program has been developed by OCCAM in partnership with IITM, the International Institute of Tele-Medicine, an independent scientific and technological structure involved in research, development and transfer of ICT projects and initiatives in medicine and healthcare.
In the framework of the eMedMed project, the XXI Euro-Mediterranean Conference launched a Mediterranean Master of Telemedicine, together with the universities of the Mediterranean Basin, in order to homogeneously train the medical and paramedic staff, whose preliminary study will be assigned to the professors Hassan Ghazal (University of Rabat), Francesco Basile (University of Catania), and Francesco Sicurello (University of Milano Bicocca).

The ICT Project

Since its establishment, OCCAM has been working on pilot applications of new technologies for social, economic, and cultural development with the main objective of fighting poverty.
At the end of the first phase of the World Summit on the Information Society (WSIS), organized in Geneva in December 2003, one of the main expected objectives was to provide connectivity and services for development to all poor communities of the world by 2015 and in order to achieve this goal, OCCAM convened the Infopoverty Seminar, which took place on June 24, 2004 in Hammamet (Tunisia) to begin a consultation process among the main stakeholders of ICT4D and prepare the Tunis phase of the WSIS scheduled for November 2005.
The Advisory Board, created in Hammamet, including representatives of international organizations (ESA, FAO, IFRC, ITU, UNDP, UNESCO and World Bank), private corporations, universities, development research institutions and civil society organizations, closely collaborated with the partners of the Infopoverty Program and with the participants of the 5th Infopoverty World Conference that convened in May 2005 at the UN Headquarters in New York.
Five sectors of intervention were identified retaining high priority in the fight against poverty through the ICTs:

1. Telemedicine: to provide medical services through ICT where distance constitutes a critical factor, for professionals;
2. E-learning: to promote remote teaching, making it interactive not only for the primary and secondary schools, but also for continuing education;
3. E-agriculture to promote food security;
4. Job creation in the field of communication to support traditional crafts;
5. E-governance: to enhance services related to the public administration.

The modeling work was presented during the World Summit on the Information Society organized by the United Nations in Tunis in November 2005. Due to the commitment with the Advisory Board and with the local authorities, OCCAM realized the first demo within the community of Borj Touil in Tunisia, leading to the opening of a new Centre of Community Access, the School, and the Health-Centre. Each one of these sites was provided with appropriate technologies based on people's needs and the ICT village model was certified at the UN level and was recognized as an efficient device in the battle against poverty with the help of communication technologies.
However, notwithstanding its efficiency, the project launched in Tunisia needed to be improved, especially under an organizational and structural perspective. In particular, although its great accomplishments, the structure of the response by the national entity lacked an easy and systematic approach. In this context, OCCAM communicated with difficulties with the local entities, especially

with the government. Indeed, there was no designated representative granted with decision-making 'powers' nor there was a wide communication channel within the government. Basically, what lacked in Borj Touil was a structured mechanism of governance.
Following the complications experienced in Tunisia, the replication of the ICT Village included a system of e-governance, which entailed a hierarchical structure from the highest rank of the government to the lower sectors which could face the challenges of the project, granted with the power of taking decisions, certificate and sign documents and so on. This is what has been implemented in the ICT Village of Sambaina.

The ICT Village of Sambaina

The ICT Village is an integrated model designated with the support of the most important international organizations (including FAO, IFA, UNDESA, UNDP, UNESCO, the World Bank) that are part of the Advisory Board to the project).
The government of Madagascar requested as soon as possible that the ICT project could be applied in its country too. After an attentive analysis and meetings with the local authorities and the audience given by Excellency Marc Ravalomanana, President of the Republic of Madagascar, in December 2005, Sambaina was selected.
The rural municipality of Sambaina is 40 km from the capital Antananarivo of Madagascar. It is accessible by a RN7 paved road going to the port city of Toamasina. It has a surface area of 33 square km with 15 Fokontany (district or administrative subdivision) and each of these is composed of hamlets for a total of 70. The population is about 10.000 people, mostly farmers.
Thanks also to the active participation of all the population, the buildings of the village (primary school, health presidium and access center) were restructured. In particular:

- A national satellite broadband connection implemented by EUTELSTAT was provided
- 55 computers were initially provided in different locations:
    - Mairie (Town Hall office): 8 computers
    - Hospitals: 3 computers
    - Middle school: 4 computers
    - Elementary school: 2 computers
    - Access centers open to the population: 38 computers
    - A digital room within the school system was provided. It has seen thousands of students who all learnt several digital techniques guided by experts.
- The hospital was renewed. On the matter, digital services related to pregnancy were improved. 3 doctors sent by "Win Focus" prepared and lectured medical students.
- Services related to e-governance were established.

Specifically, the village's dispensary, connected to national and regional hospitals utilizing public air-band width free of charge, implemented the maternal unit with the use of new e-ultrasound tools by local midwives, thus decreasing the mortality range by 82%. The local school, which was then supplied with 40 computers, professionalized 320 pupils toward new jobs exploiting local rural and craft resources. The municipal seat opened to internet community access so that the entire population had the possibility of learning how to access information useful to improve their activities, as well as facilitating governance with e-documentation. Specialized assistance on matters of the harvesting of rice, cattle ranching, pest-control and water and food security was furnished to local farmers as well as 85 doctors specialized in clinical imaging at the National University, able to assist a large part of the population with the new mobile x-devices, distributed in various other villages. At its launch in 2007, a high-level UN delegation led by Jeffrey Sachs proclaimed the ICT Village of Sambaina as UN Millennium Village. It became the model for further projects and was planned to be cloned all over the Malagasy territory.
Furthermore, after an initial intervention and provision of goods and instruments in the 00s (telemedicine and other services), followed by an interruption caused by a political crisis, in 2019 OCCAM has been asked by the local communities to relaunch and upgrade the project. Despite the difficulties, OCCAM is proud to announce the relaunch of this Millennium Village thanks to the support of STMicroelectronic Foundation, Telma Foundation, and the courage of its smart

inhabitants and local institutions. The priorities set and developed by this renewed intervention are two: the relaunch of e-education and the development of a system of food security and e-agriculture. Five major results were achieved during the recent past years. First and foremost, the signature of *« Protocole d'accord relatif au programme informatique pour tous »,* with Telma Foundation, STMicroelectronics Foundation (Suisse), the Collège d'Enseignemnt General de Sambaina and OCCAM in January 2019. Moreover, the provision by Telma of equipment for Internet connection and the purchase and diffusion by STMicroelectronics and Telma of digital intruments and devices. Contacts with potential partners in Madagascar have been created and hopefully will be exploited. Finally, a space devoted to the new devices at CEG in Sambaina was established, so that the entire population of the village would benefit from it.

OCCAM, now more than ever, is on the front line to provide the best technologies and tools to achieve what it calls "e-welfare for all" so that Sambaina can continue to be the example to follow in this field.

Telemedicine For African Rural Villages: The Smart Box Project

The recent data show that the African population amounts at 1.216.000.000 inhabitants; among them, approximately 430 million live in extreme poverty conditions (less that $2 a day). African rural villages and their residents need help to satisfy the fundamental needs for living such as energy sources, clean water, sanitary assistance, sewage treatment and food safety.
OCCAM defined a new range of tools which can be easily accessed and used by the people, no matter the level of education or competences, so to transfer skills and e-service to anyone for any specific need. During the 2018 Infopoverty World Conference the initiative was discussed, and eventually validated at the 2019 Conference, establishing itself as of great interest towards countries, institutions, and procurements alike. As such, after 20 years of experimentation in Africa and Latin American in the context of the Infopoverty Program at the UN, OCCAM has been able to complete the process of definition of the Smart Box model.
Telemedicine has been integral part of this initiative, in order to grant a basic health remote service to people whose general conditions of living are extremely problematic.

The Smart Box Tools

The Smart Box project is an innovative solution presented by OCCAM at the Infopoverty World Conferences held in New York the past years. In particular, the project attains the creation of a Smart Box, some sort of portmanteau that contains the most advanced ICT and technical solutions. One important feature is that the Smart Box is connected to the Infopoverty Global Platform in order to share the appropriate information allowing the provision of adequate services at the right time to satisfy the actual necessities of the interested communities. Namely, the Smart Box includes:

- a Solar Panel Kit
- Solar Street Lights with built-in Wi-Fi Repeater
- Drinking water tool and Solar Pump
- a Satellite Receiver for Internet Connection
- a Sewage Treatment Kit
- an Untreated Water tool
- Computer and Devices
- Portable food security kit
- Portable Telemedicine Kit

This range of tools offers the possibility of generating a real e-Welfare that can be practically used by African governments to improve the life conditions of their populations.

Portable Telemedicine Kit

One tool included in the Smart Box model is a Portable Telemedicine Kit. Considering the key role of new digital technologies in developing disadvantaged communities, this kit enables the creation of a direct communication between competent medical staff and potential patients. It allows health care professionals to evaluate, diagnose and treat patients in remote locations using telecommunications technology. It basically allows patients in remote locations to access medical expertise quickly, efficiently and without travel. Telemedicine also reduces isolation that clinicians can experience in small medical facilities in distant locations. An effective portable telemedicine kit costs around $10.000, one including a V-scan and another fundamental component which is the mini-fridge. This last tool is necessary to contain vaccines that need to be preserved at a certain temperature.

Such a various set of tools justifies the increasing need and necessity of investments. Private entities, United Nations, companies, philanthropists, and NGOs are all possible investors of the Smart Box project. As a matter of fact, through the accumulation of revenues or through the generation of positive externalities, all the actors interested in the Smart Box investment could reasonably foresee a potential profit.