Telemedicine: The Future of Humanitarian Health Sector

Chiara Lodi[*]

London School of Hygiene and Tropical Medicine – Diploma in tropical Nursing, University of West England Emergency nurse practitioner, LEAP master. via Latemar 3, 41012, Carpi, Modena, Italy.
Medical Team Leader MSF (Doctors Without Borders - MSF), International nurse EMERGENCY NGO, Nurse Emergency Medical Unit and Medical Triage medical unit, U.K.

[*]**Corresponding Author:** Chiara Lodi, Medical Team Leader MSF (Doctors Without Borders - MSF), International nurse EMERGENCY NGO, Nurse Emergency Medical Unit and Medical Triage medical unit, U.K.

Introduction

During the last three decades innovation in technology and medical care across borders had led to the current understanding that exponential adopting of new technologies in low- or middle-income countries can improve, if not solve, long standing health humanitarian problems.

Over a century of health newness and significant innovations in connectivity and devices set the groundwork/base for the modern telemedicine [1,2].

The last 30 years are marked by a significant increasing in complexity and scale of the humanitarian aid due to the rising in number of disasters and emergencies worldwide and the more and more frequent request of supporting local authorities [3].

As health humanitarian organisations have been constantly growing, they had the need to innovate the way of working.

In this humanitarian and technological landscape telemedicine laid its foundations and endless application in the present and future humanitarian healthcare.

With this essay the author will briefly explore the origin of telemedicine, explain the current practice and project future application considering advantages and challenges with the focus in humanitarian operations in low or middle/income settings.

What is telemedicine?

Important definition for this essay is the one of "telemedicine across borders" by [2] "telemedicine across borders is the delivery of health care services at a distance, involving at least two countries, using information and communication technologies. This includes two groups of applications, those linking a patient with a health professional, such as home telemonitoring for chronic disease management, and applications linking two health professionals, such as teleradiology."

This essay will focus on cross borders telemedicine as, from the author experience, its applications could drastically change the way international organisations provide healthcare in low- or middle-income countries.

Story of Evolution of Telemedicine

During the last two centuries technologies evolved from the telegrapher to the smartphone, and connectivity has evolved from the morse code to the internet and cellular networks [2].

Milestone of telemedicine are the use of television to facilitate consultation between physicians and the worldwide spreading of ICT and internet connection. This created new possibilities for healthcare services and delivery starting from the developed countries and, in the last 10 years, even in low-middle income countries [4].

The Covid-19 crises accelerated the adoption of telemedicine driven by the need of increasing and quicken communication between specialists and the need to be able to monitor patients form home or, in the hospitals, to reduce the exposure time of healthcare professionals [5].

Telemedicine has always been evolving in parallel with the advance of technologies and connectivity.

Application and Advantages of Telemedicine in low- and middle-income countries

Applications and advantages of telemedicine depend on the context and it is not the same in all low- or mild-income countries but it can change based on population, education, geographical barriers, infrastructures, health facilities, security, weather, etc.

The majority of telemedicine services focus on diagnosis, treatment and monitoring of patients but the way of implementation and application needs to be tailored based on the country.

Potentially telemedicine can profoundly transform the delivery and the quality of health services in countries where the level of the health workers is poor, access to care is difficult, poverty is an issue, distances are huge and the facilities are low in number or inadequate.

Reducing Referrals

Telemedicine has been used in situations where the health workers on duty has little or no access to specialists: telemedicine was able to offer remote physician access to otherwise unavailable specialist opinions and providing comfort to doctors and patients [6].

In Somalia, Cambodia and Balkans, telemedicine programmes have been shown to reduce, directly and indirectly, the need for patients transfer through remote care and diagnosis via telemedicine [7-9]

In less-economical developed countries patients and the health care system benefit from this reducing the need for patients' transport.

Direct link with Specialist

According to [8] with telemedicine, healthcare providers have the possibility to link with specialists, referral hospitals and tertiary care centres also around the world.

This study highlighted that if practitioners in low-resources countries has the possibility to access directly to specialistic advise, they can provide additional educational value to the field physicians, but also further benefits to other patients.

Complex Medical Case Diagnosis

One of the biggest challenges of the medical staff in low-resource settings is to diagnose complex medical cases and treat patients without the ability to directly consult with specialists.

To overcome this challenge, in 2010 MSF developed a multilingual telemedicine network to give field staff direct access to specialist advice. This program was web - based messages system.

There were three categories of users:

1. referees, who were MSF health workers that had access to telemedicine services;

2. specialists, a network of health professionals known as MSF headquarters advisors;

3. coordinators, who were active clinicians with MSF field experience.

According to the study done by MSF in 2021 "By offering direct specialist access in low-resource settings patient management is improved and there is additional long-term educational value for field physicians."

Impact on Quality of Care

According to [8] and [7] the impact of telemedicine in quality of care is indisputable.

The initial management the case by clinicians in the field was compared with the final management by the specialist after telemedicine consultation.

This comparison showed that significant modifications to initial case management were done including recognitions of life-threatening conditions 'missed' at the beginning that could have bring the death of the patient. [7] stated "showing that telemedicine significantly improves quality of care, enhances the clinical capacity of distant clinicians, and is of high added value to clinicians.".

Data Collection and Statistical Analysis

This is not a centralised system; each organisation or countries use different data storage but all of them ensured that patient information transferred by camera to the laptop are encrypted for data transfer security.

With this amount of data, it will be much easier and fast to make statistics, provisions of a specific disease and identify a trend. (WHO 2019)

Reduce Distances

As telemedicine can provide remote examination devices as camera and microphone, this can promote live video conference but also pre-recorded conference that could be lately shared.

In addition, telemedicine can support communities in remote or rural areas with few health services and staff as it reduces distance and time barriers between health workers and patients [10].

Educational Benefits

In low-middle income countries, local doctors had limited access to practical education in medical and surgical specialties during their training and are also low in number graduated each year. (WHO 2019)

Sometimes, in the field, they improvise due to the lack of resources and knowledge. By providing answers to difficult clinical questions, the system reduces field clinician resignation and improvised manoeuvres [11].

As [12] asserted, "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."

Prevent Clinicians to Escape from Rural Areas

Another potential of telemedicine is to motivate rural practitioners to remain in rural practice through augmentation of professional support and opportunities for continuing professional development [13].

Furthermore, opening new channels for communication through telemedicine can connects rural and remote sites with health-care professionals around the world, overcoming reversing the 'brain drain' of those clinician's isolated in remote part of the globe [14,15].

Cost-Effectiveness

Telemedicine holds great potential for reducing the cost-effectiveness by enhancing access to quality and efficient specialists.

In particular, telemedicine can help remote and "forgotten" communities with few on no health structures and healthcare providers, to have an easy and access point t to healthcare.

In [16] Stated "telemedicine can bring socioeconomic benefit to patients, families, health practitioners and the health system"

Challenges, Limitations and Possible Solutions in Low-Mild Resources Settings

Certainly, telemedicine has great potential for improving clinical management and delivery of health care services worldwide by enhancing access, quality, efficiency, and cost-effectiveness [10, 8].

IT Barriers

Telemedicine is based on telecommunication, the internet connections, and IT devices.

Barriers included:

    - slow Internet bandwidth is challenging in many remote areas where organisations operate, and is often affected by service interruptions such as power outages or irregular connection.

    - equipment breakdowns and not skilled staff in the field to be able to repair it,

    - lack of maintenance support in rural hospitals, IT specialists, and medical engineers;

MSF in the research published in 2018 by [17] stated that "a store-and-forward system was partly made to address these issues of slow internet connection." Furthermore, "real time communication is not only expensive but more vulnerable to technical problems and less flexible for physicians with busy schedules. As a result, store-and-forward systems appear to be more

appropriate than real time systems in resource-limited settings, although both approaches can be combined."

Operational Barrier

Another contributing problem is the high turnover of the field users able to train local staff but also the high turnover of the international staff that have the objective to both use and monitor it.

Coordination Barrer

In order to overcome all telemedicine challenges, coordination must be in place in all levels.

Coordination needs to define standards, guideline and protocols, which are applied widely, ideally worldwide.

As public and private sectors will engage in close collaboration, they need to ensure that telemedicine will be deployed intelligently to maximize health services and optimal quality but do no deprive citizens access to fundamental public health services [17].

Cultural Barrer

The use of telemedicine represents a change for healthcare workers but also for patients and families.

For healthcare professionals the huge change is in the clinical process and requires the development of trust between health professionals in numerous countries.

Furthermore, some of the clinicians can be reluctant to change practice patterns and use new technologies. (WHO 2019)

For patients and caretakers, the huge challenge is to adopt models of care different from traditional approaches or practices.

Moreover, the lack of ICT literacy to use telemedicine and to understand it. can lead to misunderstandings and cultural fights.

Lastly linguistic differences between patients and health providers but also patient and patients dramatically increase mistrust and misunderstandings [17].

Another strong cultural element to which telemedicine has to fight against is the "in-person visits."

Historically, in-person exchanges can establish the bond of trust and teamwork between patient and the healthcare provider.

It is understandable that cutting this bound it is a long long step for old generations and/or rural culture.

This challenge does not have an easy and short solution, it takes time, change in cultural behaviours and a lot of trainings and education.

Legal Barrer

At present, legal considerations have been underestimated. There is not an International legal framework to allow health professionals to deliver services in different

jurisdictions and countries; there is not policies of privacy and confidentiality, data transfer, storage, and sharing between health professionals and jurisdictions [18].

Another issue is the health professional authentication, and the risk of medical liability for the health professionals offering

telemedicine services [11,19].

Furthermore, the systems being used are complex, this could increase the morbidity or mortality of patients and the liability of health-care providers [19].

At present no legislation governing confidentiality, privacy, access, and liability it has been institute (WHO 2005)

Confidentiality

In the Fifty-eighth World Health Assembly, Geneva, May 16–25, 2005, was stated "It is imperative that telemedicine be implemented equitably and to the highest ethical standards, to maintain the dignity of all individuals and ensure that differences in education, language, geographic location, physical and mental ability, age, and sex will not lead to marginalization of care".

Quality Barrer

In low and middle resource countries, the major weakness in telehealth evaluation, is the focus on pilot studies without follow-up and rigorous evaluation.

This is largely due to capacity and limited resources and poses a threat to the credibility of telemedicine as a sustainable concept.

Furthermore, the clinical benefits of telemedicine were not well-documented: while telemedicine prove highly successful, it is crucial to acknowledge operational barriers, such as the high turnover of field staff, as well as cultural barriers, since a change in clinical process requires a development of trust between health professionals across countries.

Economic Benefit

There are only few studies that document economic benefit and cost-effectiveness of telemedicine Demonstrating solid business cases to convince policy-makers to invest in telemedicine has been unsuccessful [10].

Future of Telemedicine

It is undeniable that the global community is facing the digital transformation of healthcare.

This remarkable transformation had already begun and is having an impact on countries around the world. Advanced and affordable communication technologies and networks is providing realistic opportunities for low- and middle-income countries to integrate telemedicine into their health systems.

In humanitarian sector, we have been always talked about improving access to high quality of care, reduce distances from the population in needs and create a realistic and sustainable healthcare system for population in remote areas.

Now is the time to fully realise that with the technology available we can actually start the innovation.

MSF from 2010 to 2018 conducted a three-phase study in over 5,600 cases were from 63 countries.

These cases came from countries that suffered from armed conflict and internal instability.

Overall, the researchers found that telemedicine performed well, and that improved access to specialist opinions for multidisciplinary care could be implemented at an international level [20]. According to [20] "The telemedicine system then developed to become a mature medical service characterized by improved performance indicators and stable quality assurance scores, despite increasing numbers of referring sites and increasing numbers of cases from each referring site."

From now to 2032 the first phase should be promoted creating a worldwide coordination:

- International level: define standards, protocols and guidelines

- Country level: adapting according to country regulations

- Non-Governmental organisation level: follow up case by case to create solid bases on which telemedicine can properly grow.

According to [21, 22] coordination is one of the most challenging phases of a new project.

It is fundamental that Nations, NGOs, stakeholders an2d UN are on board.

At the same time educational campaign should be promoted in all countries, especially low- or middle-income countries.

Furthermore, we need to form technicians and trainers to be able to spread knowledge and culture of telemedicine around the globe especially in low- mild incoming settings.

National and international telemedicine programmes need to build infrastructure and regional networks can also help with sharing of expertise and innovative ways of overcoming barriers to the implementation of services and help to change the mind set of population in neds.

Network, smartphones and access to computer are barriers or non-suitable in tropical settings that need to be solved in no time, together with instability of electric power.

In my opinion only after solving these logistic problems, the international community can really discover the vast implications that telemedicine can have.

The process probably needs one real leader that will train all humanitarian world and private sector to combine resources and minds under one objective.

Thinking at the potentiality of telemedicine, I can forecast that in low- or middle-income countries **in 2052**:

- most of the consultations would be done remotely, maybe using sophisticated robots and avoiding clinicians or specialist to travel on side in places unsafe or inaccessible.

- Telemedicine will be profusely used for nursing care, physiotherapy or midwifery using sophisticated robots to reach remote population in unsafe places.

- Robots will be used in all natural and non-natural disasters, only sporadic need of human presence in the rescue team.

- Data sharing will be huge and more discovery will be done but only if the scientific community will be able to work all together.

- Telemonitoring will able specialist around the world to monitor chronic cases and avoid complications.

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