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How New Technologies Could Help in Epilepsy Care, Education and Sensitization of Patients and Carers: The Experience of Telemedicine in the South of Morocco

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Abstract

Epilepsy is a public health care problem in Morocco because of its high prevalence (1, 1%). Patients with epilepsy and their families need education and sensitization especially in South Morocco, where health resources and specialized personnel are lacking. All these factors inspired the neurology team of the university hospital in Marrakesh to start using new technologies for epilepsy care, education and sensitization of patients in Marrakech, other neighboring cities and different other parts of South Morocco. We started using new technologies in 2009 at Marrakesh university hospital, which is the sole center in all South Morocco.

The aim of this study is to describe the first experience with the use of telemedicine (TM) in epilepsy and to show how it could facilitate, improve care, education, sensitization and reach the maximum of PWE, and thus save time, energy and displacements.

Authors showed through this work, that telemedicine offers various possibilities, to connect not only patients, families, physicians and other health professionals, but also associations. (Video conferencing; use of mobile phones; and also use websites and tutorials). This use of new technologies is done for free, for all our patients with the support of university hospital of Marrakech. For a wide category of illiterate patients in Morocco, we use audio and video messages to give a chance of communication and exchange of all kind of informations about the progress of their epilepsy and its follow up. Finally, we have a busy programme for specialists, GPs and all health professionals to provide continuous training.

Keywords: Telemedicine • Epilepsy • Education • Marrakech • South Morocco

Introduction

The American Telemedicine Association defines telemedicine as the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status [1].

It connects, one or more healthcare professionals, either with a patient, or among themselves, including certainly a medical professional and, if necessary, other professionals providing care to the patient. The prevalence of epilepsy in Morocco is 1.1% according to a study conducted in Casablanca in 1998 [2].

Neurology telemedicine, also known as "tele-neurology" has many potential benefits including increased practice outreach, decreased travel time and expenses for patients and doctors, expansion of educational opportunities and continuing medical education for physicians, individual and group education for patients about their neurologic diseases [3,4].

How does telemedicine facilitate care management among patients with epilepsy?

Objective of the study

The aim of the study is to describe our experience with the use of telemedicine (TM) in epilepsy in the south of Morocco and show these benefits in our practice.

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Authors showed throughout this work that telemedicine offers various possibilities, to connect not only patients, families, physicians and other health professionals, but also associations in developing countries like Morocco.

Literature Review

History of TM in epilepsy in South Morocco

The first use of new technology in the neurology department of Marrakech was initiated in 2009 by the use of mobile phones, exchange of call and short messages between patients and doctors, and by the creation of a website that provides useful medical information for patients and health professionals and also a forum that allowed exchange between visitors and our team.

And since the creation of the Moroccan association Against Epilepsy in 2009, we started discussing and exchanging useful information about our patients with other cities in southern Morocco.

The first use of video conferencing about epilepsy was launched in 2013 via Skype conferences; this experience was a starting point for the use of Telemedicine in Marrakech.

Then, since April 2016, our first experience with the center of Essaouira, we have been conducting specialized epileptic consultations that are done remotely by a doctor on the spot and supervised by the neurology head of department.

The number of meetings per week is fixed in collaboration with the team of Essaouira. Six months later, a monthly teleconsultation session has also been initiated with the regional hospital of Safi (since September 2016).

We used the Webex system between two groups during 2016, Webex gives the possibility to connect three groups for free, and our university hospital of Marrakesh got the license for extending the connection up to 8 groups in 2017.

Since November 2017 we also organize a monthly TM session between our Department and an epilepsy center in Larache city in collaboration with the epilepsy association.

Reasons for starting TM in Neurology department for epilepsy

We have developed telemedicine in the department of neurology of Marrakech for several reasons:

- Because of the small number of neurologists and their unequal distribution in Morocco, especially in the center and the south of Morocco (Figure 1) [5].
- Difficult access to medical health care structures.
- Poverty and economical imbalance in the South of Morocco compared to the Northern and Western parts, which explains why a significant part of patients are of low-income.
- The University Hospital in Marrakech attracts more and more patients from other cities, which gives more limited access to patients.
- Displacement costs saving and time-saving; for instance one of our patients coming from Laayoune city (708 km from Marrakech) would have to spend 140 Euros just for transportation and accommodation besides the costs of food, displacement and absenteeism from work.

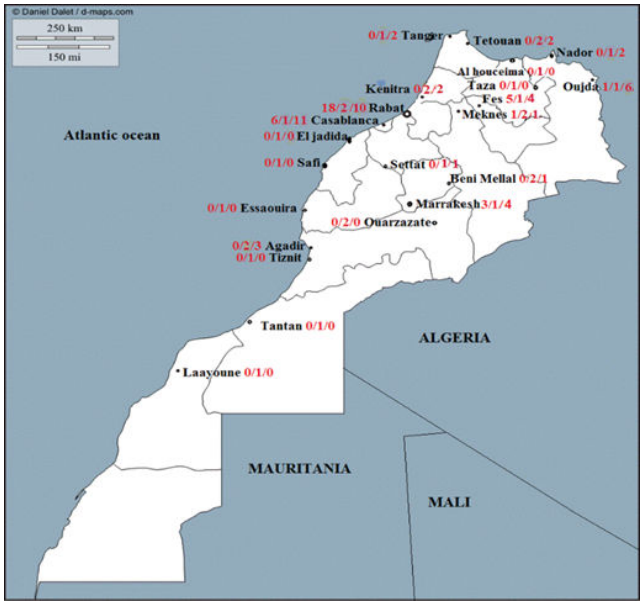

Figure 1. Map of the geographical distribution of neurologists in Morocco: a/b/c a: Teaching University Hospitals, b: Public Sector, c: Private sector [5].

The staff involved in TM program for patients with epilepsy in South Morocco

The Personnel involved in TM in epilepsy include medical experts, first, second and third level neurologists of the health system, general practitioners, as well as paramedical staff (nurses and social workers), and association members.

The idea of starting telemedicine at the neurology department was encouraged by the hospital management that created this project to facilitate access to medical care.

This 1st experience of teleconferencing was initiated with the regional hospital of Essaouira who has set up a telemedicine room under the authority of the Minister of Health.

It allows the hospital to have a technical platform to share difficult cases with our Neurology department for discussion.

This successful experiment was quickly implemented in other cities including Safi and Larache. Our telemedicine system was often used in several training sessions, including general practitioners, specialist doctors and several associations throughout Morocco.

The objective of its use varies from discussing cases requiring specialized advice, to providing training.

Following the Marrakech experience, a telemedicine unit was created in the outpatient center of Hassan II teaching hospital in collaboration with the faculty of medicine and pharmacy in Fez.

The center has started with visioconferencing and visioconsulting in Epileptology and Neurology for the benefit of medical students and residents.

How is such an activity planned and organized?

As Telemedicine is the use of new technologies to ensure a good follow-up of patients with epilepsy, it will also ensure exchanges between doctors, patients, families and all other health professionals involved.

The Marrakech 3rd level neurology department has organized specialized consultations in epilepsy, which are carried out remotely by a doctor on site and supervised by senior neurologist of the neurology department.

The number of meetings per week was fixed in collaboration with the team of Essaouira. Once a week regularly, the head of department organizes a teleconsultation session, assisted by an expert technician.

The doctor on the spot examines the patients and the data is communicated by telemedicine. In return, the professor delivers the prescriptions. Health education councils are also part of these activities. A monthly teleconsultation session was also held with the Safi regional hospital.

Teleconferencing is the type of telemedicine adopted with this center, and organized by our team with a number of consultants brought together for a level of management and monitoring of the health status of epileptic patients and also to encourage secondary and tertiary prevention.

Why use telemedicine in epilepsy

TM makes it easier to manage epileptic patients: it allows patients an easy contact with the doctor treating both for control and therapeutical management.

This is especially important for people far away from medical access. In high income countries, due to limitations in driving privileges, they may not be able to attend appointments or participate in support group activities.

Also, pregnant women with epilepsy typically require frequent evaluations by the neurologist; in addition, prison inmates require complicated logistics and police escorts to visit clinics. Telemedicine can reduce this burden while still providing the patient with high-quality care.

We emphasize that TM is a good opportunity, not only for low income countries, but also for high income countries in remote areas where health professionals and facilities are not available [6]. In addition to the improvement in care, telemedicine can provide an economical response to many challenges [7,8].

Who can benefit from TM?

TM is a good way for using new technologies to exchange information between physicians, patients, families and all other health care professionals involved in epilepsy management, education and research. (Figure 2).

Beneficiaries of telemedicine are both medical and paramedical staff including medical experts, neurologists, general practitioners, nurses, EEG technicians, and also patients and their caregivers.

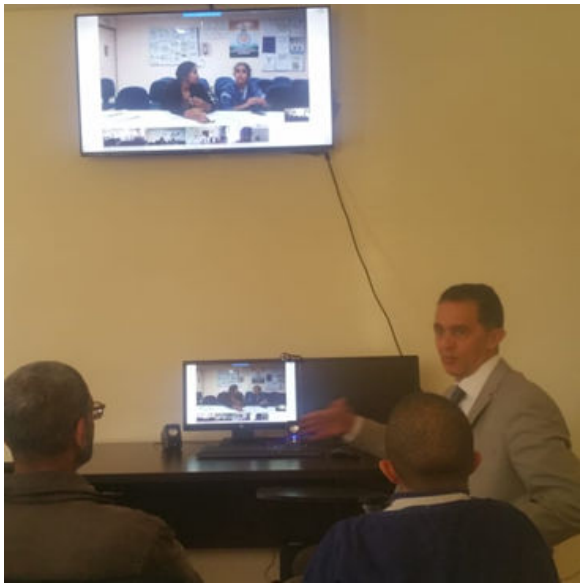

Figure 2. Photos during telemedicine session with Indian neurologists to discuss the case of an epileptic patient with autism.

How to use telemedicine in epilepsy

Telemedicine has been applied to epilepsy care in many ways. In epilepsy, many topics can beshared and discussed by TM; the field of action is very wide:

- Concerning the social aspects, the choice depends on the kind of activity and the profile of the participants (tele-education, tele-meeting, tele-sensitization…etc.) [6].

- Concerning the scientific fields, we have tele-diagnosis, tele-emergency, tele-treatment, tele-follow up of the recovery or side effects; also tele-education, tele-transmission (congresses and other meetings), tele-conference, tele-advice, tele-treatment, tele-Research, tele-teaching, tele-emergency (as for status epilepticus) and finally telecast (sharing any conference or meeting about any topic in epilepsy) [6].

The different facets used in TM: Laptops and tablets

Specialized software for video-tele-conferencing: Video-tele-conferencing is a technology that facilitates the communication and interaction of two or more users through a combination of high-quality audio and video over Internet Protocol (IP) networks.

One can choose from a large range of solutions available. We can cite Webex (CISCO), Zoom, Skype, Liveclass, "go-to-meeting", and "go-to-webinar"… [6].

Experience of video-tele-conferencing in Marrakech 3rd level Neurology Department and in other hospitals: The neurology department of the Mohammed VI University Hospital of Marrakech has regularly organized several telemedicine sessions with several centers in Morocco.

The system used in our practice is the Webex. It gives the possibility to connect three groups for free, and our university hospital of Marrakesh got the license for extending the connection up to eight groups, since 2017.

Our first experience with the center of Essaouira since April 2016. A monthly teleconsultation session has also been held with the regional hospital of Safi since September 2016.

Since November 2017 we also organize a monthly TM session between our Department and an epilepsy center in Larache city in collaboration with the Epilepsy Association.

Web sites: We created a website in March 2009 for the purpose of educating students and doctors but also for the education of patients mainly in primary prevention.

The education of patients focuses on sharing correct medical information. There is also a forum for exchange between patients, families, the general population and our team.

This website is (www.neuromarrakech.com) and has many extensions, the most used one is education extension, dedicated to epilepsy and other pathologies such as Alzheimer's, Parkinson's, stroke and other. (http://www.neuromarrakech.com/category/education/pour-les-patients) (Figure 3).

Figure 3. Home page and the epileptic patient portion of our website.

There are several websites for educating the population interested in epilepsy, giving the example of American epilepsy society, that is a coalition of American epilepsy organizations ' working together to keep the communities informed on the latest medical breakthroughs, social research, publications, news and policy about epilepsy. (https://www.aesnet.org/) [9].

E-mail: E-mail exchanging is an easy, accessible and secured tool for any medical exchange for healthcare professionals or patients.

Frequently used with our patients to share assessments, hospitalization reports, and also to have a return of the treatment to give and make a therapeutic adjustment if necessary (Figure 4).

This tool allows a quick and professional easy contact with the attending physician who can answer his patient for free and at any time.

Figure 4. Example of e-mail used to share medical analysis with a patient who lives in Ouarzazat (203 km from Marrakech).

The use of mobile phones in epilepsy

The use of smart phones can help for better communication and exchange of information between patients, their families and carers.

Example of Teleneurology in sub-Saharan Africa: Experience from a long lasting HIV/AIDS health program (DREAM); The high HIV prevalence is among the main drivers of neurological diseases in SAA (Sub-Saharan Africa), From February 2016 to April 2018, 2458 teleconsultations have been done, 5,5% (N=134) were for neurological issues. All the requested teleconsultations received advice from neurologist.

Specialists can read and share their opinions and further discuss by using the telemedicine system and/or their own cell phone or e-mail [10].

Phone call: In our practice, it is useful and easy especially for therapeutic adjustment as an example if the treatment has just been modified, or introduced with a risk of side effect.

We have a phone number given with all prescriptions that allow them to have contact with the neurologist to answer their questions when needed.

A mobile phone-based electronic health information and surveillance system was piloted from February to December 2015 in Ghana. Toll-free numbers were provided to 1446 caregivers, which they could call to receive health advice while their children showed disease symptoms.

This pilot concept, has demonstrated the practicality of using mobile phones for assessing childhood disease symptoms and encouraging caregivers to seek early treatment for their children if needed.

The strategy to use mobile phones in disease surveillance and treatment support is a promising strategy especially for areas with limited access to the health care system [11].

Short Message Service (SMS): Some studies have documented the usefulness of using SMS to increase attendance to health care services [12] and adherence [13,14].

These studies have shown that, SMS reminders increase the likelihood of clinic appointments for general illnesses [15,16].

Other establishments used it for giving advice depending on the severity of the symptom, whether to provide home treatment or seek immediate treatment [11].

It is used for the same reason in our training, this aims at reducing self-medication [17] and its side effects [18].

Phone applications: Many phone applications exist and the most used are Viber, Whatsapp, Twitter and Facebook, it allows realizing live videos, to share recorded videos (filmed crisis) and photos (balance, EEG, treatment ...).

This technique is accessible to everyone; it just requires a smartphone with free software and internet access.

Many applications have been created for different medical fields, giving the example of a study published in 2016 that reports an interactive mobile phone application that enables transfer of both patient data and pictures of a wound from the point-of-care to a remote burns expert who, in turn, provides advice back.

The client application is installed on a smartphone and structured patient data and photographs can be captured in a protocol driven manner.

A text message is automatically sent to a burn expert on call who then can access the cloud server with the smartphone app or a web browser, review the case and pictures, and respond with both structured and personalized advice to the health care professional at the point-of-care [19].

The use of social networks in our practice is very useful for health education, such as the use of Facebook, which is an application accessible and used by a large part of our patients.

Sharing the experiences of epileptic patients who lead a successful life, and sharing photos and videos of anti-epileptic days with messages of encouragement and giving hope to a young and active population.

This provides education for both patients and their entourage, which helps fight false recognition and use of traditional treatment that are still used by a large part of the Moroccan population (Figure 5).

Figure 5. Image of screen capture of the Facebook page of the association.

To address illiterate people as well as educated ones

To treat a patient we must consider the influence of the patient's language and social skills. Illiteracy is still considered a problem in the Moroccan population, and englobes a fairly large part of the population.

The latest statistics, conducted in 2014, estimate the illiteracy rate in Morocco to 32.2% [20], which limits the autonomous use of access to some means of telemedicine already developed in our work, namely e-mails, websites and text messages.

In our current practice, we communicate with these patients by video conferencing if possible or more easily by audio recording, phone call or video call; in extreme cases we try to have contact with educated people in their entourage (Figure 6).

Figure 6. Image of screen capture of a conversation between an illiterate patient and a neurologist using video call and audio recording.

Discussion and Conclusion

The authors emphasize the need to use new technology in all aspects of epilepsy especially telemedicine with tele-diagnosis, tele-emergency, tele-treatment, tele-follow up of the recovery or side effects; also tele-education, tele-transmission, tele-conference, tele-advice, tele-treatment, tele-research, tele-teaching, tele-emergency and finally telecast, ranging from care to discussions between professionals and to the education of patients with epilepsy.

This helps to reduce travel cost, time and lost energy but above all allows a regular and easy follow-up of patients with epilepsy.

From this experience, which can be reproduced in any low-income country, and regarding the benefits that we have been able to obtain from technology in the medical field, we should consider training other health professionals in different regions of Morocco to be able to develop the Moroccan experience in Telemedicine much more.

Conflict of Interest

Authors have declared that no competing interests exist.

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