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LEADING ARTICLE

Telemedicine and its role in pandemics

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Introduction:

There is no one definition for Telemedicine (care provided by physicians) and tele-health. (The care provision by other health professionals). This implies that telemedicine remains an open science able to incorporate the use of advancement in the technology the term has been in place since 1970 which basically meant healing at distance [1]. It is the use of the medical information transferred from one site to another locations using communication technologies including video conferencing, cameras, satellite, computers, iPad, mobile phones and other wireless communication aids. Urk and Hall defined telemedicine as 'the use of telecommunication technology to provide medical information and services [2].

However, the WHO [3] has adopted broader description for telemedicine: "*the delivery of healthcare, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnoses, treatment and prevention of disease and injuries, research and evaluation and for the continuing of health care providers, all in the interest of advancing the health of individuals and their communities".*

History of telemedicine:

The use of telemedicine dated back to late 19th century [4] and early 20thcentury [5]. In its modern form telemedicine, was used first in 1960 by the military and space sector [6] Then the television was used to provide medical advice from a large teaching hospital to the airport medical centre [7] and in the consultation between the mental health specialist and the general practitioner [8]. With the advancement of communication technologies; many countries with limited infrastructure and under resourced communities have adopted telemedicine to provide health care to their population [9].

Types of telemedicine in use

The asynchronous; the store-and forward type, where pre-recorded health information are exchanged between health professionals at different times, an example where a health professional sends an email asking an opinion on management for a particular condition, while the synchronous type or the real time telemedicine, involves the immediate transmission of the health and medical care such as videoconferencing [10]. Both types can be applied in tele-radiology, tele-pathology and tele-dermatology or setting up virtual clinics at time of epidemics such COVID 19, hence delivering the care at home away from the hospital settings [11].

Previous research had shown the potential for using telemedicine in disasters and public health emergency [12].It had also been incorporated well in accident and emergency to facilitate specialty consultation or hospital transfer [13].

Advantages of telemedicine:

Telemedicine had shown to successfully improve the quality of the care by allowing the distant specialist to evaluate, diagnose and manage patients remotely without the need for travel [13-14], especially it provides efficient means to get access to tertiary care where there are barriers to travel long distances [15] with positive impact on health services [16]. Telemedicine had shown to improve the quality of the life in chronic condition [17]. It had improved the compliance and adherence to treatment [18].

An adequately functioning and well-run telemedicine has the potential to offer benefits to multiple stakeholders including healthcare providers, patients and physicians. Telemedicine consultation eliminate the inconvenience of the time spend to travel to and from the health centre and the waiting time in the clinics. A study found that although the time for the face-to-face consultation is roughly 20 minutes, the actual time spend by patients is much longer, about 121 minutes when they factored in the 37 minutes of travel time and 64 minutes of waiting [11] hence minimising the time taken off the work which in turn enhances patient's satisfaction. Researchers found that 95% of responders were satisfied with care they received citing convenience and quality of care and helped to free up the clinician's clinical time [17].

A study by The Veterans Affairs (VA) healthcare system showed that it reduced utilisation of inpatient care with about 60% decrease in VA bed days of care and 30% reduction in hospital admissions [19]. It allows the health professional to get access to specialist opinion not available to them locally thus reducing the number of the referrals to both primary care and hospitals and supporting medical students during their elective [20,21].

Telemedicine reduces the cost incurred from travel to distant places to receive the treatment and minimised the stress on the patients [22]. Telemedicine provides seamless opportunity to learn from each other globally. A recent example was the collaborations between the health professional to find a vaccine and or treatment of COVID19 through the exchange of information between healthcare providers via various communication technologies.

The inter-site collaboration helps the professional to avoid the burden of difficulty in the face-to-face meeting especially in remote areas and aids to optimise their skills and knowledge [23]. It can provide the opportunity for case-based study supporting the patient-professional long term relationship and apply the knowledge gained forms the cases into management of futures patients with similar problem [24].

Studies had shown the telemedicine is a cost-effective technique in provision of the health care especially in underdeveloped countries through creating multicentre sites comparing to the costly resources needed for building infrastructures and employing extra professionals [25]. Furthermore, telemedicine has the tangential benefit in collecting and gathering patient's data for epidemiological purposes and illustration of the trends [26] and monitoring the disease activity and mobilising the vaccination team [24].

The increase use of the technologies in telemedicine in developing countries helped to cut the cost of the systems used [27] and the digital storage [28]. With internet availability, telemedicine allows the transfer of the images as attachments using the basic store and forward email-based techniques using low-cost settings [29]. The use of low-cost software in internet conferencing can mitigate the need for the expensive video conferences which may be not available in poor countries [30]. The same can be applied in pre-screening patients in remote rural areas [31].

A systematic review found that specific telehealth applications have been shown to offer significant socio-economic benefit, to patients and families, health-care providers and the health-care system [32].

Barriers to telemedicine:

The lack of access to internet in developing countries is the main barrier for utilising the telemedicine [27,33] as well as the poor supply and the unstable network of the electrical power in these countries hinders the instalment of useful and successful telemedicine [34]. The implementation of telemedicine is also limited by the unavailability of the internet beyond the major cities as well as the effects of the climate especially in tropical countries which limits the use of some of the communication technologies [35]. Even when internet is available there are other factors that may hinder the proper use of the telemedicine such as malware, computer viruses, slow connectivity and lack of technical support [30,33,36].

The over use of the internet may lead to network congestion which may delay the transmission of the images [37], poor resolution of pictures therefore interfering with the proper diagnosis remotely [38] and limits the use of videoconferencing [39]. The lack of financial resources or improper investment in the infrastructure are the main barriers to the adoption of the telemedicine in these countries [40,41].

The implementation of the telemedicine initiatives in low-income countries are faced by challenges such as maintenance of the equipment, cost of training of the necessary staffs [28,37]. In addition, the weak and or lack of convincing evidence of the cost effectiveness of implementing telemedicine strategies in the underdeveloped countries are factors that may hinder the authorities to properly invest in such initiatives [28].

The uptake of the telemedicine may also be discouraged by the lack of the expertise in computing and the time required to master the applications of the computer-based peripheral medical equipment [42,43]. Moreover, the language skills and differences in the available diagnostic and treatment resources at the various location may affect the local educational needs, the training and the distance learning.

It is prudent to understand the local context prior to establishment of the telemedicine since one of the major factor with may have a negative impact in the collaboration of the telemedicine and its proper use, is the socio-cultural perspective related to health and medicine in different parts of the same country [33] and the difficulty of transfer of the health and wellbeing information from one culture to another ,hence telemedicine is at risk of incomplete or inappropriate transfer of the medical information [33].

Healthcare professionals and their patients are more familiar with face-to-face encounters during consultations and may resist the use of telemedicine in their care [44,45]. There were concerns raised by medical professional and the allied healthcare personnel that the introduction of the telemedicine may lead to job loss and decline the needs for the bedside healthcare [46] as well as altering the medical practice in term of running clinics, referral of patients and cancelling routine tasks such as operations [14].

The aim of telemedicine must be an aid to enhance the current practice rather than hindering or downgrading the service provision with the use of a meaningful system in low-income settings [47].

Legal and ethical considerations for telemedicine in developing countries

It is imperative that telemedicine be implemented to the maximum ethical standards to maintain the dignity of patients irrespective to sex, colour, age and other individual variations [48]. The main deterrent to the invaluable use of telemedicine especially in underdeveloped countries is the lack of the information about local policies, guidelines and legal concerns, for instance, which local law apply or has jurisdiction over the telemedicine services? [49], and the conflict of the health laws in the countries involving in cross borders

transfer of health information. The patient and the physician on both side of the telemedicine need to make sure confidentiality is protected during the video visit in a private and quite room. The patient information and details must be securely transmitted and protected.

The video teleconferences and audio communications with patients must be compliant with the law. The internet provider must ensure they are keeping the data safe and secure and any conversation with patients via telemedicine must be documented for future references same as face-to-face encounters. It should include the reasons for the consultation via telemedicine as opposed to an in-person visit. It is vital that the patient's consent is obtained and documented in the patient's visit notes and reassure them that their privacy is protected, bearing in mind that telemedicine is not without risk of malpractice the same as face-to-face consultation albeit at lower risk.

Implications for telemedicine development, implementation, evaluation and sustainability

There is growing opportunity for training and certification in USA. In 2016-2017 more than 50% of USA medical school had incorporated telemedicine in required or elective training courses [50]. Evaluation is of paramount and vital to systematically document the outcomes, lessons learned, challenges faced through conducting rigorous research to address the patients and providers satisfaction and an economic analysis to demonstrate how telemedicine altered the health outcome, the cost-effectiveness of the systems used which may benefit other countries to follow the same [51].

The benefits and the overall impact of the telemedicine on the health services in the developing countries is difficult to evaluate due to lack of evidence, trials, research and data concerning the telemedicine in these countries [52]. It may be due to lack of support and funding to conduct research and data collection for the evaluation purposes [53] and the lack statistical significance due to small sample, bias and follow up data from stake holders [54].

In order to integrate telemedicine into the existing healthcare system, it needs rigorous research, the identification of the best practice and incorporation of the local social and cultural orientation in the effectiveness of distant consultations [55]. Telemedicine requires an active participation of all stakes holders in order to secure timeliness for transfer and exchange of sensitive information, reliability, safety and sustainability [33] as well local education to counteract negative perception about value of telemedicine [56] as its success is largely depends on the selection of the expertise in the field of telecommunication [57].

It is imperative that telemedicine should be tailored to the local needs [29] due to variation in the technical feasibility of some forms of telemedicine application due to differences in the infra structures, medical services and other resources hence, during international collaboration it is vital that expertise needs to be familiar with the facilities, guidelines and protocols when suggesting an appropriate plans [24].

One of the fundamental factors in the success of implementation of the telemedicine is the consideration of priorities and the socio-technical factors in the design of the project in order to achieve the potential benefits in improving knowledge transfer, training, education and conducting scientific research. It is prudent to use a low-cost user-friendly manageable system by personals with little expertise in telecommunication in order to have a swift diffusion of the telemedicine project into the local health system in developing countries (39,58) such as store -and-forward email projects have shown to be useful low-cost projects in different specialities [14,36]. The same is applied to low-cost web-based conferencing which can deliver a synchronous training and education in healthcare settings and facilitate the dialogue between healthcare professionals in industrialised and underdeveloped countries [44].

Telemedicine has proven to be cost effective in delivering the care compared to other programmes and cheaper when compared to fellowship programmes and or staff exchange strategies [24]. It is imperative to conduct proper planning, documentation, good record keeping analysis and dissemination of the information in order to maximise the current available resources [23,31] and the lessons learned to help future studies and transferability to other healthcare personnel and location.

In order to meet the local health and medical needs a multidisciplinary approach involving all stake holder; the patients and the care provider including economic analysis and the stakeholder satisfaction. The global heath challenges require partnerships between policy makers, clinicians, academic and administrators with a collaborative investment in order for telemedicine to improve the quality of the life and maintaining high quality of care while avoiding the burden of travelling to distant locations [29]. One of the important strategies in implementing and practising telemedicine is the continuous support of the healthcare professionals through the training, education and easy access to the information.

Telemedicine during COVID 19 pandemic

Telemedicine was effectively used during the current COVID 19 pandemic to increase and facilitate access to health care and to speed up the diagnosis and treatment of both the confirmed and suspected cases. The WHO highlighted telemedicine as an essential service in response to the COVID-19 emergency.

COVID 19 positive cases were triaged remotely by their general practitioners while those with mild symptoms were advised to attend the testing sites for sample collections or if needed directed them to the accident and emergency department. It was used to monitor the progress of the confirmed mild COVID 19 cases at their home setting while they receive evaluation and advice, thus limiting their contacts with other health care users and professionals hence reducing the chances of spreading the infection. They were able to continue to interact with the medical team using telecommunication facilities until they recovered hence reserve face-to-face visits for the sickest patients and those who must be admitted for other comorbidities. It was successfully utilised for distant surveillance of at-risk patients during the pandemic. It helped reducing the pressure on the health system by providing the care remotely. It allowed the front lines professionals an access to expertise in infectious diseases who were remotely located for advice without the hassle of travel through videoconferencing.

Many countries involved in the pandemic allowed other health professionals to provide healthcare via telemedicine advice and care remotely to patients in various parts of the country. Telemedicine is not without risk to patients and health care providers and like the in-person care is subject to failure to provide an accurate diagnosis and or effective treatment. In order to minimise the risk, the healthcare personnel should follow certain steps.
It is vital that the provider adheres to the same principles of the face-to-face visits and must establish a rapport and patient-to-physician professional relationship before the visit.

The healthcare individual must escalate the management of the patient to in-person visit when appropriate. The tele-visit must be accurately recorded in the telemedicine platform and or electronic health records and should include the consent of the patient, reason for choosing the virtual visit using telemedicine over in-person visit, the modality used, history and physical examination as well as treatment and patient education. The physician should engage the patient in the clinical decision making and ensure that the patient understands the risks and benefits of the instant counselling versus in person visit.

Conclusion:

Telemedicine has invaluable benefit during human disasters including pandemics. Its utilisation helps to minimise the risk of interpersonal transmission of the infections It is used

not only in clinical care but a media for use in education, training and continuous professional development during pandemic. It is also used in the administrative works in health setting using Microsoft team and other means to communicate distally.

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