NAME: OJODARE TIMOTHY ADEOLUWA

SCHOOL: UNIVERSITY OF ILORIN, ILORIN, NIGERIA

FACULTY OF VETERINARY MEDICINE

DEGREE PROGRAM: DOCTOR OF VETERINARY MEDICINE (D.V.M)

DATE OF SUBMISSION: 15TH OCTOBER, 2019

EMAIL ADDRESS: timothy.ojodare@gmail.com

HEALTHCARE THROUGH THE AIR; TELEMEDICINE, A WAY FORWARD.

1.0 INTRODUCTION

Tele- (from Greek: far, at a distance, remote) while Medicine- (a profession of treating illness as a doctor); tele medicine thus entails the transfer or communication of medical information: for diagnosis, therapy, and education, through the use of telecommunication technology. It is amazing to know that through the use of devices healthcare can be communicated through the air.

2.0 DEFINITIONS

Telemedicine and telecare are subsets of telehealth. Telemedicine is the use of information and communication technologies to transfer medical information for the delivery of clinical and educational services[1].

Whereas, telehealth is the use of information and communication technologies to transfer healthcare information for the delivery of clinical, administrative and educational services while telecare is the use of information and communication technologies to transfer medical information for the delivery of clinical services to patients in their place of domicile[1].

By World Health Organization, (WHO) - telemedicine is defined as, “The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities”.

These definitions are interwoven and necessarily silent about the nature of medicine involved. Telemedicine is not new medicine. It is rather a new way of delivering existing medicine, extending distance and access[1].

3.0 HISTORICAL AND THEORETICAL CONCEPTUALIZATION: APPRECIATING TELEMEDICINE

The historical concept of practicing medicine by a medical practitioner who is physically away from where the patient is located has been significant. The take-up was gradual and uncoordinated because telemedicine was not invented as a well-defined discipline with specialized instrumentation and protocols. Clinicians simply appropriated and began to use new technologies developed for other purposes as they became available[1].

Table 1.0 The main phases of telemedicine development[1] – History.

Development phase	Approximate timescale
Telegraphy and telephony	1840s- 1920s
Radio	1920s onwards (main technology until 1950s)
Television/space technologies	1950s onwards (main technology until 1980s)
Digital technologies	1990s onwards

The concept of telemedicine is for healthcare to go beyond the traditional method of healthcare but still be able to provide healthcare even when there is the problem of distance involved.

It could be as simple as two healthcare professionals discussing patient's condition over the telephone. It also may be sophisticated as doing robotic surgery between facilities at different country.

Theoretically; telemedicine has three major areas of focused divisions:

(1) Aids to decision-making; Telemedicine includes areas such as remote expert systems that contribute to patient diagnosis or the use of online databases in the actual practice of medicine.

(2) Remote sensing; Remote sensing consists of the transmittal of patient information, such as electrocardiographic signals, x-rays, or patient records, from a remote site to a collaborator in a distant site.

It can also include transmittal of grand rounds for medical education purposes or teleconferences for continuing education.

(3) Collaborative arrangements for the real-time management of patients at a distance: Collaborative arrangements consist of using technology to actually allow one practitioner to observe and discuss symptoms with another practitioner whose patients are far away.

This raises important issues of referral and payment arrangements, staff credentialing, liability, and licensure potentially crossing state lines.

Two-way work stations that provide smooth digital motion pictures have been integral to the long-distance, real-time treatment of patients.

As new technology is found – tele radiography, collaborative arrangements are the future of telemedicine where tele radiography is efficient and medical education with medical research will be able to overcome the limitation of distance to real-time patients.

Remote Cross Diagnostic methods - which include video teleconference, cross diagnostic, registration for referral patients, EMR, surgical operation planning, ICU monitor, document reference are vital in the concept of telemedicine.

Alongside the technical advances has come a concern to provide high quality, expert healthcare where it is needed rather than to confine it to fixed points such as city hospitals or general practitioners; surgeries. Thus, we see better healthcare becoming available to rural and disadvantaged communities, to travelers, to people confined to their own homes, and to military personnel in theatres of war[1].

4.0 WHY TELEMEDICINE? THE DRIVERS

Literature review shows that telemedicine has both technological drivers and non-technological drivers.

Computing and information technology, network and telecommunications infrastructure, and a technology-led society are the technological stimuli of telemedicine while the non-technological drivers include extension of access to healthcare services, healthcare provision for travelers, military applications, home telecare, cost reduction, market development, and health policy.

5.0 TELEMEDICINE IMPACTS ON THE FUTURE OF EXISTING PRIVATE PRACTICES

Continuing Medical Education(CME); The outcome of CME is to enhance a more complete, better performing and result oriented medical practice.

It combines virtual learning about quality health education as easy as clicking on a few buttons to gather information such as OVID medical journals, the online version of Harrison's textbook, government health reports, local and international databases and links to accredited websites.

Tele surgery: A great impact on the future of the veterinary profession will be the import of tele surgery. Compared with the other 'tele' applications, tele surgery is in its infancy[2,3]. It is practiced by two approaches: by tele mentoring[4]: which describes the assistance given by specialists to surgeons carrying out a surgical procedure at a remote location. Typically, the assistance is offered via a video and audio connection that can extend elsewhere in the building or over a satellite link to another country. Clearly, there is a strong element of tele-education in telementoring[1]. The other approach is telepresence surgery, which guides robotic arms to carry out remote surgical procedures. In this case, the term 'remote' may describe comparatively short distances as well as large ones since the surgeon manipulates interfaces connected mechanically and electronically to surgical instruments such as scalpels and needles. The links allow large movements of the surgeon's hands to be scaled down so that very precise. tremor-free incisions can be made[1].

This fast growing benefit of telemedicine is promising to save the lives of more animals and improve largely the quality of healthcare delivery and welfares.

Better Resource Utilization: Apart from the patients from clients having better access to healthcare and gaining access to better healthcare, resource utilization is impactful to private practitioners. It is uneconomic to replicate resources in several centers when these resources have infrequent use. A preferred approach is therefore to set up a smaller number of resource sites and make these available to potential users via tele medical links[1].

Therefore, for both future and existing private practitioners, telemedicine will greatly encourage client and patient target audience investment and practice. This will reduce unnecessary costs and

where there is any spare capacity, it can also be utilized for tele education. The arrangement can apply to the disposition of both specialist and expensive equipment such as MRI machines as well as to 'walk-in' centers for patients with minor complaints[5].

Teleconsultation: This connects healthcare providers in a multipoint place in order to share opinions. The success factors include large number of users, faster services, lower costs and the extent of accessibility to the homes of individuals.

Tele monitoring: The use of a telecommunications link, manual or automated to gather routine or repeated data on a patient's condition. This helps veterinarians to get the accurate and time managed reports of their patients which may be transmitted by telephone or a computer/modem system. Alternatively, the acquisition may be entirely automated so that continuous data can be submitted either in real time or in store-and-forward mode.

The patient may be in a hospital, at home, on an aircraft or wearing an ambulatory device[6] such as a blood pressure monitor, and data can be transmitted across the world. In almost every case. the purpose of monitoring is to decide if and when an adjustment is needed to the patient's treatment[1]. This enhances the quality of healthcare of the patients.

It has the possibilities of reducing burn-out and fatigue for Veterinarians: The overwhelming sense of responsibility to patients and their owners can be enormous especially when both are physically present at the veterinary clinic and in their large numbers coupled with high expectations from the pet owners. Tele-medicine can be a way out.

Telemedicine offers the hope of remote clinics identifying disease at the earliest possible stage. leading to the necessary treatment locally or at some specialized location when needed[1].

Reduced Costs: This is an arguable impact of telemedicine. Few protagonists of telemedicine have been able to show cost savings in an unequivocal way. (essential). Clear cost savings have been

demonstrated in tele radiology, which has been around long enough for practitioners to create a marketable service and optimize its operation[7]. There is also evidence for economic benefits from telemedicine in home healthcare[8] and the care of prison inmates[9].

6.0 TELEMEDICINE IMPACTS ON THE FUTURE OF PET OWNING PUBLIC

Better Access to Healthcare: The extension of healthcare access to rural communities and disadvantaged populations who keep pets, which are poorly served or without facilities, is a major drivers of telemedicine. This socio-economic impetus has provided a strategic aspect to telemedicine programs in several countries essential[10,11].

As a measure of better access to health time should also be considered maximized and cost or risk of travels minimized for both patients and the client.

Access to Better Healthcare: Telemedicine is a forerunner for improvements in the quality of care. A clear benefit of telemedicine is the remote access that a patient and his or her physician have to specialist advice when it is not available locally. (essential) this include early intervention, more seamless care (including care protocols) and better monitoring of progress[12] as additional advantages of telemedicine links involving a primary care doctor[13].

Easier and Better public education: The public who keep animals with little or no knowledge about the predisposed diseases or conditions can benefit immensely from the invent of tele medicine through the provision of healthcare courses, perhaps with awards, for the general public. Also the public can be easily and better informed about emerging or re-emerging diseases if their pets are susceptible. The use of telemedicine provides quicker implementation and preserves sustainability of public health measures staged to control endemic diseases reaching even the distant rural communities. The information can be presented (pushed) in a controlled way to a target audience

via a kiosk in a shopping mall, health center or home. or received (pulled) in a less structured way by anyone 'surfing' the web. The same mechanisms can be used to advertise facilities such as surgery hours, pharmacist opening times and so on[14,1].

7.0 IMPACTS ON THE FUTURE OF INDEPENDENT VETERINARIAN

Improved Communication between veterinarians: The swing to digital information will offer enormous benefits for veterinarians and their patients. Digitized data such as a patient's previous history, X-rays, test results and notes for the current episode are readily transmitted electronically using standard protocols and technologies such as email[13]. Discharge letters are similarly available without delay. Digital communication provides healthcare information that is more accurate, more complete and more timely-attributes of quality that lead to better access and better healthcare[1].

Easier and better continuing education

Quick medical intervention – has a benefit of remotely connecting with emergencies. This also will reduce the monopoly of market of the "big fish eating the small" among professionals spreading the clients across a vast network of veterinarians.

Additionally, the various benefits of telemedicine accrue to an improved management of risks and resources, provides continuous clinical audit, increased patient involvements and consistency, improved teamwork, reduction in healthcare costs and improvement of patient's outcome.

8.0 VETERINARIAN-CLIENT-PATIENT-RELATIONSHIP (VCPR): Can a legitimate relationship be established?

Survey of reported limitations of telemedicine include poor relationship between veterinarians, their client and patients if it really exists. Soon there will be a robust one!

The intrusion of technology between the client-patient and the veterinarian is a potential concern, particularly due to inadequacies of electronic devices or technical knowhow. On the other hand, VCPR can however be enhanced when a second healthcare worker is involved.

'How not to develop telemedicine systems'[15] gives good advice on avoiding the trap in professional, technology or bureaucracy driven relationships[16,17]. However, there are enormous clinical benefits of telemedicine than the fears. These fears will take more time to overcome[13,18]. – but it will be overcome.

The 'at-a-distance' aspect of telemedicine, coupled with its dependence on telecommunications equipment, and the technical, but nonclinical, expertise to operate and most importantly the ethical and legal involvements in telemedicine it raises new concerns.

In a welfare system (e.g. the UK), the government is both the major (often monopolistic) purchaser and provider of healthcare. In contrast, in a largely private-funded healthcare system (e.g. the USA) the government's role is mainly to produce a framework in which market forces operate. Whatever the system, however, all governments regulate healthcare by the laws they promulgate since these precepts determine the legal and (often) ethical environment in which healthcare professionals, managers and others function[19].

The legal and ethical aspect is perceived or known to moderate: confidentiality and security, patients' right to access, standard of care, duty of care, veterinarian licensure and accreditation, malpractice, veterinarian reimbursements, intellectual property rights among many others pose interesting but threatening questions to VCPR.

Questions such as: If a pet whose owner is resident in a city has access to a treatment, then does a pet with a similar condition living in a remote community have a right to similar treatment if it can be facilitated by a telemedicine link?

Is a veterinarian trained and licensed to practice in one country able to give advice across a telemedicine link to colleagues in another country? What are the consequences if as a result of this advice a patient suffers harm?

How is a veterinarian not employed by a healthcare organization reimbursed for his or her expert advice offered over a tele medical link?

I suggest that to consistently gain from the clinical rewards of the growing telemedicine system, the threats, fears and concerns posed by the legal and ethical aspect should be also gradually managed as they occur. However, this does not leave room for recklessness of practice. Health organizations that are interested in the advent and sustainability of tele veterinary medicine can form a pact to enact favorable laws and rights for practicing across their borders. Also, records of communication (visual and audio), care, medical data can be monitored by relevant veterinary and non-veterinary authorities to ensure a smart check.

To say yes to a legitimate VCPR, the government, veterinarians and the clients have their roles.

Irrespective of the healthcare system all governments must define laws to deal with data security, ethical standards of practice. Liability and malpractice, fee payment, physician licensing and accreditation. The State will frame these laws in consultation with clinicians and other professionals but ultimately only parliament, congress or their equivalents can enforce them[1].

In advancing the best standard of practice and healthcare delivery, veterinarians and all related health care givers are to provide advice to the government to frame policy, legislation and guidelines.

In the case of confidentiality ethics as it affects VCPR, medical ethics dates back to Hippocrates. It has been developed in various codes, including the International Code of Medical Ethics[20], which supports an absolute non-disclosure of patient's medical information. The duty of confidence lies on the veterinarian. And if there is a third party who is either remotely in close proximity to the patient or not, perhaps a healthcare provider or a technician this party is a healthcare professional, the client must then be aware of the special nature of the relationship and acknowledge that they are under the same obligation of confidentiality. This sense of responsibility will promote a free, fair and legitimate relationship amongst all parties. However, it is imperative that national health organizations uphold policies and monitor compliance.

Clients must also be ready and willing to take responsibility, first to ascertain the credentials and expertise of their pet outsourced care giver and secondly to accept the imperfections that might be experienced in the course of care.

9.0 CONCLUSION

Telemedicine has a promising impact for the future of privately practicing veterinarians, independent veterinarians and the general pet owning public because of the interest of every aspect and branches of medicine and healthcare e.g. nursing, surgery, radiography to add tele- as a working prefix to their conventional non-distant patient healthcare role.

Tele veterinary medicine will ensure to provide a way forward for the limitation or barriers the conventional location and physical healthcare. With tele veterinary medicine, soldier can go to war with their security dogs, a chronically ill pet can have sufficient health care at home, radiographs or ultrasound scans for pregnant pets can be done at a distance, a wildlife conservation center need not also worry out during cases of emergencies because of the quicker intervention of tele veterinary medicine.

Conventionally, veterinarians often enjoy VCPR and its rewards during proximate clinical practice, however it is will be more enjoyable and rewarding by the practice of tele veterinary medicine. It only requires the same consistent compassion for the patients, ethical and legal framework and cooperation of the clients given for the non-telemedicine approach of healthcare.

Bibliography:

1. Norris, A. C. (Anthony Charles) Essentials of telemedicine and telecare/ A. C. Norris. p. cm. ISBN 0-471-53151-9 (pbk). Telecommunication in medicine. Title R119.9 .N672001 362.1'028-dc21. [Library of congress cataloging-in-publication Data]

   British Library cataloguing in publication data ISBN 0-47-53151-0

2. Alley A, Bowersox J and Jones G G. Current state of telesurgery, Telemedicine Today: June 1997. See also the version at http://www.telemedtoday.com/articlearchive/articles/telesurgery.htm

3. Demartines N, Freiermuth O and Mutter D. Knowledge and acceptance of telemedicine in surgery: a survey. Journal of Telemedicine and Telecare., 6, 125-131, 2000

4. Berry F C, Telemedicine and the army, Army Magazine. April, 1996

5. Baldwin G, Attention shoppers, American Medical News, 19 April 1999. See also the web site at http://www.ama-assn.org/sci-pubs/amnews/pick_99/tech0419.htm

6. Fahrenberg J and Myrtek M, Ambulatory Assessment, Hogrefe and Huber, Gottingen, 1996

7. Allen A and Stein S, Cost effectiveness of telemedicine, Telemedicine Today, 6.10-12. 14-15, 1998. See also the web version at http://telemedtoday.com/articlearchive/articles/cost_effectiveness_of_telemedici.htm

8. Johnston B, Wheeler L and Deuser J, Kaiser Permanente Medical Centre's pilottele-home health project, Telei17eilicirie Today. 5 (4). 16- 19. 1997

9. Wheeler T, Corrections-based telemedicine programs top most-active list, Telemedicine Today, 6 (3), 40. 41. 44, 1998

10. Elford D R, Telemedicine in northern Norway, Journal of Telemedicine and Telecare, 3, 1-22, 1997

11. Mitchell J, Fragmentation to Integration: National Scoping Study for the Telemedicine Industry in Australia. Department of Industry, Science and Tourism, Canberra, ACT. 1998. See Chapter 4 for the USA, Chapter 5 for South-east Asia, and Chapter 6 for Australia

12. American Telemedicine Association. The Global Application of Video Conferencing in Health Care, Section 2. Medical Applications and Benefits. See also the web page at http://www.atmeda.org/news/globalsec2.htm

13. Hjelin M. Benefits and drawbacks of telemedicine, in Wootton R and Craig J (eds) Introduction to Telemedicine, Royal Society of Medicine, London. 1999, Chapter 10

14. See, for example, the Dorset Health Authority web site at http://www.dorset.swest.nhs.uk/index.htm

15. Yellowless P, How not to develop telemedicine systems, Telernedicine Todar, 5(3), 6-7. 17, 1997. See also the web version at http://telemedtoday.com/articlearchive/articles/howno ttodeveloptelenie dicine.htm

16. Yellowless P. Successful development of telemedicine systems-seven core principles, Journal of Telemedicine and Telecare. 3. 21 5-222, 1997

17. Yellowless P, how to be successful at telemedicine, in Wootton R and Craig J (eds) Introduction to Telemedicine. Royal Society of Medicine. London, 1999. Chapter 7

18. Collins B and Sypher H, Developing better relationships in telemedicine practice: organizational and interpersonal factors, Telemedicine Today. 4 (2), 27, 42. 1996. See also the version at http://www.telemedtoday.com/articlearchive/articles/developingbetterre1ations.htin

19. Lister G. Global Health: implications for Policy, Nuffield Trust, London, 1999. See also the web page at 11ttp://www.nuffieldtrust.org.uk/health2/Lister.%20Policydoc.doc

20. British Medical Association, Medical Ethics Today its Practice and Philosophy, BMJ Publishing Group. London, 1993