The potential of telemedicine in South Sudan

Victor Vuni Joseph[a] MPH, FFPH

Introduction

The aim of this article is to introduce the concept of telemedicine in South Sudan, as part of routine healthcare delivery. The following objectives are addressed, to:

1. Highlight potential areas where telemedicine would add value in addressing some of the health challenges;

2. Identify some of the examples of telemedicine initiatives in Africa and

3. Propose to the relevant authority and professional group from where to start when considering the adoption of telemedicine.

Before the modern form of distant communication was introduced, mankind had their means of communicating messages, and South Sudan was not an exception. While the purposes of such communication were many, they included those related to health such as calling for help to save lives in emergency situations. Among South Sudanese, traditional communications means included using drums, various ways of making oneself heard by sounding alarm using one's voice (kelemete) with the hope of being heard. Elsewhere in the world, there were reported examples of how health messages were communicated in ancient times. A ship with passengers infected with bubonic plaque had to fly a yellow flag in order to warn others of the presence of infectious disease on board. Lepers were made to ring bells so as to warn other people to keep away [1].

Modern technologies have extended our ability to communicate across the world, especially following the discovery of telephone in 1876 by Alexander Graham Bell [1]. While the use of new technologies for the delivery of healthcare at a distance started mainly in the United States of America (USA) in the 1960's, it has now expanded by varying degrees across the world [1, 2]. This is what has become known as "telemedicine". The World Health Organisation (WHO) defines "telemedicine" as:

"The delivery of a healthcare service, 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 the continuing education of healthcare

a Consultant in Public Health, Directorate of Public Health, National Health Service (NHS) Doncaster, UK; vuni.joseph@tinyworld.co.uk

providers, all in the interest of advancing the health of individuals and their communities." [3]

Readers should be aware that there are other terms used in the published literature including "electronic health" (e-health), "mobile health" (m-health) and "telehealth". These terms and their distinctions are discussed elsewhere [4].

Potentials of telemedicine

Why do we need telemedicine in South Sudan? The purpose of telemedicine is to add value in addressing a number of health challenges. The rationale for this need is based upon:

1. Telehealth has the potential to overcome distance by providing health care remotely being in the form of advice and information sharing.

2. With fewer healthcare professionals in South Sudan, telemedicine reduces professional isolation, enabling the exchange of ideas, optimisation of the use of limited resources and support for continuing medical education.

3. The cost of health care will be reduced for both patients and their relatives by avoiding unnecessary travel costs to referral hospitals and cost to healthcare providers by fewer referrals.

4. Telemedicine could save lives by providing the means for prompt assessment, clinical decision-making and actions and

5. It may also lead to better planning of health services by enhancing epidemiological surveillance and data collection.

Most published experience of telemedicine relates to that in developed countries where the health challenges are dominated by non-communicable disease (NCD) such as cardiovascular diseases, respiratory diseases (e.g. bronchial asthma, chronic obstructive pulmonary disease), diabetes mellitus and cancers. In South Sudan the health priorities are the reduction of high maternal mortality and infectious diseases notably malaria, tuberculosis and HIV. [5]. If telemedicine is to have added value in South Sudan, it needs to be aligned to the national health agenda and must be shown to enhance effective service delivery. These goals are similarly captured in the Millennium Development Goals (MDG), especially those related to improving child health (MDG 4), maternal health (MDG 5) and control of infectious diseases e.g. HIV/AIDS,

MAIN ARTICLES

malaria, tuberculosis, etc. [6].

A report by the WHO, based on a survey of 114 member states (from low- and middle-income countries) in 2009 revealed that the usage of mobile health was for:

- health call centres (59%);
- emergency toll-free phone service (55%);
- managing emergencies and disasters (54%) and
- mobile telemedicine (49%) [7].

The report acknowledged that telemedicine had the potential to transform the delivery of health services across the globe. The key drivers for this were the increased use of mobile phones, their integration with health services and the realisation that 85% of world's population was covered by wireless signal [7].

Experience from other countries in Africa shows that telemedicine contributed to the delivery of healthcare in several areas (Table 1). Awakame and myself have reported on the experience of the introduction of mobile health for maternal and child health in Ghana [8].

Lessons published in Telehealth Networks for Hospital Services showed that cost-effective telemedicine initiatives are likely to be those that are relatively cheap and widely available [9]. Hence, the use of new technological devices such as mobile telephone, email, and online educational resources offer cost-effective potentials for telemedicine.

There are many forms of technologies that are used for telemedicine services; ranging from low-tech to high-tech devices. Examples of the devices used in telemedicine services include: telephone, internet, email, radio, television, short message service (SMS) or text, video-conference, electronic monitoring of vital signs (blood pressure, blood glucose, oxygen saturation) and questionnaires and global positioning systems (GPS) [10, 11].

Where to start

The WHO recommended that any country wishing to consider the implementation of telemedicine needs to form a national council that will oversee steering committees and centres of excellence, supported by a national association for telemedicine or e-Health [12]. International organisations exist that the Ministry of Health (and relevant professional bodies) in South Sudan may consider joining at no cost in order to understand more and gain support in their endeavour to implement telemedicine. Two of the international organisations that support telemedicine work are: International Society for Telemedicine and eHealth: http://www.isfteh.org/ [13]; and mHealth Alliance: http://www.mhealthalliance.org/ [14].

Conclusion

Telemedicine offers the potential for added value in the delivery of healthcare in South Sudan if it could be aligned with the national health priorities, especially those related to reducing the high maternal mortality rates, improving child health, and addressing infectious diseases. Health planners in the country will need to consider the role of telemedicine in enhancing the delivery of healthcare in the country.

Declarations of conflict of interest: The author declares that there is no conflict of interest related to this publication. The author chairs Africa-UK Telemedicine Working Group, part of Africa-UK Diaspora Engagement Programme that aims to support the adoption of Telemedicine in Africa.

References

1. Darkins, A.W. and M.A. Cary, *Telemedicine and Telehealth.* 2000, London: Free Association Books.

2. Wootton, R., Telemedicine and developing countries - successful implementation will require a shared approach. *Journal of Telemedicine and Telecare*, 2001. 7: p. S1-S6.

3. World Health Organisation, *Information Technology in Support of Health Care.* 2003; Available from: http://www.who.int/eht/en/informationTech.pdf

4. Pawar, P., et al., A framework for the comparison of mobile patient monitoring system. *Journal of Biomedical Informatics,* 2012. 45: p. 544-556.

5. Ministry of Health, *Health Sector Development Plan 2012-2016:* one maternal death is one too many. 2012, Ministry of Health, Republic of South Sudan.

6. UN. *We Can End Poverty 2015 Millenium Development Goals.* 2013; Available from: http://www.un.org/millenniumgoals/bkgd.shtml

7. World Health Organisation, mHealth: *New horizons for health through mobile technologies;* based on the findings of the second global survey on eHealth. 2011; Available from: http://www.who.int/goe/publications/goe_mhealth_web.pdf

8. Awakame, J. and V. Joseph. *Towards shaping telemedicine policies across Africa:* the contribution of Africa-UK Telemedicine Working Group. 2012, Telemedicine Working Group of Africa-UK Diaspora Engagement. p. 43.

9. Joseph, V. The Effects of Telehealth on Patients with Long-Term Conditions in Routine Healthcare Use and Lessons from Practical Application, in Telehealth Networks for Hospital Services: New Methodologies, V. Gulla, et al., Editors. 2013, *Medical Information Science Reference*: Hershey. p. 410.

10. Sheikh, A., et al., The Impact of eHealth on the quality and safety of healthcare: an updated systematic

Table 1: Some evidence of telemedicine activities in Africa

Activity and setting (reference)	Descriptions of intervention and key outcomes
TB reference laboratory, Pemba Island, Zanzibar [15]	The implementation steps were: 1. TB laboratory design according to the WHO standards; 2. laboratory equipment and reagent supplies for microscopy, cultures, and identification; 3. on-the-job training of the local staff; 4. web-and telemedicine-based supervision. 921 sputum samples were received from 40 peripheral laboratories: 120 TB cases were diagnosed. Of all the smear-positive cases, 74.2% were culture-positive. Smear positive to culture positive rate increased up to 100%.
The mobile phone as a tool to improve cancer care in Nigeria [16]	After 24 months, 1,132 patients (97.6%) had attended their follow-up appointments as against 42 patients (19.2%) who did not receive the phone intervention.
Effectiveness of mHealth. Behaviour Change. Communication Interventions; Ghana, Kenya, Nigeria, South Africa, Uganda, Tanzania (Systematic Review) [17]	HIV/AIDS and family planning/ maternity were the health topics. Inconclusive but promising evidence of effectiveness.
Teledermatology, teleradiology and telepathology; Ethiopia [18]	Ten sites in Ethiopia were selected to participate in this pilot between 2004 and 2006 and 20 physicians, two per site. Telemedicine implementation does not depend only on technological factors, rather on e-government readiness, enabling policies, multisectoral involvement and capacity building processes.
Use of Mobile Learning by Resident Physicians; Botswana [19]	Smartphones loaded with point-of-care tools are effectively utilized by resident physicians in resource-limited settings, both for accessing point-of-care medical information at the bedside and engaging in self-directed learning at home.
Use of Short Message Services to Expand Uptake of Human Immunodeficiency Virus Testing; South Africa [20]	In comparison with the control, receipt of 10 motivational text messages had the most impact on uptake of HIV counselling and testing with a 1.7-fold increased odds of testing (confidence interval 95%; p = 0.0036).
Building the Capacity in e-Health (Medical education); South Africa (University of KwaZulu-Natal) [21]	Medical Education: Videoconferencing of seminars and grand rounds to regional training hospitals, over 33,000 participants in 2010 (12 years' experience). Videoconferenced sessions were directly recorded to DVD and DVDs were sent to other medical schools in Africa.
Uliza! Clinicians' HIV Hotline: A Telephone Consultation Service; Kenya (Nyanza province) [22]	Uliza! (Swahili for "ask") Clinicians' HIV Hotline was launched in April 2006. Hotline users called an Uliza! consultant who discussed the patients' problems and helped the caller work through a solution, as well as reinforced national guidelines. 296 calls handled in a year. The study concluded that Clinicians using Uliza! found it useful, and advice given was usually implemented.
A telemedicine service for HIV/AIDS physicians working in developing countries; [23]	Between April 2003 and December 2009, the telemedicine service received 1,058 queries, from more than 40 countries, mostly resource-constrained. The average time to provide a first reply was 24 hours. All queries were handled by a co-ordinator who forwarded them to a network of specialists,
Telemedicine in primary health care: the virtual doctor project Zambia [24]	Used hard body vehicles fitted with satellite communication devices and modern medical equipment to deliver primary health care services to some of the neediest areas of the country.

MAIN ARTICLES

overview and synthesis of the literature. Final report for NHS Connecting for Health Evaluation programme., in Chapter 13 Telehealthcare. 2011. The University of Edinburgh; and Imperial College, London. p. 772.

11. Lewis, T., et al., E-health in low- and middle-income countries: findings from the Center for Health Market Innovations. *Bulletin of the World Health Organization*, 2012. 90: p. 332-340.

12. Kwankam, S., Successful partnership for international collaboration in e-Health: the need for organised national infrastructures. *Bulletin of the World Health Organization*, 2012. 90: p. 395-397.

13. ISfTeH. *Facilitating the international dissemination of knowledge and experience in telemedicine and eHealth and providing access to recognised experts in the field worldwide.* 2013 [cited 2013 3 March 2013]; Available from: http://www.isfteh.org/

14. mHealth Alliance. *mHealth Resources.* 2013 [cited 2013 3 March 2013]; Available from: http://www.mhealthalliance.org/.

15. Paglia, M.G., et al., *Improvement of Tuberculosis Laboratory Capacity on Pemba Island, Zanzibar*: A Health Cooperation Project. Plos one, 2012. 7(8).

16. Odigie, V.I., et al., The mobile phone as a tool in improving cancer care in Nigeria. *Psycho-Oncology,* 2012. 21(3): p. 332-335.

17. Gurman, T.A., S.E. Rubin, and A.A. Roess, Effectiveness of mHealth behavior change communication interventions in developing countries: A systematic review of the literature. [References]. 2012: *Journal of Health Communication.* Vol.17 (Suppl 1), May 2012, pp. 82-104.

18. Shiferaw, F. and M. Zolfo, The role of information communication technology (ICT) towards universal health coverage: the first steps of a telemedicine project in Ethiopia. Global Health Action, 2012. 5: p. 1-8.

19. Chang, A.Y., et al., Use of Mobile Learning by Resident Physicians in Botswana. *Telemedicine and e-Health*, 2012. 18(1): p. 11-13.

20. de Tolly, K., et al., Investigation into the Use of Short Message Services to Expand Uptake of Human Immunodeficiency Virus Testing, and Whether Content and Dosage Have Impact. *Telemedicine and e-Health,* 2012. 18(1): p. 18-23.

21. Mars, M., Special Issue on Africa Introduction: e-Health in Africa. *Telemedicine and e-Health*, 2012. 18(1): p. 3-4.

22. Karari, C., et al., Evaluating the uptake, acceptability, and effectiveness of Uliza! clinicians' HIV hotline: a telephone consultation service in Kenya. *Telemedicine Journal & E-Health,* 2011. 17(6): p. 420-6.

23. Zolfo, M., et al., A telemedicine service for HIV/AIDS physicians working in developing countries. *Journal of Telemedicine and Telecare,* 2011. 17(2): p. 65-70.

24. Mupela, E.N., P. Mustarde, and H.L.C. Jones, *Telemedicine in primary health: the virtual doctor project Zambia.* Philosophy, ethics, and humanities in medicine: PEHM, 2011. 6: p. 9.