

## Telemedicine and Teleradiology in Saudi Arabia

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### Abstract:

Telemedicine offers the potential to alleviate the severe shortage of medical specialists in developing countries and promises to alleviate some of the difficulties rural doctors and hospitals have in accessing specialist advice in Saudi Arabia. Telemedicine programs between remote rural hospitals and central hospitals have been successfully implemented in Canada, USA, Australia and in Saudi Arabia. In all these countries telemedicine has allowed the specialist to come to the patient rather than the patient's having to travel vast distances to visit the specialist. There is an acute shortage of radiologists in rural regions of the country, particularly in southern region of Saudi Arabia, therefore applications include Teleradiology, Telepathology and teleconferencing between rural hospitals and central hospitals which is ideally suited to the development of a national telemedicine network. Nearly half a century ago, telemedicine was disregarded for being an unwieldy, unreliable and unaffordable technology. Rapidly evolving telecommunications and information technologies have provided a solid foundation for telemedicine as a feasible, dependable and useful technology.

enhanced access to healthcare via telemedicine will be achieved only with the ubiquitous distribution of telemedicine systems networks. In fact, the need for increased access to healthcare, lower cost for healthcare and increased quality of such care is generally inversely related to populations or regions economic status. To achieve enhanced access in our educational fields, these systems must become more affordable and both the public and private sectors must assume their respective shares in this investment and also use full point in medical educational field. This paper describes and clarify the role of Telemedicine and Teleradiology in education .Through identifying the relevant literature and provide suggestion that might be implemented and consider in the near future. Researchers expect that this study will enhance the level of understanding and meaning of telemedicine among stakeholders, new entrants researchers and students and eventually enabling a better quality of life.

**Keywords:** Telemedicine, Teleradiology , Telepathology Digital imaging, Free software

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### I. Introduction:

Telemedicine as a technology has been available for nearly 50 years. This term coined in the 1970s, which literally means (healing at a distance) (1), signifies the use of information and communication technologies( ICT) to improve patient outcomes by increasing access to care and medical information. Recognizing that there is no one definitive definition of telemedicine –the World Health Organization has adopted the following broad description: The delivery of health care services, where distance is a critical factor, by all health care 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 health care providers, all in the interests of advancing the health of individuals and their communities (2).The many definitions highlight that telemedicine is an open and constantly evolving science, as it incorporates new advancements in technology and responds and adapts to the changing health needs and contexts of societies. Rapid development in the information and communications technologies have enabled Telemedicine applications are cutting across the wide telemedicine to broaden its scope.

spectrum of communications technologies. This wide distribution permits application of telemedicine technologies suitable for all across the digital divide. Collaboration of technologists, researchers, engineers, developers, scientists, clinicians and practitioners is perpetually working to new and greater applications of telemedicine. Telemedicine is now a well understood concept. Although in simple terms telemedicine refers to the delivery of medical health services at a distance, there is no single or uniform telemedicine application(2).

### Telemedicine:

Telehealth is the practice of healthcare delivery using telecommunications technology including but not limited to diagnosis, consultation, treatment, transfer of medical data, education, dissemination of public health alerts and emergency updates. Telemedicine is the use of telecommunications technology to deliver clinical

diagnosis, services and patient consultation.(1) Applications can be real-time or store-and forward for the purposes of this paper Telemedicine is not a separate medical specialty. Products and services related to telemedicine are often part of a larger investment by health care institutions in either information technology or the delivery of clinical care. Even in the reimbursement fee structure, there is usually no distinction made between services provided on site and those provided through telemedicine and often no separate coding required for billing of remote services.

Access, equity, quality and cost-effectiveness are key issues facing health care in both developed and less economically developed countries. Modern (ICTs), such as computers, the Internet, and cell phones, are revolutionizing how individuals communicate with each other, seek and exchange information and enriching their lives. These technologies have great potential to help address contemporary global health problems. Telemedicine, a term coined in the 1970s, which literally means “healing at a distance (3), signifies the use of ICT to improve patient outcomes by increasing access to care and medical information. Recognizing that there is no one definitive definition of telemedicine – a 2007 study found 104 peer-reviewed definitions of the word (4) the World Health Organization has adopted the following broad description:

There is an acute shortage of medical specialists in many developing countries. In sub-Saharan African countries there are on average less than 10 physicians per 100,000 population (5) and 14 countries do not have a single radiologist (6). Internet connections are now available in the capitals of all 54 African Countries(7) however, email is more widely available and more robust over unreliable network connections. One method that has been used successfully to extend the reach of medical specialists is telemedicine (8). However the traditional approach to telemedicine relies on real-time video interaction between the specialist and the referring physician and patient. Digital imaging and the availability of Integrated Services for Digital Network (ISDN) lines have extended the reach of this technology in developed countries, but it remains impractical and uneconomic in remote and resource poor areas. However, medical diagnosis and management can often be achieved with the use of textual descriptions and still images. This store-and-forward approach to telemedicine simulates the working patterns of radiologists, pathologists, and those of certain clinical specialties such as dermatology (9), infectious diseases and ophthalmology (10).

#### **Teleradiology:**

Teleradiology is the electronic transmission of radiographic images from one geographical location to another for the purpose of interpretation and consultation. It allows images to be viewed simultaneously by various users in different locations. The main applications of Teleradiology are to provide radiological expertise at remote sites more quickly than would otherwise be possible(11).

#### **Need of Tele Radiology in Saudi Arabia:**

Saudi Arabia , southern region faces a variety of health challenges. There is a shortage of in Community Health Centers and shortage of specialists at Community Health Centers and hospitals. Particularly ,radiology departments are understaffed were Staffing shortages are occurring at a time when radiology volume generally is increasing. The gap between demand and supply of quality radiologist is ever increasing. There are various underlying reasons why the supply of radiologists is insufficient to meet demand in many areas(11,12). In this respect, Saudi Arabia is working with State Governments to setup the Tele-Radiology services across various districts hospitals in the region of southern. Were Tele-Radiology solution will help to manage the data streamline the image flow from all district hospitals.

Tele-Radiology system, offering a comprehensive enterprise class hospital. Magnum Tele-Radiology integrates images from multiple modalities with clinical patient data, streamlining radiology department workflow and improving the radiologist’s efficiency. The storage of patient studies in Magnum Tele-Radiology is almost unlimited, and it was designed to handle the ever-increasing study volumes or the increasing storage demands of the newest, most modern modalities in an enterprise.

The overall workflow for the Tele-radiology across district hospitals, central data center and reporting center is as mentioned below:

- a) Patient walk-in to hospital’s diagnostic center and undergoes certain radiology procedure.
- b) Radiology image of the patient is captured and stored in the Local PACS server of hospital.
- c) These studies are sent to the reporting center for the reporting purpose using Tele Radiology solution.
- d) Radiologist accesses the Patient image using Tele-Radiology solution and reports the same.
- e) As soon as Radiologist confirms the report, it is made available at the respective hospital and also a copy is sent to the central data center for archiving. These reports are digitally signed by the radiologist and cannot be altered by any one.
- f) All these district hospitals are connected to the central data center, which backups all the images as well as data(13).

## **II. Conclusion:**

The interest in Telemedicine and Teleradiology is consistent with the fact that there has been more thoroughly tested for medical efficacy than other telemedicine applications in Saudi Arabia. Continuing medical education may represent another potential for widespread successful telemedicine application. Telemedicine is a rapidly developing application of clinical medicine where medical information is transferred via telephone, the Internet or other networks for the purpose of consulting, and sometimes remote medical procedures or examinations. The use of satellite transmission has been used in Saudi Arabia for intercontinental consultations with the USA, but costs are very high compared with those of the conventional telephone system. Training of health care professionals in the use of the digitizer was straightforward, even with staff who were previously computer illiterate. However, the radiographers found the process of transmission to be time-consuming and that it interfered with other work. Training of clerical staff to use the digitizer correctly appears to be one solution to this problem. In summary, simple teleradiology systems are valuable in patient management in rural hospitals however their full effectiveness will not be realized until there are improvements in rural telephone lines.

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## **References :**

- [1]. Report of the Oregon Telecommunications Coordinating Council,
- [2]. <http://www.ortcc.org/PDF/CouncilReport.pdf>, Oregon Telecommunications Coordinating Council, Presented to the Joint Legislative Committee on Information Management and Technology, Seventy-Second Legislative Assembly, November 6, 2002 (Revised December 5, 2002)
- [3]. 2.Strehle EM, Shabde N. One hundred years of telemedicine: does this new technology have a place in paediatrics. Archives of Disease in Childhood, 2006, 91(12):956–959.
- [4]. Sood SP, et al. Differences in public and private sector adoption of telemedicine: Indian case study for sectoral adoption. Studies in Health Technology and Informatics, 2007, 130:257–268.
- [5]. WHO. A health telematics policy in support of WHO's Health-For-All strategy for global health development: report of the WHO group consultation on health telematics, 11–16 December, Geneva, 1997. Geneva, World Health Organization, 1998.
- [6]. Health Personnel, WHO, 1996 <http://www.who.int/whosis/healthpersonnel/>
- [7]. WHO advisory meeting on radiology education. Geneva: World Health Organization; 1999
- [8]. Jensen M. Africa Connections: <http://www3.sn.apc.org/africa/>; 2000.
- [9]. Mitka M. Developing countries find telemedicine forges links to more care and research. Jama 1998;280(15):1295-6.
- [10]. Schmid-Grendelmeier P, Masenga EJ, Haeffner A, Burg G. Teledermatology as a new tool in sub-saharan Africa: an experience from Tanzania. J Am Acad Dermatol 2000;42(5 Pt 1):833-5.
- [11]. Yogesan K, Constable IJ, Morgan W, Soebadi DY. International transmission of tele-ophthalmology images. J Telemed Telecare 2000;6(1):41-4.
- [12]. Goldberg MA. Teleradiology and telemedicine. Radiol Clin North Am 1996; 34(30): 647-665.
- [13]. AeR Standard for Teleradiology. Reston, VA. American College of Radiology, 1994.
- [14]. Goldberg MA, Aoesenthal OI, Chew FS. New high resolution teleradiology system: prospective study of diagnostic accuracy in 685 transmitted clinical cases. Radiology 1993; 186: 429-434.