Teleradiology: Historical Overview

Introduction

Telemedicine has been around for more than 50 years. The basic concept is that health care can be delivered over a distance. The use of telemedicine has exploded in recent times due to technological advances in computers and telecommunications, however they are not limited to teleradiology. Surgeons can perform procedures robotically half way around the world. Internists can check labs and prescribe medications. 'Teleradiology, has taken telemedicine to the point of routineness,' as images can easily be obtained anywhere that there is an imaging tool, such as a CT scanner, and transmitted over the internet for remote review, diagnosis and professional consultation.

Development

Telemedicine can be as simple as discussing a case over the telephone with a colleague who has particular expertise about the subject at hand. Therefore, telemedicine has been around at least as long as the telephone! When it first started, it was referred to as absentia care, often relying on mail rather than technology. In fact, its birth was not even in the United States. In Africa, villagers would warn travelers of serious illness with smoke signals in attempt to limit the spread of disease. In the early 1900’s, Australian Royal Flying Doctors would use bicycle powered radios to communicate across territories for medical information.

In the early days of electronics, cases were often reviewed on closed networks within a hospital, and over broadcast television for outsiders to review. Medical schools often employed this technique for teaching large audiences. Radiology and Pathology consultations lend themselves particularly to this approach, as both are visual fields with easily broadcast data. Massachusetts General Hospital once used an interactive television system using microwaves to transmit information from Logan Airport to the hospital to care for travelers.

Walter Reed General Hospital began using closed circuit television to broadcast radiology results to the Emergency Room in the 1960’s. However, the system was slow and had poor resolution, and television based interactive medicine was short lived.

As computers became more commonplace in the 1970’s and 1980’s, the concept of collecting and storing data using computers, then transferred for review, was born. This is now the basis for telemedicine and teleradiology. Using this method, data and images are transferred instead of voice or video for consultation. This has been applied to dermatology, pathology, cardiology and nursing home monitoring.
Technology and Regulation

Dedicated teleradiology systems became commercially available in the 1980’s, but they were extremely limited. These systems were generally used for “after hours” coverage from home, and employed photographic or videographic selected images for digitization and transfer. They were slow and very limited in resolution. Laser based digitizers improved image quality, but were still extremely slow, cumbersome to use, and required a ‘photographer’ at the source to transfer the images. Until the mid 1990’s, digital image production at the source and fast computers were not available, and the approach was not widely adopted.

Within the last 10-15 years, the internet has become the primary method of data transfer, and has become faster and faster each year. The price and performance of high speed computers has made them readily available. Several studies evaluating the quality of transmitting digitized conventional images proved that analog to digital conversion was a viable technique. Finally, the development of Picture Archiving and Communication Systems (PACS) has forever changed the face of diagnostic imaging. The vast majority of imaging today is acquired digitally, and teleradiology is now possible from anywhere on the planet, for anyone on the planet.

In 1994, the American College of Radiology (ACR) published its first ACR Standard for Teleradiology. They suggested that physicians providing interpretations maintain licensure at both the initiating and receiving sites, and hold hospital credentials. In 1996, the Federation of State Medical Boards addressed the practice of medicine across state lines. Most states have new regulations facilitating interstate practice, with specific restrictions requiring licensure.

Equipment used for teleradiology is widely available and must receive FDA approval, requiring resolution comparable to onsite equipment. Most third party payors reimburse for teleradiology services, and Medicare/Medicaid does not even segregate out cases that are read remotely. In fact, similar guidelines are used for reimbursement for other technologies, including electrocardiograms, pathology samples, etc.

Conclusion

The availability of teleradiology has changed the face of diagnostic imaging forever. Clinicians are no longer content to wait until the next day for night time interpretations. In fact, they often expect readings within minutes of a study being performed. This has been further exacerbated by imaging replacing exploratory surgery. The primary role of teleradiology to date has been to accommodate these after hours readings. However, Third Eye Teleradiology has the goal of changing that. Why not take advantage of the fact that subspecialty experts are available around the country all day long? Teleradiology need not be relegated to night time reading. We can provide the highest level of care anywhere necessary.

Finally, teleradiology makes available techniques that may not be routine, particularly in remote areas of the world, or in practices where there is no specific expertise. CT colonography, virtual cystoscopy, 3D angiography and multiplanar imaging are now possible anywhere that digital imaging is available. Truly teleradiology, when provided by experienced, skilled radiologists using the best equipment, will have the greatest impact on the globalization of medicine.