FEATURED ARTICLE

Telecardiology: A Solution Whose Time has Come

Keywords
- Digital stethoscope
- Telecardiology
- Teleecg
- Teleechocardiography

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India faces a big challenge of shortage in trained health care personnel at all levels, especially in the rural areas. There is a shortage of adequately trained specialists, technicians, and nurses for cardiology to cater to noninvasive, invasive diagnosis and disease management and as a result mortality from CVD remains high. Teleteaching and telecardiology are innovative solutions that can help address the issue of specialist shortage for teaching as well as clinical diagnosis and disease management.

BURDEN OF DISEASE

The Indian subcontinent is home to 20% of the world`s population and one of the regions with highest burden of cardiovascular disease in the world. The Indian rural population and urban poor are facing a "double burden" with incidence of acute disease continuing in addition to a rapid growth in incidence of chronic disease. It is not just the poor who are affected. With unhealthy lifestyles, decreasing physical activity, increasing stress levels and increasing intake of saturated fats and tobacco, rise of CVD`s is seen in the economically privileged population as well.[1,2]

With an incidence of 1%[3,4] nearly 180,000 children are born with heart defects each year in India. Of these, nearly 60,000 to 90,000 suffer from critical cardiac lesions requiring early intervention. Approximately 10% of present infant mortality in India may be accounted by congenital heart diseases alone. The global burden of disease caused by rheumatic fever and RHD currently falls disproportionately on children and young adults living in low-income countries with an incidence of an average of 0.9/1000 and accounting for 233000 deaths annually.[5,6]

WHERE ARE THE CARDIOLOGISTS?

India faces a challenge of shortage in trained health care personnel at all levels, especially in the rural areas. There is only about one doctor for every 1700 people in India and it faces more than a 60% shortfall of specialist at the community health center level. There is a shortfall of 600,000 docs and 1,000,000 nurses to reach the WHO recommended stand of 1 doctor for every 1000 people. The situation is even worst when it comes to cardiologists. India trains only about 150 new cardiologists every year and the number is not enough given the disease burden.[7,8]

There is a shortage of adequately trained specialists, technicians, and nurses for cardiology to cater to non invasive diagnosis, invasive and disease manage-

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ment. As a result mortality from CVD remains high, for instance the mortality rate due to acute coronary syndrome was 5.5% for the rich, while that for the poor was 8.2%.

SOLUTIONS?

One solution for the inequitable distribution of specialists is TELE-CARDIOLOGY. This encompasses tele-echocardiography, tele-ecg, tele consultations and e-teaching. Imagine a cardiologist in a traffic jam in a major city of India utilizing his or her time to review an echocardiogram of a patient in a remote town, giving a diagnosis and directing therapy. With tele-cardiology this is now possible. Newer technology with cloud based tele-echo is now available for use in India. The advantage is that specialist advice is available for patients in remote areas eliminating the need and expense of unnecessary travelling. Cardiac diagnosis at a distance is the way of the future. Some telecardiology solutions are detailed below:

Digital stethescope

Hearing the heart sounds is an integral part of telecardiology. Studies have shown that the digital stethoscope maybe more sensitive than the conventional stethoscope.[9] Using it for remote hearing makes it a valuable tool in Telecardiology. One such digital stethoscope (Figure 1) we use in our Telecardiology setup is the ViScope which is a compact electronic stethoscope combining a high resolution visual display with traditional auscultation. Using the device, medical professionals can perform dynamic remote auscultation. In addition, the visual waveforms presented in the format of the classical phonocardiogram can be transmitted to the specialist at the remote end for analysis and validation.

Tele-echocardiography

Echocardiograms, which are the most used in cardiac evaluation, need experts performing the scan and interpreting them to arrive at a diagnosis. While technicians and physicians[10] can be trained to acquire echocardiographic images, many times a skilled Cardiologist is needed to give an interpretation and plan management. Most recent Echo machines are DICOM compliant, so transmission of these images is possible using a Cardiovascular PACS system. One issue in the transmission of Echocardiogram images is its size as many are cine files, which require robust compression techniques without losing the quality of the images.

CardioSpaTM (Telerad tech, Bangalore, India) is a Cardiovascular PACS system (Figure 2) which has the ability to provide the Cardiologist a seamless platform for receiving all types of cardiac evaluations on a single platform from which they can interpret and report. The platform uses compression techniques which bring the size of the images down by 40% for the ease of transmission which is then decompressed at the specialist end making tele-echo possible without loss of image quality. The platform can also accept standard formats of ECG and Holter which can be transmitted through its workflow platform to be remotely read and reported by Cardiologists.

Figure 1. Digital stephoscope-viscope

Tele-ECG

An Electrocardiogram (ECG) is a first line of diagnosis for cardiac diseases and this has an important place in Telecardiology.[11] Transmission of ECG can be performed either as a scanned document or interfacing the equipment with a telecardiology software platform or to the existing Picture Archiving and Communication Systems (PACS). Getting the ECG interpreted quickly by a Cardiologist is becoming an urgent requirement with the proliferation of ECG machines and cardiac centers around the country. There are

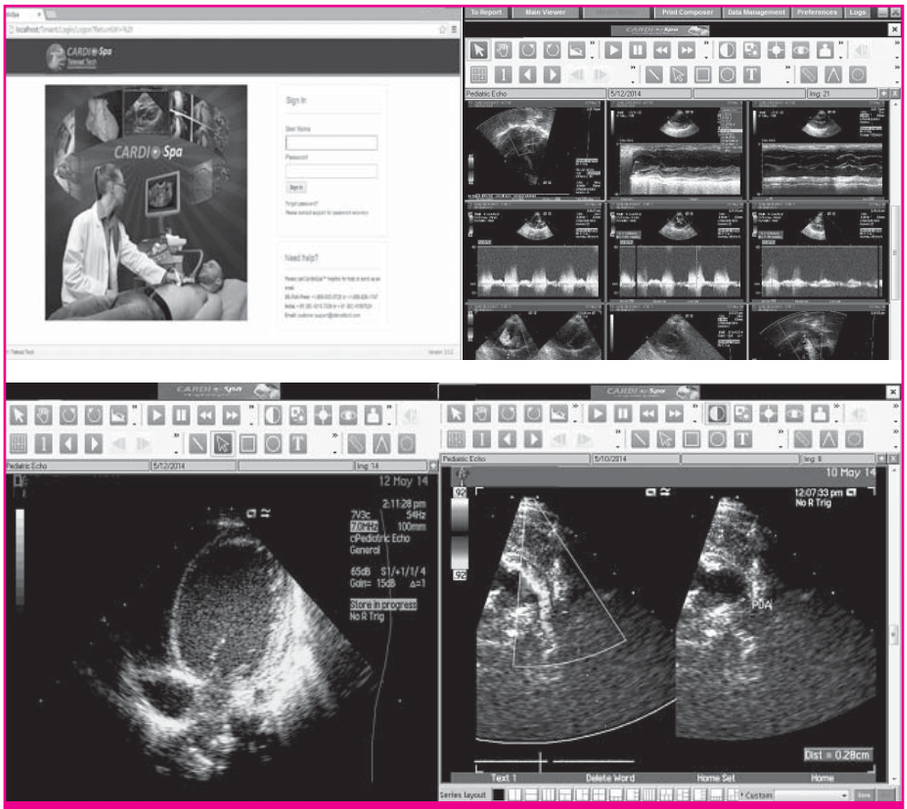

Figure 2. An example of a telecardiology platform now available in India

already products available in the market which can transmit ECG data directly from the device to the cloud which can be sent to the cardiologists on their smartphones for quick reporting. Many studies are being conducted on this technology and service to evaluate its usage in life threatening situations such as myocardial infarction.

Teleconsultation

Telemedicine technology can be leveraged to connect with people/providers who are in need of a specialist consultation. Using a traditional audio video technology, reaching on time to the right people can make a significant difference to outcome in cardiac diagnosis. Although adoption of telemedicine technology has been relatively slow in India due to many factors, this is changing and its increased usage will help obviate the shortage of specialist cardiologists in remote and rural parts of India.

Teleteaching

There is an acute shortage of teaching manpower in the existing medical college and training programs in India, particularly at the postgraduate level. There is a similar shortage of trained Pediatric Cardiologists available to interpret pediatric echoes and direct care, especially in rural and remote areas. One successful example of e-teaching in India currently is described below (http://pedicardiolearning.com/):

E-teaching in Pediatric cardiology: From May 2010 to April 2014, 319 simultaneous e-classes in Pediatric Cardiology have been conducted by faculty from across India and abroad, using Cisco technology (Figure 3) for postgraduates across India and Africa. The e program is now accredited by the National Board of Examinations, New Delhi.

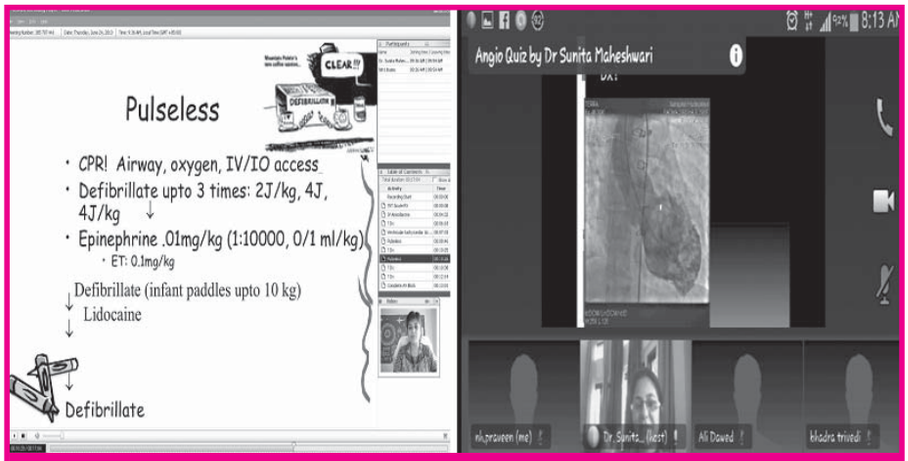

Figure 3: A screenshot of an e-class in pediatric cardiology

The advantages of virtual live e-teaching in medicine:

- One teacher can teach multiple students in multiple geographic locations at the same time, obviating the issue of teacher shortage.
- The same content can be disseminated to all the centers undergoing specialist training so there is a national consensus on diagnostic and management approach among all trainees.
- The e-classes can be recorded and replayed so they can be viewed repeatedly by the same group or new trainees.
- The question and answer sessions are fully interactive and similar to a normal classroom.

CONCLUSION

Teleteaching and telecardiology are innovative solutions that can help address the issue of specialist shortage for teaching as well as clinical diagnosis and disease management in India and this part of the world.

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