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Telemedicine: Evolution and emerging dimension

P.K. Paul [1], R. Senthamarai[2], Jhuma Ganguly[3] and M. Ghosh [4]

[1,3 and 4]FBAS, Indian Institute of Engineering Science and Technology [IIEST], Shibpur, Howrah, West Bengal, India
[2]HOD, Department of Computer Application, AVIT, VM University, Chennai, T.N

Corresponding author: prancloud@outlook.com

Abstract

Health and Medical System is one of the important name and aspect of our daily life. Day by day Medical Science is increasing and developing, the interaction and application of Information Technology and Computing creates a new domain in Medical Science—Telemedicine. This is one of the important tools and uses for providing clinical healthcare services at a distance. This is also helpful for improving access to Medical Services that would after not be consistently available in distant rural communities. Since its inception there are s many form of Telemedicine are emerged and each of them are valuable in respective situation. Telemedicine, its evolution and basic and including traditional and emerging dimension are illustrated briefly in this paper.

Keywords: Information Technology, Information Systems, Tele-Communication, Medical Science, Health Science, Healthcare, Telemedicine, Hospital, Medical Colleges

Telemedicine is one of the important tool and aspects of interdisciplinary Medical Science and Information and Computing Technology. This is actually helpful in patient living in isolated communities and remote regions, who may get consultancy and treatment from the physician. In generally this is practiced in a structured place and in house of the health and hospital systems; however the advancement of Information and Communication Technology brings some new arena in the sector, mobile collaboration technology can allow healthcare professionals in several places to share and communication; this is may also include consulting and disease related matter or any brief message from the health service providers. Remote prescription verification is also allowed in some hospital and healthcare unit by the mobile based services [01, 09]. Managing health and medical record including their digitalization in permanent storage and virtualization is also part of modern Telemedicine systems [02, 05, 13].

Objectives

The main aim and objective of this paper is includes but not limited to as follows—

- To know basic about the Telemedicine and its characteristics and features at a glance;
- To learn about the evolution and historical background of the Telemedicine;
- To learn basic about the emerging tools, techniques as well as technologies of Telemedicine;
- To know the common services and facilities offered by the Telemedicine;
- To know the most upcoming and emerging services offered by the Telemedicine;
- To learn about the Telemedicine and its characteristics and opportunities in contemporary scenario.
- Telemedicine, Evolution and Fundamental Characteristics:-

Today Telemedicine is one of the important and valuable name in the field of Applied Medical Science and Technology. Telemedicine is helps in eliminate barrier and problem between Service Provider and Service Seeker [14, 19, 22]. Today it is an important gift of Information Science and Technology. Early records are witness that, before development of modern Information Science, Medical Information and Record Management was practiced with manual documentation principles. African villagers are used smoke signal to warn people to stay away from the village in the case of serious diseases.

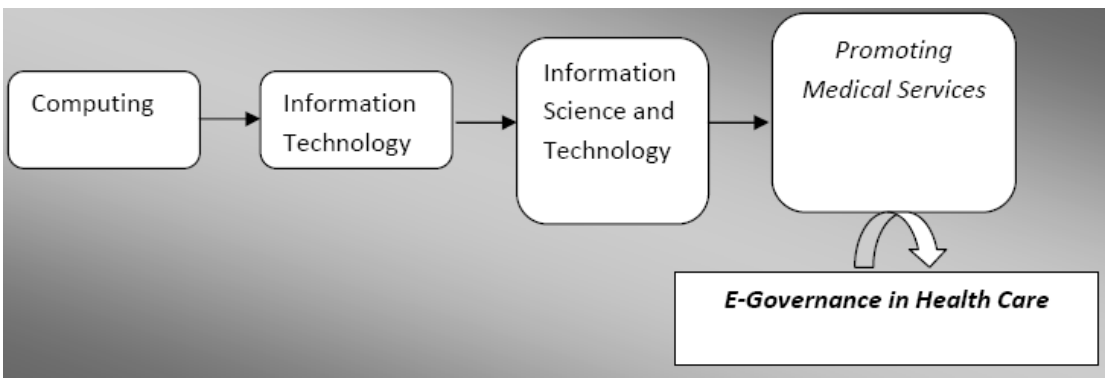

Fig. 1: Showing smaller to larger gradients and fields related to Informatics Engineering and their role in Medical Systems

Though before the emergence of satellite based TV or display unit for Health related consultancy, Radio was most popular and people living in remote areas of Australia used radio system run by the two way mode. Though the first sophisticated Medical System with Telecommunication support by standard telephone lines was created by the Med-phone Corporation during 1989 [22, 23]. During 1990-91 and later too, near about 12 hospital of the US joint with MDPhone Telemedicine services for medical related purposes including receiving and treatment services. Recently Allied Medical Science such as Nursing, Pathological and Paramedical Sciences, Pharmacy was integrated with the Telecommunication and other computing platform [19, 27].

Telemedicine and IT and wider spectrum

Information Technology including Database Systems, Multimedia System, Networking Technology and Communication Technology and other sub system play an important role for the strengthen Telemedicine and Computing based medical system. In generally Telemedicine is denotes offering medical services and consultancy or recent evolving concept Tele Medical Administration; technological monitoring remote place by the online means, such as VSAT or Record video system or recent web 2.0 site sharing and so on. Tele-monitoring helps in blood pressure, heart rate, weight and blood glucose and hemoglobin and so on [09, 28, 29].

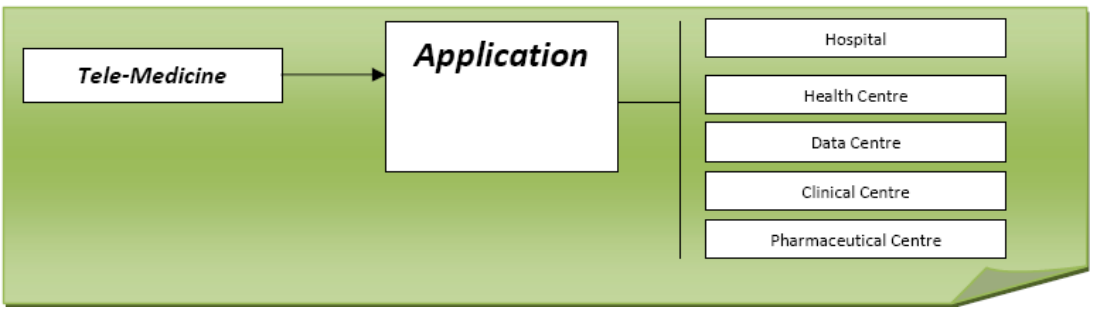

Fig. 2: Depicted main stakeholders of Tele-Medicine as far as its uses is concerned

During some years, some Allied branch of Medicine also interacts with IT for service offering by the Electronic means and Telecommunication. Electronic and IT enable nursing service is an important example where nursing service is offered by the Telecom sites with a large physical distance exists between patient and nurse/s. this is in many cases helpful in shortage management of the nurses and also reduces distance and save travel time, and to keep patient of hospital. In case of emergency and accident such system is helpful. In some countries Tele-nursing is gaining rapidly due to many factors.

Use and integration of Information Technology in Pharmaceutical Science bring a new domain called Tele-Pharmacy. Preparation and delivery of medical preparation electronically or Pharmaceutical care by the remote based delivery is the gift of IT based medical services. Tele-Pharmacy is an important term with drug therapy monitoring, patient counseling, prior authorization and refill authorization for prescription drugs and so on. Remote based dispensing, ordering medical to medical agency is provided by the Tele Pharmacy. Tele-Pharmacy is also comes as an important gift i.e. Communicating so many agency easiness such as hospital, nursing homes, clinical centre and so on[12, 18].

Today Rehabilitation Services also get affiliation of Information Science and Technology and thus two types of services are emerged- clinical assessment and clinical therapy. In broad manner, Tele-Rehabilitation is includes neuro psychology, speech language pathology, audiology, occupational therapy and physical therapy. Webcam, Video conferencing, Phone lines, video phones and web page related rehabilitation services and so on. Virtually, Tele-Rehabilitation is popular in building new data collection system to digitalize information that a therapist can use in practice. For disable people Tele-Rehabilitation is most important and useful. Tele-Audiology is an important facet for the hearing assessment and so on. Occupational Therapy and Physical Therapy still has limited uses in Tele-Rehabilitation [14, 19].

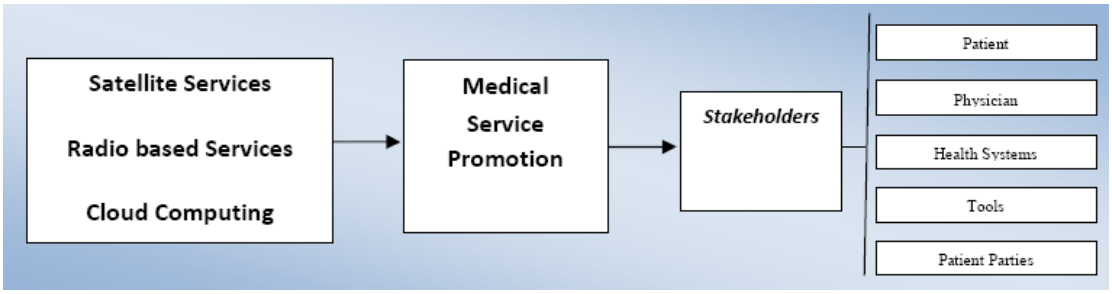

Fig 3. Depicted the core stakeholders of Telemedicine as Medical service promoter

Application and integration of Telecommunication and IT in radiology bring Tele-Pharmacy. In such area, ECG is possible to transmitted using Telephone and wireless system. Though this service is very much limited; here transmission using wireless system was done through telephone lines.

Application of ICT in the Pathological Sciences initiated some more services such as preparation of document electronically and sending through the electronic means such as E-Mail and Mobile based services. Consultancy to the higher authority from the junior pathologist, E-Documentation, result generation are also depends on computational system many ways [14, 17].

In Radiology, IT and Telecommunication is uses for communication of CT, MR, DET/CT, SPECT/CT, MG, US and others. Apart from these, IST and Telecommunication launches some more dimension of Telemedicine such as—

- Tele-Dentistry;
- Tele-Dermatology;
- Tele-Audiology;
- Tele-Surgery;
- Video Teleplay and so on.

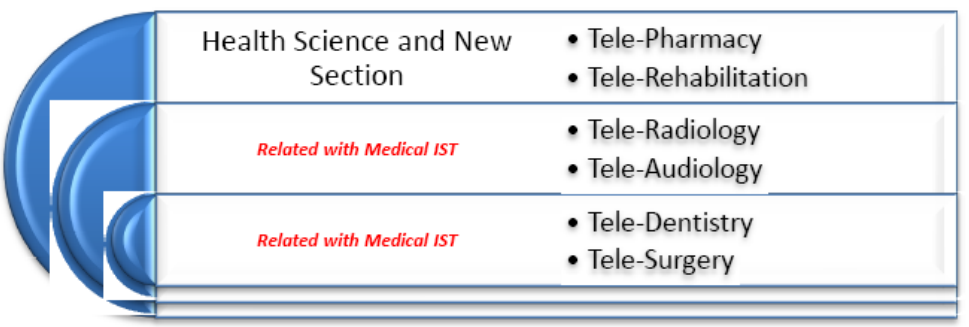

Fig. 4: Depicted the core stakeholders and subsystems of Telemedicine

Findings

- Telecommunication, IT and Computing are responsible for the modern day's service offering with complete patient-hospital relationship;
- Still programme and courses on Medical Informatics is very much limited in India and many countries;

- Telecommunication and Information System based mobile services is started in many medical colleges and hospitals;
- Funding, initiative as well as planning still a big issue for initiation of healthy medical systems;
- Allied Medical Science also involve with manual and computational Information Management.

Suggestion

- Government and ministries need to take initiative to start Medical Technological implementation for sophisticated health systems;
- Proper full-fledged or specialization based courses may be start in Telemedicine or Health Informatics/ Health Information Science in the related fields;
- Proper funding and financial assistance is essential to start by the appropriate agency;
- Computation in document and other medical record is very much essential for future Health System Management.

Conclusion

Al like main root Medical Science, Telecommunication also involves in so many other allied field and such fields are including nursing science, pharmacy and pathological science and so on[13]. For advance and modern Medical Services organization are moving complete computation and manual documentation from the beginning of patient registration, prescription preparation, E-Consultancy, Online check up and so on. People still not aware about the modern health system and computer literacy and thus proper education is essential for complete computer education for better Tele based medical services.

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