



Available Online at www.hithaldia.in/locate/ECCN
All Rights Reserved

ORIGINAL CONTRIBUTION

IT Infrastructure usage in Hospitals: A Study

Moumita Pari Giri and Satakshi Chatterjee

Haldia Institute of Management, Haldia, India

(Received Date: 23th November, 2017; Acceptance Date: 15th February, 2018)

ABSTRACT

Indian Healthcare System is one of the largest systems across the world which aims at providing quality healthcare to millions of people. There are multiple challenges which are being faced by the system. One of the major challenges is the lack of appropriate IT infrastructure. This paper aims at discussing the various IT challenges present in the healthcare system of India and also to implement certain systems which must be implemented in order to securely save the multitude of data being generated every second. Certain points should be immediately implemented in order to provide quality healthcare to all the patients. This paper only contains the literature review of the articles found pertaining to this topic. This paper is made using secondary data only.

Key words: Healthcare, IT infrastructure, India, Network

1. INTRODUCTION

Proper Healthcare management system is a combination of information science, information technology, computer science and healthcare. It handles the resources, different devices and techniques required to accomplish the activities like storage, retrieval and use of information in health care. This contains computers, clinical guidelines, information and communication systems and formal medical terminologies. Increasing initiatives in Research and Development of healthcare industry as well as quick development in information and communication technology in last 20 years have changed considerably in the quality of medical services to the customer end. Developed countries invest a lot of capital for the progress of the healthcare management systems and their assimilation with information technology. Healthcare system has transformed in suitable form through the improvement of ICT. Very easy and quick access to the remedial data which is present to all the stakeholders through network provides advantages in this system. In health care, the use of various types of information technology (IT) has progressed continuously

since the beginning of patient registration, telecommunication technologies leading to improvements in the capabilities of a large variety of computer. Both in the public and private sectors, the evolution can be recognized in the peculiarities of the health-care sector which facilitate in information storage and management, create name, scope and status as a large market for health care segment.

The improvement of magnetic cards for hospital admissions, examinations, user identification; electronic scheduling systems for appointments, computerized protocols for diagnosis and all treatment support are just a few examples of health care management. Health information technology facilitates to access not only the health literature, but also books and databases, online journals & offline to informational CD-ROMs.

This study reveals the present scenario of IT infrastructure of Healthcare sector in India. It also emphasizes the importance of IT infrastructure in the Healthcare sector. The findings of the study reflects the related issues in

*Corresponding Address: satakshichatterjee777@gmail.com

this regard and the impact of IT infrastructure on Healthcare sector in India.

2. NEED OF IT INFRASTRUCTURE IN THE HOSPITALS

Healthcare services and products are the resource-starved sector, facing with the challenge of the regulation of public health which ensures impartial access to the needy and the poor. The information sharing about facilities, performance, planners, contributors, governments, service provider resources, costs and prices among health authorities, and patients is needed to support promoting better management of healthcare management systems with public perspectives which can be developed through interactive communications. ICTs (Information and Communication Technology) are working as remarkable accelerator of social and economic development.

Recently telemedicine which is a merger of computer technologies and advanced telecommunication helps the customers a lot. Communication technology with utilizing information is used in telemedicine and it provides and supports healthcare services at remote locations. Telemedicine gives us a new model for dealings with the patients or different essential entities like hospitals, pharmacies, physicians and governmental agencies. On the other hand, advanced telemedicine technologies like telesurgery where it is impossible to move a patient immediately, facilitate the audio and visual data of the surgery received by the surgeon present at a remote or a distant location as well as robotic instruments which can perform the best role.

Another essential technology of health care management is the use of video conferencing, where helps clinicians/surgeons and physicians to interact with a distant patients at real time with giving his/her expert advice and even interacting with the patient through internet. It also helps the physician to interact with a variety of experts for taking critical decisions. The modern technology offers the ways of storing digital images such as MRI, X-Rays and

Radiographs and spreads them effectively and efficiently using tele-radiology to the consultants without any significant data loss with proper time. Advancements in information and communication technologies are the ways to connect the people around the globe with cost-effective e-services. M-health is an important part of hospitals. Here M-health means communications technologies, mobile computing and medical sensor for hospitals. These applications help to collect the data regarding doctors & patients related healthcare information through cell phones & different communication devices. It also helps to improve clinical outcomes along with good public health monitoring and education.

The ICT infrastructure is used to get medical advice from health professionals at remote location through the support centres working round the clock. Barcode technology in hospital has involved in different applications at the view point of proper service delivery.

Bar code technology is also play vital role in hospitals, especially in health management which improves security system, safety and quality of healthcare management. It verifies the patient and treatment information by using a decision support system in this scenario. ICT ensures that the right treatment is given to right patient to the right time. Similarly, Radio-frequency identification (RFID) is a wireless communications system which tracks patients throughout the hospital, and links lab and medicine tracking.

3. OBJECTIVES

- To find out the current problems of the hospitals in terms of IT infrastructure
- To find out the challenges after the installation of the IT infrastructure in hospitals
- To develop a protection mechanism to secure the information in the hospitals

4. CURRENT BUSINESS PROBLEMS IN TERMS OF IT INFRASTRUCTURE

Healthcare industry is one of the most booming sectors in India. Health is a basic necessity for people and thus, the demand for this sector will never perish. Having said that, there will be a multitude of problems in the industry which will multiply many fold. This is because of the absence of proper infrastructure to support the needs of this industry. These problems have been discussed in details in the following pages.

Even now, in this age of digitisation, most of the hospitals in India maintain physical records of the various documents on paper. This leads to many errors in maintaining these documents manually and often it takes huge space in storing these documents. Also, it is very hard for the hospital staff to find out a piece of information in the long run as it will need an extensive search. Time management is also a crucial problem over here as it will take hours to find out a document which was created a few years ago.

EMR, also known as Electronic Medical Records, are present in majority of the hospitals now. However, they are maintained separately by the individual departments in the hospital. There is no centralised system of storing data in majority of the hospitals and even if there is a system, the hospital lack proper infrastructure to maintain it. Most of the government hospitals use paper even now to schedule an appointment with the physician.

There is no end to end integration between all the responsible parties in the hospitals, be it forward integration or backward integration. All the departments maintain their records separately and so liaison between these departments for finding out information for a particular patient takes time. Time is a very crucial factor in case of an emergency. This may decide the life and death of a patient and so this can hinder the quality of a particular organisation.

Most of the major tests conducted today are either semi automated or fully automated. However, the results obtained from these tests

are stored separately in different databases. It will be easier for the physicians to diagnose and treat the patients if all the information collected from the various devices are stored under a common platform so that the physicians can have everything under one single roof.

Physicians or doctors are the crucial part of hospitals. However, nurses and other non-medical staff are the supporting system without whom the entire system will crumble. Hence, it is mandatory for any hospital to have a common portal for every member of the hospital so that each and every member can coordinate between themselves. This will help in lessening the workload of the individual members as well as give a platform in which they can interact with each other on a daily basis. This will enable to form a friendly environment within the workplace which will again help in the smooth functioning of the organisation.

A major loophole in the functioning of the hospitals is that most of the instructions given to the technical as well as the non-technical staff is through verbal means. There is no trace of records for these activities. This might prove detrimental for the organisation in the long run as in if something goes wrong, the hospital authority would not be able to pinpoint the main culprit as there will be no evidence to catch the person who was responsible.

A patient portal should be present in every hospital so that the patients do not have to go through the hassle of visiting the doctor every time. The patient can log in to the hospital's network and check his or her own progress. They can also provide their valuable feedback which will further empower the hospital by correcting their mistakes.

Instant alerts and pager systems should start in hospitals so that no time is wasted in case of an emergency case. The staff and physicians of the hospitals should be ready at the time of need. Proper training should be provided to the staff for handling such situations. Proper infrastructure should be installed in the hospitals to handle emergency situations.

Electronic integration should be maintained between the ancillary and drug stores to integrate the activities and coordinate them in such a manner that the patient's experience in that particular hospital will be free from hassles.

These were some of the current IT infrastructure problems that are present in the hospitals today in India. For the healthcare industry quality to improve, these problems need to be considered in an immediate basis and also some action has to be taken by the authorities to implement the systems as soon as possible.

5. CHALLENGES OF THE IT INFRASTRUCTURE

In this study, we have repeatedly focused on the need of the IT infrastructure in hospitals and how the hospital's reputation will increase by leaps and bounds if the hospital can find a means of adopting these systems. However, every coin has two sides. If the infrastructure is adopted in the hospital, the database will contain crucial and detailed information about the patients. Once the structure is in place, the data needs to be protected from any threat. Thus, security measures need to be taken in order to optimally protect the data from cyber scams.

On top of this, just the installation of IT infrastructure is not enough. The staffs need to be trained in order to operate these systems. Certain technical experts need to be hired in order to identify the hitches in the systems, if present. They also need to come up with certain measures to develop a control system so that the hitches can be repaired as soon as possible and the systems would be back to normal in no time.

Protection mechanism of the data in hospitals

This part of the paper will focus on certain points that need to be incorporated while designing a security system for the hospitals in order to protect the multitude of data present in the system. This will be integrated into the biomedical devices or servers, clinical systems and devices, IT endpoints and certain other associated systems.

The parts of this system are given as follows:

- **Network Security**

One of the fundamental aspects of any kind of digitisation is the network. Network security is designed in such a manner that it aims to protect the network infrastructure itself. This is the pivotal aspect which helps in protecting the data of the hospitals from being the target of attacks such as service abuse, theft of service, online transaction of payments, denial of service and finally data loss. Firewalls should be put up and properly maintained. Anybody, without a proper access code, should not be able to enter the network. Also, the network security should be enhanced by vendors such as Cisco. Firewalls should be provided to the various routing and switching platforms.

- **Endpoint Security**

End point identification in hospitals is very difficult as there is a huge plethora of them. They are very diverse as well as complex. Hospitals use a wide range of devices that may be wired or wireless. They should meet the state and country laws of the region in which they are installed. They should be protected from data theft, data loss and privacy invasion. In order to ensure endpoint security, certain security policies need to be integrated both in case of users as well as devices. Proper punishment must be meted out to users and devices that violate policies.

- **System network and Event management**

There are two kinds of tools used in the systems network. System tools help to manage the entire system and keep a check on its health. On the other hand, there are network management tools. These tools help in simplifying,

automating and integrating networks which will in turn help in reducing the operating costs. Both these tools can be obtained from various vendors who in turn can help in installing them.

- **Content Security**

The content of the hospitals are vulnerable to cyber attacks. Spam and phishing attacks are launched through emails. Stealing web content is also a means for the attacker to get access to a target system. Thus, email filtering and email checking are two of the main contents of email security. Web security must be employed against malicious websites and intrusion prevention systems.

These are the primary points based on which a reliable security system can be designed so that the data generated from the hospitals can be secured and stored for later use. Lots of research oriented work can be done by utilising this data.

Recommendations

There are certain recommendations that can be given during the course of this study to further the scope horizon of the hospitals. They are listed as follows:

- The organisation must have full proof disaster recovery system so that no data is lost in case a breach occurs.
- The security system should be upgraded on a daily basis as each and every day new malwares and spywares are being generated over the internet and corrupting many systems by hacking into them and stealing data.
- In case the network fails, a mechanism must be in place which would issue automatic alert to all the members in the network. Also, the firewall should be designed in such a way so that if a breach happens, a notification is generated across all the nodes of the

network and the entire system automatically switches off.

- Security of the Electronic Medical Records should be a priority for any organisation as any hacker's primary objective will be to create a breach in this segment.
- The technicians involved in this security detail should regularly update themselves and train themselves in order to be at par with the latest development.

6. CONCLUSION

India is a developing country and as a result the infrastructure is not upgraded. This is also the case in case of the healthcare industry, particularly of that of the hospitals. As a result, the healthcare system of India is very poor as compared to other countries. The cause for this is the large population of India and inadequate people to handle the patients. This neglect can often prove to be disastrous to the people.

IT infrastructure, though expensive, can be a solution for this problem. Trained experts will be required to deal with this, however, once successful, the people of the nation will be highly benefitted. It will save an ample amount of time as well as resources and a person sitting in a remote village can have access to a neurosurgeon or a cardiologist residing in cities. Many of these barriers will cease to exist and it will minimise the errors caused as the entire system is on its way of becoming fully automated.

As every positive is paired with a negative, this is no exception. The automation of the entire system will cost the jobs of millions of individuals who are serving as intermediaries in the system. Though the automation will promote quality healthcare services, it will reduce its employment rate drastically. However, this gap which is created will be fulfilled in other arenas and also it will encourage the youth of the nation to pursue higher education in order to increase their individual employability quotient. If there is a demand of higher education in the market, the government will be forced to provide more subsidies for the education of those students who

will not be able to pursue higher education due to lack of funds. If the government provides the funds, more and more individuals would be able

to pursue higher education and get good jobs which will further result in increasing the productivity of the nation by leaps and bounds.

References

- [1] Understanding Customer Satisfaction Of Internet Banking: A Case Study In Malacca, Goh Mei Ling, Yeo Sook Fern, , Lim Kah Boon, Tan Seng Huat, [Http://Dx.Doi.Org/10.1016/S2212-5671\(16\)30096-X](http://dx.doi.org/10.1016/S2212-5671(16)30096-X)
- [2] Mr. Lakshmi Narayana.K[a] Mr. Sri Hari.V[b] Dr.P. Paramashivaiah[c], *Acme Intellectuals International Journal of Research in Management* ,Vol- 2 No. 2 Apr2013 ,A Study on Customer Satisfaction towards Online Banking services with reference to Bangalore city
- [3] A. Ananth, Customer satisfaction on e-banking; a study with special <https://mpra.ub.uni-muenchen.de>, July 2012
- [4] Dr. Hitesh, *International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization)* Vol. 4, Issue 10, October 2015, Customer Satisfaction and E – Banking services.
- [5] Gerrard, P.; Cunningham, J. B. (2003), “The Diffusion of Internet Banking Among Singapore Consumers”, *International Journal of Bank Marketing*, 21(1), 16-28.
- [6] Mishra J.K. and Jain M. (2006-07). ‘Constituent Dimensions of Customer Satisfaction: A Study of Nationalized and Private Banks’. *Prajnan*.35(4).390-398. 6. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988),
- [7] Newman, K.; Cowling, A. (1996), “Service Quality in Retail Banking: the Experience of Two British Clearing Banks”, *International Journal of Bank Marketing*, (14)6, 3-11. 8.
- [8] Broderick, A. J.; Vachirapornpuk, S. (2002), “Service Quality in Internet Banking: the Importance of Customer Role”, *Marketing Intelligence & Planning*, 20(6), 327-335
- [9] Caruana, A. (2002), “Service Loyalty the Effects of Service Quality and the Mediating Role of Customer Satisfaction”.
- [10] *International Journal of Research in Business Management* ,Vol. 3, Issue7, Jul 2015, 1-6 , online banking services and customer satisfaction: a comparative study of public and private banks in udaipur city pallavi.
- [11] Daniel (1999), in his research paper, described e-banking as the newest delivery channel offered by the retail banks in many developing countries.
- [12] Sathye (1999), in his research paper, explored the factors affecting the adoption of internet banking by Australian customers.
- [13] Talwar (1999) examined the IT Revolution in banking sector which had not only provided improved service to the customer, but also reduced the operational cost.
- [14] Unninthan (2001) described the impact of e-banking adaptation on Australian and Indian banking sectors with the help of qualitative and quantitative analysis.
- [15] Sureshchander and Rajendran (2003), in their paper, focused on investigating the important factors of customers’ perceived quality in banks of developing economy like India.