Monitoring & Evaluation in Healthcare using Internet Of Things (IOT) Techniques

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Abstract

IoT is the term used for advanced research on information with the communications technology1. It can be used for the betterment of the people mainly in terms of Health Care Management And Evaluation, being the health, one of the most important aspect of the life. From time to time as per need to upgrade the data capturing and management of the information requires for the optimal utilization of the resources. As the IOT has emerged as Key focus area-use for the better management of the resources and for the betterment of the general public. It also helps to collect, share, monitor, store, and analyze the data which earlier was dump in the store/ warehouses and was almost impossible to use effectively. However, the IoT is a new platform where all the collected information or data is stored by an intelligent application, (Indian Govt application) like HMIS, IHIP, FPLMIS, PMSMA ABDM, and other smart healthcare application developed by different agencies.13

The Patients health record is kept digitally and can be accessed as on demand by at any point of time, which will provide the treating consultant the complete course of action taken till date for the better line of treatment of the disease. Even the IOT is enabling the patients to get rid of standing hours of hours in the queue for registration mostly in Govt health facilities. Also there is a need of a single window platform to collect different information from different applications, which will be used for monitoring and evaluation

Introduction

The digitizing of the data has enabled the speedy process and generate the desired information. The information is readily accessible to any location around the Globe by the means of Internet all the times and the direction/ guidance to handle the situation may be imparted to the correct/ desired platform. It may be by any means of communication like Email, phone call or even by video conferencing.

Moreover, it has been noticed at many instances that one of the healthcare service provider is over burdened by the work load and the patients are having long-long waiting lines whether the other healthcare service provide is having idle resources. The platform of Online OPD has enabled, to register and have the appointment of the desired specialist by online mode and make oneself at the desired time slot, which has reduced the time lag and also lower the risk of being infected at the hospital. 2, 3

The IOT is enforcing patient of not being infected when treated, by regulating the time slots to the patients and for the treating doctors also. The information availability of the experts/ doctors on the desired day has also saved the patients from being exhausted in waiting him.

More over the door step delivery of the Govt and Private schemes may be provided to the unmet need of the public. This will enable the same the human hours being wasted in the search of the need, as health is one of the basic and necessity of everyone.

 However, most of these practices are not being effectively used today. The main contribution of this desertion is to highlight the Monitoring & Evaluation in Healthcare using Internet Of Things (IOT) Techniques in detail for the better use of the technology for the health care seekers and health care service providers, as a whole to enable a doorstep delivery of the essential health care services. The paradigm shift from the current curative theme to the preventive theme, by the better or say effective and optimum use of the available resources and can effectively provide solutions and enhancements for critical applications[4].

The Monitoring and Evaluation flows as the some standards laid down for the effective and complete Monitoring and Evaluation system. A Strong and robust Monitoring and Evaluation system is a key to success of any projects and programme. It includes Identifying the problem firs which includes the underlying issues, consequences, firstly. Then mapping of the project design into the Monitoring and Evaluation Framework is done in which the project goals, objectives, activities outcome etc are identified [5]. The key stakeholders role and responsibilities are also defined with the budget allocation. The relevant indicators are identified including input, process and the output.

The data collection by the tools and methodologies re-identified, the base line and end line method and the mechanism of data recording, including data entry to data analysis is done. The periodic review of Monitoring and Evaluation system is also done to access the progress in comparison of the defined range of the output or the project is deviating the identified route, the challenges and the roadblocks are identified t and the course of action for the correction is described. The IOT has enabled us to predict and to evaluate the course of action in case of any epidemic even in the remote areas, as the data collected is analyzed centrally and enable the timely transfer of the data, information and knowledge to the correct platform on correct time and in correct manner.

Here we will be able to evaluate a need of a single window platform to collect different information from different applications, which will be used for monitoring and evaluation for Decision Support System even in the pandemic like COVID-19 and in near future.
Method

As per HMIS, the Currently health infrastructure in India on board is that out of 239631 Health facilities 8885 are Private Health facilities and 230746 are Government health facilities. Out of Government health facilities the categorical bifurcation defined into 160990 Sub Centers, 30714 Primary Health Center, 5786 Comprehensive Health centers, 1501 Sub District Hospitals, and 1041 District Hospitals including medical Colleges.11.

These facilities are distributed all over the India and the India Islands namely Lakshadwep and Andaman & Nikobar Islands don't have any Private health facility.

Various teams have been made for the purpose at different hierarchy levels starting from the health facility level, sub-district/ Block level, District level, Region level, State and National level. The composition for the purpose is done as per the project requirement. There Expert from different domain which provide their reviews and initiatives for the findings in the field. The valuable inputs are screened for the effective implementation. These teams comprises of the odd number of members to have an effective an majority output.

The planning Commission of India use this data for the planning and framing guidelines for the programmes.14

The National Level Common Review Mission Has recently conducted the reviews for the Implementation of the Health schemes at the grass root level and the interaction of the actual beneficiaries been done.

Data is the main component of the planning process for any Policy. Quality data is fundamental for good policy formulation, implementation, Monitoring and Evaluation.7

The traditional process of documentation is physical record-keeping. Which includes files and touchable records such as photographs, paper, data charts, and other three-dimensional items for later use. The volume of the physical records is at big risk, as hard copies are stored in shelves, cabinets etc which are frangible and susceptive to deterioration.

When storing and searching the physical records there is a much handling practices is involved from sorting in the stored items and it requires a much efforts and the resources is utilized in the task in terms of searching and storing the physical records.

Before the involvement of the electronic data storage, The organizations keep physical records. But the accessibility of these physical records is not easy and guidelines related to box labels, inventory lists, etc. are to be followed

However the Electronic records store the information through digital means. Electronic records are records that are stored on a digital medium, like a computer or a mobile device. These records are created, accessed, and maintained digitally. By the use of information technology for documentation, records get saved by a computer, storage drive, or online server and are only electronically accessible.8

Electronic document management is a single critical point of access to all the relevant business information in a formidably organized manner. Electronic record is an improvement over physical records. The downside of electronic records is that they can be easily tampered with or deleted Several trends and changes, imply that computer-based information management and record-keeping are overriding physical record keeping like such as the rapid shift in labor mobility trends and the adoption of remote working systems.

The basic considerations for the storing and retrieving the digitized records

First, consider digital scanning and conversion. Records digitization or scanning is the process of converting the physical records into a digital format (such as PDFs, TIFs, etc), which can be easily stored and able to access. Digitizing the files allows to be one step ahead and prevents it from deteriorating in the first place. It also provides the backup recovery which protect the records from natural disasters, structural threats, IT vulnerabilities, etc. Digitization reduces the risks of losing the records, physical handling, and storage space requirements 13.

Secondly there should be a clear method of organizing the digital data so that the people can find what they need. When digitizing the records, there are several options to implement and to make data easier to find, such as through indexing and optical character recognition (OCR). These features work together to improve the records retrieval process and make the records more accessible.

Third, explore the option of a document management system (DMS) to store the digital files. This can reduce, and maybe eliminate, the issue of having the records spread across too many locations by storing digitized records in a single electronic repository.

These steps should help to solve the biggest pain points and help to create a better document management solution. If needed more help to solve the pain points, then the work can further with the scanning partner to build a customized document management solution for the organization.

Patient data management is one of the most critical tasks undertaken by medical institutions. For a long time, paper-based record-keeping had been in practice, but with the introduction of Electronic Medical Records (EMR) or EHR, the data landscape is changing rapidly.9

Introducing the Electronic Medical Records Software become beneficial for various hospitals and clinics for both small and larger health facilities. The Healthcare services has shown better management and handling of internal functions by the efficiency of such software.

Depending on the various factors that concern the hospital authorities shall look at the difference usability between Paper based vs Electronic Health Records (EHR) software in depth for effective monitoring and evaluation.
Results

As per the current scenario if we focus on the monitoring of only one indicator ie Ante Natal Care, During Financial Year 2021-22, 6590822 women were registered but if we look at the number of deliveries reported are Institutional Deliveries(3687667+Home deliveries 261136 = 3948803) Data Source- HMS report-2021-22.16, 15

This data points two scenarios

1. The Deliveries are missed out, and are not fully reported, However only about 60% is only reported.

2. The reporting the ANC is being over reported and the Duplicate ANC is being reported.

The list of the various IOT Platforms maintaining the health records of the patients like 13

Sl No	Description
1	NIN Portal
2	HMIS portal
3	RCH Portal
4	IHIP Portal
5	FPLMIS Portal
6	PMSMA Portal
7	Mera Aspatal Portal
8	NI-Kshay Portal
9	NCD portal
10	Cowin Portal GOI
11	Covid-19 Portal GOI
12	Hospital Information Management System
13	State Specific Portal for Covid Management (NIC)

But all the platforms keep the different information of the patients and even in the duplicate/ triplicate but **there has to be at least single platform which can provide all the information stored about the health care including investigation, testing diagnostics and treatment of the patient so that a comprehensive and effective line of the treatment**. The patients roam here to there even all the information is maintained in the digital but at different platforms.

Discussion

As number of the HER and EMR available to the different health facilities, there has to be an API to integrate the data based on the unique Identification of the patients at a single platform. This will enable the patient to free from the document carrying and caring for them and fear of lost and theft. The Health system will have a robust, complete and comprehensive data of the patients for betterment of the treatment. The transfer of the records can also be done effectively. So there is a strong need of single window healthcare record repository of the patients.

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