Data Management of Medical Records: A case study of Chittaranjan National Cancer Institute.

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Abstract

Data Management of Medical records is a comprehensive collection of information resources for lifecycle needs. This work on electronic medical records in a clinical domain has been carried out throughout the world in various ways. The general aim of this study are enhanced public service and cut down on time lags due to want of physical documents and work as disaster recovery system and avoid tampering of documents ensuring security confidentiality, and to find out the challenges faced by Chittaranjan National Cancer Institute health records personnel in record keeping and service delivery. This study design will focus on health record keeping and management specifically in matters dealing with medical care and hospital management at Chittaranjan National Cancer Institute

Keywords

Electronic medical record, patient order entry, computer-based patient system, patient information,

Electronic access

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1. Introduction

In computing, data are information that have been translated into a form that is efficient for processing. Management is an individual or a group of individuals that accept responsibilities to run an organization. Data Management is a comprehensive collection of practices of organizing, maintaining, concepts, procedures, processes, and a wide range of accompanying systems that allow for organization information resources for lifecycle needs. It is developments of tools of data data management methods that have roots in accounting, statistics, logistic planning and other disciplines. Electronic Medical Record (EMR) is an integrated electronic system that contains patient information. The information recorded includes not only individual health status and care but also demographic, medical and financial information, which is often derived from ancillary services like laboratories, billings and others. Tange, 1999 worked on electronic medical record and defined a repository of clinical data within one single healthcare enterprise that is characterized by direct data entry and integration from different sources. EMR system establishes a link between databases, networks, medical entry, clinical workstations and electronic communication systems. Unlike other health care information systems, EMR system is solely focused on patient care. Tang, LaRosa, & Gorden, 1999 also worked on the medical records that have been used for more than a century as a tool to assist clinicians in the care of patients. Today, the medical records have a comprehensive purpose: “to recall observation, to inform others, to instruct students, to gain knowledge, to monitor performance, and to justify intervention’. Wigertz, 2001 suggest that several studies have shown that paper based records cannot adequately support the task of providing patient care in an efficient manner. Van der Lei, Moorman, & Musen, 1999 in their work with electronic medical record suggest that the electronic patient record will significantly change healthcare, rather than merely replacing the paper-based record. This change allows data to be used for a wide variety of purposes, ranging from direct patient care, decision support, quality assurance, scientific research, and management of health care facilities. Shiffman, Branndt, & Freeman, 1999 suggest the transition to a computer-based record necessitates fundamental changes in the way clinical information is expressed. Cimino, 1996 says that this is one of the challenges facing health care computing since the presentation of patient data has to be in a usable form. Thus works on electronic medical

records in clinical domain has been carried out throughout the world in various ways. This paper focuses on data management of Electronic Medical Records with special reference to Chittaranjan National Cancer Institute (CNCI).

2.Objectives of this study

1. To create a digital record of all medical documents in TIF / PDF format.
2. Enhance public service and cut down on time lags due to want of physical documents.
3. To make documents available to multiple users simultaneously that will work as disaster recovery system for paper based record system, to avoid tampering of documents.
4. Ensure security and confidentiality of documents.
5. Minimizing turn-around time for key departmental processes.
6. Improved ability to meet public requests on real time basis.

3. Importance of the study

Medical records are a combination of both self-reported patient information and a physician's notes on diagnoses, care, and treatments. Importance of Electronic Medical records is as follow:

1. Electronic Medical Record improves quality, safety and efficiency & reduces costs. Through EMR Systems, physician and health practitioner improves care coordination.
2. EMR system is a multiuser Environment that enhances public service delivery and makes documents readily available to multi users simultaneously.
3. EMR system ensures high availability of document as and when required and minimizes turn around time for key departmental processes.
4. Improves the ability to meet public request on real time basis.
5. It is an official record which digitalizes the health information for improving efficiency, quality of care and it definitely reduces the costs.

In other words, EMR are recorded, stored, and accessed on a network which may include multiple medical providers. Physicians will have the ability to forward any or all patient files to medical specialists and consultants. Electronic Health Record has the ability to share automatically and update information among different offices and organizations. Through Electronic Health Records (EHR) systems, standardization of medical health service is possible.

Electronic Medical Record keeps:

- Patient Demographics
- Progress Notes
- Current/Past Medications
- Medical History
- Laboratory Data/Radiology Reports

4. Methodology

The methodology used for the proposed study is case study method of Medical Records with the help of data collection method through the schedule. The primary data collected from the study are available from Electronic Medical Records system.

1. Medical Records in Chittaranjan National Cancer Institute

Chittaranjan National Cancer Institute (CNCI) is a comprehensive centre for cancer treatment and research in West Bengal, and is one of the pioneer Regional Cancer Centres of India. It offers sophisticated diagnostic and treatment services to cancer patients from all over West Bengal, the neighboring states and countries.

The CNCI Hospital comprises of the Departments of Surgical Oncology (including units of Gynecological Oncology, Head and Neck surgery), Medical Oncology, Radiotherapy, Anesthesiology, Radio-diagnosis, Pathology, Dentistry, Blood Bank and Medical Records. It is also having Hospital Based Cancer Registry, Telemedicine and several ongoing clinical research projects.

The CNCI Research Wing comprises of the Department of Anticancer Drug Development, Cancer Chemoprevention, Environmental Carcinogenesis and Toxicology, Epidemiology & Biostatistics, Experimental Hematology, Immunoregulation and Immunodiagnostics, Metabolic Regulation, Oncogene Regulation, Receptor Biology & Tumor Metastasis, Signal Transduction and Biogenic Amines, Animal Care and Maintenance, Central Research Instrumentation Facility, Pathological Cancer Screening.

On an average, 9000 (Nine thousand only) new patients register themselves at the Out Patient Door (OPD) of CNCI Hospital annually. Also on average 1000 new patients register themselves at the Pathological Cancer Screening (Research Wing)

annually. Apart from these, annually about 3000 new patients' records are generated from different cancer screening camps conducted by CNCI. All these old patients' records are computerized by EDMS (Electronic Data Management System) software.

2. Stages of work of Electronic Data Management System at CNCI :

a) The work involves pre-scanning activities, scanning, quality control, indexing and profiling, metadata entry, and providing metadata in CSV and corresponding images in TIFF & PDF format on DVDs and or in hard disks.
b) Document management system, as a repository of scanned document images/pdf for online retrieval / usage.
c) The digitization process will be conducted at the Medical Record Department. The process of scanning involves unbinding the record files for scanning, and then refilling the scanned papers after scanning.
d) The reports of the investigations, digital copy of pathological slides, X-ray, USG, CT-Scan etc. are also to be computerized along with the medical records. The EDMS software has functionalities to support the same.
e) The photographs of the patients (for certainty of patient identification) and photographs of different critical surgical inventions etc. will also be added to the medical records in grayscale.
f) All the departments in the hospital building need to be covered over a comprehensive LAN, supplying of PC nodes along with Server to host the Document Management System.
g) The Local Area Network shall consist of 21 Nodes (PCs) with 1 server.

3. Data Management through EDMS (Electronic Data Management System) Software at CNCI

A. Electronic Data Management System Software is based on Client/Server concept
B. EDMS software designed as LAN and WAN connectivity and network module.
C. PDF to simplify work flow, this will be act as single click report format.
D. LAN/WAN based patient registration system from anywhere of the Institute. The registration counter could be in same or remote places.
E. Addition of New User for smooth operation and security of data, different category of users to be added in EDMS software. The main category will be of three types.
   1. Administrative. The administrative user has access to all types of operation of EDMS.
   2. Registration operator. The registration operator has access to registration module and if required, can access report.
   3. View only Guest. The guest type operator can only view reports.

F. The web base EDMS to install in live web server. It is can be accessed from anywhere in the world to view report.

4. Volumetric Information

i. A file consisting of 12 pages is allotted to each patient with a unique Registration Number at the time of registration at the Registration Counter of OPD. Then subsequent investigation reports and treatments sheets are added to the patients' record. Thus on an average, each records contains 20 - 30 pages. The paper size to be scanned would vary from Legal size to A4 with a few pages like nursing sheet etc. All these files would have to be scanned and digitized into the proposed web based document management repository.
ii. It is projected that the volume of existing records would be to the tune of about 3 Lakhs of old patents' records are at present in the Department of Medical Records (MRD).
iii. Metadata parameters 14 Fields / file.
iv. 25 concurrent users for the DMS application along with relevant RDBMS license and other software required to run the system.
v. The scanning and digitization activities for the projected back log files and ongoing file.
vi. The medical records will be made available to each and every Departments/Units of the hospital.
vii. A broad overview of the 15 departments to be connected over LAN with 22 PCs and one server.

The file based approach for storing heterogeneous electronic patient related information is an advantageous system, which can handle general and custom file formats. All files are organized spontaneously based on the unique identifier of the patient in the file-name. The natural sorting orders the files chronologically, thus creating a clear medical record, close to the standard paper forms. Stored on a central server with read only access, the files should be further protected as any other crucial digital information. Automatic robots and

queries could perform checks of the integrity of the identifiers in the file name and the meta-data, contained in the file itself.

5. Statistical Analysis:

Statistical Analysis was performed with help of Epi Info (TM) 7.2.2.2 statistical software) which is a trademark of the Centers for Disease Control and Prevention (CDC).

Using this software, frequency distributions was prepared. The mean with corresponding standard deviation (s.d.) were calculated under descriptive statistics. Test of proportion (Z-test) was used to test the significant difference between two proportions. t-test was used to test the significant difference between means. $p \leq 0.05$ was considered statistically significant.

Table-1: Distribution of patients of patients attended at CNCI during last five years

Descriptive Statistics	Year				
	2014	2015	2016	2017	2018
Number of new cancer patients registered for treatment	8187	8772	8622	8664	8819
Number of cancer patients admitted for treatment	5042	5203	5267	5045	5052
Number of new and old cancer patients attended at OPD for treatment	53877	55428	57829	56117	58228

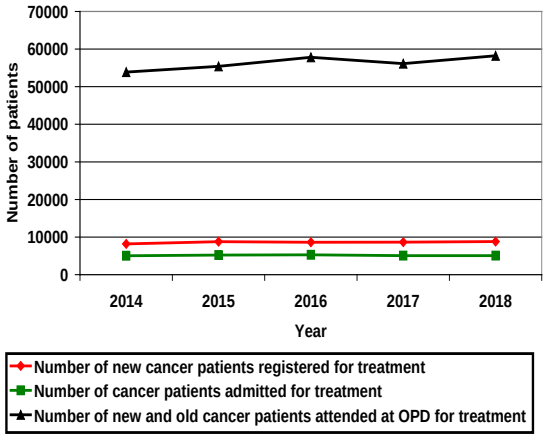

Fig.-1: Line diagram representing load of cancer patients at CNCI

Test of proportion showed that there was no significant difference in proportion of patients in different years ($Z=1.26$; $p= 0.23$).

In overall the ratio of male and female was (Male:Female =1.0:1.2). However, proportion of female cancers (51.1%) was higher than that of male cancers (48.9%), but it was not statistically significant ($Z=1.01$; $p=0.61$).

The mean (mean±s.d.) age of the female patients 47.99±16.38 years was significantly higher than that of the male patients 56.13±17.98 years ($t= 4.26$; $p<0.0001$). Thus the females were in higher risk of having cancer at a younger age than males.

The five leading sites in males were digestive organs (19.44%), oral cavity (17.70%), respiratory organs (12.89%), bone & soft tissue (9.75%) and hypopharynx (7.26%) which were significantly higher than that of other primary sites of cancers in males ($p<0.01$).

The five leading sites in females were cervix (41.18%), breast (17.03%), digestive organs (11.97%), oral cavity (7.62%), and ovary (5.06%) which were significantly higher than that of other primary sites of cancers in females ($p<0.01$).

However, in overall the five leading sites of cancer were head & neck (24.26%), cervix (22.07%) digestive organs (14.42%), female breast (9.15%), respiratory organs (6.61%) and lymphoma & leukemia (4.40%). Thus the prevalence of head & neck cancers and cervix cancer were significantly higher than that of other primary sites ($Z=4.26$;$p<0.0001$).

6. Conclusion

CNCI, being one of the cancer hospitals of eastern India, the number of cancer patients visiting the hospital is increasing each day which has a proportional effect on the number of records stored in the Medical Record Department. Also, CNCI receives frequent requests for medical records from various researchers working in the field of cancer research in this institute. As the patient information has become a key metric to improving the quality of patient care, the solution starts with "at source" capture of patient records through scanning into the unified electronic repository, strengthening security to enable tighter control of the stored documents and eliminating the need to access physical files to retrieve vital data. With a single source of patient information, delays from searching and pulling patient charts from physical storage locations are minimized, speeding up physicians' ability to diagnose, prescribe and monitor, while also meeting physicians and patients' demands for access to information at the point of care. Due to these reasons the computerization of medical records has become extremely critical.

Moreover, medical records of cancer patients are unique in nature as compared to medical records of the patients of general hospitals due to the fact that the history of previous treatments are very useful at the time subsequent follow-ups or in case of second line treatment for recurrence of cancers and occurrence of cancer in any other primary site, which may occur due to curative treatment of the patient's previous cancer. The medical records of the patients are required to be kept till the natural death, or death due to cancer of the patients. Moreover, even after the death of the patients records are required for the research purposes. Some of the patients who had registered themselves for their treatments in 1950 (year of establishment of the hospital) onwards are visiting the hospital for their treatments or recurrence of their cancers. On the contrary, most of the medical records of the patients of general hospitals are required to be kept for few days or months. Only thus, in view of treatment and cancer research, it is necessary to computerize the medical records of cancer patients around the globe.

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