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Electronic Medical Records Management Systems: An Overview

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ABSTRACT

Records document the actions of an organisation's business activities. Nowadays, more and more government agencies, companies and healthcare organisations are moving towards electronic records from records on paper. In healthcare organisations, Electronic Medical Record (EMR) system is being used to capture, organize, maintain and retrieve patient's medical records. EMR system consists of a comprehensive database used to store and access patient's healthcare information. The EMR has replaced the existing paper medical records as the primary source of information for healthcare purposes for all clinical, legal, and administrative purposes. The paper aims to review the existing Electronic Records Management Systems (ERMS) and assess the impact of EMR systems on the healthcare industry. This paper also discusses the advantages and disadvantages of EMR systems and problems encountered while implementing and using the systems by different groups of users.

Keywords: Electronic records, electronic medical records, electronic records management systems

1. INTRODUCTION

Protection of records from destruction is an important task as they provide us evidence of legal status, ownership, accounts received and the particulars of obligations required by the government agencies or private organisations. These records can be either electronic or in print forms and are critical because they contain information required to continue functioning during disasters or to re-establish operations after a calamity has ended. According to McDougall [1], it is estimated that there are more than 1500 businesses razed by fire in Australia every year. More than 70 per cent of businesses whose paper records and computer programs were lost in fire resulted in the folding up of business after three years of the fire. A large quantity of vital records were destroyed in the USA due to the terrorist attack on 11 September 2009. In the event of such disasters, if one uses electronic records, most of the records can be saved compared to paper records by maintaining backups at remote locations.

Nowadays, more and more government agencies and companies are relying on electronic records. This has necessitated management and preservation of large volume of electronic records by various agencies. ERM initially evolved from the archives management. In records management, the requirements for managing records both in paper and in digital formats are similar and in this context, the smallest unit is the folder. Both in electronic and paper media, it refers to maintaining an individual document as a file. Although, records in electronic form saves us from a lot of hassles compared to paper records but there are other factors to be considered in managing them.

2. WHAT ARE ELECTRONIC RECORDS?

Electronic records (ERs) are either born digitally or converted from paper records using a scanner. ERs may be a combination of text, graphics, data, audio, pictorial, or other information representation in digital form that is

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created, modified, maintained, archived, retrieved, or distributed by a computer system. ERs are not just a collection of data but also the consequences of an event. Besides, records need to provide evidence of the content and structure of the document; the context of its creation is present and accessible. ERs can be created from organisation's financial, human resource and corporate databases. Word processors (e.g., WordPerfect, Microsoft Word), Spread Sheet (e.g., Excel), E-mail, Computer-aided-Design (CAD) and Web publishing tools (e.g., Dreamweaver) are the sources for the creation of ERs.

ERs are part of an organisation's memory that is invaluable to the current and future functioning of an organisation or a corporate body. To consider ERs as formal records with intrinsic value, these must go through stringent information management policies. For the sake of reliability and authenticity, ERs must adequately capture and describe the actions these represent. The record should not only preserve the 'content' but also the 'context'. Therefore, Stephens and Wallace [2] have indicated that now most of the archival repositories are undergoing transition from paper to electronic format. Archival institutions worldwide have plans to protect the integrity and ways to retrieve archival value of the ERs.

Every business organisation is unique and, therefore, the type and level of value of the business's vital records will determine the amount of protection that is required. Although a specific category of records may not be vital, it does not mean that that type of record does not require protection. Based on their value, the records are classified into four types:

(i) *Vital records*: Refer to records without which the organisation could not continue or operate as the records give evidence and legal status of the organisation. It is also to protect the assets and interest of the organisation, its clients and shareholders, therefore, they are irreplaceable.

(ii) *Important records:* Refer to the categories that are replaceable and can be reproduced at considerable cost, time, and labour. Important records are those having significant value for administrative functions. These records are crucial for operation and smooth functioning of the organisation and those including financial statements such as general ledgers and tax records.

(iii) *Useful records:* Refer to the category of records, which may cause some inconvenience if lost but could be easily replaced. Loss of these records does not create any real problem in day-to-day operations as these can be verified from other sources, either internally or externally.

(iv) *Non-essential records:* These records are of little or no value to the organisation and their loss or destruction would not pose any inconvenience in the operations of the organisation.

3. LIFECYCLE OF ELECTRONIC RECORDS

According to the Public Records Office of the UK National Archives [3], records, regardless of electronic or paper form, need to pass thought certain phases from the initial creation till the disposal stage [3]. To retain the authenticity, integrity and reliability, ERs need to be actively and properly managed according to the established procedures. Figure 1 shows the various phases in the lifecycle process of electronic records.

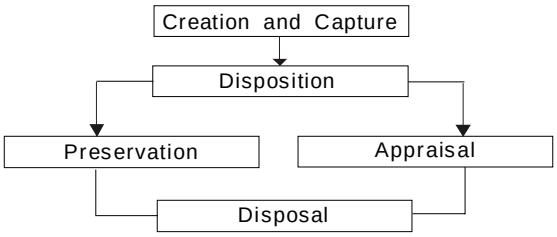

Figure 1. Lifecycle of electronic records.

(i) *Create and capture* refers to the initial creation or capture of a record within an established Records Management System (RMS).

(ii) *Disposition* refers to the initial decisions that are made on the estimated retention period for a record when it is no longer active.

(iii) *Appraisal* refers to the decision-making process based on a set of guidelines to determine whether the record is kept in the permanent preservation or destroyed.

(iv) *Preservation* refers to the strategies and methods of migrating and keeping the records for future access by upgrading to the latest hardware and software platforms.

(v) *Disposal* refers to the process of transferring the records to permanent archives, preservation or for final destruction.

4. STRUCTURE OF ELECTRONIC RECORDS

According to Victorian Electronic Records Strategy (2003): to access people from all groups of management to all types of records, ERs must have a common record structure. While creating ERs, in spite of the recommended structure to electronic records, the following points also must be taken into consideration:

(i) *Self-documenting* interprets and understands the information in a record without reference to an external documentation, which is based on ASCII (American Standard Code for Information Interchange) text. By doing this, documents can be viewed on any computer.

(ii) *Self-contained* means that the structure contains all information about the record. Information associated

with a record stored at one place will be easier to manage than stored separately in the form of its components.

(iii) *Extensible* means that the structure of the data can be extended by adding new metadata or new record type without affecting the basic structure of the data. Recommended structure is expressed by using XML (Extensible Markup Language). XML is a text-based mark-up language and the specifications are easily extensible.

5. ADVANTAGES AND DISADVANTAGES OF ELECTRONIC RECORDS

Many government agencies are now creating more records using computers than ever before. From a records management perspective, ERs have the following distinct advantages over their paper counterparts [4]:

- Ë Increase in speed of information exchange and enables users to conduct more advanced searches.
- Ë Require little storage space resulting in cost saving. Magnetic discs and optical media provide even greater space savings.
- Ë Storage cost is much less than the equivalent number of paper records.
- Ë Easy to copy and take very small amount of time.

The disadvantages of ERs include:

- Ë Presently, the lifespan of both magnetic and optical media on which ERs are preserved is very short.
- Ë Hardware that is used to read data becomes obsolete almost every 3-4 years and software changes every three years.
- Ë Storing colour images need more disk space and that resulting in incurring higher hardware costs.
- Ë ERs can only be viewed using computer, software, and operating system.

ERs are viable alternative storage medium to paper in terms of preservation of information and saving storage space. While considering storage of ERs, thought must be given to the choice of medium, the information content (required in terms of resolution and depth), the equipment needed to read, and the cost of long-term storage.

6. CREATION OF ELECTRONIC RECORDS IN VARIOUS ORGANISATIONS

6.1 National Archives and Records Administration

National Archives and Records Administration (NARA) has several projects related to records management issues. The Electronic Access Project was carried out during 1996-99 to enable users to search and locate documents in digital copies as long as they have the Internet connection. The collections include those from Presidential libraries and regional archives. NARA's Electronic Records Management System (ERMS) database is called NARA Archival Information Locator (NAIL). NAIL is an online research database, which contains descriptions of more than 3,000 publications that are available in microfilms and 4,40,446 archival holdings that enable users to search the descriptions through keywords or subject headings. About 1,24,000 digital records are available for researchers to view through NAIL database.

6.2 Electronic Registry System

During 1995-96, National Computer Board (NCB) in Singapore started a project known as Electronic Registry System, which was common platform for all governmental agencies at that time. The automation project was initiated by a few government agencies led by NCB. The purpose of the ERs Project was to introduce ERS across all public sector organisations and institutions, to reduce duplications in the development and maintenance, and to achieve synergies of scale and scope. The main objectives of ERs was: (a) to provide e-filing of e-mails from within the GEMS (Government Electronic Mail System) environment; (b) to digitise as much as the existing physical registry system; (c) to assist in work assignment and task management from within the GEMS environment; (d) to file and provide organisational structure in the stored documents; and (e) to organise and monitor work assignments and allow access to classified information/ documents/records.

6.3 Singapore National Eye Centre

Singapore National Eye Centre (SNEC) is a member of Singapore Health Services (SingHealth), SNEC introduced an electronic document archival platform to manage its financial records in July 2003 [5]. Besides financial records, other vital records like medical and human resource records that are converted from paper records to ERs through a strict imaging process that is fully compliant to the Evidence Act (EA) of Singapore have also been archived electronically. These electronic images can be used with confidence as substitutes to their paper counterparts. SNEC also reached another milestone by gaining approval from Inland Revenue Authority of Singapore (IRAS) to convert their physical financial records into EA certified digital images which will benefit in managing and safely keeping its vital records in electronic form. This resulted in increased access, usage and productivity where paper records do not allow multiple accesses. Electronic Record Management (ERM) and Electronic Document Management (EDM) are required by most organisations regardless of public or private. The two systems are closely related in their functions and can be integrated in one software package that supports the

management of electronic information in different ways but complements each other.

ERM provides a digital environment for capturing electronic documents and applying standard records management practices to manage them. It supports the medium to long-term information management needs of each organisation's business. Besides that, it also manages a corporate filing structure, document classification within the filing structures, and formal retention and disposition scheduling based on an approved disposition and review schedule.

EDM emphasises on usability and is designed based on business needs of an organisation to support the operational functions. It has less emphasis on document control and accountability. Fundamental difference between these two are that ERM focuses on the access and version control, audit trails, security, and back-up whereas, EDM is the subset of Records Management that concentrates on data collected on Web forms and internal administrative systems. It is to ensure the accurate handling of information hence EDMS is the aggregation of the three technologies including imaging, electronic foldering, and workflow management. Moreover, EDM has components that possess optical character recognition (OCR) and automatic identification abilities.

7. PRESERVATION OF ELECTRONIC RECORDS

With the enormous flow of ERs among all types of organisations, preservation of ERs is an important problem that many people are facing in the industry [6]. Preservation of ERs will focus mainly on the purpose, access levels and multiple access, and duration of the preservation period. The purpose refers to the owning organisation's intention of preserving the records and the information content. Preservation of records is vital as they can be kept for future references. So, many departments and organisations began realising the benefits of their corporate information. However, there must be a clear direction on why records are to be preserved and how long to be preserved?

Level of access is also crucial for ERs. Similar to paper records, they can be classified as restricted or confidential. Therefore, some ERs are available only to the public and some to the entire organisation or designated people of that organisation. The duration of the preservation period is another concern to all organisations and agencies. In most cases, the duration will not exceed 30 years but may be shorter or longer depending on the policy of the organisation or agency. McLeod and Hare {7} recommended the following standard file formats for long-term preservation: (i) PDF for plain text or XML documents; (ii) SQL for spreadsheets; (iii) SQL for databases; and (iv) TIFF for pictures.

8. METADATA AND AUTHENTICATION

McLeod and Hare defined metadata as contextual information of a record [7]. Metadata is structured information that enables us to describe, locate, control, and manage other information. McLean strongly feels that Electronic Medical Record (EMR) is similar to any types of electronic records [8]. EMR generates metadata that is invisible to an average computer user however, any alternations could be viewed under the "track changes" feature of the program. Hence, doctors and healthcare professionals who are authorised not only to access the EMR but also to alter or edit the record. Metadata could be used to track person(s) who accessed the electronic record, what types of information was being viewed and whether the record was modified etc. Unlike paper records, visual inspections are needed to detect any alternations.

Similar to paper records, ERs must be authenticated prior to using them as evidence in court or business transaction. Present technology helps us in knowing the authenticity of ERs and identifies whether the documents or records have been altered or tampered [9]. The technologies that are used could also provide an audit trail of the documents or records, even to the extent the person altered who had created or signed the records or documents could be traced. ERs are difficult to authenticate as ownership, authorship, and validity need to be ensured. The ability of tracking the path of ERs is important as it can enable users to know whether when and by whom the records were revised and where the authentic version is stored.

9. REVIEW OF MAJOR ELECTRONIC RECORD MANAGEMENT SYSTEMS

ERMS is a central management and storage system for medical records that meets the legal requirements of an organisation by retaining all the important records. ERMS records document and supports the operational, performance, and administrative activities of hospitals. ERMS manages these records for electronic storage and retrieval by authorised staff of a hospital, allows elimination of paper file copies, and prevents their inadvertent destruction. ERMS could be used for any application in various healthcare organisations however, this paper covers medical ERMS more extensively.

10. ELECTRONIC MEDICAL RECORDS SYSTEM

In the beginning, there was only hand written charts which were time consuming and tedious. Illegible handwritten charts not only took lot of time to undertaking and interpret but also to more serious problems such as errors in diagnoses, treatment, and billing.

Advent of computers, lead to many ways to store vast amount of information without requiring huge physical storage space. They also offered the convenience where several people can access the same information concurrently and from different locations. In keeping up with the complexity of managing the patients' health-related information, the healthcare industry started computerising these records over a decade ago.

EMRS Comprises a set comprehensive database used to store and access patients' healthcare information. The EMRs replaced the paper medical records as the primary source of information for healthcare purposes including clinical, legal, and administrative requirements. It is seen as a virtual compilation of non-redundant health data about a person across lifetime, including facts, observations, interpretations, plans, actions, and outcomes. The EMRS is supported by a network of systems that captures, stores, processes, communicates, secures, and presents information from multiple disparate locations as per requirement. The system facilitates the interaction among specialists or initial attending doctors, patient, attendance of long-term care, and business administration such as risk management and billing. EMRS allows medical personnel to look at charts and histories of patients without having to search for paper-based medical reports. With the use of document imaging system, cataloguing can be done according to its specific need. Moreover, patients' charts can be customised according to the preference of the medical personnel. Besides that, it can also list the type of medication and dosage on a patient's file.

At the moment, there are many EMR systems available in the market. Healthcare organisations are normally caught in a dilemma either to purchase ready-made or custom-made system. There is no system in the market that could accommodate all the requirements of any organisation. More initial investment is definitely needed if the organisation decides to go for custom-made system. As far as ready-made system, the organisation will tend to adapt the system and see how it could compliment to its operations. Whereas, for custom-made system, the organisation will decide on how the system is going to improvise on its current workflow. Measuring tools such as checklist must be developed to keep track of the entire implementation process. Since the market is very competitive, vendors are outshining each other with additional features to attract potential buyers. The following are some of the import EMR Management Systems that are being used in various hospitals, health centres, clinics, etc. however, longer list is given at *Appendix 1*.

NextGen (http://www.nextgen.com/proemr.asp): It is suitable to cater small to large medical practise. This system is good for healthcare providers, which would like to manage administrative and clinical information. It is a comprehensive system specially developed for over 20 different specialities such as neurology, urology, orthopaedics, dermatology, etc., and has built-in user friendly tools, which enable fast and easy customisation of workflow and content options. The system could improve quality, reduce risk, cut cost and increase revenues of the user.

Visionary Medical Systems, Inc (http://www.visionarymed.com/home.php): This system enables better office efficiency and workflow of EMR by providing fast access to the patient's information. The use of Microsoft architecture enables better stability and integration with most software in the market. Besides that, visionary could store critical information of a patient such as medication, allergies, laboratory reports, charts, etc. The system also has an easy-to-use Windows user interface that helps the users in booking of medical appointments, billing, financial, and operational elements of a successful medical practice. Another advantage of this system is that electronic claims can be processed to insurance carriers of commercial or government entities. This system is suitable for use either for single or multiple practices.

AdvantaChart (http://www.advantachart.com/): This system is a Window-based EMR application designed in partnership with Obstetricians and Gynaecologists. The system is easy to use and is available at affordable price. Besides that, this system could be used for workflow process to streamline and to provide quality patient care. The interface is user friendly and doctors and healthcare professionals could record all phone calls, laboratory tests, and hospitalisation records. The system is reliable in which the information and charts of the patient could be accessed from remote locations through an Internet connection. This system combined imaging, data recognition, and other leading edge technologies to create, maintain, and access to patient records. It helps in tracing patients; the movement of particular patient could be monitored at every stage (from check-in till discharge).

National Computer System (http://www.ncs.com.sg/documents/Clipping_Keylines_NovDec-ncs1.pdf): This system enables doctors and healthcare professionals to share information of patients from hospitals and polyclinics between the two clusters of public healthcare providers (i.e. SingHealth and National Healthcare Group). Electronic Medical Records Exchange (EMRX) is a platform which enables the two healthcare providers to share EMR of the patients that was created by either of the cluster. With EMRX, patient's discharge summary, laboratory results, medical alerts, operation reports, radiological and X-ray's report's and drug allergies could

be shared and unnecessary laboratory tests and questions reduced. In the event of an unconscious patient, it will be a great help to doctors because it will provide existing medical conditions, histories, drug allergy and medication given to similar type of the patients before. This will greatly help the attending doctors or healthcare professionals in properly diagnosing and giving suitable prescriptions to the patient.

10.1 Advantages, Disadvantages and Problems implementing EMRS

Nowadays EMR systems are widely used in hospitals, nursing facilities, healthcare, clinics, laboratory facilities, treatment centres, and physician's offices. The advantages of EMRS [10] are:

- Convenience of use.
- Remote access
- Information is more organised and easier to read compared to paper records.
- Simultaneous access to multiple users.
- Improved efficiency of processes such as data collection, data management and data retrieval.

The disadvantages of EMRS are:

- High initial investment.
- Every error on the record can have a major impact due to multiple people accessing to the same record at the same time.
- Failures in hardware or software can result in loss of information.

10.2 Problems Implementing EMRS

Although many healthcare organisations enjoy the benefits of EMRS, following barriers are there in implementing the system: (a) decision to buy a ready-made or custom made system according; (b) choosing the right vendors and hardware/software; (c) participation and involvement of healthcare professionals in the implementation process; (d) insufficient financial resources to invest in improved information technology; (e) lack of time and human resource to retrain the staff for switch into EMR; and (f) anticipated problems in attempting to an integrated system. While implementing the system, measurement tools such as checklist must be developed to ensure that the implementation process is on the right track, and security and confidentiality issues must be clearly defined while developing the system. The need for medical records is growing everyday, vast amount of data are being created, which is to be used for clinical, administrative and managerial purposes. Therefore, many healthcare organisations are switching to EMRS as they allow multiple authorized users can simultaneously access to the same record from one or different locations at the same time. Nowadays, healthcare facilities are being provided by different organisations from varieties of locations; in all types of organisations EMRS helps in getting right information at the right time for healthcare professionals.

10.3 Challenges of Conversion to EMR

However, there are some challenges while transiting to EMR. According to Fairbrook it takes time to convert records on paper to EMR because standardisation of the office procedures are needed to ensure all staff adheres to the same process while doing the each task [11]. The transition period of a clinic could be as much as 12 to 18 months so productivity of the staff could also be affected during that time. Transferring of information and cost involved within and different healthcare groups are other challenges for paper records conversion.

11. IMPACT OF EMRS ON HEALTHCARE INDUSTRY

No doubts that most of the hospitals do not have a complete paperless EMRS still from the admission of the patient till the discharge many procedures have already been computerised. Many administrative departments (billing, financial management and abstracting of medical records) of healthcare providers are being automated besides, areas like laboratory tests, radiology reports, issuing of medical certificates. Virtual Medical Worlds had noticed that computer-based ERMS have streamlined the automation of workflow and greatly reduced the usage of paper up to 75 per cent [12].

Omtool, a leading document and information handling solutions provider for managing the lifecycle of medical records highlighted that the existence of EMR must be in the format that all required users must be able to share information timely [13]. Although, EMRS is able to provide immediate access to the information of the patients, privacy is also one of the factors that must be taken into consideration. The U.S. Department of Health and Human Services had introduced a privacy rule under the Health Insurance Portability and Accountability Act (Patient Safety and Quality Healthcare, 2004) [14]. The purpose of the act is to protect and safeguards the information of the patients either physically or technically. Due to the reliance on EMR, Business Continuity Plan (BCP) is then become vital to all healthcare organisations from catastrophe strikes. Hence, proper contingency plan(s) must be provided for all healthcare providers in case of any emergency so that normal operations could be resumed within a stipulated time frame as information of patient is confidential. Therefore, healthcare providers should plan for storing "back-ups" in a secured offsite location(s). As paper records are volatile and prone to destruction, many healthcare providers should consider to digitise their paper records so that they could be accessed electronically in the event of any disaster(s).

In Singapore, SingHealth introduced EMR during the year 2002 in three hospitals, four national centres as well as eight polyclinics and then progressively implemented the Electronic Medical Records Exchange (EMRX) over a period of two years. With the implementation of EMRX, it is estimated that more than 4000 patients are now enjoying better patient care, improved drug safety, fewer repeated tests resulting an integrated and seamless care for the patients [15]. Since 2005, SGH has been film less as all the X-rays are digitised and stored on a centralised server which could be accessed by doctors and authorised healthcare professionals from remote locations. Besides SGM has advanced another step link diagnoses to related articles from the two renowned healthcare databases (OVID and The Cochrane Library) which facilitate the research for rare or uncommon diseases.

12. CONCLUSION

The introduction of EMR has significantly influenced the management in filing, chart tracking, retrieving, sharing data, etc. of medical records. Once the medical records are in electronic form, in various operations the basic functions of Healthcare Information Management System (HIMS) would become very easy. EMRS allows concurrent access to the data on the medical records to multiple users. It also helps in saving physical housing space of the hospitals, which is an expensive component in all types of places. With the move towards a paperless environment, HIMS professionals will need to focus on efficient systems that provide accurate data timely, reduce space, and help in managing records innovatively. Besides the healthcare professionals, patients also reap the benefits of good EMRS in terms of better quality of care, improved drug safety and fewer repeated tests. Having a successful EMRS will not only capture, store and manage data effectively but also allow all authorised personnel to access simultaneously so that everyone will get maximum benefits from the system.

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List of Electronic Medical Records Systems

S. No.	Name of the ERMS	Company name and address	System's features	URL
1	OmniMD	Integrated Systems Management, Inc. 303 South Broadway, Suite 101 Tarrytown, NY 10591	The leading edge solutions for practicing physicians and clinics for complete practice workflow.	http://www.omnimd.com/html/pOverview.html
2	SequelMed EHR (Electronic Health Records)	Sequel Systems, Inc. 225 BroadHollow Rd, Suite # 205E Melville, NY 11747	It is an integrated solution and all-in-one system inclusive of practice management (SequelMed EPM), document management (SequelMed EDM) and medical records (SequelMed EMR) solutions that captures and manages episodic and longitudinal health records information by facilitating comprehensive workflow tasking related to all components of the health record with appropriate timeliness and effective delivery of healthcare services.	http://www.sequelmed.com/
3.	MedicsElite	Advanced Data Systems Corporation, 255 West Spring, Valley Avenue, Maywood, NJ 07607	The Ultimate Medical Practice Management Software provider of Practice Management, Electronic Medical Records (EMR) and Radiology Information System (RIS) software solutions, currently serving over 30,000 physicians and healthcare providers in every medical specialty and practice size.	http://www.adsc.com/
4	PowerMed	PowerMed Corporation Phone: 207.772.3920 48 Free Street Portland Maine 04101	PowerMed Solo is a single user, non-networkable, subscription based version of PowerMed Practice Suite, and includes EMR, Billing, and Scheduling, with additional specialty modules that can be configured by the end user.	http://www.powermed.com/
5.	MediNotes	MediPro	MediNotes e is one of the most flexible EMR software packages in the market today. Templates and other medical content objects have been designed for complete control by the physician. MediNotes e links with over 40 practice management systems including Lytec Medical.	http://www.medipro.com/emr/index.html
6.	Practice Management ULTRA System	American Medical Software, 1180 S State Route 157, Edwardsville IL 62025.	Practice Management ULTRA System for a Complete Electronic Health Record the "Ultimate" in Medical Office Software. This fully integrated system is made up of the following systems and modules: Electronic Patient Charts System, Medical Management System, Appointment Scheduling System and Handheld Module.	http://www.americanmedical.com/
7.	EMR software solutions framework	Binary Spectrum 448, Abbott Road, Paramus New Jersey–07652, USA	The EMR software program helps to create a computerized patient record quickly, which also includes progress notes, treatment plans, etc. The automated security measures built in an EMR makes the product more attractive to the users because of HIPAA compliance. EMR is flexible enough to fit into an existing practice without affecting the streamline and smoothing the rough edges of the process.	http://www.binaryspectrum.com/HealthcareSolutions/ElectronicMedicalRecords/electronic-medical-record.html

8.	e-MDs Solution Series	e-MDs 9900 Spectrum Drive Austin, Texas-78717	This is a standard for affordable and integrated EHR / EMR & Practice Management software solution. Designed by physicians to improve care, reduce errors and simplify business so that time spent with patients is quality time automatically billed and coded properly.	http://www.e-mds.com/
9.	MedicWare EMR Software	MedicWare products 6520 North Irwindale Avenue Suite 215, Irwindale CA 91702	MedicWare EMR system is one of the most complete, efficient and affordable electronic medical record software. MedicWare EMR is medical office software that increases profitability of your practice, improves efficiency of your staff, and enhances your patient care.	http://www.medicware.com/
10.	mrecord EMR	MRecord 4909 Watersedge Dr. Suite 218, Raleigh, NC-27606	MRecord's electronic medical record system is a healthcare automation system to physician practices and preparing them for the connected community.	https://www.mrecord.com/emr.html
11.	A.I.med	A.I.med Toll-Free: (800) 403-2330 Tel: (858) 268-1150 E-mail: info@acrendo.com	A.I.med is an electronic medical record and practice management software system created for smaller sized practices. With a sophisticated backend system, users can customize the EMR in real-time and access it remotely.	http://www.acrendo.com/
12.	Abraxas EMR	Abraxas Medical Solutions 135 Technology Drive, Suite 200 Irvine, CA 92618	Abraxas Medical Solutions provides a single software application for both electronic medical records and practice management (PM) using a single Microsoft-SQL database.	http://www.abraxasmedical.com/
13.	AdvancedMD	AdvancedMD® Software, Inc.11781 South Lone Peak Pkwy, Suite 110 Draper, UT 84020	AdvancedMD is a leading EMR and medical billing software system. With a large national customer base, this EMR caters to primary care physicians as well as a wide range of specialty physicians.	http://www.advancedmd.com/
14.	AdvantaChart	AdvantaChart™Inc. 5948 Timber Ridge Drive, Suite 202 Prospect KY-40059	AdvantaChart is a specialty-specific EMR designed for small to medium OB/GYN and Internal Medicine practices. Utilizing innovative and proven technologies, AdvantaChart is easy to use, reasonably priced and known for unparalleled system.	http://www.advantachart.com/
15.	athenaClinicals	athenahealth, Inc. 311 Arsenal Street Watertown, MA 02472	athenahealth is suitable for medical practices that combines intuitive web-based practice management and EMR software, payer and clinical intelligence and results-oriented services.	http://www.athenahealth.com/
16.	ChartLogic EMR	ChartLogic Inc. 3995 South 700 East Suite 200, Salt Lake City Utah-84107	ChartLogic EMR is a unique charting system driven by speech recognition software which allows to document patient's information in less than 90 seconds.	http://www.chartlogic.com/electronic-medical-record-software.php
17.	e-Health Method	eHEALTH G-4 Sector 39, Noida Uttar Pradesh-201 301, India	e-Health Method, Version P by Global Medical Data, is a web-based EMR & Practice Management system that features scheduling, diagnosis/procedure capture, claims submission/follow up, and patient billing system.	