

Electronic Health Records: An Introductory Course

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Purpose & Objectives

This is an introductory course which will give you an overview of Electronic Health Records (EHR) and the systems which are used to manage them. The course is designed for nurses who are already familiar with nursing terms and concepts.

After successful completion of this course, you will be able to:

1. Discuss why all nurses are expected to interface with an EHR System in their workflow
2. Discuss the definition of an EHR System
3. List the benefits of an EHR System
4. Describe federal government mandates for adopting EHR systems
5. Describe the core functions of an EHR System
6. Describe what is meant by 'Meaningful Use' of an EHR System
7. Compare paper based work flow to an EHR based one in a healthcare organization

8. Describe the benefits of coded nomenclature in EHR systems
9. List the important interfaces of a nursing professional with the EHR system

Why Should You Learn About EHR Systems?

EHR (Electronic Health Record) systems are now being implemented in healthcare institutions of all sizes since the government has mandated compliance. Government incentives have expedited the transition of paper records to EHR systems by 2015. No matter where you work, in a large hospital, in any size of private practice, or any health organization which has a patient interface, you will be required to have familiarity with the functions, advantages and uses of an EMR system.

As a nurse, you are an important user segment for EHR systems. You will input data for patient care in the system which then generates lab tests, medication orders, care transfer, billing and coding, patient monitoring, etc. In the past, you entered this data in paper files and forms, but now you will enter this in the EHR computer system using its screen interface. Therefore you are required to be familiar with EHR systems, their purpose and usage. There are several EHR systems in the market, with some of the popular ones being Epic, McKesson and AllScripts. You do not need to learn all EHR systems nor learn all details of any one particular system. This course will give you an overview and will give you familiarity with EHRs and their use so that you can confidently say you know about EHRs. You will then be able to easily learn and pick up the particular EHR system your employer or potential employer will be using.

This course is designed to give you an understanding and a basic overview of all these areas – functions of EHR, advantages of EHR systems and uses of EHR systems. Further courses will describe specific EHR systems and give you familiarity with generic key strokes used in the operating of an EHR system.

Why the Rush to Learn EMR Systems? Government Mandate to Implement EHR Systems

GOVERNMENT MANDATE: President Barack Obama identified EHR as a priority and signed into law the Health Information Technology for Economic and Clinical Health (HITECH) Act. This act promotes widespread adoption of EHR. It authorizes Medicare to make incentive payments to doctors and hospitals that use a certified EHR. Eligible providers are those who implement use of a certified EHR prior to 2015. After the end of 2014, Medicare will begin to administer financial penalties.

The Office of National Coordinator (ONC) for Health Information Technology (HIT) has also created a strategy for adoption of health information technology and goals with a 10 year timeline for achievement.

Note that the HITECH Act had preceded President Obama's Affordable Care Act (ACA) and laid the foundations of the technology infrastructure needed for the ACA to be successfully implemented.

The Big Picture of Government Plans For EHR

First, the government planned to inform, incentivize and popularize EHR clinical practices to enable adoption.

Second, regional hubs were set up to Interconnect clinicians by fostering regional collaborations. The regional hubs for information exchange are a key link in making the goal of adoption of health information technology a success. Public and sometimes private medical colleges have been granted the funding and responsibility for implementing these Regional Information Exchanges. A national health information network has also been set up.

Third, the government has charged all providers to promote personalized care by encouraging use of personal health records (PHR), informed consumer choice and use of tele-health systems.

Fourth, the government will utilize the technology infrastructure and data to increase access and efficiency of healthcare by improving public health surveillance architectures, streamlining care and monitoring quality.

Finally, the government will focus on privacy and security of medical records, interoperability of technology systems, and collaborative medical care.

Definition of Electronic Health Records (EHR)

In your workplace you will hear these terms: EMR and EHR. What is the difference?

Electronic medical records (EMR) are a digital version of the paper charts in the clinician's office. An EMR contains the medical and treatment history of the patients in one practice. EMRs allow clinicians to track data over time, easily identify which patients are due for preventive screenings or checkups, check how their patients are doing on certain parameters—such as blood pressure readings or vaccinations, monitor and improve overall quality of care within the practice. But the information in EMRs cannot be accessed by clinicians outside the practice. Then the patient's record might have to be printed out and delivered by mail to specialists and other members of the care team. This is where EHR's have more advantages.

Electronic health records (EHR) do all the things EMR does and focus on the total health of the patient. EHRs are designed to reach out beyond the health organization that originally collects

and compiles the information. EHR's are built to share information with other healthcare providers, such as laboratories and specialists, so they contain information from all the clinicians involved in the patient's care. The National Alliance for Health Information Technology stated that EHR data "can be created, managed, and consulted by authorized clinicians and staff across more than one healthcare organization." EHRs are designed to be accessed by all people involved in the patients care—including the patients themselves. Indeed, that is an explicit expectation in the Stage 1 definition of "meaningful use" of EHRs (discussed later in detail). Healthcare is a team effort, and shared information supports that effort.

Test Yourself

What is the difference between an EMR System and an EHR System?

- A. EMR has medical information while EHR has health information
- B. EHR Systems have government incentives while EMR Systems don't
- C. EMR stores patient medical information in one healthcare provider while EHR is designed to share it with other providers – **Correct!**

What are the Core Functions of an EHR System?

There are eight core functions of an EHR:

1. Health information and data recording
2. Order management
3. Result management
4. Patient support
5. Administrative processes and reporting
6. Decision support
7. Electronic communication and connectivity
8. Reporting and population health

Several healthcare related organizations have worked diligently to define the functions and goals for EHR Systems. The Institute of Medicine (IOM) and the Computer Based Patient Record Institute (CPRI) defined EHR functions listed above. These functions cover the full cycle of tasks included in a patients care from data collection, lab and medicine order placement, data analysis and resultant decision support, patient empowerment in monitoring self care, to reporting of health statistics for research and population analysis.

As a nursing professional, you perform functions 1 through 4 routinely. With EHR systems in place, you will perform the same functions on a computerized system which is very structured

and more directed. Some nurses even find EHR systems very constraining but the functional advantages outweigh any resistance.

Most Important Nursing Interfaces with Core Functions of an HER

Among the eight core functions listed previously, nurses are critical to the interface in the first four functions.

Nurses are at the forefront of monitoring and generating health information and data for the patient during patient care. When a patient encounter occurs whether at a physician practice on an out-patient basis or at a healthcare organization on an in-patient basis, the physician makes the diagnoses and enters into the EHR system. It is the nurse who is responsible for continuing care and executing any orders of medications and lab tests which the physician has requested. Consequently, nurses are responsible for order management through the EHR system as well. When the reports come in, the EHR system will receive these electronically. It will be the nurse who brings these to the attention of the physician for follow through if needed. Nurses will also communicate with the patients regarding the results and any actions required by the physicians based on the results. Consequently, result management and patient support through the EHR interface will be an important interface for nurses.

Nurses do in fact play an important role in the administrative processes and reporting and the electronic communication and connectivity as well. These are crucial as support functions in settings where the insurance approvals and the billing and coding functions are seamlessly integrated into the EHR systems. Any time there is need for transitioning patient care, and for communicating regarding orders or reports with external care givers, these interfaces become important for the nursing function.

The Importance of Nurse Engagement in EHRs

EHRs present an opportunity for nurses to provide high quality, safe and effective patient care. Various studies have reported that a majority of nurses believe EHRs improve the quality of documentation, safety, patient care, and clinical diagnoses.

Nurses are critical in the patient care as well as patient interface, patient education, and interface with the healthcare team. When nurses use EHR systems, patient and clinical data have improved legibility, and the ability to be searched and shared with other clinicians such as doctors, pharmacists, lab technicians, as well as external providers. Since EHR systems structure data entry, they reduce medical errors and eliminate duplicate screenings and tests. This contributes to higher quality of patient care and controls cost of care.

Nurses can enter clinical data at the point of service and in real-time into the EHR. Without an EHR system, nurses enter data after the encounter often at the end of their shifts and do so on paper charts. The members of the healthcare team can then continuously monitor patient progress and outcomes, can collaborate easily using the greater accessibility to real-time client's information and make improved decisions regarding their patients care.

Nurses can also use the data in the EHR system to counsel the patients. One of the goals is to increase patient engagement and client education. Nursing notes in the EHR system facilitates patient empowerment in their own care planning and outcomes management.

Test Yourself

Which if the following core EHR functions has the least nursing interface?

Health information and data recording

Reporting and population health – **Correct!**

Order management

Objectives Specified for EHR Use: Meaningful Use

Meaningful use essentially ensures that healthcare organizations do not merely install EHR systems to get incentives without actually using them for the benefit of the patients. Government has tied the \$\$ incentives for implementing EHR systems to reporting of meaningful use metrics by the healthcare institutions.

There are three components of Meaningful Use:

1. Use of a certified EHR system in meaningful manner.
2. Use of a certified EHR system for electronic exchange of health information to improve quality of healthcare.
3. Use of a certified EHR technology to submit clinical quality and other measures selected by Secretary of Health and Human Services (HHS).

There are up to 25 meaningful use clinical quality measures which need to be reported to HHS for an institution to qualify as having “beneficially adopted an EHR system.”

A “certified EHR” is a system which has been certified by an Office of National Coordinator's Authorized Testing and Certification Body (ONC-ATCB) or the Certification Commission for Healthcare Information Technology (CCHIT).

Clinical Quality Measures (CQM) for Meaningful Use of an EHR System

Clinical Quality Measures (CQM) are an important component in the strategy to improve the quality of healthcare for patients. These CQM reporting requirements are designed for quality improvement, and specified as pay-for-reporting programs for healthcare providers using EHR systems. EHR systems have inbuilt functionality with facilitates collection of the CQM data and its reporting and this has a direct correlation to the future of reimbursement for the healthcare organization.

Healthcare organizations and providers must report data on chosen CQMs in order to achieve and demonstrate meaningful use. Starting in 2014, data for all CQMs have to be reported electronically. A CQM can provide information regarding whether a healthcare provider, such as a hospital, has provided care to their patients that supports a clinical process found to be effective in reducing complications associated with a specific disease or medical condition or associated with being hospitalized. CQM results are reported to demonstrate that the provider has used EHR technology in a meaningful way.

Each healthcare organization analyzes their patient services and decides which CQM they will report against for meaningful use. They do so by reviewing the patient population and focusing on the most often encountered diagnoses (10 to 20) for which they typically provide care services. They then match those top frequency diagnoses against the listing of CQMs available, identify the most appropriate CQMs that align with these common diagnoses amongst their patient population and work with the EHR vendor to ensure their EHR system has the ability to track the selected CQM and report it.

Clinical Quality Measures (CQM) Described

CQMs are measures of processes or outcomes of patient care, observations or treatment that relate to one or more quality aims for healthcare including effective, safe, efficient, patient-centered, equitable, and timely healthcare. Government healthcare related documents and web sites (such as www.cms.gov and www.healthit.gov) provide these definitions and guidelines and the examples below have been taken from these sites.

Parts of a Clinical Quality Measure Include:

Initial Patient Population:

The group of patients which the performance measure is designed to address.

Example - All patients 65 years and older.

Denominator

A subset of the initial patient population (i.e., Patients with diabetes. The initial patient population and the Denominator could be the same).

Example - All patients 65 years of age and older with diabetes.

Numerator

A subset of the denominator population for whom a process or outcome of care occurs. It represents a clinical action to be counted as meeting a measure's requirements (i.e. patients who received the particular service or obtained a particular outcome that is being measured).

Example - Patients who had a diabetic foot exam.

Denominator Exclusion

The mechanism used to exclude patients from the denominator of a performance measure when a therapy or service would not be appropriate in instances for which the patient otherwise meets the denominator criteria.

Example - A patient with bilateral lower extremity amputation is excluded from a measure of foot exams.

The CQM in this example will report the results as the ratio of the numerator to the denominator and this will enable an assessment of quality care of diabetic patients 65 years or older.

Test Yourself

What are CQMs?

Clinical Questions for Measurement

Clinical Questions for Medicine

Clinical Quality Measures – **Correct!**

A Note on Privacy, Security, and Meaningful Use: HIPAA

The primary goal of HIPAA (Health Insurance Portability and Accountability Act) is to make it easier for people to keep health insurance, protect the confidentiality and security of patient healthcare information and help the healthcare providers control administrative costs.

The HIPAA Privacy and Security Rules protect the privacy and security of individually identifiable health information. HIPAA Privacy Rule covers protected health information (PHI) on paper or any other kind of medium while the HIPAA Security Rule covers electronic protected health information (ePHI).

Nurses stand at the forefront in bridging the gaps between the policies or burdens imposed by HIPAA and patient needs or requests. HIPAA privacy and security requirements are also embedded in the incentive programs which have been specified for EHR meaningful use. Providing healthcare and expedient transitioning of patient care if needed often requires sharing or transmitting patient information. In the world of EHR-mediated healthcare where large amounts of information can transfer at the click of a button, nurses have to be especially aware of regulations and trained in properly utilizing EHR technology.

A variety of initiatives are crucial for HIPAA compliance and nurses can ensure these are adopted in the healthcare settings they work. Examples are the development of unique patient identifiers and information technology (i.e., EHR system) safety reviews.

Advantages of EHR

Improved legibility: EHR systems lead to improved legibility, and the ability to find, share, and search client records.

Reduce medical errors: EHR systems reduce medical errors.

Eliminate duplicate screenings: EHR Systems eliminate duplicate screenings and tests.

EHR Systems eliminate duplicate screenings and tests: EHR Systems promote patient engagement and improved transition of care.

Shared data: Shared data from EHR will be analyzed for research and advancement in healthcare.

Several thousands of people die in hospitals each year as result of medical errors. An estimated loss of 17 billion dollars is incurred annually. EHR systems are designed to reduce human error and automatically check consistency of entered data as well and utilize vast stores of medical and drug data to issue various alerts when needed.

What will be your role in EHR Usage?

From 2014 to 2016:

Nurses will assist in entering data at point of care on all patient findings and administration notes electronically in the EHR system being used at the provider's location.

Nurses will assist the physician in diagnoses by monitoring electronic charts on patient history, electronic lab results, and implementing electronic nursing care plans.

Nurses will seamlessly transition patient care between healthcare practitioners by using the information exchanges set up by the government instead of merely exchanging clinical information and reports.

Nurses will provide patients with electronic and online access instead of merely providing patients with copies of their health information.

In summary, nurses will be critical in the meaningful adoption of EHR systems which requires clinicians to empower patients to get engaged in monitoring their own healthcare.

EHR Enabled Patient Care Transition

Government has required that nurses and doctors will need to ensure that the healthcare provider sends:

1. Healthcare records for more than 50% of patients needing transitions to another provider
2. More than 10 percent of these should be sent as electronic transmissions using the EHR system
3. At least one instance of exchange should be made with a provider using EHR technology from a different EHR vendor

These three requirements allow the seamless information exchange goal to be tested in practice in all healthcare institutions with differing EHR technology platforms.

Workflow in an Office Making Full Use of an EHR System

As opposed to paper charts where SOAP and other notes are dictated and transcribed later and orders are handwritten and faxed, the flow of patient care in the EHR world is:

Step 1: Client phones office; schedules appointment. Or, schedules appointment via web.

Step 2: Client arrives and is asked to confirm demographic information existing in EHR.

Step 3: Client asked to complete medical history and reason for visit using a computer or smart device connected to EHR directly or wirelessly.

Step 4: System alerts nurse that client is ready to move to exam room; vital signs are taken and wirelessly transmitted to EHR.

Step 5: Nurse and doctor and client review client-entered symptoms and history.

Step 6: Doctor/nurse practitioner enters room and discusses the reason for visit, performs physical exam, makes assessment, creates plan, and documents encounter similar to SOAP notes in EHR.

Step 7: If medications are ordered, prescriptions are sent electronically to pharmacy through the EHR System.

Step 8: If labs are ordered, necessary specimens obtained and order is sent electronically to lab through the EHR System.

Step 9: Clinician has more personal time with the client.

Step 10: Client are escorted to checkout area and can be given a printed copy of the completed encounter note right there at that time.

Step 11: Test results are sent to doctor electronically through the EHR System, reviewed on screen, and automatically merged into patient records in the EHR system.

Inpatient Workflow from Admission Through Discharge

All clinicians provide services and use the EHR system to input information and access instructions.

Step 1: Client demographic and insurance information is collected/updated in the EHR system.

Step 2: Doctor signs order to admit and examines client through EHR system.

Step 3: Nurse/doctor orders tests, medications, and procedures. These are transmitted through the EHR system.

Step 4: Doctor reviews results of tests and diagnostic procedures.

Step 5: You, the nurse, will provide most of the patient care and will enter all nursing notes and all work done into the charts in the EHR System.

Examples of nursing notes which you will be required to enter into the charts in the EHR System are:

- Record of medications administered
- Specimens obtained and sent for tests
- Measurements of vital signs
- Description of nursing assessments and nursing interventions performed
- Record of care coordination with interdisciplinary providers

- Providing essential client education
- Enter details of coordination of care for the discharge plan

Step 6: Doctor examines client and writes discharge orders.

Step 7: Health Information Management (HIM) department, if there is one at your healthcare organization, examines client's chart randomly chosen.

Importance of the Order Management Interface in EHR Systems for Nurses

One of the most important EHR interfaces for nursing professionals is the order management interface. Understanding that interface is crucial for you as a nurse because it impacts several of your clinical care responsibilities for patients. This includes electronic orders as well as their transmission to the interconnected ancillary departments such as laboratories, radiology, internal or external pharmacies, medical administration and record transcription departments. Note that coding for billing purposes is not a function of electronic order management.

It is often stated that order entry using an EHR system takes longer. Hospitals and other healthcare institutions also see some negative impacts on nurse-physician communication and other inter-dependent communication patterns as well. However, there are several important benefits from utilizing the order management interfaces available in EHR Systems. Electronic order management leads to reduced errors, reduced length of stay or patient re-visits, faster availability of lab results and radiology results, and decreased time for administration of medication to the patient. All these factors contribute towards increased quality of care and increased patient safety.

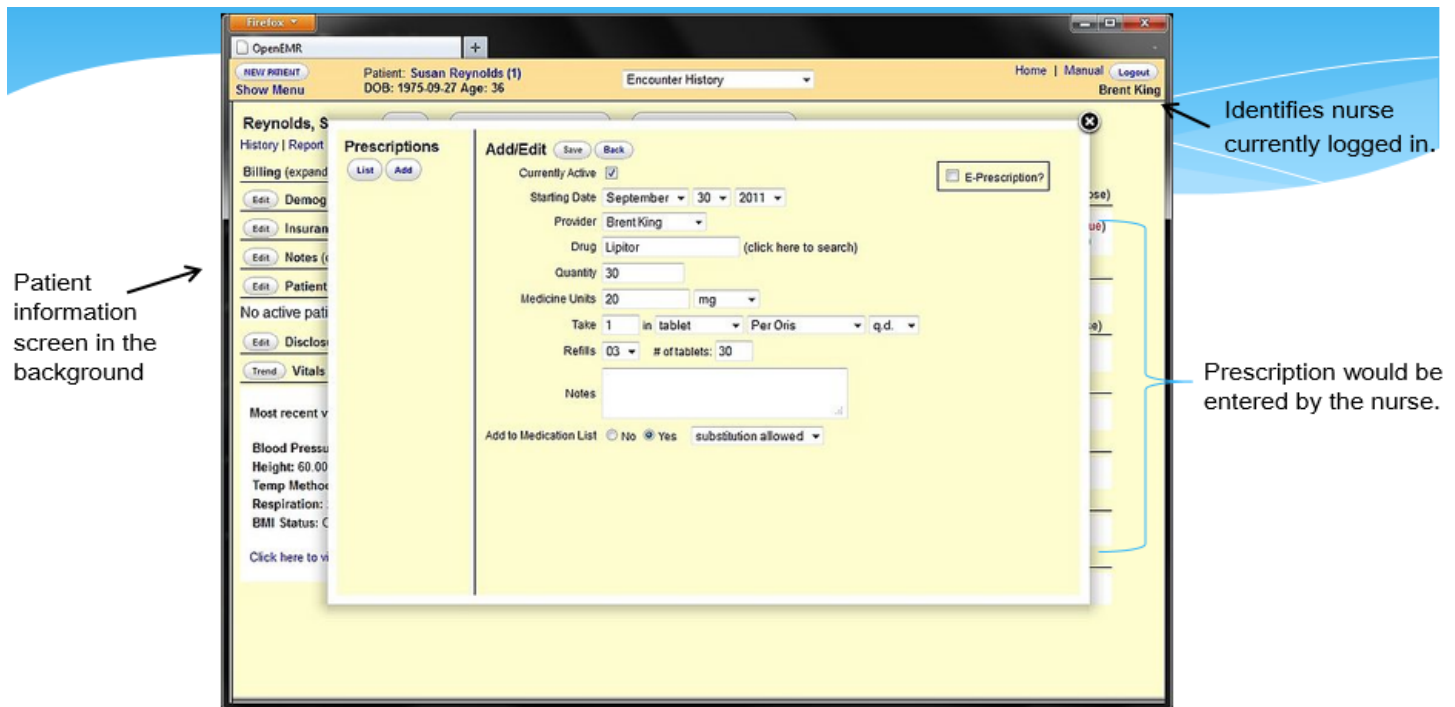
Importance of the Order Management Interface in EHR Systems for Nurses

Another aspect of improvements which results from the electronic order entry in EHR systems deals with the system having inbuilt checks for order completeness, order accuracy such as dosing accuracy and system checks of drug-drug or drug-allergy interactions.

Barcode medication administration (BCMA) when enabled in EHR systems also works toward decreasing errors and increasing information in patient records. Information which can be scanned in BCMA include product ID number, expiration date, and lot number which are

typically read visually by a nurse, jotted down on paper, and then entered into the EHR System.

Sample Prescription Entry Screen for Order Management in an EHR System



Nurses can enter prescription and medication details, one of the most often performed tasks by nurses in order management. This can be electronically transmitted at the click of a button. This sample screen is from the free open source EHR software, OpenEMR. Note that the nurse who is logged in and is entering information is identified on the screen (top right) and the patient information is listed on the banner across the top of the screen.

Test Yourself

Which of the following functions is not included in electronic order management with EHR Systems?

Electronic entry of prescription and lab orders

Electronic transmission to interconnected ancillary departments

Electronic orders to the billing department for coding the diagnosis – **Correct!**

Sample Vital Signs Documentation Screen in an EHR System

Nurses can enter vital signs for the patient at every encounter and charts will show trends as well as exceptions to be flagged. This sample screen is from the free open source EHR software, OpenEMR. Note that the nurse who is logged in and is entering information is identified on the screen (top right) and the patient information is listed on the banner across the top of the screen.

The screenshot displays the OpenEMR interface for documenting vital signs. At the top, a banner identifies the patient as John Kerry (6) and the logged-in user as Brent King. The left sidebar contains navigation menus for various EHR functions. The main area is titled 'Vitals' and contains a table for data entry. The table has columns for 'Name', 'Unit', and two columns for dates and times. The data entered includes weight (140 lbs), height (62 in), blood pressure (150/90 mmHg), pulse (95 per min), respiration (16 per min), temperature (98 F), and BMI (25.6). A 'Save Form' button is located at the bottom of the table.

Name	Unit	09/30/2011 18:06:01	09/30/2011 18:05:50
Weight	lbs	140	140.00
Weight	kg	63.50	63.50
Height	in	62	62.00
Height	cm	157.48	157.48
BP Systolic	mmHg	150	120
BP Diastolic	mmHg	90	80
Pulse	per min	95	80
Respiration	per min	16	20
Temperature	F	98	100.00
Temperature	C	36.67	37.78
Temp Location	Oral		Oral
Oxygen Saturation	%	97	97
Head Circumference	in		
Head Circumference	cm		
Waist Circumference	in		
Waist Circumference	cm		
BMI	kg/m ²	25.6	25.6
BMI Status	Type		Normal BL
Other Notes			

Identifies nurse currently logged in.

Patient information

Patient vitals would be entered by the nurse.

Downloaded from internet <http://open-emr.org/> (May 19, 2014)

Sample Patient Record in an EHR System

Patient information

Patient record will be checked and assessment parameters would be entered by the nurse.

Nurses can enter assessment parameters in the EHR charts and will be guided by the system to note the important observations. The nomenclature in the EHR screens closely matches the terminology used by you in your clinical practice and during patient care. The sample screen above is from an open source VistA EHR System developed by the US Department of Veterans Affairs to handle the records of the millions of veterans.

Downloaded from internet <http://www.ehealth.va.gov/Vista.asp> (May 19, 2014)

Sample Encounter Notes Screen in an EHR System

Menu bar giving options to perform general file functions.

Nomenclature panel which allows simple point and click to choose symptoms for diagnoses. Note that symptoms can be expended for further levels of detail.

Data Entry Details

Nurses and clinicians can enter or view encounter notes in this panel

Image adapted from: Gartee, R., & Beal, B. (2012). Electronic Health Records and Nursing. Pearson Education

EHR software allows clinicians to document client encounter by selecting menu items for Symptoms, History, Physical examination, Tests, Diagnoses, and Therapy.

The menu bar and tool bar located at the top and bottom of the screen allows quick access of commonly used functions.

Encounter notes can be entered as free flowing narrative text or as an outline from selected diagnoses codes such as CPT-4.

What Methods of Data Entry Can you Use in an EHR System?

You can capture data in EHR systems in many ways: scanning paper records, importing diagnostic images in digital format, importing text or word processing files, clients may enter their own history and symptoms, and most importantly, providers will record the notes at point-of-care. EHR data can be digital image data, or text-based data, or discrete data which was entered in fields specified on EHR system screens which are ideally codified in the system.

All pictures such as scans of earlier paper records should be cataloged and indexed in the EHR system to allow easy searches. It is best that reports or clinical data for patients which are received from other EHR systems be received electronically. Receiving data electronically will make it is easier to code those reports and data as per the nomenclature of your own EHR system. This is the only way to get your EHR system to give complete diagnostic trends, charts and searchable information for your patients.

Biomedical devices in hospitals also have the capability of exporting data into an EHR system.

Still, without a doubt, the surest source for reliably coded EHR data is the data entered by providers such as you (doctor, nurse, and medical assistant) during client encounters using a standardized nomenclature.

Data Entry in EHR Systems through Exchanges and Provider Networks

The Regional Health Information Organizations (RHIO) are examples of projects to enable electronic transfer of health records between different providers. RHIOs encourage exchange of client's health information across medical practices even though currently several obstacles are being faced by RHIOs such as technical, economic, even political.

The Office of National Coordinator for Health Information Technology's development of a national health information network (NHIN) is also an example of a project to enable electronic transfer of health records between different providers.

The mandated specifications for transitioning patient care has also incentivized electronic transfer of health records between different providers. As previously mentioned, a provider

needs to electronically transfer healthcare records for more than 50% of those patients needing transitions to another provider and more than 10 percent of these transfers should be sent as electronic transmissions using the EHR system in use at the providers location. Recall that at least one instance of exchange should be made with a provider using EHR technology from a different EHR vendor. This forces providers to test out the RHIOs or the NHIN for connecting dissimilar EHRs.

Data Entry in EHR Systems through Exchanges and Provider Networks

HL7 (High Level 7) is a leading messaging standard used by healthcare EHR systems to exchange information. DICOM (Digital Imaging and Communications in Medicine) is the most widely used format for storing and sending diagnostic images. These specifications are independent of any EHR application or EHR vendor.

Clinical Nomenclature for your use in recording Medical Observations in EHR Systems

Clinical nomenclature uses code sets designed specifically to record medical observations. EHR nomenclatures was developed by studying previously existing individual nomenclature terms and correlating them into clinically relevant findings. The resulting EHR nomenclature is a structured and standard list which makes it easy, efficient and error-free for the doctor and the nurse to enter their clinical findings by clicking and picking from lists.

But you should note that the nomenclature used in recording clinical observations in an EHR system differs from the billing codes. EHR nomenclatures have many more codes at finer levels of detail and granularity since they are to be used to describe the details of the clinical exam. Clinical nomenclature in the EHR system uses terminology which codifies each medical term. Prominent coding standards are SNOMED-CT, MEDCIN, LOINC, CCC.

You should also note that EHR nomenclatures are not easy to use in the beginning at the point of care and requires some study. As you become more familiar with the EHR being used at the healthcare organization where you are working, it becomes easier to identify the EHR nomenclature very quickly.

Nursing Code Sets Support EHR Development

Your work as a nurse has in fact been streamlined in an EHR system through the excellent hard work by several nursing organizations which worked to codify the nursing clinical nomenclature and terminology. 12 standards for coded nursing languages are recognized by American Nurses Association. EHR Systems have taken care to incorporate nursing code sets into EHR nomenclature in order to enable nurses to perform their work flow seamlessly with ease and efficiency.

The most popular standardized nursing coded languages are:

CCC: Clinical Care Classification System provides standardized coding terms specifically created for nursing and which can be incorporated into an EHR system. It includes nursing diagnoses, outcomes, nursing interventions, and actions.

NANDA-I, North American Nursing Diagnosis Association International has a system of classification of 206 Nursing Diagnoses.

NIC: Nursing Interventions Classification is designed for documenting nursing interventions in any clinical setting. Consists of numeric codes for 514 interventions.

NOC: Nursing Outcomes Classification is used to document effect of nursing interventions on client progress. Structure of 330 numerically coded outcomes.

These ultimately facilitate nursing communications and guides the process of professional nursing practice for assessing and treating the nursing diagnosis. Its incorporation into the EHR System facilitates professional nursing practice in the EHR era with ease and efficiency and in a standard, error free manner.

Test Yourself

Which of the following nomenclature codes is among the most popularly used in EHR Systems?

The Institute of Medicine's Health Insurance Portability and Accountability (HIPAA) code

The Clinical Care Classification (CCC) system – **Correct!**

The Clinical Quality Measures (CQM)

Electronic Nursing Care Plans: Clinical Care Classification (CCC) and EHR Systems

The Clinical Care Classification (CCC) System is recognized as the most popular terminology of choice for documenting the essence of patient care in the electronic health record (EHR) systems. It meets all the features of a concept-oriented terminology and has been formally accepted by various standards organizations. CCC provides standardized coding terms specifically created for nursing diagnoses, outcomes, nursing interventions, and actions. Its incorporation into the EHR System specifically benefits nursing work flow.

The CCC Model codifies and standardizes the documentation of patient care by nurses in any healthcare setting. EHR systems codify the CCC terminologies and inter-relate them with an electronic Nursing Care Plan which resides in the EHR System. This allows the nurse to achieve quality patient care using the EHR System as a data entry, monitoring, diagnosis, and continuous feedback system.

The CCC System is a set of atomic-level data elements that describe the six steps of the Nursing Process which is the standard of professional nursing practice recognized by the American Nurses Association (ANA) for clinical decision making in a codified and standardized framework. The CCC data elements cover assessment, diagnosis, outcome identification, planning, implementation, and evaluation. These data elements developed a nursing terminology specifically for computerization in EHR or other computer-based patient records systems.

Working the Electronic Nursing Care Plan from an EHR System

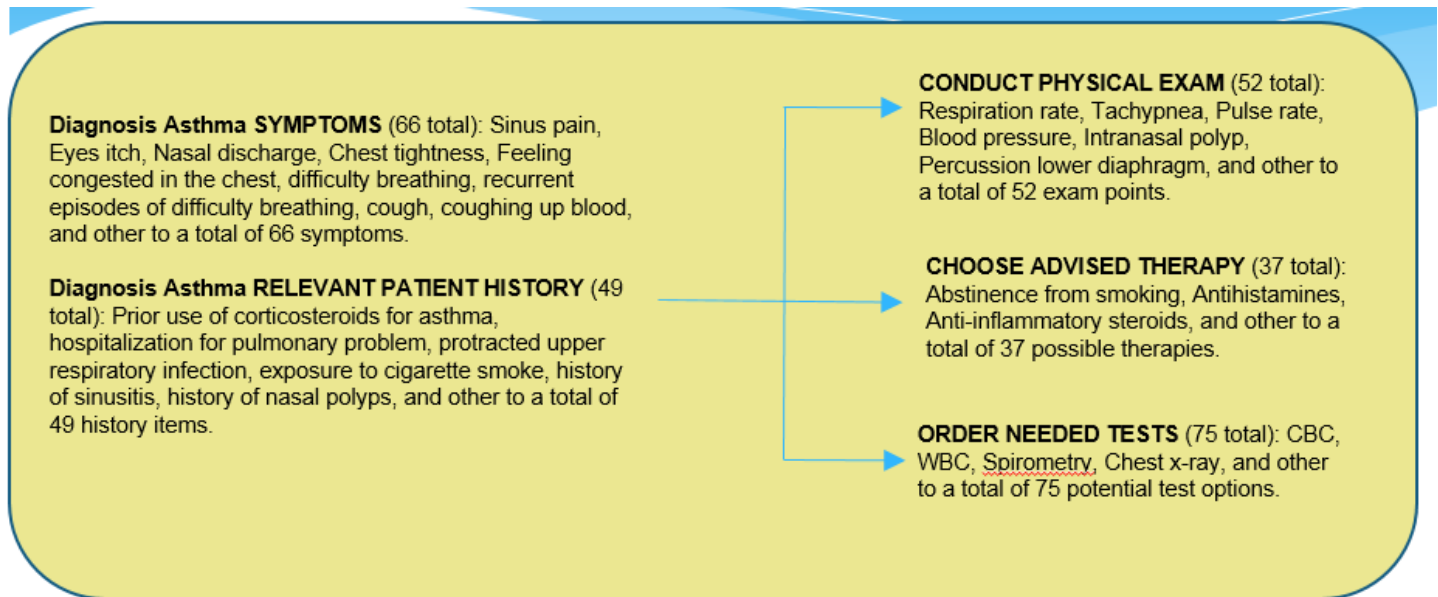
The CCC framework includes nursing data elements designed to allow EHR Systems to electronically generate Nursing Care Plans. The data elements to be recorded by nurses include behavioral, functional, physiological, psychological data.

Specifically, CCC data elements cover the 6 steps of the Nursing Process: assessment, diagnosis, outcome identification, planning, implementation, and evaluation. As an illustration, there are 21 Care Components in most EHR Systems which serve to describe “assessment” in the nursing plan. At the next level, data elements exist for 182 nursing “diagnosis” concepts representing concrete patient problems. Once the nurse has identified the diagnosis from the 182 options in the EHR system, the nurse needs to pick from 4 “interventions” and “action” types (assess, perform, teach, and manage) for each diagnosis. So, for the disease options, the EHR System has 792 options for nursing “interventions” and “actions”. -- with each one depicting a unique single atomic-level clinical concept.

Use of the EHR System in the context of the electronic Nursing Care Plan requires:

- Capturing patient care data electronically using a standardized, coded nursing terminology (i.e., CCC)
- Coding clinical encounters electronically: diagnoses, interventions/actions, and outcomes
- Getting historical charts on patient interventions for improving clinical decision making
- Tracking nurses’ contribution to patient care and care outcomes

Illustrating Nomenclature Links for the Diagnosis “Asthma”



Adapted from: Gartee, R., & Beal, B. (2012). Electronic Health Records and Nursing. Pearson Education

The EHR System in use at your place of work will provide screens which will guide you through the diagnoses under consideration. The system will allow you to conduct the exam, choose appropriate therapies, order needed tests, and electronically transmit the orders with click of buttons or from drop down lists.

Significance of Coded Data in EHR Systems: Clinical Decision Making

When data is coded in EHR systems, it can be used for trend analysis, alerts, health maintenance, and decision support.

Trend Analysis is based on charts, graphs and cumulative summary reports. These are constructed in the EHR System using comparison of data on the patient's outcomes and comparison of outcome data based on interventions from different dates or from different tests or from different events, such as medication changes or dosage changes and changes in blood tests.

Alerts are messages and reminders that are very useful for nurses and are automatically generated by the EHR system from the data to caution the nurses and doctors about an important task. The most useful ones for nurses are drug utilization review alerts, formulary alerts about insurance coverage benefits, and administration of medication alerts.

Health maintenance and decision support is based on EHR provided reference information at the point of patient care and just when the clinician needs it. Examples of useful reference information for nursing professionals will be interactions between prescription drugs being given to the patient. Other examples for nursing reference information include evidence based

guidelines for interventions, on-line medical references, and care planning for certain age groups.

Closed Loop of Medication Protocol

An EHR Example for Nurses

Step One: Nurse initiates an electronic prescription in the EHR system to be electronically routed to the pharmacy system.

Step Two: Order is checked and approved by the pharmacist and the medication is dispatched for the patient.

Step Three: Nurse administering the medication scans the client's armband to ensure the medication is being given to the right client in the right dosage.

Step Four: Nurse scans the barcodes on each medication or whichever item is being administered such as intravenous solution.

Step Five: The EHR system checks the electronic order and alerts the nurse of any Drug Utilization Reviews (DUR) or formulary alerts.

Step Six: If the medication dose, specification, and time match the order for the client, the nurse can then administer the medication to the client.

Step Seven: Nurse indicates in the EHR System that medication was administered and enters all required fields for completing this documentation, such as time, nurse ID.

Step Eight: The EHR system now has confirmation recorded that the medication has been administered.

Some Names of Popular EHR Systems

There are three categories of EHR Systems popularly used:

(i) Free and open source ones used mostly by smaller and private practices

(ii) Installed on computers at healthcare location also used mostly by smaller and private practices

(iii) Web-based and accessible by a variety of devices such as laptops, hand-held smart devices such as smart phones (used by several healthcare institutions of all sizes)

The market of EHR systems is very disintegrated and several vendors have come up with very acceptable and functional systems. As a result, there are too many names to be listed here. This list is only illustrative of some names which would be good to know. The largest ones are Allscripts, Meditech, Cerner, McKesson Practice, Epic Systems, and Siemens Healthcare. Other

popular names are AthenaClinicals, Care 360, CareCloud Charts, eClinicalWorks, iPatientCare EHR, MedicFusion, ModOffice EHR, MyAvtar, Practice Fusion, Scribe Complete, and WebChart.

Your place of employment will already have a particular EHR system installed and it will take you a little time to get familiar with the screens and the workflow imposed by that system. Or, you may work at a healthcare provider who is in the process of adopting an EHR system and as a nurse, you will then be critical in the adoption, training and go-live phases. You could work in allocation which still has to take the step to adopt an EHR system and then you will be a very valuable resource to spearhead the initiative.

Last Word: Nursing and EHR Systems

The implementation of EHR in healthcare settings has the goal to improve healthcare in several ways. Nurses and other healthcare professionals are all learning and participating in this technology initiative. Nurses in particular have to be engaged at the forefront and all throughout the process of EHR implementation and adoption by the healthcare organization and providers.

EHRs present an opportunity for nurses to provide high quality, safe and effective patient care. Nurses are critical in the patient care as well as patient interface, patient education, and interface with the healthcare team. EHR systems provide improved access to information needed by nurses, physicians, and medical professionals. Information and data entered by the nurses during their nursing care plan will improve and facilitate care coordination among the providers and make the workflow efficient, streamlined and effective. Nursing interfaces with the EHR system also contributes to reduced errors in patient care, avoids omissions in patient care, and safeguards patient data and safety.

For further study and understanding of the EHR systems, hands-on programs exist at provider locations as well as in some training and educational institutions.

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