# Table of Contents

**Executive Summary**

**Introduction**

**Background**
EMRs and Meaningful Use

**Phase I. Selection**
Functional Requirements
Technical Requirements
Clinical Requirements
Accessibility to EMR
Downtime
Security
Reporting Capabilities
Archive Process
Financial Requirements
Administrative Requirements
Accreditation, Legal, and Regulatory Requirements
Quality Improvement/Risk Management
Hardware/Device Considerations
Vendor Reputation

**Phase II. Implementation**
Assess Organizational Readiness
Develop an Implementation Plan
Budget Considerations
Conversion Approach
Conduct Training and Implement
Achieve Meaningful Use

**Phase III. Evaluation**
Continuous Quality Improvement
Competency Assessment
Chart Audits
Evaluation of Data Collection/Report Usage

**Summary**

**Additional Information**

**Glossary of Terms**

**Authors**

**References**

**Other Resources**
Executive Summary

The emergency department (ED) setting requires a time efficient and clinically effective means to document care provided, review significant patient data, and communicate that information at the transition of care. A well-planned, well-structured, and well-maintained ED electronic medical record (EMR) significantly enhances the ability to deliver quality patient care, improve population health, and control the rising cost of maintaining an overall excellent healthcare system.

Functionality and usability are the two most important features when choosing an EMR system for the ED. EMRs that are certified for Meaningful Use will have the functionality requirements built in, but usability features will vary by vendor. Selecting a user-efficient EMR system will help prevent errors and reduce risk primarily by providing evidence-based tools to support safe care, allowing for improved clinician decision-making, decreasing time to complete tasks, and lessening frustration for users. Involving end-users in the selection and design process is imperative to ensure safety and quality of patient care as well as successful adoption of the chosen EMR system.

Introduction

An Emergency Department (ED) Electronic Medical Record (EMR) system is a vital component of real-time data dissemination for the healthcare team. To provide safe, quality patient care, an electronic platform that identifies potential safety concerns, is user-friendly to the front line clinician, is in alignment with department systems and work flows, and is flexible and adaptable for a department with continuous refinement of its processes is necessary. This handbook is intended to assist ED leaders in the selection, implementation, and ongoing evaluation of an EMR system for their facility.

In each stage of this project, it is important to include end-users from all involved disciplines as well as leaders from various levels of the organization in the discussion, decision-making, and testing. Doing so will help to improve buy-in and accountability of the healthcare team as well as to promote effectiveness of implementation strategies. This collaborative approach has demonstrated improvement in registered nurse (RN) retention, decrease RN turnover, and ultimately quality and safety of patient care.
Background

Hospitals, including EDs, are expected to adopt an EMR system with the goal of improving the delivery of healthcare in five critical areas:2

1. Improve the quality, safety, and efficiency of care while reducing disparities
2. Engage patients and families in their care
3. Promote public and population health
4. Improve care coordination
5. Promote the privacy and security of electronic health records

The benefits of implementing an EMR include the ability to:

- Enhance patient safety and provide safer healthcare by providing a comprehensive picture of current health concerns
- Improve patient outcomes
- Offer instant access to health information
- Alert providers of potential conflicts such as drug-drug interactions or drug allergies
- Verify appropriateness of medications and dosages
- Reduce costs by reducing the need to repeat tests and procedures

EMRs and Meaningful Use

The use of EMRs has demonstrated the ability to improve patient outcomes and can help control the cost of delivering that care. It is estimated that Medicare and Medicaid will cost taxpayers $806 billion in 2013.2 As a result, the federal government, a significant stakeholder, has embraced health information technology (HIT).

The Health Information Technology for Economic and Clinical Health (HITECH) Act, a component of the American Recovery and Reinvestment Act of 2009, provides for financial incentives to hospitals and eligible professionals who implement certified electronic health records (EHRs) and demonstrate Meaningful Use.2 Meaningful Use criteria ensure that the implemented system provides functionality geared toward optimizing patient care in terms of quality and efficiency.

All EDs must select, upgrade to, or design an EMR that is certified for Meaningful Use.2 A list of certified HIT products is available through the Office of the National Coordinator for Health IT at http://oncchpl.force.com/ehrcert?q=chpl.

In order to receive federally funded incentives, certified EHRs need to be implemented by September 2014 to meet Stage I Meaningful Use attestation. Failure to demonstrate Meaningful Use by 2015 will result in penalties in the form of decreased reimbursement for Medicare and Medicaid.2

Implementation of an EMR system consists of three phases: Selection, implementation, and evaluation.
Phase I. Selection

Selection is an essential step to implementing an EMR. It is imperative that the selected EMR product, whether a best-of-breed or an enterprise system, meets the clinical requirements and functional needs of your department. Having a clear view of the objectives to be met will ensure that the selection process integrates with the overall goals of the organization. As with other phases of this project, it is strongly recommended that all end-user disciplines participate and provide input into selection. Attention to usability (the “fit” between end-users and the system) and safety (prevention of errors) can determine the overall success of EMR product implementation.

Functional Requirements

Ensure that the EMR product considered for purchase is certified for Meaningful Use. For a list of certified products visit [http://oncchpl.force.com/ehrcert?q=chpl](http://oncchpl.force.com/ehrcert?q=chpl).

For an EMR system to be effective, it needs to be adaptable in a healthcare environment that encounters constant change in regulations and technology. The system should be:

- Integrated or interfaced:
  - Integrated systems share data elements across the patient experience from EDs to inpatient and outpatient areas; often referred to as ‘enterprise’ systems
  - Interfaced systems require discrete data elements to be programmed to display in disparate systems; it is common for emergency departments to select their own ‘best-of-breed’ EMR products, which require an interface into inpatient EHRs
- Comprehensive: Accepts and effectively displays data from all relevant hospital systems including laboratory, imaging, cardiology, food and nutrition, respiratory therapy, pharmacy, etc.
- Historically complete: Incorporates the entire patient record including past inpatient and outpatient visits (consider potential to include physician office/clinic visits from affiliated and non-affiliated practice settings)
- retrievable: Authorized users can easily pull up patient records at any time
- Scalable: Allows for expansion as organization grows
- Configurable: Defines what system elements the organization can change onsite versus base-product changes that can only be made by the vendor (consider financial impact)
- Usable: Design is efficient, easy to learn, and compatible with end-users’ workflow

Technical Requirements

An effective EMR system should have the overall functionality to improve safety and efficiency through improved communication and care coordination. EMR systems that are certified for Meaningful Use should include these features:

- Medical device integration/interface, which allows for data captured by peripheral medical devices (e.g., cardiac monitors) to be uploaded into the EMR. Data should include basic and complex vital signs, including but not limited to temperature, pulse, respirations, blood pressure, advanced hemodynamics, pulse oximetry, capnography, etc., as well as blood glucose, and other point-of-care lab tests
- Transmission of medical device-generated data in “real-time” (e.g., instant transmission) or as a periodic, batched transmission via download (e.g., when a device is docked)
- An integration/interface for viewing data at an enterprise level
- Integration/interface with prehospital and intra-departmental transport devices and/or records as applicable
- An electronic medication administration record (eMAR) that consists of:
  - Electronic medication verification
  - Bar coded (or similarly electronically enhanced) medication administration via the use of wireless versus wired scanners/readers
  - The ability to share with or interface to inpatient records
  - The ability to interface with infusion pumps
- A summary view, or the ability to extract required and relevant data points into a single view for handoff during patient transfer/transition of care
- A data dictionary, which provides for a common language (interoperability) between all systems and healthcare providers
Clinical Requirements

Another feature integrated into EMRs is a clinical decision support system (CDSS) to assist clinicians with decision-making and help reduce errors. A CDSS program merges each patient’s information in the EMR with evidence-based knowledge/best practices and in turn provides clinicians with real-time alerts or reminders to help improve safety and support overall quality improvement.6

In the very busy clinical environment of an ED, the EMR should allow for user-friendly documentation and information retrieval. Usability is a key component to a successful implementation of an ED EMR. Many of the features listed below help support usability, starting with patient arrival/entry into the system through ED disposition. When defining EMR clinical documentation requirements, ensure that the necessary elements are included for data collection, benchmarking, and quality reporting for regulatory/accreditation purposes.3

Patient Arrival (including prehospital)

- Quick registration
- Ability to establish “door” (arrival) time
- Integration with enterprise master patient index (EMPI)
- Entry of unidentified patients (John/Jane Doe)
- Entry of patients into EMR prior to ambulance arrival
- Alert to appropriate provider(s) when patient does not arrive within expected timeframe
- Capability of positive patient identity verification (photograph, etc.)
- Ability to merge patient records

Triage Information

- Chief complaint identification (list of choices with free text option)
- Acuity level identification
- Basic and/or advanced triage assessment documentation
- Rapid order entry and triage intervention documentation
- Reminder alerts for reassessment of triaged patients in the waiting room

Documentation (Arrival to Disposition)

- RNs
  - Assessment and flow sheet format (e.g., checklist with free-text option)
    - Vital signs and graphing trends
    - Input & output (e.g., multiple lines, drains, tubes, and/or airways in various locations)
    - Safety assessment
    - Substance use assessment (tobacco, alcohol, recreational drugs)
  - Histories (medical, surgical, social, family)
    - Dysphagia screen
    - Pain assessment (for pediatric, adult, and unresponsive patient)
    - Body system assessments (neurological, musculoskeletal, integumentary, gastrointestinal, etc.)
  - Code/resuscitation management
  - Trauma care management
  - Procedure notes
  - Current medications
  - Allergies
  - Immunizations
  - Alerts for abnormal values by age
  - Alerts for prior communicable diseases
  - Prompts/hard stops for required documentation/screening
  - Automatic chart deficiency notification
- Physicians (MDs)/Licensed independent practitioners (LIPs)
  - Alerts for abnormal values by age
  - ePrescribe (ability to prescribe electronically with patient consent)
  - Alerts for medication dosing and interactions
  - Alerts for infectious diseases
  - Prompts for required documentation
  - Reminders to use chronic disease guidelines/protocols
  - Templates for notes by disease state
  - Free-text option
  - Ability to pull data (labs, vitals, I & O, etc.) from other sources via a trigger
  - CPT/ICD-10 coding enabled/driven
  - Automatic chart deficiency notification
  - Voice/speech recognition
  - Scribe order entry (only executable with LIP signature)
- Emergency Medical Services (EMS)
  - Prehospital documentation interface
  - Electrocardiogram/rhythm strip reception interface
- Required documentation/chart completion indicator for all disciplines
- Image management
  - General anatomic drawings (adult, child, male, female)
  - Specialized anatomic drawings (rule of nines, dermatomes, etc.)
  - Photographic storage (positive patient identification, wounds, forensics, etc.)
Discharge
- Instructions available in electronic format (for patient request)
- Ability to transmit visit summary to primary provider (auto fax, electronic data exchange)
- Prescription writing with electronic transmission to pharmacy
- Patient education content
  - Organized by disease state
  - Includes smoking cessation material
  - Written at appropriate comprehension level for facility’s patient population
  - Customizable/editable
- Foreign language translation

Disaster/mass casualty management
- Ability to create face sheets with pre-designated disaster account numbers—allows for rapid pre-registration (EMS triage tag number used as part of registration)
- Disaster tracking board with EMS disaster triage color scheme
- Identify and track disaster/mass casualty patients separate from other patients
  - Computerized provider order entry (CPOE)
- Customizable user (MDs/LIPs, residents, medical students, scribes, etc.) database includes co-signature where required
- Standardized order sets
  - Ability to incorporate evidence-based order sets
  - Configurable/customizable
  - Ability to edit in real time
- Automated prompt for documentation of “read back” when verbal/telephone orders are entered
- Automated trigger for order sets based on diagnosis and/or presentation/chief complaint
- Clinical decision support
  - Medication interaction check
  - Allergy check
  - Duplicate therapy check
  - Pregnancy/lactation check
- Medication reconciliation process at
  - Admission
  - Transfer
  - Discharge

Tracking Board
The electronic tracking board is an important visual communication tool that should support safe and efficient workflow in the ED as well as other clinical settings. Information must be clear, concise, and relevant to the end-users, who should be included in the development process to maximize usability. The following tracking features are recommended to maximize safety and care coordination:

- Customizable/configurable/sortable by:
  - Users
  - Role
  - Patient location
  - Patient status
- Has ability to track:
  - Current patient location in ED
  - Current patient status
  - Orders by type (lab, radiology, medications, consults, etc.)
  - Current status of orders
  - Isolation status
  - Patient location/activities outside of department
  - Registration requirements
  - Clinical team assignment by location and/or patient
- Makes all statuses easily distinguishable (e.g., with color coding)
- Stores and calculates relevant times for ED metrics/benchmarking (including but not limited to):
  - ED arrival time
  - Triage time
  - Provider arrival time for medical screening examination (MSE)
  - ED length of stay (LOS)
  - Lab/imaging/consult turn-around time
  - Admit/discharge decision times
  - Bed request time
  - Discharge/departure time
- Stored times retrievable for analysis/reports
- Central/main tracking board allows for:
  - Masking of protected health information (PHI)
  - Monitor size/resolution requirements
- Dashboard (at-a-glance) view includes:
  - Average ED LOS
  - Patient load by provider
  - Volume, acuity, and overcrowding metrics (automated and calculated in real time)
- Access to patient record directly from tracking board
- Access to tracking board during system downtime
Accessibility to EMR

Aside from direct access via the tracking board, remote EMR access is essential for medical professionals, but poses a security threat and vulnerability for data to be compromised by hackers. To allow for remote access, EMR applications are available online, which gives hackers the opportunity to find flaws in the network and compromise the data. A Virtual Private Network (VPN) helps to decrease this risk by sheltering private information (such as ePHI) sent over a public network by use of dedicated virtual pathways and encryption.

Also, various devices may be used for electronic documentation and information retrieval that may pose a threat to privacy and security. For example, personally owned handheld devices or laptops do not have organizational oversight for virus protection, networks, etc., which allows for inadvertent HIPAA violations and data compromise. To protect against these risks, it is recommended that any remote/portable devices be owned and securely configured by the organization.

Access considerations include:
- Remote (via portal) for
  - Offsite LIPs
  - Telemedicine providers
  - Electronic intensive care unit (eICU) providers
  - Off-site behavioral health providers
- Device type
  - Portable workstations on wheels (WOWs)
  - Handheld (i.e., smartphone, tablet)
  - Location: Bedside, outside patient room and/or in centralized workstations
  - Connectivity with online resources/references and mobile applications
  - Spell-check capabilities (includes medical dictionary)

Downtime

All EMR systems experience scheduled (e.g., routine maintenance) and unscheduled (e.g., system failure) downtime. Most systems have a back-up server that prevents data loss by copying and restoring data in the event of system failure. For those instances when the EMR system is not available to users, a process should be in place to allow for documentation and access to information to prevent interruption in care and processes. Thus, determine if the EMR system in question has:
- Downtime forms (paper templates) for documentation
- Vendor’s statistical uptime and definition
- Reliable vendor assistance

- Disaster recovery plan when system comes back online (i.e., late entries versus scanning written downtime documentation into EMR)
- Shadow (back-up) server capability

Security

To meet HIPAA Security Rule standards, a security management process must be active to safeguard all electronic protected health information (ePHI). For guidance on the HIPAA privacy rule and exchange of ePHI, the Nationwide Privacy and Security Framework established the Safeguards Principle, which emphasizes that “individually identifiable health information should be protected with reasonable administrative, technical, and physical safeguards to ensure its confidentiality, integrity, and availability and to prevent unauthorized or inappropriate access, use, or disclosure.” State security measures should also be met (e.g., State Board of Pharmacy). Authentication measures to restrict ePHI access to designated employees and healthcare workers include:
- Biometric security (e.g., fingerprint, retina scan)
- Log-in/sign-on requirements
  - Single sign-on capability
  - Password expiration
  - Password requirements (alpha-numeric, case-sensitive, mandatory changes, etc.)
- Mandatory electronic signature
- Tracking screen with automatic sign-off

Maintaining integrity of data and ePHI can be achieved with:
- Encryption
- Access policies and controls for physical location of HIT systems
- Workforce HIT security awareness and training
- Monitoring and audit controls by HIT security official
- Policy/process to remove terminated employees from system access

Reporting Capabilities

Data will need to be extracted from the EMR for reporting that meets the needs of the organization for benchmarking, regulatory, and accreditation purposes. Check the product features for:
- Quantity and quality of basic, preconfigured reports
- Customized reports
- Output (i.e., online, printed, and electronic)
- Stratification of data (by care providers, diagnoses, chief complaint, date/time of service, etc.)
- Automated reporting to external agencies
- Real-time access to database versus batched data
Archive Process

Archiving, or long-term storage of data, is necessary to safeguard PHI for a specified time to comply with current state and federal regulations (minimally seven years). When transitioning to a new EMR, consider an archiving solution that can extract and convert data from the older, legacy system into the new EMR system. Archiving policies should be established to determine what data is most valuable to save. Archived data should be encrypted for security, in read-only format, and well organized for easy retrieval by providers. Safe and secure data storage includes:

- Daily data back-up procedures
  - Automatic or manually initiated (ad hoc)
  - Data sent to a shadow (back-up) server
- Storing archived data to secure, long-term storage
- Easy access to archived data and complete EMR/EHR (for required statute of limitations)

Financial Requirements

For a provider and/or facility to receive reimbursement from the Centers for Medicare & Medicaid Services (CMS) or other healthcare payers for services rendered, the EMR documentation must accurately reflect the patient care given. For billing purposes, special numerical codes are assigned to each service called evaluation and management (E & M) codes. There are also charges associated with administered medications, procedures, and supplies, which nursing documentation must support. For accurate billing and reimbursement the EMR should support these processes:

- Professional coding with E & M guideline support
- CPT/ICD-10 enabled
- Medication charges
  - Charge upon dispense or administration
  - Initial prescription
  - Subsequent prescriptions
  - Hourly intravenous (IV) infusion rate
  - Intravenous intake amount including start/stop times
- Documentation charges
  - Procedures
  - Supplies
- Automated facility-related charge (e.g., trauma, chest pain, E & M level)
Administrative Requirements

Census/Bed Management
Bed management software that is integrated into the EMR can help improve hospital and ED throughput by communicating census information in real-time. Data can be collated and trended for reports, which can then be used for resource planning in events of high census and/or surge capacity. Recommended features include:

- Notifications for peaks in census
- Infectious disease surveillance
- Communication of inpatient bed availability
- Housekeeping/environmental services interface
- Admission, discharge, transfer (ADT) interface
- Mass casualty documentation (with brief entry option)
- Capability to add beds to system in high census periods (to cohort patients)
- Capability of building virtual rooms/beds (including mass casualty areas)
- Staff assignment
  - Straightforward
  - Location-based automatic staffing (nursing, LIPs, physicians, others)
  - Alert for unassigned patients
  - Self-assignment functionality
  - Staff assignment

Accreditation, Legal, and Regulatory Requirements

- Vendor’s contract language addresses liability in event of patient injury related to software
- Develop organizational policies for requests of printed EMR by patients, attorneys, etc.
- Reporting process for accreditation/regulatory agencies (i.e., TJC, CMS)
- Maintains records and tracks selective data [i.e., Emergency Medical Treatment and Active Labor Act (EMTALA) log, etc.]
- Vendor provides automatic notification of new regulations
- Vendor provides notification of risk/quality issues regarding product functionality

Quality Improvement/Risk Management

- Integrated performance measure functionality
- Automatic medical record abstraction for QI reporting (e.g., Core Measures)
- Audit trail functions
  - Maintains list of all personnel accessing patient records
  - Patient identification protection for special situations (i.e., VIP, mental health, abuse, forensics, etc.)
  - Tracking of documentation changes/corrections
    - Date/time stamped with retrievable history of all data entered
    - Documentation and order entry history (modifications, addendums, discontinuations, etc.)
  - Ability to integrate with external auditing applications
  - Tracks unsigned provider orders (management defined)
  - Tracks ‘refused’ provider orders (management defined)
  - Allows for a failure mode and effects analysis (FMEA) to determine/reduce potential risks of system

Hardware/Device Considerations

- Cleaning and infection control
- Ergonomic features
- Power/emergency power capability
- Equipment security/ tracking and anti-theft procedures

Vendor Reputation

- Customer support
- Industry rating score
- Reference sites
- Economic viability
Phase I. Selection (Checklist)

Functional Requirements
- Certified for meaningful use
- Integrated (enterprise) vs. interfaced system
- Comprehensive (includes all hospital systems)
- Historically complete (access to all patient records)
- Retrievable (easy access of records)
- Scalable (allows for expansion)
- Configurable (defines which system elements can be changed by organization versus vendor)
- Usable (efficient, good fit for end-user workflow)

Technical Requirements
- Medical device integration/interface
- Medical device transmits in real-time versus batched download
- Integrated or interfaced for viewing at enterprise level
- Integrated with prehospital and intradepartmental transport devices and/or records as applicable
- eMAR (electronic medication administration record
  - Electronic medication verification
  - Bar coding with wireless/wired scanner
  - Interface with inpatient record
  - Interface with infusion pumps
- Summary view (extracts data into single view for hand-offs)
- Data dictionary (standard, common language for interoperability)

Clinical Requirements

Patient Arrival
- Quick registration
- Establish “door” time
- Integrated with Enterprise Master Patient Index (EMPI)
- Entry of unidentified patients (John/Jane Doe)
- Entry of prehospital patients (prior to arrival)
- Alert provider(s) if patient does not arrive when expected
- Patient identity verification
- Merge patient records

Triage Information
- Chief Complaint (choices with free-text option)
- Acuity level
- Basic and/or advanced triage assessments
- Rapid order entry/triage intervention documentation
- Alerts for triage reassessment
### Documentation (Arrival to disposition)

**RNs**
- Flowsheet format (list entries + free-text option)
- Code management
- Trauma management
- Procedure notes
- Home medications
- Allergies
- Medical/Surgical/Family/Social history
- Alerts for abnormal values by age
- Alerts for communicable diseases
- Prompts for required documentation/screening
- Automatic Chart Deficiency notification

**Physicians**
- Alerts for abnormal values by age
- Alerts for dosing
- Alerts for communicable diseases
- Prompts for required documentation
- Orders/order sets by disease state
- Note templates by disease state
- Includes free-text option
- Includes ability for system to pull data from other sources such as labs, vitals, I&O, etc., via trigger
- CPT/ICD10 coding enabled/driven
- Automatic Chart Deficiency notification
- Voice recognition
- ePrescribe enabled
- ‘Scribe’ potential (orders entered by scribe but not executable until signed by licensed independent practitioner (LIP))

**EMS**
- Pre-arrival documentation
- EKG/Rhythm strip transmission

**Required Documentation/Chart completion indicator for all disciplines**
- Image management
- Anatomical drawings (burn man, dermatomes, etc.)
- Photographic storage (positive patient identification, wounds, forensics, etc.)

**Discharge**
- Instructions available in electronic format (if requested by patient)
- Visit summary transmitted/sent to primary provider (auto fax, electronic data exchange)
- Prescription writing/transmission
- Patient education content included
  - Organized by disease state
  - Includes smoking cessation
- Foreign language translation

### Disaster/Mass Casualty management
- Capability to create face sheets with predesignated account numbers or to allow for rapid preregistration (can use EMS Triage Tag number as part of registration)
- Capability for Disaster Tracker Board based on EMS triage color scheme
- Capability to identify and track disaster/mass casualty patients

### CPOE
- Customizable user database (MD, NP, residents, medical students, scribes) to include co-signature where required
- Standardized order sets
  - Configurable/Customizable
  - Editable on-the-fly
- Automated trigger for order sets based on diagnosis and/or presentation
- Clinical Decision Support
  - Drug interaction checking
  - Allergy checking
  - Duplicate therapy checking
  - Pregnancy/lactation checking
  - Medication Reconciliation

Back to Phase I.

### Tracking Board
- Customizable/configurable/sortable
  - By users
  - By role
  - By location
  - By status
- Current patient location in ED
- Current patient status
- Current order status
- Isolation status
- Patient location/activities outside of department
- Registration requirements
- Clinical team assignment by location and patient
- Statuses easily distinguishable (color coding, etc.)
Store and calculate times for benchmarking
- ED arrival time
- Triage time
- Provider arrival time (medical screening exam)
- ED length of stay
- Lab/imaging/consult turnaround time
- Admit/Discharge decision time
- Bed request time
- Discharge/departure time
- Stored times retrievable for analysis (reports)
- Central tracking board
  - Patient identifiers/sensitive information hidden
  - Monitor size/resolution requirements
- Dashboard view includes:
  - Average LOS
  - Patient load by provider
  - Volume, acuity, and overcrowding metrics
- Access to patient charts directly from tracking board
- Tracking board remains accessible during system downtimes

Census Management
- View only assigned patients
- Protect patient identity
- Public and private tracking boards

Accessibility to EMR
- Direct (from Tracking Board or Census onsite)
- Remote (portal)
  - LIPs
  - Telemedicine
  - eICU
- Device type
  - Bedside/roomside/centralized workstations
  - Workstations on wheels
  - Tablets/handheld
- Connected to online resources/references (e.g., Epocrates, MedScape, Lexi-Comp, Pepid, etc.)
- Spell-check capable (includes medical dictionary)

Downtime Considerations
- Statistical uptime and vendor definition
- Information accessibility
  - Scheduled downtimes – Routine maintenance
  - Unscheduled downtimes – System failures
- Downtime forms
- Disaster recovery plan (Late Entry versus Scanning Documentation)
- Shadow server capability
Back to Phase I.

Security Considerations
- Biometric security (fingerprint, retina)
- Login/Sign-on requirements
  - Single Sign-on capability
  - Password expiration
  - Password requirements (alphanumeric, etc.)
- Secure screen/auto sign-off/logout
  - Maintain integrity of data and ePHI
  - Encryption
  - Control access to HIT equipment/systems
  - HIT security awareness/training for all staff
  - HIT security official to monitor/perform audits
  - Policy/process to remove terminated employees from access
Back to Phase I.

Reporting Capabilities
- Preconfigured “canned” reports – quality/quantity
- Customized reports – quality/quantity
- Output (online vs. printed vs. electronic media)
- Ability to stratify data (by provider, diagnosis, chief complaint, etc.)
- Automated reporting to external agencies
- Real-time access to database vs. batched data
Back to Phase I.

Archive Process
- Back-up procedure – daily
  - Shadow server
  - Automatic scheduled (daily)
  - Manually initiated (Ad hoc)
- Back-up to archive (secure, long-term storage)
- Access to archived data in archive – to meet statute of limitations for EMR/HER completion
Back to Phase I.
Financial Requirements

- Professional coding (E&M guideline support)
- Medication charges
  - Charge on dispense or administration
  - Initial Rx
  - Subsequent Rx
  - Hourly IV infusion (Start/Stop times)
- Charge on documentation
  - Procedural
  - Supplies
- Automated facility-related charge (trauma, E&M level, etc.)

Back to Phase I.

Administrative Requirements

- Facility Census/Bed Management/Surge Capacity
  - ADT interface
  - Quick-registration (bypass hospital registrar)
  - Rapid/Brief patient information entry for mass casualty
  - Double-bunking (cohorting)
  - Capability to build virtual rooms/beds
  - Staff assignment
    - Straightforward, location-based, automatic
    - Alert system to capture unassigned patients
    - Self-assignment functionality

Back to Phase I.

Accreditation, Legal, and Regulatory Requirements

- Vendor contract language addresses liability if patient injury
- Organizational policies – requests for EMR/EHR hard copies
- Auto-notification by vendor of new regulations
- Required reporting process
- Records/tracking of selective data (i.e., EMTALA log, etc.)
- Auto-notification by vendor of product risk/quality issues

Back to Phase I.

Quality Improvement/Risk Management Considerations

- Integrated performance measure functionality
- Medical record abstraction – automatic for QI reporting
- Audit trail
  - Chart access – List of all personnel accessing patient records
  - Patient protection – Ability to add ID protection for VIP, behavioral health, abuse, forensic, etc., status
  - Changes/corrections – Date/time stamped retrievable history of all data entered
  - Documentation and order entry history
  - Ability to integrate with external auditing applications
- Unsigned provider orders – management defined
- ‘Refused’ provider orders – management defined
- Allows for a failure mode and effects analysis (FMEA) of system

Back to Phase I.

Hardware/Device Considerations

- Infection control
- Ergonomics
- Power/Emergency power
- Equipment tracking/anti-theft/security

Back to Phase I.

Vendor Reputation Considerations

- Industry rating score/customer support
- Reference sites
- Economic viability

Back to Phase I.
Phase II. Implementation

Implementing a new EMR can be a relatively smooth process if staff has been engaged from the beginning of the project. A solid implementation plan includes an assessment of organizational readiness for change, a well thought-out training budget for all affected departments and disciplines, dedicated subject matter experts (SMEs), and ongoing technical/administrative support throughout and after implementation. The primary goal for all involved in the project is to ensure that Meaningful Use objectives are met.

Assess Organizational Readiness

- Appoint a steering committee/task force for charter development
  - Establish accountability and commitment
  - Establish change management approach (cultural and workflow based)
  - Establish change control mechanisms (technical/operational changes as the system matures)
  - Allocate resources
  - Oversee project management timeline
- Interdisciplinary project team (to include but not limited to, some may be ad hoc):
  - Multi-disciplinary clinical informaticists
    - Internal and external resources
  - Educators/SMEs (provide training and ongoing support for all users)
  - Representative from internal quality management
  - Representative from health information management (HIM)
  - Systems administrators (software maintenance)
  - Database administrator/report writer
  - Site preparation coordinator (hardware installation and maintenance)
  - Help desk coordinator
  - Physician project lead/champion(s)
  - Nursing project lead/champion(s)
  - Administrative/executive project lead
- Engage end-user champions
  - Executive
  - Clinical
    - Nursing
    - ED providers (physicians, LIPs)

Develop an Implementation Plan

- Perform a current state analysis
  - Identify workflows
  - Identify workflow experts
  - Document workflows
    - Identify challenges/barriers/inefficiencies
    - Identify change points
- Perform future state design by workflows
  - Anticipate and mitigate implementation challenges and barriers
  - Anticipate and address shortcuts and workarounds
  - Identify and communicate design rationales
- System build activities
- Develop change management structure and policies
- Unit/module functional testing
- Integrated testing (involve end-users to determine usability)
Training
- Budget/staffing
  - Consider temporary restriction on vacation time
- Didactic/classroom
- Computer-based with simulated practice environment
- Establish competencies to assess learning
- Evaluation of training program

Technical go-live: Integrating patient and clinical data upload
- Tiered go-live support model
- Availability of vendor support 24/7/365
- Assignment of SMEs/super-users by area
- Additional staffing coverage during go-live
  - Consider temporary restriction on vacation time
  - Use of registry and/or per diem staff
- Length of time needed for technical support on unit (for all disciplines)
- Budgetary considerations

Budget Considerations
- Software
  - Initial purchase
  - Interface engines
  - Ongoing maintenance
  - Subscriptions/licensure
  - Disaster recovery
- Hardware (wired vs. wireless)
  - Personal computers
  - Tablets
  - Portable workstations
  - Batteries
  - Mounting brackets
  - Keyboard covers
  - Privacy screens
  - Emergency power
  - Bar code scanners (handheld)
  - Infrastructure upgrades
  - Physical storage/recharging space
  - Cleaning and disinfection process
  - Large screen monitors/tracker boards
- Support
  - Initial conversion go-live: SMEs, super-users, vendor assistance, additional staffing
  - Ongoing: Help desk availability 24/7/365
  - Committee work
  - Internal clinical informatics team

Conversion Approach
- Staged
  - Unit-by-unit
  - Function-by-function (example: Begin with results reporting, expand to nursing documentation, followed by order entry, then CPOE, etc.)
- Big Bang
  - All units and functions convert simultaneously
  - Consider availability of support/resources for this method
Conduct Training and Implement

- Draft policies
  - Password control/system access/security breach policy
  - Downtime procedures
    - Information access
    - Data backload
  - Change control process
  - CPOE
    - Order input: Consider entering all orders into system to allow for a single definition source
    - LIP-defined
    - Unsigned orders management
    - ‘Refused’ orders management
  - Change control process
  - Privacy and security
  - Data backload
  - Information access

- Health information management (HIM)
  - Chart printing/release of information
  - Forms design/approval
  - Telephone/verbal order management (obtaining timely electronic physician signature post-order)
  - HIPAA considerations (includes social media implications)
  - Remote access
  - Point of care documentation (includes real-time data entry on bedside devices)

- Construct committees for system communications, enhancement requests, etc.
  - Housewide to include departmental liaisons
  - Department-specific

Achieve Meaningful Use

- Report design allows for essential data extraction that meets Meaningful Use criteria
- Process available to submit data to regulatory agencies
Phase II Implementation (Checklist)

Assess Organizational Readiness

- Appoint Steering Committee/Task force
  - Establish accountability and commitment; develop charter
  - Establish change management approach
  - Allocate resources
  - Establish and oversee project management timeline
- Collaborative Project Leadership (including, but not limited to):
  - Multidisciplinary Clinical Informaticists
  - Internal and external resources
  - Educators –Training and ongoing support
  - Quality Management Representative
  - HIM Representative
  - Systems Administrators (software maintenance)
  - Database administrator/Report writer
  - Site Preparation coordinator (hardware installation and maintenance)
  - Help Desk coordinator
  - Physician Project Lead/Champion(s)
  - Nursing Project Lead/Champion(s)
  - Administrative Executive Project Lead
- Engage End-user Champions
- Executive
- Clinical
  - Nursing
  - ED Providers (Physicians, APRNs, PAs)
  - Non-ED Providers
  - Ancillary Services (including, but not limited to)
    - Respiratory
    - Diagnostic Imaging (all areas)
    - Lab
    - Pharmacy
    - Dietary/Nutrition
    - PT/OT/SLP
    - Case/Care Management
    - Social Work
    - Behavioral Health
    - Pastoral Care
    - Others
  - Emergency Medical Services (EMS)
- Non-clinical (including, but not limited to)
  - HIM/Coding/Utilization Review
  - Quality/Safety
  - Risk Management
  - Registration
  - Finance
  - Research and Education
  - Security
  - Biomedical Engineering
  - Supply/Materials Management

Develop Implementation Plan

- Perform current state analysis
  - Identify workflows
  - Identify workflow experts
  - Document workflows
    - Identify challenges/barriers/inefficiencies
    - Identify change points

Assess Organizational Readiness
Develop Implementation Plan
Budget Considerations
Conversion Approach
Select (or Upgrade) Certified EHR/EMR
Conduct Training and Implement
Achieve Meaningful Use
Perform Future State design by workflows
- Anticipate/mitigate challenges and barriers
- Anticipate and address shortcuts and workarounds
- Identify and communicate design rationales

System Build Activities
- Develop Change Management Structure and Policies
- Unit/Module Functional testing
- Integrated testing – involve end-users in integrated testing

Training considerations
- Didactic
- Computer Based Training
- Practice environment
- Budgetary considerations/additional staffing
- Consider temporary organization-wide changes in vacation policy

Technical Go-Live/Patient and clinical data upload
- Super-users and Go-Live support model with tiered levels of support
- Availability of vendor support
- Assignment of super-users by area
- Back-fill/additional staffing during go-live
- Consider temporary organization-wide changes in vacation policy
- Length of time for technical “floor” support

Budget Considerations
- Software
  - Initial purchase
  - Interface engines
  - Ongoing maintenance
  - Subscriptions/Licensure
  - Disaster recovery
- Hardware (wired versus wireless)
  - PCs
  - Tablets
  - Computers on Wheels
  - Batteries
  - Mounting brackets
  - Keyboard covers
  - Privacy screens
  - Emergency power
- Bar Code scanners
- Infrastructure upgrades
- Physical storage/recharging space
- Cleaning and Disinfection process
- Large Screen Monitors/Tracking boards

Training
- Develop training plans
  - Methods of training
    - Classroom/lecture
    - Computer based
    - Combination
  - Initial training for current employees – who will conduct
    - Number and types of employees to be trained
    - Salary costs
    - Training space capabilities to determine number of staff who can be trained per session
    - Number of sessions to meet the need
    - Plan for make-up sessions
- Budget for staff while in training
- Continuous training for new hires – who will conduct
- Training – prior to initial conversion
- Training – ongoing for new hires, system enhancements, agency staff, etc.

Support
- Initial conversion (‘Go-Live’) – Super-users, vendor assistance, additional staffing
- Ongoing – 24/7/365 Help Desk
- Committee work
- Clinical Informatics Department support

Conversion Approach
- Staged: Unit-by-unit
  - Staged: Function-by-function (example: Begin with results reporting, expand to nursing documentation, followed by order entry, then CPOE, etc.)
  - “Big Bang” – all units and all functions or combinations

Select (or Upgrade) Certified EHR/EMR
- Select (or upgrade) Certified EHR/EMR

Back to Phase II.
Conduct Training and Implement

- Draft policies
  - Password control/system access/security breach
  - Downtime procedures
    - Information access
    - Data backload
  - Change Control process
- CPOE
  - Order input
  - LIP defined
  - Unsigned orders management
  - ‘Refused’ orders management
- HIM
  - Chart printing/Release of Information
  - Forms design/approval
  - ‘Telephone orders’ management
  - HIPAA considerations (includes Social Media implications)
- Remote Access
- Point of Care documentation

- Construct committees for system communications/enhancement requests
  - Housewide to include departmental liaisons
  - Department-specific

Back to Phase II.

Achieve Meaningful Use

- Report design meets Meaningful Use criteria
- Data submission process

Back to Phase II.
Phase III. Evaluation (Post-implementation)

The evaluation of an EMR system is continuous and begins at the onset of the project. The desired outcomes of a system should be determined early on, prior to the selection phase. Qualitative and quantitative measures for data collection need to be defined and then evaluated. The Health Information Technology Evaluation Toolkit offered by the Agency for Healthcare Research & Quality (AHRQ) suggests the following measurement goals:

- Clinical outcomes measures
- Clinical process measures
- Provider adoption and attitude measures
- Patient adoption, knowledge, and attitude measures
- Workflow impact measures
- Financial impact measures

The success of an EMR project depends not only on selection and implementation, but adoption by end-users. Information management skills are important for all healthcare providers. Providing appropriate education and training from the onset provides a solid groundwork for end-user competency, and ongoing competency assessment assures that data is being entered and extracted accurately. Ease of use in terms of matching clinical workflows is critical, as is accuracy of data entry for continuous quality improvement (CQI), to help organizations move toward their outcome goals. The National Learning Consortium notes, “Although the EHR can make the CQI process more efficient by automating some data collection, staff members will still need to analyze and interpret the data and then translate those interpretations into action.”

Continuous Quality Improvement

The following items will assist with ongoing EMR system evaluation:

- Any upgrades or enhancements to the EMR require education for end users as well as an audit of the upgrade to ensure correct utilization
- User-requested upgrades/enhancements based on practice changes, workflow changes, etc.: These upgrades are typically managed locally and are performed by onsite IT staff
- User-requested changes based on system design (e.g., field in wrong place leading to data omission; errors in configuration, spelling, calculations, etc.)
  - A system of prioritization that focuses on patient safety will be required to manage enhancement requests
- Help desk call monitoring (e.g., types of calls, priority, timeframe for resolution, etc.)
- Report validation and ease of use
  - Standard reports
  - Customized reports
  - Routine time frames
  - Ad hoc
  - Reports that are user-friendly
  - Ability for data analysis
- Operations optimization: The system demonstrates the ability to compare EMR impact on operations optimization pre- and post-implementation. Data should include but not be limited to:
  - EMR downtime and disruption statistics as viewed by the end-user
  - Pre-discharge departures (i.e., left without being seen) percentage
  - Admitted LOS
  - Discharge LOS
  - Accuracy of billable charges including but not limited to:
    - Supplies
    - Medications (bill on dispense versus administration)
    - IV infusions
    - Medication administration, treatments, and procedures
    - Coding
    - Critical care times
    - E & M levels
Competency Assessment
• Ensures that users are competent in data entry, data retrieval, policies, and procedures
• Case study with documentation entered in the test environment
• Computerized simulation of data entry using electronic learning (eLearning) authoring software
• Case presentation as an assessment tool
• Games as an assessment tool

Chart Audits
• Done periodically to check for required documentation compliance
• Identify educational needs
• Automated reports to identify high-risk areas in documentation/billing omissions

Evaluation of Data Collection/Report Usage
• Data collection and reports should be customized and useful to end-users (both clinical and management) for purposes of quality measures reporting
Phase III. Post-implementation (Checklist)

Continuous Quality Improvement

- Workflow optimization
- Vendor upgrades and enhancement management
- User requested upgrades/enhancements based on practice changes, workflow changes, etc.
- User requested changes based on system design
- Help desk call monitoring
- Report validation/ease of use
  - Standard reports
  - Customized reports
  - Routine time frames
  - Ad hoc reports
  - “User friendly” reports
  - Ability for data analysis
- Operations optimization: Compare EMR impact on operations optimization pre- and post-implementation
  - EMR Downtime and disruption statistics as viewed by the end-user
  - PredischARGE departures (Left Without Being Seen, etc.) %
- Admitted LOS
- Discharge LOS

- Accuracy of billable charges including, but not limited to:
  - Supplies
  - Medications (bill on dispense versus administration)
  - IV Infusions
  - Medication administration, treatments, and procedures
  - Coding
  - Critical Care times
  - E&M levels

Competency Assessment Considerations – Ensures that users are competent in data entry, data retrieval, policies, and procedures

- Case Study with documentation entered in the test environment
- Computerized simulation of data entry using eLearning authoring software
- Case presentation as an assessment tool
- Games as an assessment tool

Chart Audits Considerations

- Periodic chart audits

Evaluation of Data Collection and Report Usage Considerations

- Analysis data collected should be useful to the end-users (both clinical and management)

Summary

Implementation of an ED EMR is a complex undertaking and impacts many healthcare disciplines from the executive team to front-line staff, and ultimately, patients. The steps involving the selection, implementation, and evaluation of an ED EMR system have been detailed in this handbook to assist the project team and help ensure a successful execution of such a project with an emphasis on patient safety and quality.

Additional Information

For inquiries regarding this Handbook, please contact IQSIP@ena.org.
Glossary of Terms

**Authentication:** The verification of the identity of a person for the purposes of accessing a medical record. In the case of computerized systems this typically involves entering a combination of account number and passwords so that the identity of the person using the computer is verified and access can be enabled.

**Best-of-breed:** The best individual software/application product of its type.

**CDSS:** Clinical decision support system; software/applications designed to aid clinicians in decision making by matching individual patient characteristics to computerized, evidence-based knowledge bases. These applications automatically generate patient-specific assessments or recommendations to improve patient safety and reduce errors at the point of care (i.e., drug interaction alerts when medications are prescribed, reminders of clinical interventions/guidelines for treating patients with chronic disease, reporting and trending of lab results, etc.).

**CPOE:** Computerized provider order entry; allows the provider to enter orders into the computer, which then interfaces with pharmacy, medication-dispensing units, diagnostic areas, and patient bar-coding systems.

**CPT codes:** Current procedural terminology codes; developed by the American Medical Association and assigned to thousands of various medical procedures/services performed by clinicians for uniform billing purposes; they are also used by insurers to determine reimbursement (except Medicare).

**Downtime:** The impaired functionality, unavailability, or failure of an application or system rendering it partially or completely unusable.

**Downtime procedure:** Steps that are used in the event of a system failure to allow healthcare personnel the ability to properly document the necessary elements of patient care. A paper record back-up system allows information entry to continue despite the loss of the electronic system.

**EHR:** Electronic health record; an aggregate record that can span multiple patient visits across multiple locations and providers. The EHR is designed to reach beyond any single organization or provider that collects the information and focuses on the comprehensive health of the patient.

**eICU:** Electronic intensive care unit; a form of telemedicine where specialized physicians, or critical care intensivists, are remotely available 24/7 to monitor and direct patient care via two-way cameras, video monitors, smart alarms, etc. The onsite healthcare staff communicates with the intensivists via dedicated telephone lines.

**eMAR:** Electronic medication administration record; allows for automated documentation of medication administration into a certified EMR/EHR system via radio frequency identification (RFID) or electronic bar coding.

**EMPI:** Enterprise master patient index; a comprehensive electronic database within each healthcare organization that holds each patient’s demographic data (i.e., name, date of birth, gender, medical history, etc.) and is linked with MPIs of other smaller entities (i.e., clinics, outpatient centers). Each patient is only represented once in an MPI to allow for efficient, accurate patient care across an organization.

**EMR:** Electronic medical record; a digital version of a patient’s chart for a single episode of care (i.e., ED or outpatient). The EMR accumulates and stores data from a variety of applications (clinical documentation, order entry, laboratory, radiology, pharmacy, registration, etc.) which then become integrated into one comprehensive electronic health record for the patient.

**Encryption:** A technology that converts messages or data being transmitted into an unintelligible form that can only be read by authorized recipients.

**Enterprise system:** Large-scale software system that integrates and coordinates all business applications to facilitate work across the enterprise; also allows for reporting and data analytics.

**ePrescribe:** Electronic prescribing; allows providers to electronically transmit prescriptions to a waiting pharmacy.

**ePHI:** Electronic protected health information; any information in electronic form that identifies an individual and is protected under the HIPAA Security Rule.

**Go-live:** The initiation and duration of implementing an EMR or a component thereof.

**Hardware:** Computers and/or devices that are connected to computers, such as a CD-ROM, monitor, printer, scanner, router, modem, etc.
**HIT:** Health information technology; the comprehensive management of health information and its secure electronic exchange between consumers, providers, government, quality entities, and insurers.

**ICD-10 Codes:** Abbreviation for International Statistical Classification of Diseases and Related Health Problems (Tenth Revision). Developed by the World Health Organization to monitor disease progression, ICD-10 codes classify diseases, symptoms, causes of injury, etc., to help explain the reason a patient saw a provider; used for billing. Note: Per CMS, the ICD-9 codes currently in use will be replaced with more expansive ICD-10 codes on October 1, 2014. It is important to ensure the EMR system will easily facilitate this transition.

**Integration:** When various software components communicate and work well together despite differences in design (i.e., software from different vendors); allows for interoperability and efficient data exchange.

**Interface:** Software that allows for communication between computer systems, software applications, and various medical devices. Interfaces may be built in to an EMR system or may need to be added to allow for integration of specific applications.

**Interoperability:** The ability of different systems or applications to communicate and exchange data with each other and with healthcare providers.

**Scribe:** An individual trained in medical documentation (usually a medical student) that assists a provider by entering patient data into the EMR so that the provider can focus attention on the patient.

**Software (application):** A collection of instructions and/or programs that tells a computer how to perform useful tasks; installed on hardware.

**SME:** Subject matter expert; an individual with expertise in a particular area who provides the project team with valuable input into various aspects of EMR selection and implementation, including design, approval, training, etc.

**Super-user:** A staff member/clinician with strong problem-solving skills who participates in extra training to prepare for EMR go-live; serves as a resource/mentor to colleagues in clinical areas.

**Uptime:** The amount of time that a service/system is online and available.

**Usability:** Compatibility of an EMR system for end-users and their workflow; human capabilities and limitations are incorporated into the technological design process to provide consistency, reliability, and error reduction.

**VPN:** Virtual private network; provides secure access to an Internet connection by using special network pathways and encryption of data.
Authors

Emergency Nursing Technology and Informatics Work Team
Michael Seaver, BA, RN
Nicholas Chmielewski, MSN, RN, CEN, CNML, NE-BC
David Holman, MNSc, RN
Jeannette Jefferies, MS, RN, CCRN-K
Dagny Scofield, RN, CEN, CPEN
Catherine Olson, MSN, RN, Staff Liaison/Director, Institute for Quality, Safety and Injury Prevention

ENA 2013 Board of Directors Liaison
Ellie Encapera, RN, CEN

ENA Staff Liaisons
Kathy Szumanski, MSN, RN, NE-BC, Chief Nursing Officer and Deputy Executive Director, Institutes for Education, Research, and Quality, Safety and Injury Prevention
Leslie Talbert, Senior Administrative Assistant, IQSIP

References

Other Resources


This handbook, including the information and recommendations set forth herein (i) reflects ENA’s current position with respect to the subject matter discussed herein based on current knowledge at the time of publication; (ii) is only current as of the publication date; (iii) is subject to change without notice as new information and advances emerge; and (iv) does not necessarily represent each individual member’s personal opinion. The information and recommendations discussed herein are not codified into law or regulations. Variations in practice and a practitioner’s best nursing judgment may warrant an approach that differs from the recommendations herein. ENA does not approve or endorse any specific sources of information referenced. ENA assumes no liability for any injury and/or damage to persons or property arising from the use of the information in this handbook.