Documentation for Acute Care

Jean S. Clark, RHIA
Technical Editor

AHiMA
American Health Information Management Association®
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Appendix J Sample Acute Care Health Record in Paper Format
Appendix K Demonstration of an Acute Care Electronic Health Record System
Appendix L EHR Functional Model, 2004 Draft
Appendix M Practice Briefs on EHR Implementation
Clinical documentation and health records play a vital role in every aspect of healthcare delivery and decision making, no matter what the setting. But complete and accurate documentation is especially important for modern acute care facilities, which provide a wide variety of technologically and medically sophisticated diagnostic and therapeutic services. Documentation is also a central focus in current efforts to improve healthcare quality and patient safety as well as the efficiency of the U.S. healthcare system. The development and implementation of electronic health record (EHR) systems promise to revolutionize the collection, use, and management of healthcare data over the next decade.

Ensuring the accessibility, accuracy, and integrity of health records has been the primary mission of health information managers since the profession emerged more than seventy-five years ago. Just as important, health information management professionals continue to champion the protection of patient privacy and the confidentiality of health information. As experts in the documentation requirements of external governmental agencies and accreditation organizations, they also play an invaluable role in managing their facilities’ regulatory compliance and accreditation performance.

The goal of this publication is to help health information management students understand the role of health records and clinical documentation in the delivery of direct patient care and the operation of individual healthcare organizations. The book also explains the external environment in which health records function and the documentation requirements of local, state, and federal governments. The process of voluntary accreditation and the development of external practice standards are also explored.

This publication will also be informative for practicing health information management professionals, especially in the area of EHR systems. It provides an integrated overview of all of the external standards relevant to clinical documentation and health records. Included are AHIMA practice guidelines, acute care accreditation standards, Medicare Conditions of Participation for Hospitals, national health informatics standards, and state and federal statutory and regulatory requirements.

Specifically, chapter 1 explains the importance of clinical documentation in the context of the U.S. healthcare delivery system. Chapter 2 describes the various uses of health record information in patient care, healthcare operations, healthcare reimbursement, public health, clinical education, and biomedical research. The content of acute care records is explored in detail in chapter 3, which includes dozens of sample health record forms and reports. Chapter 4 explains the organization of acute care health records, including health record formats and identification/storage systems in both paper-based and computer-based systems. The chapter
also provides basic information on health record analysis and management, release and disclosure, and retention and destruction as well as the management of master patient indexes and other indexes, registries, and clinical databases. Chapter 5 explains the accreditation, statutory, and regulatory requirements applicable to acute care documentation and the processes of accreditation, licensure, certification, and medical staff credentialing.

This publication also includes nine appendixes in print format and four additional appendixes in electronic format on the two accompanying CD-ROMs. The print appendixes include a complete bibliography, a glossary of the terms used in this book, and a crosswalk between the Medicare Conditions of Participation for Hospitals and the 2004 accreditation standards of the Joint Commission on Accreditation of Healthcare Organizations and the American Osteopathic Association’s Healthcare Facilities Accreditation Program. Other appendixes cover form and screen design, the AHIMA data quality model, the maintenance of master patient indexes, and principles of health record release and disclosure and retention and destruction. A list of the regulations on documentation for nonacute care settings is also provided.

CD-ROM number one includes a complete acute care record in paper format, a copy of the Health Level Seven EHR functional model, and six AHIMA practice briefs on the subject of EHR implementation. CD-ROM number two provides a functional demonstration of the proprietary EHR software developed by The Shams Group.

AHIMA hopes that the publication of this up-to-the-minute book on documentation for acute care services will help new professionals, as well as those already in practice, to meet the current demands and future challenges of health information management.

Sandra R. Fuller, MA, RHIA
Senior Vice-President and Chief Operating Officer
American Health Information Management Association
The publications staff of the AHIMA gratefully acknowledges the contributions of Jean S. Clark, RHIA; Patricia Shaw, MEd, RHIA; Betty N. Mitchell, RHIA; Kamruddin Shams, MA; and Sobia Ahmed. Without the help of these dedicated professionals, this publication would not have been possible.

Jean Clark reviewed the content of the manuscript for its technical accuracy and contributed samples of clinical documentation forms. She also furnished the content for the sample acute care health record in paper format (appendix J). Jean has had more than twenty-five years of experience as a health information management professional. She was the president of the American Health Information Management Association in 1995 and currently serves as the U.S. representative to the International Federation of Health Record Organizations. She was also a member of the health information advisory committee that worked on revising the hospital accreditation manual published by the Joint Commission on Accreditation of Healthcare Organizations in 2004.

Pat Shaw reviewed the manuscript’s content, developed chapter review questions, and created the instructor’s materials for this textbook. She has been a member of the health information administration and health services administration faculty at Weber State University, Ogden, Utah, for more than thirteen years. Before becoming an educator, Pat managed hospital health information services departments and worked as a nosologist for 3M Corporation’s health information systems division.

Betty Mitchell reviewed the manuscript for this book and offered numerous suggestions for improvement. She is currently the director of the health information technology program at Baltimore City Community College in New Freedom, Pennsylvania.

Kam Shams and Sobia Ahmed provided the demonstration model of an acute care electronic health record system as well as sample health record views and screens. Kam is the chairman of The Shams Group, Inc., a health information systems software and consulting company headquartered in Coppell, Texas. Kam is also a visiting professor in health information management and healthcare informatics at the College of St. Scholastica in Duluth, Minnesota, and the University of Tennessee Health Sciences Center in Memphis. Sobia is a communications specialist with The Shams Group.

In addition, we are grateful to Michele Kala, RN, MS, and George Reuther, DO, for providing information on the Healthcare Facilities Accreditation Program offered by the American Osteopathic Association. We also acknowledge the generosity of the Joint Commission on Accreditation of Healthcare Organizations in allowing us to reprint information on its current health information standards for hospitals.
How to Use This Book

This book explains the importance of accurate and timely health record documentation in acute care settings. Many of the principles discussed, however, also apply to other healthcare settings. Information about acute care legal, regulatory, and accreditation requirements is also provided. Sample forms and records are included to demonstrate the application of these principles as well as compliance with applicable external requirements.

The paper-based forms in this book were specifically designed as examples of data capture and management tools and samples of appropriate health record documentation. In some cases, the sample forms have been greatly simplified to fulfill educational purposes. They were also sized and formatted to fit the printed book format. Therefore, direct use for documentation of actual clinical services would not be appropriate. However, educators and students are free to copy and use the forms as part of their classroom activities. Any other usage would require the expressed permission of the American Health Information Management Association.

The sample health record documentation in this book was created exclusively for educational purposes. All of the healthcare organizations, healthcare professionals, and patients represented in this book are fictional. Any similarity to actual organizations or real individuals, living or dead, is entirely coincidental.

Appendix K is an example of a proprietary electronic health record system. The demonstration version of the system is reproduced in this book with the permission of the developer and copyright owner, The Shams Group. Most of the sample electronic documentation in the text is also used with permission from The Shams Group. These samples are meant to be used exclusively for educational purposes. Any other usage would require the expressed permission of The Shams Group.

Appendix L reproduces the Health Level Seven functional model for electronic health records, which was released in a preliminary form in 2004. The model is used with the permission of the copyright owner, Health Level Seven, and may not be reproduced for any other purpose without the expressed permission of Health Level Seven.

Sample lesson plans, answer keys, and other instructional materials that complement this book are provided free of charge to AHIMA members through the AHIMA Assembly on Education. Educators who are not members of the association should contact the publications staff at AHIMA to request a copy of the supplementary materials.
Chapter 4

Organization and Management of Acute Care Health Records

Learning Objectives

• Compare the features of the three different paper-based health record formats
• Describe the features of electronic health records
• Compare the benefits and drawbacks of EHRs and paper-based records
• Explain the types of technological systems that support EHRs
• Describe the basic types of health informatics standards
• Explain the functions of clinical decision support systems
• Describe and compare the different methods of health record numbering and filing
• Describe and compare the different methods of health record storage
• Outline the steps in record retrieval and tracking
• Explain the importance of the standardization of forms and views
• Explain the importance of the standardization of abbreviations and symbols
• Outline the process for correcting errors in health records
• Compare qualitative and quantitative health record analysis and explain the purposes of each
• Describe the four quality domains in the AHIMA data quality management model

Terminology

Alphabetic filing system
Alphanumeric filing system
American Society for Testing and Materials (ASTM)
Authentication
Average record delinquency rate
Clinical data repository
Clinical decision support (CDS)
Data exchange standards
Introduction

Whether paper-based or computer-based, health records must include the same patient information and perform the same communications functions. (The functions of the health record were discussed in detail in chapter 2; the content in chapter 3.) All acute care facilities must develop and enforce policies that ensure the uniformity of health record content and format. Health record policies are based on a number of external and internal factors. Professional practice standards, reimbursement requirements, accreditation standards, state licensing requirements, federal regulations, and public health reporting requirements all must be considered. Each hospital’s internal information requirements depend on its organizational structure, the type of care it provides, and the characteristics of the community it serves. For example, the health record policies of a public hospital in New York City might be quite different than those of a private psychiatric hospital in Spokane.
Early medical practitioners probably used handwritten notes to help them keep track of important information about their patients. A few of the handwritten records kept by field surgeons during the Civil War still survive in museums and private collections as examples. The first hospital in the British colonies of North America—Pennsylvania Hospital in Philadelphia—began maintaining paper health records on the day it opened, in 1752.

The standardization of medical and hospital care in the early twentieth century marked the beginning of modern medical record-keeping systems. For the first half of the century, all of the clinical, administrative, and financial records of hospitals and medical practitioners were maintained as handwritten notes, indexes, and registers and typewritten reports. The health information management profession grew out of the early efforts of medical record librarians to protect and organize those paper documents.

Hospitals, like other American businesses, began applying computer processing to operations and management in the 1960s. The first hospital applications of computer technology were implemented in the areas of financial management, admissions, and billing. By the year 2000, virtually every clinical laboratory in the United States had implemented computer-based diagnostic systems with automatic reporting capabilities. Many of today’s sophisticated diagnostic, medical, and surgical procedures would not be possible without the support of accurate and reliable software systems.

In contrast, the application of computer technology to health record systems has progressed slowly. Most acute care organizations now depend on mixed-media health record systems made up of computer-generated laboratory reports, digital images, transcribed medical–surgical reports, and handwritten orders and progress notes. The cost of computer-based clinical documentation systems certainly has been one reason why progress has been slow. But the biggest factor delaying the universal implementation of electronic health records has probably been the lack of a shared vision. Healthcare organizations have been reluctant to undertake complex and expensive technology projects without national guidelines that establish what electronic health record (EHR) systems should include and how they should function.

Health Level Seven (HL7), a healthcare standards development organization, completed the initial work on a functional model for EHRs in late 2003. In early 2004, industry stakeholders led by the EHR Collaborative voted to adopt the proposed model. The EHR Collaborative is composed of several healthcare professional and trade associations, including the American Health Information Management Association, that support the universal implementation of EHRs. The model will be refined during a two-year trial period to begin in 2004. (A copy of the 2004 draft of the EHR model is provided in appendix L.) After the trial period is over and the model has been finalized, the model will become an HL7 standard. The American Health Information Management Association (AHIMA), along with the other healthcare organizations participating in the EHR Collaborative, believes that the adoption of a national EHR standard will stimulate the commercial development of more broadly applicable and less costly electronic health record systems.

The American Society for Testing and Materials (ASTM) has also developed a standard related to electronic health records. ASTM standard E1384-99el is entitled Standard Guide for Content and Structure of the Electronic Health Record. The new standard covers the content and structure of electronic health records and provides guidelines for healthcare organizations planning and implementing new systems.

The universal adoption of electronic health record systems may still be years off, but the change is inevitable. The primary goals of every health record system are to facilitate the sharing of clinical information and to ensure the quality and safety of patient care. Increasing demands for accurate, secure, and accessible health information will only be fully met through the application of advanced communications technology. (The AHIMA has published six practice briefs designed to guide hospitals and other healthcare organizations in the design and implementation of EHR systems. The briefs are reproduced in appendix M.)
Format of the Paper-Based Health Record

The traditional paper-based health record has several limitations. One limitation is the need to adhere to a strict record format, sometimes referred to as “chart order.” Because paper-based records are lengthy and difficult to handle, healthcare organizations organize them according to a specific format that must be followed by every user. The greater the number of users, the more important it is that the records follow strict format guidelines.

Another limitation is the obvious fact that paper-based health records can be viewed by only one user at a time and in only one place at a time. Therefore, the valuable information documented in health records is often unavailable to individual users when and where they need it.

Paper-based health records also can be difficult to update. An active record of a patient receiving care moves from provider to provider within the healthcare facility. The individuals responsible for updating its content must hand-carry paper documents to wherever the record is located in order to file them or wait until the record is returned to them. Updates and reports may be delayed or misplaced as a result.

Finally, paper-based health records are fragile. They are susceptible to damage from water, fire, and the effects of daily use. For most hospitals, maintaining duplicate copies as backups for paper records would be prohibitively expensive. Consequently, paper-based health records are always at risk for being misplaced, misfiled, or damaged.

Most hospitals currently follow one of three formats for paper-based health records: the source-oriented health record, the problem-oriented health record, or the integrated health record. It is important to remember, however, that no hard-and-fast rules exist for arranging the elements of a health record. Hospitals are free to select the arrangement that best suits their needs as long as their systems fulfill the requirements of state laws, federal regulations, and accreditation standards.

Source-Oriented Health Records

In the source-oriented health record, documents are grouped together according to their point of origin. That is, laboratory records are grouped together, radiology records are grouped together, clinical notes are grouped together, and so on. Thus, physicians’ progress notes for a single episode of patient care would be arranged, usually in reverse chronological order, and filed together in the patient’s health record. Similarly, notes prepared by nursing services, social services, and other clinical services would be grouped separately.

Under this format, the individuals charged with filing reports in paper-based records can do so simply by looking at the source and date of the report. However, the users of information filed in this type of record have more trouble. To follow or document information on the patient’s course of treatment, they must search by date of occurrence in each of the sections (that is, laboratory, radiology, and every group of clinical notes). The more departments a hospital has, the more sections the source-oriented health record can have. It is left to the end user to tie together information from the various sections of the record to get a full picture of the patient’s course of treatment.

Problem-Oriented Health Records

The problem-oriented health record is easier for the patient’s caregivers to use. The key characteristic of this format is that it is arranged according to a problem list. A problem list is an itemized description of the patient’s past and present social, psychological, and medical
problems. Each problem is indexed with a unique number, and reports and clinical documentation are keyed to the number of the problem they address. The documentation is then arranged in chronological or reverse chronological order within sections, each of which covers a specific problem. (See figure 4.1.)

In addition to the problem list, the problem-oriented health record contains a prescribed set of patient data, an initial care plan, and progress notes. The content of the problem-oriented health record is basically the same as the content of source-oriented records. Content includes:

- Chief complaint
- Present illness(es)
- Social history
- Medical history
- Physical examination
- Diagnostic test results

The initial care plan serves as an overall guide for addressing each of the patient’s problems. The services described in the plan are numbered to correspond to the problems they address.

The patient’s caregivers use progress notes to document how the patient’s problems are being treated and how the patient is responding to treatment. Each progress note is labeled with the number of the problem it is intended to address. This problem-indexing system allows the clinician to easily follow the patient’s course of treatment. Ideally, other elements of the health record (for example, physicians’ orders) are also numbered according to the problems they address. The biggest shortcoming of problem-oriented records is the inconsistent application of problem numbers to every piece of documentation.

**Integrated Health Records**

The third format used for paper-based acute care records is the integrated health record. The integrated health record is arranged so that the documentation from various sources is intermingled and follows a strict chronological or reverse chronological order. The advantage of the integrated format is that it is easy for caregivers to follow the course of the patient’s diagnosis and treatment. The disadvantage is that the format makes it difficult to compare related information. (See figure 4.2 for an example of a progress note page from an integrated health record.)

**Format of the Electronic Health Record**

The electronic health record can be considered the inevitable result of health record evolution. By design, the electronic health record addresses many of the problems that have troubled paper-based health record systems for years. For example, electronic health records are almost always accessible through a computer network, and so the availability problems characteristic of paper-based records do not affect electronic records. The other strengths of EHR systems are equally obvious. For example, EHR systems:

- Make it possible to access information quickly and easily
- Allow various levels of access and view customization
### Discharge Outcomes

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<th>Target Date/Initials</th>
<th>Key Interventions</th>
<th>Discipline</th>
<th>Start Date/Initials</th>
<th>Stop Date/Initials</th>
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**Key**

- CM = Case Manager
- DTC = Diabetes Treatment Center
- ETN = Enterostomal Nurse
- FSR = Financial Services Representative
- HCC = Home Care Coordinator
- NSG = Nursing
- OT = Occupational Therapist
- PC = Pastoral Care
- PHM = Pharmacy
- PT = Physical Therapist
- RD = Registered Dietitian
- RT = Respiratory Therapist
- SLP = Speech/Language Pathologist
- SW = Social Worker

Origin:
Figure 4.2. Example of an Integrated Progress Note

University of Anystate Hospitals

PROGRESS NOTES
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<table>
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<th>Barriers to Patient Education</th>
<th>Outcome</th>
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<td>☐ Emotional</td>
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<td>☐ Other</td>
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<td>P/F</td>
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<td>☐ Signs/Symptoms</td>
<td>P/F</td>
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<td>☐ Wound/Skin Care</td>
<td>P/F</td>
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<td>☐ Pre/Postop Care</td>
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<td>☐ Other</td>
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Outcome Key:
1. Able to state understanding and/or return demonstration.
2. Unable to state understanding and/or return demonstration. Continue to reinforce. (See progress notes.)

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## University of Anystate Hospitals

### PROGRESS NOTES

<table>
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<tr>
<th>Date</th>
<th>Time</th>
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### Key
- CM = Case Manager
- CR = Cardiac Rehabilitation
- DTC = Diabetes Treatment Center
- ETN = Enterostomal Nurse
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- PHM = Pharmacy
- PT = Physical Therapy
- RD = Registered Dietitian
- RT = Respiratory Therapy
- SLP = Speech/Language Pathologist
- SW = Social Worker
- TR = Therapeutic Recreation

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### University of Anystate Hospitals

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#### DAILY RN REASSESSMENT

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### Plan of Care

Interdisciplinary plan of care/clinical pathway/clinical guidelines: Reviewed/Revised

Discalimer:

- **Risk for Falls/ Injury**: Patient is at fall/injury precautions. If yes, proceed with fall/injury reassessment:
  - Yes
  - No

Discalimer:

- **Advise Directives**: If patient has an advanced directive, is a copy on the chart?
  - Yes
  - No

Discalimer:

- **Integument**: One or more (+) checks indicates a reevaluation of the plan of care is needed.
  - Yes
  - No

Discalimer:

- **Diabetic Treatment**: One or more (+) checks, refer to the OTC
  - Yes
  - No

Discalimer:

- **Nutrition**: One or more (+) checks, refer to the RD
  - Yes
  - No

Discalimer:

- **Discharge Planning**: One or more (+) checks, refer to the CM
  - Yes
  - No

Discalimer:

- **Spiritual Needs**: One or more (+) checks, refer to PC
  - Yes
  - No

Discalimer:

- **Functional**: One or more (+) checks, refer to OT/SLP/PPT
  - Yes
  - No

**RN Initials:** __________ RN Signature: __________ Date: __________ Time: __________

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Figure 4.2. (Continued)

University of Anystate Hospitals

PROGRESS NOTES

PAGE 4 OF 4

DAILY CARE RECORD

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• Allow multiple users to access the same information simultaneously
• Perform complex or difficult tasks quickly
• Permit ready access to volumes of professional resource information such as practice standards and medical literature

Another benefit of electronic health records is the ease with which they can be updated and maintained. In addition, because EHRs can be copied and stored in a variety of electronic media, computer files can be backed up frequently and stored at off-site locations or in secure storage areas within the facility. Thus, they can be more easily protected from damage, loss, and tampering than paper-based records.

EHR systems also have one obvious drawback: They are very expensive to design, implement, and maintain. But like all technological advances, the cost of EHR systems is probably the highest now, when the technology is still relatively new. As national standards are accepted and more customers want the technology, more vendors will begin marketing uniform systems that meet industry standards. Prices should go down dramatically after the original development costs have been recouped and manufacturing processes have been refined.

EHR systems are also expensive to implement because of the extensive training required for health record users. The need to make process changes, redevelop health record policies and procedures, convert existing paper records to electronic formats, and recruit information system support staff also adds to the total cost of implementing a new system.

For individual hospitals, the implementation of an EHR system is likely to yield significant and lasting improvements in both operations and patient care. On the national level, the potential value of enhanced information sharing among policy makers and public health experts is obvious. The dollar value of these benefits, however, is impossible to quantify. There is no way to place a price tag on improved outcomes for patients, reduced levels of medical error, or more efficient healthcare delivery systems. Still, in spite of the complexity and cost of implementing EHR systems, few healthcare experts doubt that the electronic health record will become the industry standard in the near future.

**Definition of the Electronic Health Record**

In its landmark report, *The Computer-Based Patient Record: An Essential Technology for Health Care*, the Institute of Medicine (Dick et al. 1997, p. 55) defined the computer-based health record as follows:

> A computer-based patient record (CPR) is an electronic patient record that resides in a system specifically designed to support users by providing accessibility to complete and accurate data, alerts, reminders, clinical decision support systems, links to medical knowledge, and other aids.

A number of different terms have been used to refer to health records created and maintained in digital environments. Computer-based patient record (CPR), electronic medical record (EMR), and electronic patient record (EPR) are some of the most common. Currently, the AHIMA prefers to use the term electronic health record, or EHR. The AHIMA reserves the term EHR for record systems that fulfill the Institute of Medicine’s vision for computer-based records. (The IOM of the National Academies, an entity of the National Academy of Sciences, provides health and science policy guidance to all sectors of society.)

True EHRs are not simply digitized versions of traditional paper records. Rather, they incorporate sophisticated data capture and retrieval technology as well as fully functional decision support systems. In addition, the infrastructure of EHRs automatically protects the security and integrity of clinical documentation and makes it available instantaneously to multiple users.
Many hospitals and other healthcare organizations are currently using computerized health record systems that store whole files as images rather than as individual data elements. In other words, many existing computer-based records are storage mechanisms for electronic versions of paper documentation. For example, a record in this type of system might contain a scanned digital image of a physician’s history and physical report, but the clinical content stored within the history and physical report would only be accessible visually. Therefore, it would still function in the same way a paper-based record would, and it would still have many of the paper-based record’s limitations.

Current computer-based record systems do make patient information more widely accessible, but most lack the decision support capabilities and links to expert medical resources that are characteristic of fully functional EHRs. In today’s healthcare environment, few organizations have implemented fully functional EHRs as envisioned by the Institute of Medicine. However, the implementation of electronic imaging technology in mixed-media records stored electronically is probably the first step toward more widespread adoption of true EHRs.

**Technological Support for EHRs**

Electronic health record systems are very complex. They are not like other digital systems currently used in hospitals to perform relatively narrow functions such as admitting and administration or laboratory reporting. EHRs fulfill a number of interrelated communications functions that involve virtually every area of the hospital.

Communications technology has evolved quickly over the past fifteen years, and EHR developers and administrators often find it challenging to keep up with new developments. System administrators also must develop ways to make existing information systems work with new technological devices.

A number of communications technologies support EHR systems. The most important are databases, database management systems, image processing and storage systems, data capture and retrieval technology, and servers and networks. (See figures 4.3 and 4.4.)

**Figure 4.3. EHR Data Types and Their Sources**

![EHR Data Types and Their Sources Diagram](image-url)

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Figure 4.4. Conceptual Model for a Health Information Management System

Databases and Database Management Systems

A database is an organized collection of data that have been stored electronically for easy access. Database management systems make it possible to create, modify, delete, and view the data in a database.

Most EHRs are organized according to one of two database models—the centralized EHR and the distributed EHR—or in a hybrid of the two models. In the centralized EHR, all of the organization’s patient health information and data are stored in a single EHR system. In the distributed EHR, patient health information and data are distributed in department-based systems or subsystems that are able to exchange information with one another.

The centralized EHR system is built around a clinical data repository. A clinical data repository is a centralized database that captures, sorts, and processes patient data and then sends them...
back to the user. These functions demand specialized database management capabilities. The
most common type of database management system in use today is the relational database, which
uses data tables to organize information. New types of database management systems are in
development and will probably speed up processing time in the future. (See figure 4.5.)

In decentralized EHR systems, health record information is retained in separate departmen-
tal computer systems or databases. Data are then exchanged among departmental systems as
needed (for example, between the clinical laboratory’s system and the obstetrics unit’s system).
The decentralized system can work relatively well when all or most of the facility’s computers
were manufactured using the same proprietary operational system. However, all of the organiza-
tion’s departments must follow established data exchange standards, which ensure that all of
the organization’s data are structured and formatted in the same way (Amatayakul 2002, p. 180).

**Image Processing and Storage Technology**

Traditional paper-based health records included few photographs and diagnostic images. With
the introduction of clinical imaging devices, it has become possible to combine health record
text files with digital diagnostic images (X rays, CT scans, and so on) as well as digital pho-
tographs. This technology makes it possible for clinicians at different locations to view the
same images at the same time and then compare their diagnostic interpretations.

Many hospitals have incorporated document image processing technology into their health
record systems. Digital scanners create images of handwritten and printed documents that are
then stored in health record databases as electronic files. Using scanned images solves many
of the problems associated with traditional paper health records. Digital files can be backed up
frequently, which helps solve the problem of lost paper and microfilm records. In addition,
because digital files are always under the control of a system administrator, access and confi-
dentiality can be protected simultaneously. Digital imaging also makes it possible for more
than one clinician to view the same document at the same time from distant locations. How-
ever, as noted previously, clinical documentation stored as digital images can only be accessed
visually; that is, it cannot be searched electronically.

**Data Retrieval Technology**

Retrieving a single piece of information from a paper record can require a lot of time and effort.
Many organizations have attempted to improve retrieval processes by using color-coded file
folders, flags, and tabs as well as automated record-tracking systems. Although such methods
are helpful, they have not completely resolved the problem of inefficient information retrieval.

![Figure 4.5. Physical and Logical Data Repositories for EHR Systems](image-url)
The ultimate goal of every EHR system is the fast and secure delivery of accurate and complete health information to authorized recipients when and where they need it. To be effective, data retrieval systems must be based on the needs of the users.

Database systems that use query language applications allow users to perform text searches of electronic health record data. The ability to identify key words and phrases in textual data makes it easier to find and retrieve key pieces of patient information from health records.

Unfortunately, the usefulness of text search technology in healthcare applications has been limited by the lack of standardization in medical terminology. Currently, several different medical terms can be used to describe the same condition. For example, angiohemophilia may also be called von Willebrand’s disease, von Willebrand’s syndrome, constitutional thrombopathy, or vascular hemophilia. As a result, text searches using one of the synonyms for this condition would likely yield only a small portion of the information that is actually available.

To address this problem, healthcare industry groups are working together to develop standardized vocabularies. Of these, the Systematized Nomenclature of Medicine Clinical Terms® (SNOMED CT®) is the most likely to be adopted universally. (SNOMED CT and other clinical vocabularies are discussed in more detail in chapter 5.)

**Data Capture Technology**

Creating a workable data capture process has proved to be one of the biggest challenges in EHR development and implementation. Ideally, the individual responsible for providing each service would enter the documentation for the service into the health record database at or near the time the service was performed. Once recorded, the information would become available immediately to all authorized users who needed access.

Unfortunately, many clinicians who graduated from medical school before the widespread use of personal computers have been very reluctant to learn how to input data directly into electronic records. As a result, transcription of dictated reports is still the most common type of data input for hospital EHRs.

Although continuous voice recognition technology is now available, the level of error is still too high for most medical applications unless the digital output is checked against the dictation and corrected. However, the reliability of voice recognition systems is steadily improving, and the technology may become a viable clinical documentation tool in the future.

Optical character readers (OCRs) have also been developed. These devices work like digital scanners and can be used to convert handwritten data into digital data. Like voice recognition technology, however, optical character readers yield poor results when used in medical applications.

Additional data capture tools are being developed to address the challenge of creating a workable data capture process for clinical documentation. Structured data entry screens are one type of alternative data capture tool. (Figure 4.6 provides examples.)

Text processing software applies very sophisticated formulas to narrative text in order to convert the text into structured data. Text processing can be considered a type of data entry, but it is not yet a practical tool for application to EHRs (Amatayakul 2002, p. 181).

**Healthcare Information System Standards**

In the current healthcare environment, there are hundreds of healthcare information system (HIS) vendors but only limited standardization of products. The use of proprietary software and technology is widespread. Healthcare professionals, managers, policy makers, regulators, and educators often struggle to locate and share information among incompatible computer information systems.
Unlike other industries such as banking and air travel, the healthcare industry has been slow to develop and accept IS standardization. Even in areas where IS standards do exist, non-compliance remains a problem. The slow progress toward industry standardization was a major contributing factor behind the passage of Health Insurance Portability and Accountability Act (HIPAA) in 1996. (HIPAA regulations are discussed in chapter 5.)

Recent efforts toward the development of healthcare standards have gained momentum. Today, the following standards development organizations are working to develop HIS standards for healthcare organizations:

- Health Level Seven (HL7)
- American Society for Testing and Materials (ASTM)
- The Institute of Electronic and Electrical Engineers (IEEE)
- American College of Radiologists/National Electrical Manufacturers Association (ACR/NEMA)
• International Standards Organization (ISO)
• Systematized Nomenclature of Medicine (SNOMED)
• National Library of Medicine (NLM)
• Unified Medical Language System (UMLS)

For EHR systems to function beyond one healthcare facility, several types of HIS standards must be established and followed (LaTour 2002, pp. 122–24):

• **Health informatics standards**: General standards that describe acceptable methods for collecting, maintaining, and transferring health-related data and information

• **Vocabulary standards**: Standards that establish the medical terms to be used in health record documentation as well as common definitions for those terms

• **Structure and content standards**: Standards that establish the data elements to be collected in health records as well as clear definitions for those data elements

• **Messaging standards**: Standards that facilitate the electronic interchange of data between two or more separate computer systems

• **Privacy and security standards**: Standards that ensure the confidentiality and integrity of patient-identifiable information

(Standards development is discussed in more detail in chapter 5.)

**Network and Server Technology**

EHR systems are made up of a complex configuration of computer hardware and software. A computer system’s architecture includes the configuration and structure of the system’s components as well as the interrelationships of the components. Three main types of system architecture form the basis of an EHR system (Amatayakul 2002, p. 182):

• Mainframe architecture uses a single, large computer that processes the data received from input devices. The mainframe generally has limited analytical capacity.

• Client/server architecture uses a combination of smaller computers to process and capture data. Server computers are powerful processors that support multiple client computers, which have specialized data capture capabilities.

• Web-based architecture uses the latest browser and network technology to capture data and move it through the system. Network devices connect computers to the main network and to other networks. Network devices also direct data traffic.

**Clinical Decision Support Systems**

Clinical decision support (CDS) systems help physicians and other clinicians make diagnostic and treatment decisions. A CDS system automatically analyzes health record data and searches for unusual patterns. When a potential problem is identified (for example, a drug interaction), the system issues an alert or a reminder that includes a recommendation for specific corrective action.

CDS systems rely on **online analytical processing** (OLAP) technology and an elaborate set of rules. OLAP technology includes statistical analysis and search capabilities that match health record data to facts, rules, and other data stored in an electronic knowledge base. The
information in the knowledge base is based on biomedical research, medical literature, clinical guidelines, and other advice from expert physicians (Amatayakul 2002, p. 182).

**Links to Secondary Databases**

Clinical indexes and registries have been compiled by acute care hospitals and other healthcare organizations for decades. These secondary databases are a valuable source of information for healthcare policy makers, researchers, and educators. In the past, the information in secondary databases was compiled directly from paper-based health records, and so maintaining the databases was labor intensive and expensive.

Today, the availability of clinical information in digital format has made it easier and less expensive to create secondary databases. (For example, information on diagnoses and procedures is routinely collected in the form of ICD-9-CM codes, which are recorded electronically during the coding and billing process.) As a result, the number, size, and complexity of clinical registries, indexes, and other databases have grown rapidly. Database development, however, has not been without its problems. Organizations that manage clinical databases have had to deal with a number of complex issues, including patient confidentiality, health information ownership and control, and data quality and accuracy.

**Health Record Identification and Storage Systems**

Record identification and storage are integral parts of electronic health record systems. But there are a number of different options for identifying and storing paper and mixed-media records.

In hospitals that use paper-based clinical documentation systems, it is not unusual for the record of one inpatient encounter to include 100 or more pages of computer-generated and transcribed reports and handwritten documentation. The reports and documents generated by various departments and caregivers must be sorted into individual health records for each patient. The content of each record then must be arranged according to the facility’s accepted record format. Each health record is labeled as belonging to a specific patient and placed in some sort of folder. The folder is used by caregivers and stored on the nursing unit until the patient is discharged. The record is then brought to the health information management (HIM) department for coding and quality assessment. Once physicians have provided any missing documentation and the record is complete, it can be moved to permanent storage. When the patient returns to the facility for inpatient or outpatient services some time in the future, his or her record will be retrieved and updated. Eventually, inactive paper records will be destroyed according to state and federal record retention guidelines. (The AHIMA’s guidelines on health record retention and destruction are provided in appendix H.)

**Health Record Identification and Filing Systems**

Acute care facilities assign a unique identifier to each patient’s health record during the process of admission and registration. The unique identifier in virtually all hospitals is a number referred to as the health record number or medical record number. In general, alphabetical identification using a form of the patient’s name is not practical for large healthcare facilities such as hospitals.

Hospital HIM departments are usually responsible for ensuring that no two patients receive the same health record number. However, caregivers must still confirm that they are looking at
the correct record before making documentation entries or using health record information for patient care purposes. In both paper and electronic health record systems, the process for confirming patient identification is usually stipulated in the hospital’s policies and procedures.

Electronic health records can be accessed using the patient’s name or health record number. However, it is still very important that caregivers verify that the correct record has been accessed by checking the patient’s full name, date of birth, Social Security number, and other identifiers before making entries or using information in electronic records (Johns 2002, pp. 760–70).

In hospitals that use paper-based record systems, the system of health record identification is coordinated with the record filing and storage system. The patient’s name and health record number must be included on every page of documentation to ensure that every record is up-to-date and complete during and after the patient’s stay.

**Health Record Numbering Systems**

Acute care facilities use several different systems of health record numbering. However, most acute care hospitals use some version of the unit numbering system. Three types of health record numbering systems are common: serial, unit, and serial–unit.

**Serial Numbering System**

Under the **serial numbering system**, patients are assigned a different but unique numerical identifier for every admission. In other words, each patient receives the next available number in a series of predetermined health record numbers.

For example: A patient admitted to the hospital at 8:00 a.m. on October 12 would be assigned number 786544. The next patient, who registered at 8:05 a.m. on the same day, would be assigned the next available number, 786545. If the same patient were admitted to the hospital on three separate occasions, three different health record numbers would be assigned. Therefore, three completely separate health records would be created and maintained for the same patient.

The serial numbering system has one obvious shortcoming: Having three separate records for the same patient makes it difficult to retrieve and compare information on the patient’s three admissions. The serial numbering system is also more costly than other systems because it requires more materials, labor, and storage space.

**Unit Numbering System**

In the **unit numbering system**, the health record for every new patient is assigned a unique health record number the first time the patient is admitted as an inpatient or outpatient. The health record number assigned for the first admission is then used for every subsequent admission. The records of every one of the patient’s admissions are then filed together. Consequently, the unit numbering system is more cost and labor efficient. But using this system does involve an extra step in the admissions process: checking the facility’s master patient index to ensure that the patient was not assigned a record number during a previous admission.

**Serial-Unit Numbering System**

The **serial-unit numbering system** combines the features of the serial and unit numbering systems. Under this system, health record numbers from a predetermined numerical series are assigned by admitting staff, just as in the serial numbering system. However, the health records of the patient’s previous admissions are then retrieved from storage and combined with the record of the current admission. After the episode of care is finished, the complete unit record is then filed according to the most recent number. This system has the merits of the other two systems without the drawbacks.
Health Record Filing Systems

Few hospitals use an alphabetic filing system for paper-based health records, because the system is inadequate for heavy patient volume. Some small facilities and specialty clinics, however, may still use some form of the patient’s name as a unique identifier on health records. Under this system, the patient’s last name is used as the first component of identification, and his or her first name and middle name or initial provide further definition. The obvious shortcoming of this system is the likelihood of duplicate or similar names. Facilities that use alphabetic identification and filing systems usually use the patients’ dates of birth to distinguish duplicate records. But duplicate dates of birth are still a possibility, and the identification of the patient must always be confirmed before the record is used.

All but the smallest hospitals use a numeric or alphanumeric filing system. In a numeric filing system, records are filed by health record number. Numeric filing systems rely on the use of a master patient index to match each patient’s name with his or her health record number. (The master patient index is discussed in chapter 2. Maintenance guidelines for the master patient index are provided in appendix F.) Three types of numeric filing systems are common (Johns 2002):

- **Straight numeric filing systems**, in which records are arranged consecutively in ascending numerical order according to the health record number
- **Terminal-digit filing systems**, in which the last digit or group of digits (terminal digits) in the health record number determines file placement
- **Alphanumeric filing systems**, in which a combination of alphabetic letters (usually the first two letters of the patient’s last name) and the health record number are used

The terminal-digit system is preferred by most hospitals. In a typical terminal-digit system, records are filed according to a three-part number made up of two-digit pairs. The typical system contains 10,000 divisions within each section, with 100 sections numbered from 00 to 99 and 100 divisions within each section numbered from 00 to 99.

Terminal-digit filing is different from straight numeric filing: In straight numeric filing, the first numbers (those farthest to the left) are considered first. The number itself can be a permanent unit number or a serial number. In terminal-digit filing, the record number is placed into terminal-digit order when the health record is ready for filing. The number is broken down into two-digit pairs and read from right to left. For example, the number 670187 would be written as 67-01-87:

- The first pair of digits on the right (87) is called the primary number or the terminal-digit number.
- The second pair of digits (01) is called the secondary number.
- The third pair of digits (67) is called the tertiary or final number.

The primary number is considered first for filing. Because many records are filed in each section of the file, each section is further subdivided, first according to the secondary number and then according to the tertiary number. In this example, the record numbered 67-01-87 would be filed in section 87, in subsection 01, and then in numerical order for 67 (after 66-01-87 and before 68-01-87). All records with the tertiary and secondary numbers of 01-87 would be filed within the same part of the file.
One advantage of terminal-digit filing is that file shelves fill equally rather than at the end, as is the case with conventional straight numeric filing. Another advantage is that the department’s workload can be evenly distributed among filing personnel because specific sections can be assigned to each employee.

Health Record Storage Systems

As discussed earlier in the chapter, electronic health records are stored digitally in centralized or departmental clinical data repositories. The storage options for paper and mixed-media records include paper-based storage systems, microfilm-based storage systems, and digital image-based storage systems.

Paper-Based Storage Systems

No matter what type of identification system the hospital uses, most use color coding on health record folders to make storage and retrieval more efficient. Color-coded file folders are available from suppliers, but color-coded labels can also be used to organize records.

Paper-based health record files can be stored in vertical or lateral filing cabinets, open-shelf files, or compressible file systems. Vertical file cabinets are difficult to access and so are rarely used to store health records. Lateral file cabinets are easier to access but would only be used in low-volume areas of the hospital.

Hospitals usually use open-shelf or compressible files for housing paper-based health records. Open-shelf filing units resemble open bookshelves. Some are always open, and others have recessed doors that can be closed and locked.

Compressible file systems take up less space than fixed storage units. Compressible file systems are similar to open-shelf systems. The difference is that the shelving units are not fixed. In one type of compressible system, the units are mounted on permanent tracks in the floor so that they can be moved. Another type of compressible system is made up of horizontal or vertical carousels. The horizontal carousel contains open-shelf files that revolve around a central spine or track. The vertical carousel brings all files or records directly to a workstation. Vertical carousel systems are often used to store master patient indexes.

Microfilm-Based Storage Systems

Paper-based health records require a huge amount of storage space, but alternative storage options can reduce space needs significantly. Storing images of paper reports and documentation on microfilm is an effective option for inactive or infrequently used health records. Microfilm records are also acceptable as courtroom evidence, because they are difficult to alter (Johns 2002, pp. 786–87).

The process of microfilming involves making special photomicrographs of the original paper documents. These tiny negative film images are then archived for long-term storage. Anyone who is interested in accessing the stored records must use a special microfilm reader, which magnifies the images.

Image-Based Storage Systems

Another storage solution for health records is based on digital scanning technology. In electronic document management systems (EDMs), source documents are scanned to create
digital images of the documents that can be stored electronically on optical disks. Some digital scanners can process hundreds or even thousands of documents per day. Access to images stored on optical disks is fast and easy, and scanned information can be made available to any number of users simultaneously. Document scanning is also being used to convert stored health record information into images that can be loaded onto new electronic health record systems.

**Retrieval and Tracking Systems**

In paper-based health record systems, tracking and retrieving records is an important process. In most acute care facilities, there is usually only one copy of each complete health record but many potential users. One of the HIM department’s biggest responsibilities is ensuring that paper-based health records are available when and where they are needed.

In traditional paper-based systems, authorized users sent a written requisition to the HIM department whenever they needed to access a health record in storage. However, most hospitals today use electronic record request systems, and written requisitions are used mostly by small facilities. Whether in written or electronic format, the record requisition asks the HIM department to retrieve a specific health record from storage and deliver it to the department that needs it. The information contained on the requisition usually includes:

- Patient’s name
- Health record number
- Date of the request
- Date and time the record is needed
- Name of the person making the request
- Delivery location

Electronic requisition and tracking systems make it easy to monitor how many records are charged out of the HIM department at any time. The systems also provide information on each record’s location and when it is due back to the department.

Paper-based requisition and tracking systems use multiple copies of paper requisition forms. The first copy becomes the routing slip that arrives with the health record. The second copy is used to mark the record’s place in the file. The third copy may be used as a transfer notice when the health record is subsequently transferred to another location rather than being returned to storage. Using outguides is probably the most common type of tracking system for paper-based requisition systems. An outguide is a durable sheet of paper or vinyl that is inserted into a file to replace a health record that has been removed from storage.

**Standardization of Forms and Views**

Forms management is critical in both electronic data management systems and traditional paper-based record systems. The standardization of data capture tools ensures the quality and completeness of health record content in both paper-based and computer-based environments. Most acute care organizations have established forms committees to oversee the development, review, and control of the facilities’ data capture tools, including all paper forms and computer views and screens. The committee should include information users from the following departments (Johns 2002, p, 780):
The forms committee or a representative of the committee usually works directly with commercial vendors to develop health record forms or electronic data capture systems that fulfill the information needs of the organization.

The design of computer views and data entry screens is one of the most important considerations in developing EHR systems. Electronic systems allow individual users to choose the way data are presented, and so designers should understand how clinicians and other users prefer to receive information. For example, physicians generally prefer to find all of the information they need in one place. Therefore, putting as much information as possible in each view would meet their needs better than creating less crowded views that require users to scroll down into the document or view multiple pages.

In both electronic and paper-based health record systems, the most important step in the standardization of forms and views is to establish the information needs of health information users. In other words, every form or view must fulfill its intended purpose by including all of the data required in an appropriate and easy-to-use format.

For example: When the purpose of a form is to provide patient instructions for aftercare, the data elements on the form must provide all of the information the patient will need in language that the patient can understand. Similarly, when the form is meant to be completed by hand, the response areas on the form must allow enough space for handwritten information. When the purpose of a view is to provide clinicians with an update on the patient’s condition, the view should contain all of the pertinent information in a format that can be reviewed at a glance. (Complete principles of form and screen design are provided in appendix D.)

Following thoughtful design practices may not always ensure the overall effectiveness of the organization’s documentation and data entry tools. Duplication and redundancy can also frustrate users and yield conflicting information. Forms design and management processes should ensure that only one version of each form is available for use at any one time. Processes should also look at the number of different forms in use to determine whether the same information is being collected on multiple forms or views in more than one way.

For example: The admissions form might ask for the name of the patient’s next of kin while the patient assessment form asks for the name of the patient’s spouse. If the patient’s spouse were deceased, the information on the patient’s next of kin would be inconsistent.

### Standardization of Acronyms, Abbreviations, and Symbols

To avoid ambiguity, acute care facilities should standardize the abbreviations, acronyms, and symbols that may be used in health record documentation. Hospital health record policies and medical staff rules should determine which symbols, acronyms, and abbreviations may be used
by the clinicians who author health record entries, and the rules should be enforced. As an alternative method, some hospitals develop lists of prohibited acronyms, symbols, and abbreviations rather than approved lists.

In 2003, the JCAHO published six patient safety goals, one of which was to require healthcare organizations to designate the abbreviations that should never be used in health records (JCAHO 2003). In general, prohibited abbreviations are those that have more than one meaning or can easily be misinterpreted in handwritten form, with potentially dangerous results for patients. The JCAHO now requires hospitals to prohibit the use of the following abbreviations in all handwritten, patient-specific documentation:

- U (for unit)
- IU or iu
- QD or qd
- QOD or qod
- Zero after decimal point
- No zero before decimal point
- MS, MSO₄, MgSO₄

Symbols, acronyms, and abbreviations should be limited to those that are the most widely applicable and unambiguous. The list of abbreviations, acronyms, and symbols should include the accepted definition of each entry, and ideally, each abbreviation, acronym, or symbol should have only one meaning. When illustrations, forms, or other complex materials use numerous or unusual abbreviations, the author should provide a legend to explain what the abbreviations mean.

Because of space limitations, the use of symbols, acronyms, and abbreviations in EHR data entry screens may create problems in interpretation. To solve this problem, developers should consider creating a feature whereby definitions are made available when users click on an abbreviation, symbol, or acronym.

**Authentication of Health Record Entries**

In the context of health records, authentication is the process of providing proof of the authorship of health record documentation. Authentication can be performed in several different ways, depending on the health record environment. Some types of health record documentation require an original handwritten signature as authentication, for example, physicians’ orders for drugs and other substances. (Most states also require that prescriptions include the prescribing physician’s original signature.) Computer-generated documentation generally does not require authentication, for example, routine reports of laboratory test results.

State laws dealing with the authentication of health record entries vary widely. Some states have no requirements at all, while others outline specific procedures for authentication, including acceptable methods and time frames (Welch 2000a). Many state laws apply exclusively to physicians’ orders for drugs and services (Dougherty 2001).

According to Medicare regulations and accreditation standards, only qualified individuals as specified in hospital and medical staff policy may enter information in health records. Entries must be written by the clinicians who personally provided, ordered, or interpreted the services, and the entries should be made at the time the services were delivered or as soon as possible afterward. Entries must also be authenticated and dated by the authors of the entries, never by their surrogates. Specifically, physicians must personally authenticate their reports of history and physical examinations, surgical procedures, and medical consultations as well as discharge summaries. When an unlicensed physician’s surrogate, such as a physician’s assistant, authors
a record entry, the surrogate should sign his or her own name, not the physician’s name. In some cases, state regulations and hospital policies may require physicians to countersign the record entries made by their surrogates.

In general, most hospital policies allow only physicians, nurses, social workers, dietitians, psychologists, and allied health professionals to author and authenticate health record entries. Routine diagnostic reports such as laboratory results, however, usually do not require authentication.

Authentication requirements are most stringent in the area of physicians’ orders for pharmaceuticals and biological substances such as blood products. In general, every physician’s order for drugs or biologicals must be documented in writing and signed by the physician responsible for the care of the patient. Physicians’ telephone and verbal orders for drugs and biologicals may be accepted only by clinical personnel authorized to do so by medical staff policies and procedures. In most hospitals, only registered nurses and licensed pharmacists are allowed to accept and execute verbal and telephone orders for pharmaceuticals. Federal Medicare regulations and some state laws require that the prescribing physician authenticate verbal and telephone orders as soon as possible after issuing them. Physicians’ orders permitting the use of restraints in medical and psychiatric units also must meet specific authentication and time-frame requirements.

**Paper-Based Records**

In paper-based records, authentication includes the author’s signature along with the author’s credentials and the date the entry was made. Handwritten authentication must be made in permanent ink. Some hospitals accept caregivers’ initials on specific types of reports, such as records of vital signs. Hospitals may also permit rubber-stamp signatures but should have strict rules that disallow the use of rubber stamps by anyone other than the person represented by the signature.

Entries written by medical, nursing, and allied health students and clinical staff who are working under the supervision of licensed healthcare professionals usually require a supervisor’s countersignature. Depending on state law and hospital policy, documentation authored by physician’s assistants and nursing assistants may require countersignature. Teaching hospitals generally require an attending physician to countersign all of the reports completed by unlicensed physicians in resident training programs. The countersignatures are meant to confirm that the supervisors have reviewed and approved the documentation prepared by those working under their supervision.

**Electronic Records**

Authentication in electronic health record systems is accomplished through the use of electronic signatures or digital signatures. An **electronic signature** is a unique personal identifier that is entered by the author of EHR documentation via electronic means. The unique personal identifier may be in the form of a code or password, or it may be a biometric identifier such as a fingerprint or retinal scan. Each unique personal identifier must be assigned exclusively to a specific clinician, and a master list of the electronic identifiers must be maintained in a secure environment. Electronic signatures are permitted under Medicare regulations and accreditation standards as well as most state laws (AHIMA E-HIM Task Force 2003a).

Digital signatures use the same technology as automated credit card authentication systems. A **digital signature** is a digitized version of a handwritten signature. The author of the documentation signs his or her name on a pen pad, and the signature is automatically converted to a digital signature that is affixed to the electronic document (AHIMA E-HIM Task Force 2003a). (More information on electronic and digital signatures is provided in appendix M.)
Corrections in Clinical Documentation

Health record documentation is considered a legal business record, and so all entries in health records must be permanent. Entries must never be erased, removed, or obliterated even when they are found to contain incorrect information. Any corrections to entries should be added as notes to the original entries so that the entries remain intact and in chronological order. This requirement is the same for both paper-based and computer-based records. Only clinicians authorized to enter information into health records should be permitted to make health record corrections.

Patients are permitted to access their own health records and to correct or add information under the provisions of the HIPAA regulations. (See chapter 5.) Any information or corrections added to health records by patients should be inserted as separate notes, or addenda. Patients’ changes must never be made in original health record entries. Any information added to the health record by the patient should be clearly identified as an addendum authored by the patient.

Paper-Based Records

Errors in paper-based records should be corrected according to the following process (Smith 2001):

1. The clinician making the correction should draw a single line in ink through the incorrect entry.
2. The clinician should then print the word error at the top of the entry.
3. The clinician should authenticate the error notation by signing or initialing the notation and noting the date and time. The signature should include the individual’s credentials and title. The reason why the change is needed should also be noted.
4. The correct information should then be added to the entry as a notation. Late entries should be labeled as such; that is, entries must never be antedated (assigned a date earlier than the current date).

Electronic Records

Making corrections in EHRs is essentially the same as making corrections in paper-based records (Welch 1999). Data capture methods for EHRs must include a mechanism for adding corrections to electronic documentation without changing or deleting the originals. The process of error correction in EHRs should include the same basic steps as the process for paper-based records, namely:

- The original entries must remain unchanged. (EHRs automatically protect earlier entries from change and deletion.)
- Corrections must be added as notations to the original entries.
- Corrections must be dated and authenticated by the author of the changes at the time the changes are entered. (EHRs automatically disallow antedating of entries.)

Inclusion of Other Types of Documentation in Acute Care Records

The basic function of the health record is to collect and store documentation of the services provided to patients by a healthcare practitioner or facility. Health records are considered legal business records, and so the information stored in them must relate exclusively to the services provided by the facility maintaining the records. Therefore, information provided by
patients (for example, copies of personal health records) and health information furnished by
independent healthcare practitioners (for example, copies of past diagnostic results) should
not be stored as part of a hospital’s official health record. There is, however, one important
exception: copies of records provided by patients or outside providers that are used directly
in the current course of hospital care.

In general, federal regulations and rules of evidence allow the use of copies in legal busi-
ness records, including health records. State laws vary. Accreditation standards allow the use
of copies as long as there is no question of their authenticity. Common methods of making
copies include computer printing, digital imaging, photocopying, and facsimile transmission.

Telephones have been in common use for more than 100 years. Telephone conversations
between patients and providers as well as between providers engaging in consultations related
to the care of a specific patient should be documented in the patient’s health record. (Verbal
and telephone orders were discussed earlier in the chapter.)

Use of Copies from Outside Providers

In general, the legal health record should not include copies of health record information cre-
ated by other providers and furnished directly by the patient. Similarly, personal health records
created or controlled by the patient should not be included in the legal health record. However,
if any of these materials (for example, a patient’s glucose/insulin-tracking records) are actually
used by the provider organization in delivering care, they may be included in the legal health
record (Amatayakul and others 2001; Dougherty 2002).

Use of Facsimiles and Photocopies

Federal regulations do not specifically address the use of photocopies and facsimile (fax)
copies in health records, although federal rules of evidence do permit the use of copies in gen-
eral (Hughes 2001). State laws vary and may address the use of fax copies in licensing or
health information laws or in laws related to specific types of disease, such as sexually trans-
mitted infections and psychiatric disorders. The fax transmission of physicians’ orders is per-
missible under Medicare regulations, and the regulations do not require the prescribing
physician to countersign the orders at a later date.

Use of Electronic Communications

Web-based communications technology has partially replaced the use of telephones and regular
mail in healthcare communications. E-mail communications between patients and their healthcare
providers and online consultations between providers are becoming more and more common.

Patient–Provider Communications

Patient–provider electronic communications include e-mail messages and PDA text messages.
Electronic communications between patients and healthcare providers are considered busi-
ness records, and so they are subject to the same policies and protections as any other patient-
identifiable documentation (AHIMA E-HIM Task Force 2003c).

Obviously, the use of e-mail communications between providers and patients in inpatient
settings is very limited, but such communications are relatively common in outpatient settings.
In outpatient clinics, e-mail applications include appointment scheduling, patient education,
requests for prescription refills, and discussions of test results. Ensuring the confidentiality,
authenticity, and integrity of electronic messages is critical. The AHIMA E-HIM Task Force
has developed policy and technology guidelines for managing e-mail and other electronic com-
munications between patients and providers (AHIMA E-HIM Task Force 2003c).
For paper-based health record systems, physicians and other clinicians should print out paper copies of e-mail communications for inclusion in the patient’s health record. Both the patient’s original message and the provider’s reply should be copied and authenticated. Similarly, in EHR systems, all messages and replies should be copied to the patient’s record (AHIMA E-HIM Task Force 2003c).

**Provider–Provider Communications**

Communications between healthcare practitioners should be documented in the health record when they apply to a specific patient, because such discussions constitute medical consultations. Consultations may be accomplished through a variety of communications systems, including telephones, regular mail, e-mail, video, and online “chats.”

**Telemedicine** incorporates medical consultations that are conducted between providers or between providers and patients located in different geographic locations. Telemedical consultations can be interactive; that is, they can be conducted via Web-based conferencing technology. Alternatively, they can be static; that is, they can be conducted through the use of video, or one physician can send diagnostic images to another via the Internet. As telecommunications technology has become more sophisticated and reliable, some healthcare providers are even providing treatment to patients through telemedical applications.

For example, in October 2001, surgeons in New York City successfully performed gallbladder surgery on a patient in France. They sent instructions to surgical robots in a Strasbourg clinic via high-speed fiber-optic cables under the Atlantic Ocean (Kohn 2002, p. 53).

**Best Practices in Acute Care Documentation**

In 1998, the AHIMA’s House of Delegates approved a resolution that called for “Advocating Quality and Cost-Efficient Health Information Documentation Requirements” (Fletcher 1999). The resolution noted that documentation is an important, dynamic form of communication that provides a clinical treatment record for healthcare practitioners and an historical medical–legal document for use in future patient care, education, research, and reimbursement. The resolution also stated that documentation guidelines should reflect both current practice and modern technology.

A subsequent practice brief (Fletcher 1999) published in 1999 described a process for making improvements in health record documentation. The practice brief also provided a list of best practices in health record documentation. (See figure 4.7.)

**Health Record Analysis and Management**

In many acute care hospitals, health information management (HIM) professionals are responsible for assembling and/or evaluating every health record after the patient has been discharged. In addition, HIM professionals may also perform a concurrent or ongoing review of health record content while the patient is still receiving inpatient services. These assessments are often grouped together under the term health record analysis, health record review, or discharge review.

The purpose of health record analysis is to ensure the quality and completeness of clinical documentation. The process is not an evaluation of the clinical care provided to the patient. However, quality improvement and accreditation organizations do look to health record documentation for evidence that appropriate and effective care is being provided to patients in the facility. In addition, the quality of clinical documentation has a very significant impact on the coding and billing processes that lead to reimbursement.
1. Consistent and standardized documentation requirements
   - Advocate consistent and standardized documentation requirements by working with stakeholders and accrediting and regulatory bodies, including but not limited to the JCAHO, the National Committee for Quality Assurance, the Centers for Medicare and Medicaid Services, the ASTM, and HL7.
   - Eliminate physician attestation requirement.
   - Streamline regulatory activities.
   - Change laws or legislation that requires physician signatures on verbal orders.

2. Innovative, high-quality, and cost-efficient clinical documentation practices
   - Utilize authentication and authorship mechanisms that use available technology.
   - Reduce record completion time frames. The time from patient discharge to record completion should be as short as possible. Develop policies and practices to facilitate completing records in a timely manner.
     - Collect records of discharged patients quickly.
     - Ensure that incomplete records remain available to physicians for completion. When the record is needed for purposes unrelated to patient care, have the record reviewed in the department.
     - Establish the physician’s preferred appointment day and time to complete records and make them available at the appointed time.
     - Develop an equal-access system so that every physician who has deficiencies in the same record can have access to the record.
     - Apply record completion policies uniformly to all physicians without exception.
     - Withhold the paychecks of residents or do not allow them to graduate when they have incomplete records outstanding.
     - Use quality improvement techniques to improve record completion timeliness.
     - Reduce documentation requirements to those required to fulfill accreditation standards, federal regulations, and state laws.
     - Monitor and graphically report improvement efforts.
     - Redesign forms to ensure that they are user-friendly.
     - Decentralize record completion.
     - Work with other hospitals in the system or geographic area to standardize record completion requirements.
     - Analyze records for deficiencies on a concurrent basis.
     - Levy fines, suspend privileges, or otherwise punish physicians who do not complete records in a timely manner.
     - Utilize positive incentive programs for timely record completion.
     - Reduce reliance on paper-based sources of information to reduce or eliminate routine delivery and maintenance requirements.
     - Standardize billing process so that claims are derived exclusively from electronic documentation to reduce or eliminate the need to release paper-based information for reimbursement purposes, claim audits, and record handling.
     - Streamline health record completion guidelines.
     - Minimize the number of unsigned verbal orders.
     - Reduce loose filing backlogs.
     - Allow medical staff to take responsibility for record completion timeliness.
   - Utilize new and improved technology for documentation.
     - Use speech recognition technology to supplement transcription services.
     - Develop a standardized format for policies and procedures that are accessible electronically.
     - Utilize e-mail to transmit information.
     - Implement telemedical record documentation processes.

(Continued on next page)
Traditional health record analysis comprises two separate but related processes: quantitative analysis and qualitative analysis. Many hospitals are applying a new quality review technique that combines quantitative and qualitative review. Ongoing record review is performed while the patient is still hospitalized.

In hospitals that use traditional, paper-based health record systems, the HIM department is responsible for ensuring that the health records of discharged, transferred, and deceased patients are returned to the department (Coffman-Kadish 2002a). Department personnel may also update the master patient index at this time. Depending on the hospital’s health record policies, HIM personnel may also reassemble the contents of the record in a specific order for storage. (This order is sometimes referred to as chart order.) These processes are not necessary in facilities that use electronic health record systems. (See figure 4.8.)

**Quantitative Analysis**

The purpose of **quantitative analysis** is to assess the completeness and accuracy of patient health records. Quantitative evaluations are based on the regulatory, accreditation, licensing, and reimbursement requirements that apply to the hospital. Therefore, the timing and extent of quantitative health record analysis depend on policies developed by individual organizations. Both paper-based and computer-based records are subject to quantitative review.

For inpatient records, quantitative analysis may be performed concurrently (while the patient is still hospitalized) or retrospectively (after the patient has been discharged). For outpatient records, quantitative analysis usually takes place after the patient encounter is complete. The benefit of concurrent review is that content or authentication issues can be addressed before the patient has been released, when it is still possible to address clinical quality issues.

The value of retrospective health record review is not universally accepted. Many hospitals feel that concurrent review is a much more effective way to ensure that documentation is completed at the time patient services are performed. The implementation of electronic health record systems should make concurrent review more universal.

Whether performed concurrently or retrospectively, quantitative review may include an evaluation of any or all of the following factors (Johns 2002; Coffman-Kadish 2002a):

- All of the necessary reports and data entry forms or screens have been completed.
• All of the reports and data entry forms or screens include accurate patient identification information (name, health record number, gender, attending physician, and so on).
• All of the necessary consents and authorizations have been signed by the patient or the patient’s legal representative.
• All of the diagnostic tests ordered by the patient’s physician have been performed, and the results have been documented.
• All of the medical consultations ordered by the patient’s physician have been performed, and the consultants’ reports are complete.
• All of the entries and reports that require authentication have been signed and dated according to hospital policy.
• The history and physical examination report is complete and includes documentation of all admission diagnoses.
• The discharge summary is complete.
• The physician’s documentation includes all of the principal and additional diagnoses and principal and additional procedures.
• For surgical patients, all preoperative, intraoperative, and postoperative anesthesia reports are complete.
• For surgical patients, all operative reports, pathology reports, and postoperative progress notes are complete.
• For surgical patients, all recovery room reports and progress notes are complete.
• For patients who died while under hospital care, preliminary and final autopsy reports are complete if an autopsy was ordered.

When record analysis identifies missing or incomplete information, the reviewer may first attempt to find the missing documentation. When the materials cannot be located, the HIM department issues deficiency notifications to the appropriate caregivers.

**Deficiency systems** may be paper based or computer based. Paper-based deficiency systems use a checklist to indicate missing orders, progress notes, reports, consents, and other documentation. (See figure 4.9 for an example of a paper deficiency slip.) Computer-based deficiency systems provide logs for reporting and tracking health record deficiencies. Most HIM departments periodically remind physicians that they need to complete their patients’ records for past admissions.
Accreditation standards require hospitals to track the number of deficient records and to report the average record deficiency rate at least quarterly (JCAHO 2003). The delinquency rate is calculated by dividing the monthly average number of discharges by the monthly average number of delinquent records.

**Qualitative Analysis**

**Qualitative analysis** is the systematic review of sample health records to determine whether patient care and record documentation standards are being met. Qualitative record analysis may be performed at the point of care by clinical or HIM professionals or after discharge when the record is returned to the HIM department. The goal of qualitative analysis is to determine the adequacy of the health record as documentation of the quality of care provided to the patient. For example, HIM professionals look for evidence in the record that indicates that caregivers followed clinical practice guidelines, performed adequate patient assessments, and so on.

The results of qualitative analyses are usually reported to the health records committee or performance improvement manager for action. Common problems identified during qualitative reviews include the following:

- Obvious inconsistencies in documentation related to the diagnostic information recorded on admissions records, history and physical reports, operative and pathology reports, care plans, and discharge summaries
- Inconsistencies between the patient’s pharmacy profile and the medication record
• Inconsistencies in the documentation related to test results, treatment plans, and follow-up instructions
• Ambiguities in documentation resulting from the use of unapproved symbols and abbreviations
• Inconsistencies in nursing documentation related to the patient’s pain status compared to physician’s orders for analgesics
• Inadequacies in nursing documentation related to interdepartmental transfers that result in time gaps during which the patient’s location is not accounted for

**Ongoing Record Review**

Ongoing record review is a continuous health record quality review process. Clinical and/or HIM professionals review the records of current inpatients daily as well as closed records after the patients have been discharged or transferred. The goal of ongoing record review is to ensure that inpatient health records are complete and accurate and that the facility’s clinical documentation practices meet relevant accreditation standards, state licensing laws, and federal regulatory requirements. (See figures 4.10 and 4.11 [pp. 236–37] for examples of record review checklists.)

**Data Quality Management Model**

In 1998, the AHIMA spearheaded a task force to study data quality management. Data quality management is a process that ensures the integrity of data during data collection, application, warehousing, and analysis. The task force developed a data quality management model, which is based on four quality domains (Cassidy and others 1998):

- Data applications: The purposes for which data are collected
- Data collection: The processes whereby data are collected
- Data warehousing: The processes and systems whereby data are archived (saved for future use)
- Data analysis: The processes whereby data are translated into information that can be used for a designated application

The data quality management model applies the following basic characteristics to the four quality management domains:

- Accuracy: The correctness of the data
- Accessibility: The easy availability of the data
- Comprehensiveness: The completeness of the data
- Consistency: The reliability of the data
- Currency: The immediacy of the data in relation to the events they describe
- Definition: The meaning of the data
- Granularity: The level of detail in the data
- Precision: The acceptable value ranges in the data
- Relevancy: The usefulness of the data
- Timeliness: The availability of the data at the time they are needed

The AHIMA data quality management model is explained in more detail in appendix E.
## Figure 4.10. Open Record Review Checklist: Initial Assessments

<table>
<thead>
<tr>
<th>Information/Indicator</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nursing unit</td>
<td>11B</td>
<td>12B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Admission date</td>
<td>04/06/04</td>
<td>04/06/04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Primary physician</td>
<td>Jones</td>
<td>Smith</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Was the history and physical report available within 24 hours of the admission?</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Does the history and physical report include information of the patient's past history, examination of heart, lungs, and mental status and other body systems related to the condition for which the patient was admitted?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Is the nursing initial assessment complete and free of blanks?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Was the nursing initial assessment completed within 24 hours of the admission?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Was a functional status screen completed when warranted by the patient's condition?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Was a nutritional status screen completed when warranted by the patient's condition?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Was the need to plan for discharge or transfer determined?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Was the patient's level of pain assessed?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Did the patient sign the consent to treatment?</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Was it determined whether the patient had an advance directive?</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

<table>
<thead>
<tr>
<th>Actions Needed</th>
<th>Who</th>
<th>When Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply missing report of history and physical.</td>
<td>Dr. Jones</td>
<td>04/08/2004</td>
</tr>
</tbody>
</table>
Figure 4.11. Closed Record Review Checklist: Discharge Summary

<table>
<thead>
<tr>
<th>Information/Indicator</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
<th>Record Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nursing unit</td>
<td>10A</td>
<td>12B</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>12B</td>
<td>10A</td>
</tr>
<tr>
<td>2. Primary physician</td>
<td>Smith</td>
<td>Green</td>
<td>Jones</td>
<td>Smith</td>
<td>Black</td>
<td>White</td>
<td>Jones</td>
</tr>
<tr>
<td>3. Discharge date</td>
<td>04/04/04</td>
<td>04/04/04</td>
<td>04/04/04</td>
<td>04/04/04</td>
<td>04/04/04</td>
<td>04/04/04</td>
<td>04/04/04</td>
</tr>
<tr>
<td>4. Was the discharge summary in the record within 30 days of discharge?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Does the discharge summary include the reason for the patient's hospitalization?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Does the discharge summary include documentation of significant findings?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7. Does the discharge summary include documentation of all of the procedures performed and the other care, treatment, and services provided?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>8. Does the discharge summary include documentation of the patient's condition at discharge?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td><strong>No</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>9. Does the discharge summary include documentation of the patient aftercare instructions?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10. Is the discharge summary readable, complete, and free of blanks?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>11. Is the discharge summary free of abbreviations from the prohibited list?</td>
<td><strong>No</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>12. Is the discharge summary signed and dated by the author or otherwise authenticated?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments

<table>
<thead>
<tr>
<th>Actions Needed</th>
<th>Who</th>
<th>When Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send Dr. Smith another reminder about the use of prohibited abbreviations from the JCAHO list, specifically SO4.</td>
<td>Tilly</td>
<td>Today</td>
</tr>
<tr>
<td>Ask Dr. Smith to add specific information about the patient's condition at discharge.</td>
<td>Dr. Smith</td>
<td>04/10/2004</td>
</tr>
</tbody>
</table>
Summary

Every acute care facility must develop and enforce policies that ensure the uniformity of health record content and format in both paper-based and computer-based health record systems. Most hospitals currently use one of three formats for paper-based health records: the source-oriented health record, the problem-oriented health record, or the integrated health record. In addition, there are several options for storing paper-based or mixed-media records.

The organization of electronic health records is accomplished through the application of various types of technological support, including database management, image processing and storage technology, data capture and retrieval technologies, and information system standards.

References


Review Quiz

**Directions:** Select the best answer for the following items.

1. ___ What is the term used in reference to the systematic review of sample health records to determine whether documentation standards are being met?
   A. Qualitative record review
   B. Legal record review
   C. Quantitative record review
   D. Ongoing record review

2. ___ George Johnson was admitted to the hospital on July 1 and assigned the health record number 334567. On August 9, George was readmitted to this same hospital and assigned the health record number 334975. All of the health record information for each admission is filed under its respective health record number. What type of numbering system does this case exemplify?
   A. Serial
   B. Unit
   C. Terminal-digit
   D. Serial-unit

3. ___ What type of signature is created when a person signs his or her name on a pen pad and the signature is automatically converted and affixed to a computer document?
   A. Identification
   B. Digital signature
   C. Electronic signature
   D. Standardization

4. ___ What technology creates images of handwritten and printed documents that are then stored in health record databases as electronic files?
   A. Clinical data repository
   B. Data exchange standards
   C. Central processor
   D. Digital scanner

5. ___ Which type of computer system architecture uses a single, large computer that processes the data received from input devices?
   A. Web-based
   B. Mainframe
   C. Client/server
   D. Desktop

6. ___ Which type of computer system architecture uses a combination of smaller computers to process and capture data?
   A. Web-based
   B. Mainframe
   C. Client/server
   D. Desktop

7. ___ Which type of computer system architecture uses the latest browser and network technology to capture data and move it through the system?
   A. Web-based
   B. Mainframe
   C. Client/server
   D. Desktop
8. ___ Which health record format is in use when documents are grouped together according to their point of origin?
   A. Electronic
   B. Source-oriented
   C. Problem-oriented
   D. Integrated

9. ___ What term is used for a centralized database that captures, sorts, and processes patient data and then sends it back to the user?
   A. Clinical data repository
   B. Data exchange standard
   C. Central processor
   D. Digital system

10. ___ In health record documentation, the use of approved symbols, acronyms, and abbreviations is usually limited to those that:
    A. Have more than one meaning and are never used
    B. Are approved by the JCAHO
    C. Are the most widely applicable and unambiguous
    D. Are approved by the CMS

11. ___ Which type of numbering system assigns a unique health record number to every new patient the first time he or she is admitted and then uses the number for all subsequent admissions?
    A. Serial
    B. Unit
    C. Terminal-digit
    D. Serial-unit

**Directions for items 12–20:** Match the definition with the type of filing or storage system.

12. ___ Records are arranged consecutively in ascending numerical order according to the health record number.
    A. Alphabetic
    B. Alphanumeric
    C. Compressible units
    D. Digital image
    E. Lateral file cabinets
    F. Microfilm
    G. Open-shelf
    H. Straight numeric
    I. Terminal digit

13. ___ The patient’s last name is used as the first component of identification and his or her first name and middle name or initial provide further definition.

14. ___ This record storage system would only be used in low-volume areas of the hospital.

15. ___ Source documents are scanned to create digital images of the documents that can then be stored electronically on optical disks.

16. ___ The last digit or group of digits in the health record number determines file placement.

17. ___ This type of record storage takes up less space and is mounted on permanent tracks in the floor so that the shelves can be moved.

18. ___ A combination of letters and health record numbers are used to file patient records.

19. ___ This type of record storage resembles bookshelves.

20. ___ This type of record storage involves storing images as special photographs.
21. In which EHR database model is all of the organization’s patient health information stored in one system?
   A. Distributed
   B. Centralized
   C. Hybrid
   D. Traditional

22. The process of providing proof of the authorship of health record documentation is called what?
   A. Authentication
   B. Standardization of data capture
   C. Standardization of abbreviations
   D. Identification

23. What is the key characteristic of the problem-oriented health record?
   A. Problem list
   B. Chief complaint
   C. Initial care plan
   D. Physical examination

24. Sue Smith was admitted to General Hospital on June 10 and assigned the health record number 334685. Sue was readmitted to General Hospital on October 20 and assigned the health record number 339124. Sue’s previous records for the June admission were combined with this current admission and filed under the health record number 339124. This is an example of what numbering system?
   A. Serial
   B. Unit
   C. Terminal-digit
   D. Serial-unit

25. What mechanism allows two or more databases to transfer data between them?
   A. Clinical data repository
   B. Data exchange standards
   C. Central processor
   D. Digital scanner

26. What process helps to ensure the quality and completeness of health record content in both paper-based and computer-based environments?
   A. Standardization of data capture tools
   B. Data exchange standards
   C. Standardization of abbreviations
   D. Authentication of health record entries

27. A unique personal identifier that is entered by the author of EHR documentation via computer technology is called what?
   A. Digital signature
   B. Identification
   C. Electronic signature
   D. Standardization

28. Dr. Smith orders 500 mg of penicillin by mouth tid for Jane Doe in the hospital emergency department. The computer sends an alert to Dr. Smith to tell her that the patient, Jane Doe, is allergic to penicillin. What type of computer system is Dr. Smith using?
   A. Clinical data repository
   B. Data exchange standard
   C. Clinical decision support
   D. Health informatics standard
29. ___ Which health record format is arranged in chronological order with documentation from various sources intermingled?
   A. Electronic
   B. Source-oriented
   C. Problem-oriented
   D. Integrated

30. ___ Which of the following represents one of the biggest challenges in EHR development and implementation?
   A. Images of handwritten and printed documents
   B. Data exchange standards
   C. A workable data capture process
   D. A clinical data repository

31. ___ Which of the following technologies would allow surgeons in Dallas to perform an appendectomy on a patient in Italy?
   A. Facsimiles
   B. Telemedicine
   C. Provider-provider communication
   D. Provider-patient communication

32. ___ What type of health record analysis assesses the completeness and accuracy of patient health records?
   A. Qualitative record review
   B. Legal record review
   C. Quantitative record review
   D. Ongoing record review

33. ___ Which area of hospital operations was the first to utilize computer technology?
   A. Financial management
   B. Order-entry
   C. Clinical laboratory
   D. Computer-based diagnostic systems

34. ___ HIM professionals sometimes monitor the records of current inpatients as well as closed records after the patients have been discharged or transferred. What is this process called?
   A. Qualitative record review
   B. Legal record review
   C. Quantitative record review
   D. Ongoing record review

35. ___ What term is used to refer to an organized collection of data that have been stored electronically to facilitate easy access?
   A. Digital formatting
   B. Database
   C. Telemedicine
   D. Data capture