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ELECTRONIC MEDICAL RECORDS

FINDING SOLUTIONS TO CLINICAL AND LITIGATION RISKS/PRACTICAL APPLICATIONS IN THE EMERGENCY DEPARTMENT



Table of Contents

Introduction and Background.....	3
Part 1: Copy and Paste Issues and Solutions.....	4
Prevalence of the Problem.....	4
Patient Safety and Compliance Challenges.....	4
Risk Management Recommendations.....	5
Part 2: EHR Challenges Related to Discovery and Litigation.....	6
Compliance with Local, State and Federal Legal Requirements.....	6
Physical Production of the EMR.....	6
Audit Trails and ‘Fishing Expeditions’.....	7
Copy and Paste Challenges During Litigation.....	7
Risk Management Recommendations.....	8
EMR-related Case Scenarios.....	9
Part 3: Emergency Medicine – Challenges and Potential Solutions.....	10
Benefits of Visual Guidance.....	11
Real-time Clinical Decision Support.....	13
Evidence-Based Medicine and the EMR.....	14
Vital Sign Considerations.....	16
Conclusion.....	18
References.....	18

Introduction and Background

The 2009 enactment of the Health Information Technology for Economic and Clinical Health Act (the “HITECH Act”) and the incentives associated with “Meaningful Use” have stimulated the adoption of electronic medical records (EMRs) in all areas of medicine in the United States. EMR use offers the healthcare industry many potential benefits, including real-time access to patient information, clinical decision support and alerts, greater legibility of notes, and interfaces with ancillary services to improve the overall quality and coordination of care.

However, in our work with hospital clients, the CNA healthcare team often hears about the challenges as well as the advantages of EMR use. Unfortunately, these electronic health record (EHR) systems have not always been designed with patient safety and risk management considerations as paramount objectives. As a result, the limitations of this technology and the bad habits it can engender among users, must be acknowledged as potentially affecting both quality of care and legal defensibility in the event of a claim or lawsuit. Awareness of basic EMR risks can provide opportunities for organizational and medical staff leadership to adopt appropriate procedural and technical safeguards to avert or mitigate them. The goal is to ensure that EMR technology serves as a problem-solver, rather than a problem-creator.

This resource examines three major EMR-related issues and suggests countermeasures to protect patients and minimize liability exposures. Part 1 of this paper examines patient safety and compliance challenges associated with the copy and paste function of EMR systems and offers practical measures designed to minimize these risks. Part 2 addresses problems associated with production

of the EMR in the context of a medical malpractice claim and offers related risk management strategies. Information in Part 1 and Part 2 is derived from a review of existing literature, as well as discussions with healthcare professionals and defense attorneys with expertise in medical malpractice. Part 3 is based upon the work of The Sullivan Group and demonstrates how a guidance-based EMR program can strengthen patient safety and risk control initiatives in emergency medicine by enhancing both diagnostic decision-making and documentation.

This document frequently refers to the electronic health record (EHR) and the electronic medical record (EMR), and it is important to understand the difference between them. The EHR is typically the foundation of the enterprise’s information technology for healthcare records. It is the database that contains the patient’s history, diagnoses, medications, treatment plans, immunization dates, allergies, radiology images and laboratory test results. When properly designed, it permits sharing of data between providers. In addition, it often includes a coding and billing function.

Within the EHR, there is a component or application designed to manage and document patient visits, i.e., the tool utilized by the medical practitioner during the patient encounter. This component is known as the EMR. It may be considered the electronic equivalent of the paper medical record, but with interactive safety and quality features beyond the scope of any paper record. The EMR may be built into the underlying EHR, or it may be a third-party program or application added to the EHR.

Part 1: Copy and Paste Issues and Solutions

Copy and paste, also known as cloning, is **defined** on the Internet by the Centers for Medicare & Medicaid Services (CMS) as “the practice of copying and pasting previously recorded information from a prior note into a new note.”

Used with restraint, the copy and paste function is a convenient and time-saving tool for busy practitioners in specific situations, and is not inherently problematic. For example, a physician can safely copy the patient history from a previous visit onto a new note after verifying in the patient’s presence that there are no changes and documenting this authentication. If changes and updates are necessary, the physician should edit the copied-forward material carefully and electronically sign, date and time-stamp the edited note which is “provenance”. Conversely, when EHR systems do not facilitate efficient documentation, copy and paste serves as a workaround. Inappropriate and excessive use of copy and paste has become a common practice, which has been shown to negatively affect patient care. “Copy and paste is the 21st century version of illegible handwriting,” notes Mary T. O’Grady, Vice President of Risk Management at Advocate Health Care.

Prevalence of the Problem

Use of the copy and paste functionality is widespread in U.S. hospitals. A study conducted in a large academic medical center reveals that 82 percent of all resident notes and 74 percent of all attending notes involved copying. The problem is now considered so extensive that a new term has been coined: e-iatrogenesis, referring to an adverse event caused by technology. (See Thornton, J. et al. [“Prevalence of Copied Information by Attendings and Residents in Critical Care Progress Notes.”](#) *Critical Care Medicine*, February 2013, volume 41:2, pages 382-388.) The Joint Commission, noting that it has received sentinel event reports identifying the copy and paste function as the specific root cause of patient injury, expresses the need to more accurately quantify the scope of this problem through consistent tracking of adverse events related to copy and paste. (See [Quick Safety](#), February 2015, Issue 10). A study of orthopedic surgery patients at Saint Louis University Hospital demonstrates that the use of copy and paste in high-risk patient populations is linked to inaccuracies in daily progress notes that can be detrimental to patient outcomes. (See Winn, W. et al. [“The Role of Copy and Paste Function in Orthopedic Trauma Progress Notes.”](#) *Journal of Clinical Orthopaedics and Trauma*, 2017, volume 8:1.) For example, if a diagnosis is rendered based upon outdated laboratory results that were copied and pasted, inappropriate antibiotics could be ordered and administered.

Patient Safety and Compliance Challenges

Considering the prevalence of the use of copy and paste and the potential for patient harm, healthcare professionals, informatics specialists, risk managers and healthcare professional liability insurers must take steps to identify and mitigate clinical, legal and compliance risks associated with the use of copy and paste in the EMR.

One of the most serious potential consequences of copy and paste is the *dissemination of erroneous information throughout the record*. The consequent “comedy of errors” can be especially perilous when the patient is receiving care from multiple services and the record is the primary means of communication about the patient’s condition and treatment plan. In the absence of direct communication among practitioners, erroneous or outdated information may become established as “the truth” in the patient record, influencing clinical decision-making and leading to delay in diagnosis, failure to diagnose and misdiagnosis.

Problem lists, a frequently copied section of the EMR, are especially vulnerable to overuse or misuse of this function. Obsolete lists that do not reflect current problems can lead to errors in diagnosis and treatment.

Another too-common scenario is “*note bloat*,” in which entire progress notes, including labs, are copied from previous visits into a new note. Such a practice may make it difficult for subsequent healthcare providers and consultants to distinguish current and pertinent information from superfluous data, and hence to identify and prioritize urgent patient problems. Consultants in particular, may find it a time-consuming challenge to locate the author of the copied material as well as the date and time when the information was copied. According to the [American College of Physicians](#), “These distended records can be a source of excess downstream documentation, which perpetuates the difficulty many physicians perceive when trying to quickly find a useful signal in a field of noise.” (See “Clinical Documentation in the 21st Century: An Executive Summary of a Policy Position Paper from the American College of Physicians,” *Annals of Internal Medicine*, February 17, 2015, volume 162:4, pages 301-303.)

A related unintended consequence of excessive use of copy and paste is the “*loss of the patient’s story*.” In the paper medical record, the patient’s story was found in the narrative, which included the physician’s diagnostic thought process and chronology of events. These notes have been replaced by duplicative notes that have been copied, lacking clear order and authorship.

The final challenge associated with copy and paste is upscaling or “*code creep*,” which occurs when a practitioner bills for more services than are actually provided. For example, if a physical exam is copied from one visit to the next but the patient has not, in fact, been reexamined, the potential for duplicate billing arises. Improper use of copy and paste is now being scrutinized by regulatory agencies and payers, resulting in payment denials, CMS audits and penalties under the False Claims Act. CMS and the Office of Inspector General have indicated that fraud detection and prevention in relation to the EHR has become a top priority.

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Risk Management Recommendations

The following suggestions can help minimize the errors in patient care and liability risks associated with misuse of copy and paste:

- **Establish policies and procedures delineating appropriate use of the copy and paste function.** Risk management and health information technology (HIT) professionals should work with medical staff and vendors to develop proactive strategies which reduce the risks associated with copying and pasting critical clinical documentation.
- **Require ongoing education regarding proper use of the copy and paste function** and include information regarding compliance and patient safety risks in training sessions.
- **Consider adopting a voice-activated dictation system for the electronic medical record**, which can help augment efficiency while avoiding the risks of copy and paste.
- **Investigate the option of using software technology** programmed to highlight all copied patient information in a different color or to block the ability to copy high-risk information, including the history of present illness.
- **Audit EMRs on an ongoing basis.** EMR audits – conducted by multidisciplinary teams under the auspices of a quality committee – should pay special attention to providers’ use of copy and paste. By reviewing audit results, risk managers and other healthcare leaders can gain valuable insights into problem areas and translate this knowledge into staff education and training initiatives.
- **Respond to EMR reviews or audits that reveal potential chronic misuse of copy and paste.** Chronic abuse of copy and paste should be reported to, and formally reviewed by appropriate professionals or departments in the organization, including but not limited to the Compliance Officer, Human Resources and the Credentials and Peer Review Committee or similar body. Corrective action or sanctions should be taken, when appropriate, such as training and education; and focused chart reviews. If noncompliant behaviors persist, privilege restrictions should be considered in order to increase the likelihood for change.
- **Monitor incident reports, in order to track adverse outcomes associated with copy and paste.** Incident reports should be used along with EMR audit findings to create a more complete picture of copy and paste risks and identify the need for policy and procedure changes.
- **Consider EHR-based simulation training of residents and the medical staff to improve efficient access to critically needed patient care information.** Such simulation training may broaden awareness in order to avoid chronic abuse of copy and paste. (See Stephenson, L. et al. “[Participation in EHR Based Simulation Improves Recognition of Patient Safety Issues.](#)” *BMC Medical Education*, October 21, 2014, volume 14:224.)

Part 2: EHR Challenges Related to Discovery and Litigation

Ongoing challenges in defending professional liability claims include managing requests for paper production of an EMR as well as limiting discoverability of EHR-based information. Issues to consider include legal requirements and definitions, logistics of physically producing the document, audit trails and fishing expeditions, protecting peer review privilege, and challenges created during litigation by inappropriate use of the copy and paste function.

Compliance with Local, State and Federal Legal Requirements

The version of the EMR which is released in response to a request for information pertaining to a judicial or administrative proceeding, or by a patient for his/her personal records, is referred to as the *legal medical record* (LMR). In general, information is deemed part of the LMR if it relates to the provision of clinical care and would reasonably be expected to be released upon request during discovery. Professional and accreditation organizations, including the [American Health Information Management Association](#) and [The Joint Commission](#) offer guidance regarding content that should and should not be included in such disclosures.

Many organizations do not have a committee to guide the process of determining what constitutes the legal medical record. The goal of such a committee is to ensure that neither too much nor too little information is disclosed, i.e., that the information released includes relevant documentation of services provided to the patient, and does not include information beyond the scope of the request or "metadata" collected as part of the electronic health record.¹ During litigation, the defense attorney on the case will determine what additional information is appropriate to release in response to discovery requests.

Physical Production of the EMR

Once the LMR has been defined, other issues may arise relating to the paper production of the EMR, such as the following:

- **Appearance and organization.** Clinicians utilize screens to enter and review information in the EMR. However, the paper copy typically bears little or no resemblance to these screens or the flow of information in the live EMR. This discrepancy may create unexpected difficulties for clinicians as they try to locate information needed for reference during a deposition or trial.
- **Changes in iterations of the EMR software.** Updated versions of the EMR software adopted subsequent to the incident may feature new options, prompts and/or drop-downs that were not available at the time of the incident. These changes may create the appearance of gaps in the documentation, requiring an explanation from the defense team.
- **"Down-time" entries.** If IT problems or power outages occurred during the patient's hospitalization, the EMR may contain scanned entries or gaps in documentation.
- **Associated costs.** Producing a paper version of the EMR may be a costly process. The cumbersome nature of the document also increases the complexity of record review by experts, raising litigation costs.

¹ Commonly described as "data about data," *metadata* refers to an automatically generated computer record that includes but is not limited to audit trails, order and results "detail" sheets, and other data that certify how, when, where and by whom electronic documents (e-documents) and other computer-based information have been reviewed, manipulated or otherwise accessed. (Courtesy of Silverstein, S. "[Primer on Healthcare IT Myths, Realities, Risks, and Practical Implications for Trial Lawyers.](#)")

Audit Trails and 'Fishing Expeditions'

Another important issue to consider is audit trails.² As Matthew Keris notes, use of audit trails by plaintiff attorneys can significantly affect the defense of medical malpractice claims by exposing sensitive information to discovery, thus compromising the otherwise protected nature of material generated through peer review. (See "A Pandora's Box: The EMR's Audit Trail," cited in References on [page 18](#).)

Plaintiff's counsel also may utilize audit trails during discovery to "fish" for potentially relevant information in the absence of an established theory of liability. A nonspecific, general search transcends the scope of the original request for information. For example, the audit trail may highlight and create a red flag regarding a discrepancy between the time a particular service was provided as opposed to the time it was documented. The discrepancy potentially creates a misleading chronology of events. Such time-sensitive documentation may be especially important in the emergency department and intensive care unit settings, where a patient's condition may change rapidly.

Keris demonstrates in his article that use of the audit trail for fishing purposes (i.e., to try to identify discrepancies not previously known) is becoming limited by case law to situations where credibility is an issue or other substantial reasons justify a request for audit trails. Moreover, analyses have shown that the expense and inconvenience associated with forensic audit trails typically far outweigh the potential benefits.

Copy and Paste Challenges During Litigation

Copy and paste errors may negatively affect not only clinical care, but also the ability to defend a professional liability claim and maintain credibility before a jury. The Physician Insurers Association of America's (PIAA's) [survey](#) of claims and risk management professionals reveals that 53 percent of respondents had experienced EMR-related claims, and that of these claims, 70 percent involved copy and paste practices.

As discussed in Part 1, there is a common practice of repetitive copying and pasting of previously documented practitioner examinations. In an effort to take advantage of the convenience of copy and paste, one may inadvertently create errors in documentation by including information that is no longer accurate or relevant. This misuse of copy and paste may create questions about the credibility of the entire record, which, in turn, may lead to requests for a forensic investigation of the EMR.

Misuses of the copy and paste function may have ramifications for hospitals as well as individual practitioners. New corporate liability theories are emerging in relation to copy and paste errors, involving the allegation that the healthcare institution knew or should have known of the improper use of the copy and paste function. Therefore, by failing to take action to correct this misuse, it permitted unreliable and deceptive documentation. (For more information, [see page 64 of Keris, M. *Electronic Medical Records and Litigation*, 2017 edition. New York: Thomson Reuters.](#))

This misuse of **copy and paste** may **create questions** about the **credibility** of the entire record ...

² An *audit trail* is a compilation of electronic record entries that includes who input the data, when they were input, who accessed or reviewed the data, who manipulated or altered the data, and when and from where such activities took place. (Courtesy of Silverstein, S. "[Primer on Healthcare IT Myths, Realities, Risks, and Practical Implications for Trial Lawyers.](#)")

Risk Management Recommendations

The following suggestions are intended to foster discussion regarding production and disclosure of EMR information in the context of discovery:

- **Ensure that legal counsel involved with defending healthcare professional liability claims maintain current knowledge of case law and local, state and federal requirements regarding response to requests for information and audit trails.** Case law and legal requirements are neither static nor consistent across states. Legal counsel must remain current in order to establish sound policies and procedures related to releasing information from the EMR, prepare for depositions and otherwise defend against healthcare professional liability claims.
- **Create a committee tasked with developing policies and procedures for responding to requests for copies of the EMR and audit trails.** As discussed above, established procedures for responding to information requests are imperative. The committee must ensure that criteria for inclusion in the LMR reflect compliance with applicable discovery rules along with HIPAA privacy rules and state-specific requirements regarding release of information relating to mental health and psychotherapy, HIV/AIDS and substance abuse treatment.

Committee members should have the breadth and depth of knowledge to adequately define the LMR, as well as the requisite technical expertise to produce a paper document reflecting those criteria. Committee membership should include representatives from health information management, health IT, informatics, analytics, clinical leadership, risk management and legal counsel. AHIMA provides guidelines and other resources for hospitals initiating this process. (See “Issues With Printing From The Electronic Health Record: A Business Case,” cited in References on [page 18](#).) Additional guidelines delineating formation of the LMR for organizations utilizing the Epic EHR, are available in “Epic Releasing Protected Health Information Strategy Handbook,” updated 10-10-15 edition. Basic information regarding LMRs can be found in [“Electronic Record Requests: Meeting the Challenge of E-discovery.”](#) CNA *CarefullySpeaking*® 2015 – issue 2.

- **Provide ongoing education for medical staff and employees regarding appropriate practices for documentation in the EMR.** The best line of defense against claims will always be thorough, accurate and timely documentation of patient care. The introduction of the EMR – with its time-stamping capability, copy and paste function, audit trails and other information not found in paper medical records – reinforces this critical lesson. Medical staff and others involved in patient care should be taught best practices for documentation in the EMR, including appropriate utilization of EMR features that demonstrate the quality of care provided. They also should be instructed to avoid documentation practices that can impair the organization’s ability to defend against healthcare professional liability claims.
- **Consider disclosing the LMR in read-only mode, rather than as a paper document.** By producing the LMR in electronic form during discovery, healthcare organizations can avoid some of the problems inherent in translating electronic information into hard copy. In this case, safeguards must be established and implemented to limit what is available for viewing, such as using the “view-only” mode (if this is technically possible as well as legally acceptable) and limiting views to the equivalent of the LMR.

The **best line of defense** against claims will always be **thorough, accurate and timely documentation** of patient care.

EMR-related Case Scenarios

Case number one involves falsification of documentation relating to the deterioration of a postoperative patient's vital signs. A 55-year-old patient underwent open heart surgery and was transferred to the intensive care unit for monitoring. On postoperative day three, the patient became hypotensive but recovered after fluid administration. Following this episode, the attending physician ordered frequent monitoring of vital signs. The patient continued to have intermittent episodes of hypotension throughout the evening and night shifts which resolved without further treatment. The nurse, believing these transient episodes to be benign, did not report them to the attending physician.

On postoperative day four, the patient suddenly went into cardiopulmonary arrest. Resuscitative measures were unsuccessful and the patient expired. The family subsequently filed a lawsuit.

The EMR that was printed out and produced by the hospital appeared to show that vital signs were within normal limits and charted in an appropriate and timely manner. Plaintiff's counsel deposed the hospital-employed nurse, who testified that he documented the patient's blood pressure at the time he obtained it, and that the blood pressures had been stable prior to the patient's arrest.

As discovery proceeded and expert review testimony began, the etiology of the patient's sudden arrest without any warning, i.e., vital sign abnormality, became the focus of the case. The blood pressure documentation was questioned by plaintiff's counsel and became a significant challenge to the hospital's defense team. IT experts conducted a computer analysis of metadata and audit trails to determine who had documented the vital signs and when these data were entered into the EMR. The IT analysis detected that the vital signs had been entered over a five-minute period by one nurse at the end of the shift, after the patient's arrest. These findings were in direct contradiction to the nurse's deposition testimony that he had notified the surgeon immediately about the abnormal blood pressure and entered the vital sign readings as soon as he obtained them. The EMR discredited the testimony of the nurse, who ultimately admitted to falsifying the records.

Case number two involves care provided in the intensive care unit (ICU) at a community pediatric hospital. A 2-year-old patient with a past medical history of asthma presented to the Emergency Department (ED) with complaints of difficulty breathing. The initial physical exam revealed wheezing. Arterial blood gases and oxygen saturations were abnormal, but did not meet the criteria for intubation during the time frame that the patient was in the ED. The patient was promptly transferred to the Pediatric Intensive Care Unit for further evaluation and treatment and remained stable. Unfortunately, the patient experienced a sudden deterioration in his respiratory status requiring intubation. Soon after, the child died. A lawsuit was filed, contending that there had been a delay in intubation.

At the time of the incident, the ICU nurses copied and pasted nursing notes indicating that the patient was stable, rather than typing out each note. These notes also stated that the parent was in the room, even though the same nurse had separately documented that the parent had left the hospital. Plaintiff's counsel alleged that the patient was likely unstable during the entire period, and made use of this discrepancy to discredit the entire record.

Case number three involves inappropriate copy and paste practices resulting in harm to a patient. An elderly patient was admitted on a weekend for treatment of a large pressure injury abscess. An admitting resident noted in the EMR that the abscess required drainage and possible surgical intervention. The surgery proceeded, but the intern failed to note the procedure in subsequent documentation, instead copying and pasting the original entry note for the next two days. The infectious disease team consulted on day three and, unaware of the surgical drainage and improvement, made an unnecessary and deleterious change in the patient's antibiotic regime. As a result of the error, the patient remained hospitalized for diarrhea and dehydration, and required skilled nursing care for several weeks following discharge.

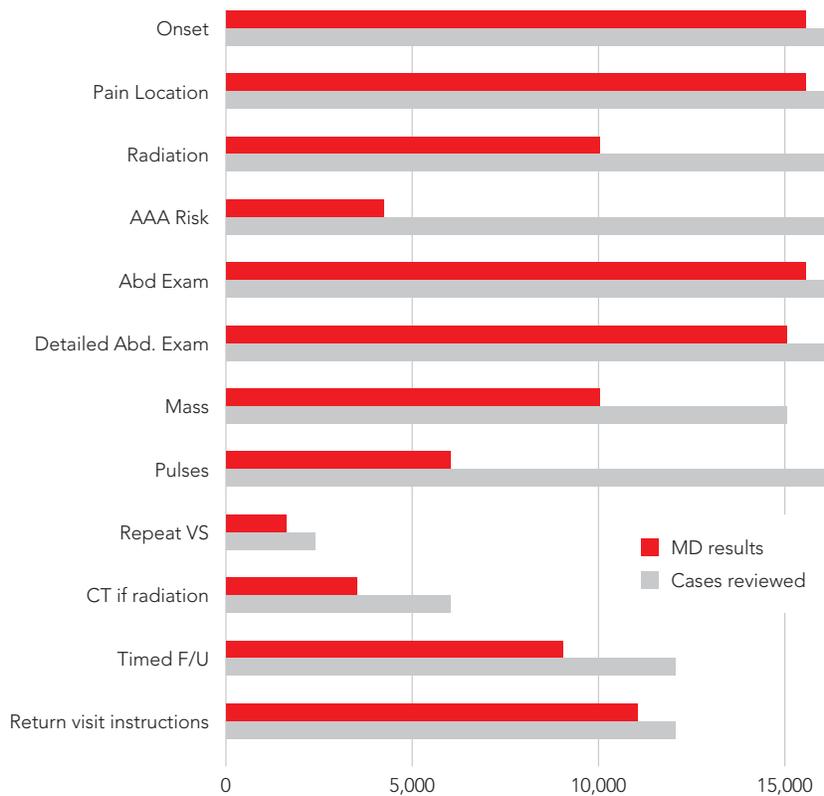
Part 3: Emergency Medicine – Challenges and Potential Solutions

Part 3 addresses a specific example of how innovative technology can enhance the EHR and improve patient outcomes. We gratefully acknowledge the work of Daniel J. Sullivan, MD, JD, FACEP, President and CEO, The Sullivan Group, who authored this section of the report. His collaboration over the course of producing this publication is appreciated, as well as his important efforts on behalf of patient safety and enhanced quality of care. The images used in this section are reprinted with permission of Medical Professor™.

In 1998, the Institute of Medicine (IOM) published its groundbreaking study, *To Err is Human*, which brought national attention to the problem of avoidable medical errors. More recently, in 2015, the Health and Medicine Division of the National Academies of Sciences, Engineering and Medicine (formerly IOM) released the report “*Diagnostic Error in Health Care*,” which revealed that most adverse events leading to litigation stem from diagnostic lapses.

Given the close relationship between diagnosis-related errors, physician workflow patterns and documentation issues, some have wondered whether an “optimized” EMR may help improve diagnosis and reduce related healthcare professional liability claims. The Sullivan Group, a clinical risk management and patient safety firm in Oakbrook Terrace, IL, performed extensive research in the area of improving patient safety using EMR-based tools. This section of the resource examines how human factors engineering (i.e., the study of how people use technology) can be applied to healthcare IT, in order to create more usable EMR systems for physicians and a safer clinical environment for patients.

1 Abdominal Pain Patients Over 50 Years Old



Benefits of Visual Guidance

After several years spent investigating thousands of healthcare professional liability cases, a team of medical-legal experts at The Sullivan Group identified common gaps in clinical practice and documentation that contribute to emergency medicine errors. A larger clinical analysis of 170,000 high-risk patients was then performed to determine the frequency of these common omissions during patient care, regardless of patient outcome.

The analysis includes more than 16,000 patients over the age of 50 presenting with abdominal pain, a common emergency room presentation. Figure 1 depicts physician compliance with key abdominal pain-related diagnostic data elements in over 200 U.S. emergency departments. The grey bar represents the total number of patients, and the red bar represents those cases in which the physician documented anything related to that data point.

In this high-risk presentation, compliance with these key data elements should be almost 100 percent, and certainly greater than 90 percent. The table demonstrates a striking lack of compliance in physician documentation of clinical data elements that may be critical to the physician thought process leading toward a correct diagnosis, such as, onset of pain or presence of an abdominal mass, among others. Another analysis conducted by The Sullivan Group clearly demonstrates that a system of visual highlights or clinical guidance built into the EMR workflow could raise documentation compliance on these important clinical elements to 90 percent. Figure 2 demonstrates how the system highlights in red key clinical elements in a physician documentation template. This visual guidance relates to the consideration of thoracic aortic dissection in a patient presenting with chest pain.

2 EMR Chest Pain Template Key Clinical Elements

ONSET	Unknown <input type="checkbox"/>	1 2 3 4 5 6 7 8 9 0										Today	Yesterday	Sudden
	Seconds	Minutes	Hours			Days				Weeks	Months	Years		
DURATION	Unknown <input type="checkbox"/>	1 2 3 4 5 6 7 8 9 0										Since Onset	Chronic	
	Seconds	Minutes	Hours			Days				Weeks	Months	Years		
CONTEXT	At Rest	Sleeping	After Eating			With Exertion				Activity	Breathing	Illicit Drugs		
LOCATION OF PAIN	Substernal	Epigastric	L	R	Chest				Jaw	Arm	Neck	Shoulder		
RADIATES TO	No Radiation	Abdomen	L	R	Chest				Jaw	Arm	Neck	Shoulder		
MIGRATION OF PAIN	None	CHEST TO:	Abdomen			Back				BACK:	Upper to Lower			

Visual highlights help
the practitioner focus
on key clinical elements.

One of the largest health systems in the country, with over 6 million emergency department visits annually, achieved a 90 percent rate of compliance (Figure 3) with these key clinical data elements (i.e., TSG RSQ® Assessment) and reduced the frequency of missed and delayed diagnosis malpractice claims in emergency medicine over the course of a nine year timeframe. The system decreased subarachnoid hemorrhage claims by 87 percent, stroke claims by 48 percent, acute myocardial infarction claims by 66 percent, abdominal aortic aneurysm and thoracic aortic dissection claims by 82 percent, pulmonary embolism claims by 82 percent and meningitis claims by 70 percent. The two key takeaways are

- 1) a systematic approach to documentation support can drive compliance to or above 90 percent; and
- 2) The Sullivan Group experience is that visual highlights or clinical guidance in an EMR can accomplish that goal in a very short time frame.

3 Compliance in Physician Documentation of Clinical Data Elements

N=>100,000 High-Risk Patients

Hafner, J. Hubler, J., Sullivan D. "Quality in Emergency Department Care: Results of The Sullivan Group's Emergency Medicine Risk Initiative National Audit." *Annals of Emergency Medicine*, September 2005, volume 36:3, supplement, page 22.

Medical record type	Compliance	Opportunities	Percent compliance
Handwriting	120,274	168,920	71%
Dictation	260,102	352,962	74%
Paper Template	721,802	914,147	79%
Electronic	59,769	70,862	84%
Electronic with highlighted RSQ® system	66,145	73,296	90%

Clinical alignment around
 key data elements
reduces the frequency of
 missed diagnoses
 and malpractice claims.

Real-time Clinical Decision Support

Practicing medicine should not be a memory game. In a closed claims study published in the *Annals of Emergency Medicine*, researchers found that 41 percent of the lawsuits involved a lapse in memory that contributed to the failure to diagnose. It is simply not possible to remember all the factors that predispose to a pulmonary embolism or a subarachnoid hemorrhage, or all elements of the Modified Wells or Pulmonary Embolism Rule-out Criteria (PERC), or all the key tendons and ligaments in the body, or all the names of the bones in the ankle and the wrist, or all the cranial nerves and exactly what they do. But these key data points, risk factors and anatomical details must be recalled at the correct moment if a physician is to provide appropriate care and avoid error.

Today's IT capabilities make it possible for a practitioner to click or touch one button to reveal all necessary decision support tools immediately visible without ever leaving the user interface. The key is to employ an EMR system smart enough to know where the practitioner is and what decision support is required. For example, when treating a laceration of the hand, the EMR should make necessary information immediately available and permit the physician to review the relevant anatomical information, close the screen and continue managing the patient – all with one click, touch or voice command.

In Figure 4, critical resources for hand injuries are immediately available without ever leaving the EMR environment or the user interface. Note that the hand injury template is in the background, and a single click on Resources (blue arrow) accesses the decision support typically required for hand injuries. In this particular case, the tendons on the back of the hand are named – which aids practitioners, who often do not recall what these tendons are called or how to examine them. This critical information is required when managing a laceration in this area or attempting to avoid failing to diagnose a partial or complete tendon laceration.

Real-time decision support, available to physicians when they are examining patients, is required to provide the highest quality care possible. Optimally, the decision support system should be easily accessible, built into the workflow and smart enough to modify available resources based upon user input. This description highlights the need for complaint-specific content, without which the program cannot select the most relevant decision support tools.

4 EMR Decision Support Inside the User Interface

The screenshot displays an EMR interface with a sidebar on the left containing categories such as 'ONSET', 'DURATION', 'CONTEXT', 'LOCATION OF PAIN', 'RADIATES TO', 'MIGRATION OF PAIN', 'PAIN QUALITY', 'SYMPTOM SEVERITY', 'PROGRESSION', 'ASSOCIATED WITH', 'WORSENERD BY', and 'IMPROVED BY'. The main content area is titled '11.36 TSG RSQ Summary: Hand Exam' and includes a 'Hand Extensor Tendon Illustration' with labels for Extensor indicis, Extensor pollicis brevis, Extensor pollicis longus, Extensor carpi radialis longus, Extensor carpi radialis brevis, Extensor digitorum communis, and Extensor digitorum minimus. Below this is a 'Flexor Digitorum Superficialis Testing' diagram. To the right, there is an 'Extensor Carpi Ulnaris Testing' diagram showing 'Radial deviation force' and 'Tendon insertion' with instructions: 'Palpate tendon just past distal edge of ulna. Tendon inserts at the base of the 5th metatarsal, dorsum (back) of the hand. To test tendon function, ask the patient to ulnar deviate the wrist and palpate the tendon just past the distal edge of the ulna. Apply a radial deviation force with your finger on the tendon to test tendon strength.' Below that is an 'Extensor Carpi Radialis Longus & Brevis Testing' diagram with instructions: 'These tendons are on the dorsum (back) of the hand and palpable at the wrist. The longus inserts at the base of the 5th metatarsal, dorsum (back) of the hand. To test tendon function, ask the patient to ulnar deviate the wrist and palpate the tendon just past the distal edge of the ulna. Apply a radial deviation force with your finger on the tendon to test tendon strength.'

Evidence-Based Medicine and the EMR

There is general consensus among healthcare practitioners regarding the value of evidence-based medicine or best evidence. If, based on good evidence, a patient presenting with chest pain has a very low probability of a pulmonary embolism (PE), it would be inappropriate to order a CT scan and expose the patient to the dangers of unnecessary radiation. Alternatively, if an algorithm suggests that pulmonary embolism is likely or probable, it would be inappropriate not to order a chest CT scan.

However, it is important to note that “evidence-based medicine” is talked about more than it is actually practiced. The term refers to a subject area (e.g., the need for CT to rule out a PE in a chest pain patient) so well studied and a related test or algorithm so well evaluated that a positive or negative result clearly establishes the presence or absence of a disease or clinical entity. The process typically involves a major research organization evaluating dozens if not hundreds of clinical trials, finding a substantial number that are of high quality and performing a meta-analysis with as high a denominator as possible. Such publications will be recognized by national organizations that publish guidelines and indicate the strength of the supporting clinical trials by categorizing recommendations such as Level of Evidence A, B or C.

However, not many of these evidence based guidelines exist. More will appear over time, but many practitioners would be surprised at how rarely clinical decisions are supported by strong evidence-based algorithms. Notably, if such algorithms exist, they are invaluable. For example, if an adult with chest pain has a very low probability of PE, the patient avoids a CT and the physician can focus on another diagnosis. Or, if a child with head trauma scores all negatives on the Pediatric Emergency Care Applied Research Network (PECARN) Pediatric Head Injury/Trauma Algorithm, there is no need for a head CT and the physician and parents can thus be informed that the child is at low risk for traumatic brain injury. Additionally, in the event of an adverse outcome, following such

guidelines may provide some element of defense against malpractice allegations. If strong evidence is available, there should be complete clinical practice alignment around related guidelines.

Unfortunately, EHRs often lack good content, and typically do not provide guidance or provide easily accessible clinical decision support. Moreover, they do not weave evidence-based algorithms seamlessly into the mental workflow.

The PE algorithm offers a perfect example. The medical evidence supports the use of a tool such as the Modified Wells’ Criteria to gauge the risk of a PE, but an additional test or calculator called PERC is required to establish the very low probability of PE that permits the practitioner to withhold a CT scan.

As shown in Figure 5, there are seven elements or questions in the Modified Wells’ Score, none of which is typically remembered by the practitioner.

If the answer to all these questions is no, then the practitioner should apply PERC, which has eight additional questions (Figure 6). Few practitioners remember these without access to a reminder.

If a practitioner is considering PE in the differential, this evidence-based analysis, or a similar one, should be completed and documented. The practitioner’s documented medical decision-making should help to clarify that this national guideline-based analysis was performed and that a CT was or was not necessary based upon the result.

The problem is that this algorithmic process or level of clinical sophistication is not integrated into most current EHR systems. Implementation of this process would significantly improve the workflow and functionality of existing EHRs.

5 Seven Elements in the Modified Wells’ Score

Suspected DVT?	No	Yes
Heart rate greater than 100?	No	Yes
Alternative diagnosis less likely than PE?	No	Yes
Prior history of DVT or PE?	No	Yes
Immobilization or surgery in last 4 weeks?	No	Yes
Hemoptysis present?	No	Yes
Malignancy, within last 6 mos, or palliative?	No	Yes

6 Additional Questions Regarding the Pulmonary Embolism Rule-out Criteria (PERC) RULE

Age 50 or older?	No	Yes
Heart rate 100 bpm or greater?	No	Yes
Oxygen saturation less than 95% on RA?	No	Yes
Prior history of DVT or PE?	No	Yes
Recent trauma or surgery?	No	Yes
Exogenous estrogen use?	No	Yes
Hemoptysis present?	No	Yes
Unilateral leg swelling?	No	Yes

Because most EHR systems lack enhanced features, the physician's task becomes more complicated and time-consuming, and workflow suffers. For example, a careful look at the Modified Wells and PERC queries in Figure 7 reveals that 13 out of 15 items could be pre-answered by information already in patient demographics, history, physical exam and vital signs. Therefore, the practitioner's work on the front end should automatically populate five of seven items in Modified Wells and all eight items in the PERC calculator. By the time the practitioner gets to medical decision-making, it should be necessary only to click "Yes" or "No" on two questions that require practitioner judgment. At that point, the algorithm is complete, the level of supporting evidence is apparent and the risk analysis with its supporting literature is immediately available. With another click, the entire process is inserted into the medical record.

What would customarily take several minutes extracting resources from disparate sources, followed by multiple clicks and much scrolling and copying/pasting, can and should be accomplished in seconds with as few clicks or touches as possible. If the evidence is not presented in an easy-to-use format inside the physician's workflow, the practitioner is far less likely to appropriately think

through the process, populate the calculators, and apply and document the process. If the evidence is in an algorithmic format, the level of research guidance is clear, and the tools or calculators are prepopulated by a well-designed template, the entire process can be documented in a few clicks, touches or voice commands and the practitioner is far more likely to use it.

Evidence-based medicine or best evidence should be coordinated in an algorithmic manner and built into the EMR as part of the clinical workflow, whenever possible. In addition

- Queries should be automatically populated from the patient's past or current medical record.
- Medical decision-making support should be ready and waiting upon the practitioner's arrival.
- The output should make it clear to the practitioner what Level of Evidence has been reached and exactly what the evidence dictates for the patient.

When the EHR/EMR does the heavy lifting, it greatly facilitates clinical judgment and decision-making.

7 Medical Decision Making In The Clinical Workflow

HPI | P/E | Results | Vitals | Demographics

Medical Decision Making Note

Thoracic Aortic Dissection Note

There is no historical, physical exam, laboratory or imaging data that would suggest a need to consider or further evaluate the patient for thoracic aortic dissection at this time. I am no longer considering thoracic aortic dissection in the differential diagnosis for the following reasons:

- ✓ The analysis of risk factors that would predispose to dissection do not indicate a need to further pursue the diagnosis.
- ✓ The pain is not sudden or abrupt in onset.
- ✓ There has been no movement of pain from the chest to the back or to the abdomen, which would be consistent with a dissection process.
- ✓ There is no apparent aortic murmur.
- ✓ There is no gross radial pulse differential and/or no significant blood pressure differential between the right and left arms.
- ✓ The chest X-ray interpretation is not consistent with a dissection process.

Clicking on 'Apply' will generate a dynamic medical decision-making note within this chart listing supporting evidence of your consideration of a thoracic aortic dissection process. All items check-marked above have been documented in discrete data elements elsewhere in this chart (excludes free text entry).

PERC Rule

Age 50 or older?	No	Yes	Demographics show age 48 years old.
Heart rate 100 bpm or greater?	No	Yes	Maximum pulse on vital signs was 140.
Oxygen saturation less than 95% on RA?	No	Yes	
Prior history of DVT or PE?	No	Yes	No prior history of DVT or PE.
Recent trauma or surgery?	No	Yes	No recent surgery and/or trauma.
Exogenous estrogen use?	No	Yes	No history of estrogen/BCP usage.
Hemoptysis present?	No	Yes	No hemoptysis was present.
Unilateral leg swelling?	No	Yes	No unilateral leg swelling appreciated.

All eight criteria are met, thus the patient is PERC Negative. The rule may be used for risk stratification.

You may apply the results of this rule to the chart. ▶

Vital Sign Considerations

Vital signs are just that – vital. Abnormalities in vital signs or trends in vital signs must be apparent to the clinical team. In emergency medicine – and presumably in urgent and primary care as well – one of the common causes of failure-to-diagnose allegations is the failure to recognize or act upon abnormal vital signs. In an analysis performed by The Sullivan Group of 90,000 patients from more than 200 emergency departments, 16 percent of patients presented to the emergency department with an abnormal vital sign, and 10 percent of that group went home without a single repeat of the abnormality. This data represents a significant number of abnormal vital signs, with the probability of undiagnosed conditions and significant morbidity in that patient group.

How could this be? Everyone on the team is a dedicated health-care professional, and everyone wants the best for their patients. But the physician may not have a current awareness of the vital signs simply because of EHR design – i.e., they are not included in the visual and/or the abnormalities are not highlighted. The

physician tells the nurse to discharge, and the nurse either does not have vitals in the visual or has access to them but decides that it is okay to discharge the patient with an abnormal vital sign if the doctor says so.

The problem is easy to fix. The team simply should maintain a “constant current awareness” of the patient’s signs and condition, along with a “forced awareness” of potentially critical issues when the discharge decision is made, such as: **There is an abnormal vital sign.** Figures 8 and 9 demonstrate what might be in the patient’s EMR visual and how a forced awareness may appear at discharge.

There are too many other critical vital sign considerations to permit full discussion here. But one key EMR/EHR function that should be mentioned is increasing provider and staff awareness of vital sign trending.

8 Abnormal Vital Sign Highlights

The screenshot shows a 'VITAL SIGNS' panel with a dropdown arrow and a 'HISTORY...' button. The panel lists four vital signs, with the first two highlighted in yellow to indicate abnormality:

Date/Time	Vital Sign	Value	Unit
8/16 11:56a	Heart Rate	140	bpm
8/16 11:56a	Respirations	24	resp min
8/16 11:56a	Blood Pressure	160/90	mm Hg
8/16 11:56a	Oxygen Saturation	98	%

9 Abnormal Vital Sign Notification

The screenshot shows a 'DISPOSITION' interface with several buttons: Discharged (circled in red), Decision to Admit, Admitted, Eloped, LWBS, and AMA. A prominent red banner across the top of the interface reads: "Patient is being discharged with abnormal vital signs." Below this, there are sections for 'DISCHARGE NOTES', 'CRITICAL CARE' (with a 'MINUTES:' field and a close button), and 'IMPRESSIONS' (with an 'Add Impression' button and a 'From Differential' dropdown).

Given the complexities of patient care, it is sometimes difficult to recognize critical vital sign patterns and connect the diagnostic dots when vital signs are displayed in table format, as in Figure 10.

The data are those of a 70-year-old woman who presented with a cough and history of fever. Because the vital signs are normal or close to normal, this format fails to reflect a critical patient issue: the fact that her mean arterial pressure has been dropping over the two hours she has been in the emergency department. It is far easier to recognize the trend in Figure 11.

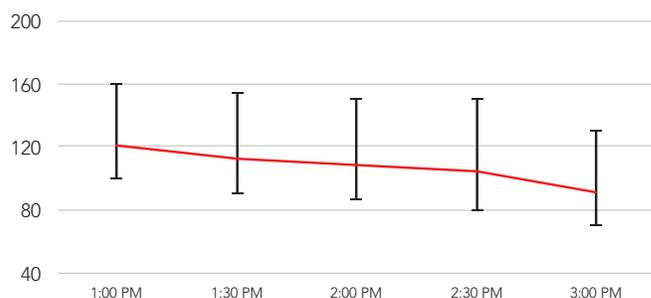
We are now in an electronic environment, which should be fully utilized. Let the program do the math and inform the practitioner that there is a 20, 25 or 30 percent drop in mean arterial pressure over time, or in pulse rate, pulse oximetry and respiratory rate. Let the EMR do the calculating and then deliver the message in a manner carefully designed to alert the clinical team.

The **EMR design** should create a constant **current awareness** of the state of the patient's **vital signs**.

10 Recognition of Critical Vital Sign Patterns

Time/VS	Pulse	Respirations	Systolic	Diastolic	Temperature	Mean Arterial Pressure
1:00 PM	98	14	160	100	98.6	120
1:30 PM	98	14	154	90	99	111
2:00 PM	102	18	150	86	98	107
2:30 PM	100	16	150	80	99	103
3:00 PM	104	18	130	70	100	90

11 Trending Mean Arterial Pressure



Conclusion

When the EMR was introduced, it was hoped that it would be a panacea for the pitfalls associated with the paper medical record. However, as this resource and others have demonstrated, EHR and EMR use poses certain risks and challenges that need to be addressed by healthcare industry leaders. This publication focuses on three major areas of concern and offers related risk mitigation strategies. As IT and case law evolve, new exposures will emerge, necessitating ongoing attention and a willingness to revisit and revise EMR-related policies and procedures.

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- Anthony D. Dwyer, Esquire, CNA Managing Trial Attorney Maryland and Virginia, June 29, 2017.
- Janelle Forget, RN, BSN, JD Senior Director Risk Management, June 16, 2017.
- Anupam Goel, MD MBA, Vice President Clinical Information, June 23, 2017.
- Andrew Jamison, JD, CNA Senior Litigation Attorney, June 28, 2017.
- Matthew Keris, Esquire, Marshall Dennehey Warner Coleman & Goggin, Attorneys at Law, June 13, 2017.
- Robert V. Kish, Esquire; Senior Litigation Attorney with Ohio Litigation Counsel of the CNA Insurance Companies, June 29, 2017.
- David J. McTaggart, Esquire Senior Litigation Counsel Law Offices of Brian J. Judis, the Austin/Dallas Litigation Counsel Offices of the CNA Insurance Companies, CNA, June 30, 2017.
- Michael J. Mascis, Esquire, CNA Senior Litigation Attorney, June 26, 2017.
- Karen Nathan, RN, JD, CNA Senior Litigation Attorney, June 16, 2017.
- Mary O'Grady, MSN RN, Vice President of Risk Management, June 23, 2017.
- Gregg Peugeot, JD, CNA Director and Managing Trial Attorney for Ohio, June 29, 2017.
- William B. Reisbick, Esquire, Former Facilitator of the Epic Legal Medical Record Hospital Network Group June 21 and June 30, 2017.
- Daniel J. Sullivan, MD, JD, FACEP, President and CEO, The Sullivan Group, January 3, February 16, and April 13, 2017.



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