Curevita Research
https://Curevita.org

Contents lists available at Curevita Journals
Frontiers of Health Innovation and Medical Advances
A Peer-Reviewed International Journal
journal homepage: www.curevitajournals.com

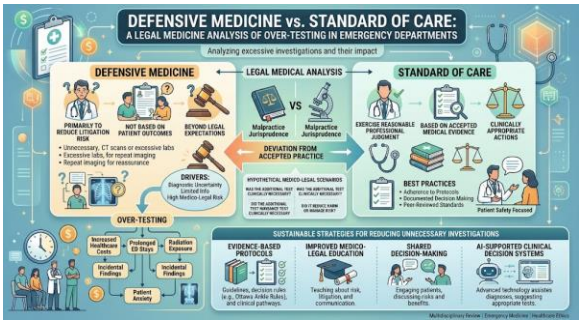
Defensive Medicine vs. Standard of Care: A Legal Medicine Analysis of Over-Testing in Emergency Departments

Uday Hiremani

Abstract

Emergency Departments (EDs) are high-risk environments characterized by diagnostic uncertainty, driving physicians toward defensive medicine—ordering unnecessary tests primarily to mitigate litigation risk rather than improve patient outcomes. This practice exceeds the legal standard of care, escalating healthcare costs, prolonging ED stays, and increasing patient anxiety and radiation exposure. This paper explores the boundary between defensive medicine and legal standards through a multidisciplinary lens of legal medicine, healthcare ethics, and malpractice jurisprudence. Presenting a conceptual framework and hypothetical scenarios, it proposes that evidence-based protocols, medico-legal education, shared decision-making, and AI decision support can effectively reduce over-testing while maintaining patient safety.

Infographic abstract



Keywords: Defensive medicine, Emergency department, Standard of care, Medical malpractice, Legal medicine, Over-testing, Clinical decision-making, Healthcare law.

Article info

Article history: Received 22 Jun, Revised 28 Jun, Accepted 6 July 2026. Published: Oct-2026

Corresponding Author: Dr. Uday Hiremani, PhD. Scholar, Department of Medicine, YOGA UNIVERSITY OF THE AMERICAS, Accredited to American Association of Drugless Practitioners (AADP - America), An American Religious University, 421, NW 156th Lane. Pembroke Pines. FL33028,USA. .**Email:** udayhiremani@gmail.com

Citation: Uday Hiremani,2026.Defensive Medicine vs. Standard of Care: A Legal Medicine Analysis of Over-Testing in Emergency Departments. Frontiers of Health Innovation and Medical Advances.2,3,1-24..

Publisher: Curevita Research Pvt Ltd.

Introduction

Emergency physicians face one of the highest medico-legal risks in healthcare. Patients frequently present with vague symptoms, incomplete histories, multiple comorbidities, and time-sensitive illnesses requiring immediate clinical decisions. Under these circumstances, physicians often order additional laboratory tests or imaging studies to avoid missing rare diagnoses.

Defensive medicine has become increasingly recognized as a contributor to healthcare inefficiency. Unlike evidence-based investigations, defensive testing is primarily motivated by perceived legal vulnerability rather than clinical necessity. Surveys consistently report that many emergency physicians acknowledge medicolegal concerns influence their ordering practices.

The emergency department (ED) operates at a highly volatile intersection of acute clinical uncertainty, rapid-fire decision-making, and severe diagnostic gravity. In this high-stakes environment, clinicians increasingly find themselves balancing the clinical needs of the patient against the legal vulnerabilities of their practice. This tension has catalyzed the global rise of defensive medicine—defined strictly as medical practices, diagnostics, or omissions primarily motivated by a desire to minimize the risk of malpractice litigation rather than to enhance patient care (Baungaard et al., 2022; Tawfik, 2024). While defensive medicine manifests in two distinct operational forms—negative defensive medicine (the avoidance of high-risk patients or procedures) and positive defensive medicine (assurance behaviors)—it is the positive form, particularly diagnostic over-testing, that has fundamentally reshaped emergency medical culture (Delice et al., 2019; Sekhar & Vyas, 2013).

From a legal medicine perspective, the proliferation of over-testing in the ED highlights a widening chasm between the subjective fears of the clinician and the objective, legal definitions of the "standard of care." Historically and legally, the standard of care does not demand diagnostic infallibility or exhaustive, low-yield testing; rather, it requires a physician to exercise the degree of skill, care, and diligence that a reasonably competent practitioner

would demonstrate under similar clinical circumstances. However, driven by a pervasive fear of legal liability, public scrutiny, and the professional fallout of a missed diagnosis, emergency and consulting physicians routinely deviate from established clinical guidelines to seek absolute diagnostic certainty (Baungaard et al., 2022; Delice et al., 2019). Survey data indicates that in lawsuit-prone specialties like emergency medicine, upwards of 93% of physicians report altering their clinical practice due to litigation fears, with defensive over-testing serving as the primary self-protective mechanism (Tawfik, 2024).

Paradoxically, while clinicians engage in positive defensive medicine to mitigate legal risk, the legal medicine reality suggests that over-testing may actually exacerbate physician liability (Mais, 2024). Every unindicated diagnostic measure exposes the patient to downstream medical risks—including false-positive results that necessitate secondary, highly invasive interventions, catastrophic diagnostic delays due to unnecessary specialist consultations, and cumulative radiation or contrast dye exposure (Delice et al., 2019; Mais, 2024). When an unindicated test triggers an avoidable adverse event, the clinician's defensive shield transforms into a legal vulnerability, as the initial deviation from standard clinical protocols fails to meet the legal criteria for justified medical necessity.

Furthermore, the systemic and economic consequences of defensive over-testing heavily burden the broader healthcare infrastructure. By occupying limited ED resources with non-urgent, low-yield testing, defensive practices compromise department throughput, increase patient length of stay, and actively contribute to emergency department crowding—a metric directly tied to heightened baseline morbidity and mortality (Delice et al., 2019). Financially, the practice drives billions in unnecessary expenditures, shifting resources away from high-value care and eroding the foundational trust of the physician-patient relationship (Sekhar & Vyas, 2013).

This analysis explores the legal and clinical boundaries separating defensive medicine from the standard

of care within emergency departments. By dissecting the medico-legal drivers of diagnostic inflation, the specific liabilities introduced by over-testing, and the structural friction it generates in acute care settings, this paper evaluates the critical need for tort reform, standardized clinical pathways, and a legal framework that recognizes and protects reasonable clinical judgment in the face of medical uncertainty.

Standard of Care in Legal Medicine

In legal medicine, the "standard of care" functions as the baseline metric for determining medical negligence. Unlike rigid statutory mandates, the standard of care is a contextual, evolving concept. Legally, it does not require clinical perfection or the absolute optimization of patient health; instead, it represents the level of care, skill, and treatment that a reasonably competent physician with similar training would provide under similar clinical circumstances.

To successfully establish a medical malpractice claim, an injured plaintiff must satisfy four strict elements of negligence: duty, breach of duty, causation, and damages (Bono, n.d.). Proving a breach of duty—the critical second element—is entirely dependent on showing that the treating clinician deviated from this established standard of care. This literature review synthesizes how the legal standard is constructed, proved, and bounded within the modern medicolegal ecosystem.

The Multifaceted Determination of the Standard

Because courts and lay juries inherently lack specialized medical expertise, the standard of care cannot be evaluated in a vacuum (Peters Jr, 2024). Instead, the legal system relies on a synthesis of empirical medical data, professional consensus, and situational contexts to determine what a "reasonable" practitioner would have done.

1. Clinical Practice Guidelines (CPGs) & Published Medical Evidence

With the rise of Evidence-Based Medicine (EBM), traditional "opinion-based" customary practice has increasingly faced judicial scrutiny . Literature notes a distinct shift toward objective, peer-reviewed baselines.

Under evidentiary doctrines like the *Learned Treatises Doctrine* and *Federal Rule of Evidence 702*, published medical literature and CPGs serve as critical substantive evidence in court (Mackey, 2011). These resources help anchor the legal framework to objective scientific data, validating or challenging clinical actions based on structural criteria rather than purely subjective opinions.

2. Expert Witness Testimony

Despite the expansion of objective guidelines, expert witness testimony remains the fundamental mechanism for establishing the standard of care in medical litigation (Bal, 2009). CPGs are rarely entirely inflexible or universally applicable. Thus, an expert witness—a peer with comparable credentials—is required to analyze the medical records after the fact and educate the court on how general guidelines translate to the specific scenario in question. However, the literature highlights a known limitation: chart reviews by opposing experts frequently suffer from poor inter-rater agreement and hindsight bias, highlighting the tension between fixed guidelines and a peer's clinical interpretation (Bal, 2009).

3. Professional Consensus & Local Resources

Historically, many jurisdictions adhered to a strict "locality rule," assessing a physician's performance solely against peers in the exact same geographic neighborhood . Modern medicolegal literature demonstrates that the locality rule has largely eroded in favor of a national standard, driven by national board certifications, standardized training, and instantaneous digital access to medical research . Where geographic boundaries still matter legally, they are framed around available *local healthcare resources*. A rural general practitioner with limited diagnostic equipment is not legally held to the same standard of immediate resource availability as an urban specialist operating in a tertiary trauma center, though both must practice with minimal sound competency .

4. Patient-Specific Circumstances

The standard of care is highly dynamic and reacts to individual patient variables. Clinical realities such as

advanced patient age, extreme emergency timelines, severe comorbidities, and atypical presentations shift the baseline of what is deemed reasonable (Dumitru, 2021). An intervention that is perfectly sound in an elective outpatient setting may be entirely contraindicated or altered in an emergency department crisis, and the legal standard adapts to mirror these high-risk parameters.

Legal Boundaries: The Myth of Exhaustive Diagnostics

A critical distinction emphasized across both legal and medical literature is that the legal standard of care **does not require every possible diagnostic test** or ideal medical practice. The standard of care is not optimal care. Rather, it is a continuum, with barely acceptable care at one end, and the ultimate in care at the other end. In terms of malpractice liability, physicians just need to make it onto the continuum, even if near the barely acceptable care end."

When a clinician undertakes a case, they provide an implied contract to render *minimally sound medical judgment*, not a guarantee of a perfect cure or an error-free diagnostic pathway . Medical errors or unexpected diagnostic deteriorations do not automatically equal legal negligence (Dumitru, 2021). If a physician exercises logical, prudent reasoning based on the presenting symptoms, ruling out top differential diagnoses, they fulfill their legal duty. When litigation or fear of liability drives physicians to excessively order unnecessary diagnostic tests or procedures simply to avoid a lawsuit, they cross into the domain of "defensive medicine". Medicolegal research consistently illustrates that defensive medicine is fundamentally inefficient, inflating healthcare costs and exposing patients to unnecessary procedural risks without actually raising the true legal standard of care .

Figure 1. Standard of Care Decision Model

Defensive Medicine

Defensive medicine is defined as a deviation from standard, evidence-based medical practice driven primarily by a practitioner's fear of medical malpractice litigation rather than the genuine clinical needs of the patient (Katz, 2019). While medical legal frameworks are originally designed to safeguard patient rights and enforce accountability, an escalating "blame culture" in global healthcare environments has shifted clinical decision-making from therapeutic optimization to legal risk management. This literature review evaluates the dual dimensions of defensive medicine, its systemic catalysts, and its financial and clinical consequences across healthcare systems.

Dual Dimensions: Assurance vs. Avoidance Behaviors

The academic literature broadly categorizes defensive medical practices into two distinct behavioral archetypes: positive (assurance) behavior and negative (avoidance) behavior (Baungaard et al., 2022).

1. Assurance (Positive) Defensive Medicine

Positive defensive medicine occurs when clinicians order supplementary, often unnecessary, interventions to construct an exhaustive legal paper trail. Literature demonstrates that this predominantly manifests as:

Ordering extraneous diagnostic imaging (e.g., MRIs, CT scans) and laboratory panels.

Initiating superfluous specialist consultations.

Unwarranted hospital admissions and hyper-detailed documentation.

The objective is to establish that the physician went "above and beyond" baseline standards, thereby neutralizing potential allegations of diagnostic negligence or omission (Katz, 2019).

2. Avoidance (Negative) Defensive Medicine

Conversely, negative defensive medicine involves passive risk-mitigation strategies where clinicians intentionally restrict care to insulate themselves from liability. This behavior manifests as avoiding or refusing high-risk patients, withdrawing from complex or experimental therapeutic protocols, and transferring potentially litigious individuals to tertiary care facilities. Studies highlight that high-liability specialties—such as obstetrics and gynecology, emergency medicine, neurosurgery, and orthopedic surgery—exhibit the highest rates of avoidance behaviors, which paradoxically disrupts equity and accessibility in critical patient care.

Systemic Drivers and Socio-Legal Catalysts

The primary driver of defensive practices is a profound distortion in how physicians perceive legal vulnerability. Literature indicates that a physician's anxiety regarding malpractice claims rarely correlates with the actual structural stringency

of their regional tort system (Katz, 2019). Instead, clinicians routinely overestimate their personal risk of being sued.

This anxiety is exacerbated by systemic organizational factors. In an exploration of organizational culture, researchers identify that a punitive "blame culture"—focused heavily on identifying and punishing individual human error while ignoring latent, systemic vulnerabilities—directly fosters a defensive climate. Furthermore, public perception and media sensationalism surrounding medical errors generate a mutual atmosphere of suspicion between patient and physician, transforming a collaborative therapeutic alliance into a defensive, adversarial relationship (Antoci et al., 2016). Recent global data also notes that unexpected variables, such as escalating workplace physical violence against healthcare staff, compound clinical anxieties and significantly increase defensive behavior scores (Arafa et al., 2023).

Table-5:Types of Defensive Medicine

Type	Description	Example
Positive Defensive Medicine	Additional testing or treatment	CT scan despite low clinical risk
Negative Defensive Medicine	Avoiding high-risk patients or procedures	Referring complex cases unnecessarily

Positive defensive medicine predominates in emergency departments.

Causes of Over-Testing in Emergency Departments

Over-testing and medical overutilization within Emergency Departments (ED) represent significant systemic challenges that

escalate healthcare expenditures, induce iatrogenic harms (e.g., radiation exposure, contrast-induced nephropathy), and degrade the patient experience. This review synthesizes current academic literature investigating the primary etiologies of unnecessary diagnostic ordering. The findings reveal a complex web of cultural, behavioral, operational, and institutional drivers. Dominant factors include defensive medicine driven by malpractice fears, intolerance of diagnostic uncertainty, acute operational time pressures, misaligned patient expectations, rigid institutional policies, and the ubiquitous availability of advanced imaging modalities. Addressing these compounded drivers requires multi-pronged, systemic interventions.

1. Fear of Malpractice Litigation & Defensive Medicine

The practice of "defensive medicine"—defined as ordering tests or treatments primarily to secure a legal defense rather than strictly benefit the patient—remains the most heavily cited driver of ED over-testing. Because emergency medicine physicians (EMPs) routinely evaluate acute conditions under high stakes, the psychological and financial threat of a missed low-probability diagnosis is pronounced. Survey data reveals that nearly 60% to 97% of emergency physicians openly admit to ordering advanced imaging studies (such as CT scans or MRIs) that they know are not clinically indicated, specifically to shield themselves from legal liability (Alalshaikh et al., 2022; Lam et al., 2020). This systemic risk aversion heavily lowers the clinical threshold for testing, shifting the diagnostic benchmark from "what is likely" to "what is legally defensible."

2. Intolerance of Diagnostic Uncertainty

Emergency departments operate as undifferentiated diagnostic environments. Patients present with overlapping, vague symptoms (e.g., chest pain, shortness of breath, acute abdominal discomfort) that can signify anything from benign conditions to catastrophic events (Yen, 2024). This structural ambiguity, compounded by a prevalent clinician culture that associates missing a diagnosis with incompetence, breeds a distinct intolerance for clinical risk. Instead of

applying empirical risk-stratification scores or relying on safe, structured observation, clinicians frequently resort to a "shotgun approach" (Lam et al., 2020). This entails ordering broad panels of blood work or extensive imaging matrices to forcefully eliminate diagnostic uncertainty, even when the pre-test probability of severe pathology is mathematically negligible.

3. Acute Time Pressures & Operational Throughput

Operational constraints within modern, overcrowded EDs paradoxically incentivize over-testing. Engaging in thorough clinical decision-making, discussing risks with patients, and practicing "watchful waiting" or clinical observation require substantial time—a resource severely restricted in high-volume emergency environments. Research shows that nearly half of emergency physicians attribute unnecessary testing directly to a lack of time for meaningful discussion (Alalshaikh et al., 2022). In a rapid-turnover setting, ordering an advanced diagnostic test or an expansive lab panel acts as an operational efficiency mechanism. It allows the physician to move on to the next patient while the diagnostic infrastructure processes the baseline workup, shifting cognitive burden to technology to maintain throughput metrics.

4. Patient Expectations & the Reassurance Gap

Misalignment between clinician perception and actual patient desires contributes significantly to medical overuse. Physicians frequently report that patient insistence and the clinical desire to "keep the patient happy" compel them to order unnecessary evaluations (Alalshaikh et al., 2022). However, literature indicates that emergency physicians regularly misjudge patient expectations (Newton, 2017). While clinicians assume patients require physical tests or imaging for reassurance, empirical evidence demonstrates that patients heavily prioritize clear communication, empathy, and an explanation of their symptoms. When structured Shared Decision Making (SDM) is implemented to transparently outline the risks of over-testing (such as incidentalomas or radiation), patients frequently opt for

less aggressive, conservative pathways (Newton, 2017).

5. Institutional Policies, Electronic Health Records, & Care Standardization

At an organizational level, institutional protocols and electronic workflows inadvertently institutionalize over-testing. Many hospitals implement rigid, symptom-based triage order sets (e.g., standardized "chest pain" or "abdominal pain" panels) that are initiated by nursing staff before a physician ever evaluates the patient. While designed to streamline care, these pre-calculated routines strip away clinical nuance. Furthermore, the architecture of modern Electronic Health Records (EHR) makes ordering repetitive, complex diagnostic panels exceedingly frictionless, blinding clinicians to cumulative costs or prior baseline results (Shaik et al., 2023).

6. Availability of Advanced Modalities & Financial Frameworks

The hyper-availability of advanced diagnostic technology creates a supply-induced demand cycle. When high-resolution CT angiographies or rapid laboratory assays are accessible 24/7 within the physical footprint of the ED, the physical barrier to utilization vanishes, fostering an over-reliance on technology over clinical exam skills (Tung et al., 2018). This technological density is historically tied to fee-for-service reimbursement models, where productivity and diagnostic volume directly correlate with departmental revenue. Even in salary-based settings, the institutional pressure to maximize utilization of costly infrastructure remains an implicit driver of test ordering.

7. Documentation Concerns & Handover Vulnerabilities

The fragmented nature of emergency care—characterized by constant shift handovers and transitions of care to inpatient units—amplifies documentation anxiety. Emergency physicians feel compelled to build an unassailable objective paper trail. Tests are often ordered to ensure that when a patient is handed off to an admitting team or discharged home, the chart contains definitive negative findings. Comprehensive, dense diagnostic testing serves as an objective clinical insurance policy,

substituting deep physical assessments with concrete, black-and-white data fields designed to withstand retrospective scrutiny during shift transfers or potential future peer reviews.

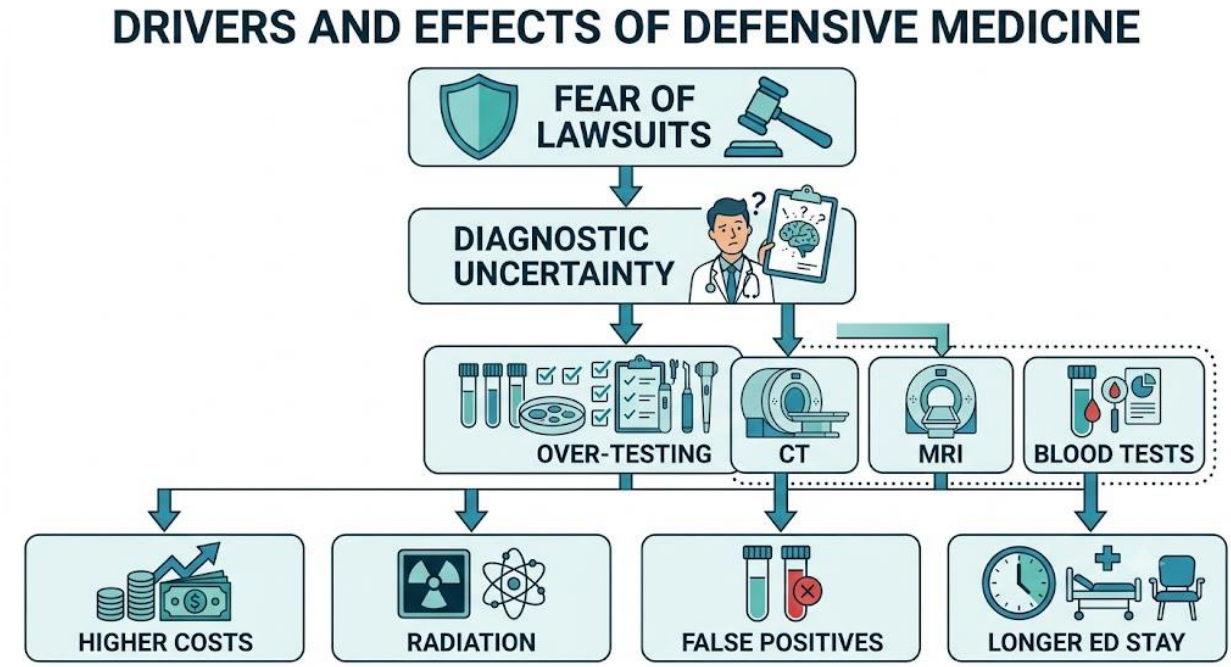


Figure 2. Drivers of Defensive Medicine

Legal Perspective

Defensive medicine—the practice of ordering tests, procedures, or consultations primarily to secure a legal shield rather than optimize patient outcomes—is deeply embedded in contemporary healthcare culture (Katz, 2019; Nahed et al., 2012). While clinicians frequently assume that "more is safer" from a liability standpoint, legal scholarship and medical literature demonstrate a stark mismatch between clinical perceptions of risk

and actual legal standard requirements (Black, 2007).

1. The Legal Concept of "Reasonableness" vs. Exhaustive Testing

The foundational premise of medical malpractice law does not require clinicians to be flawless or to exhaust every conceivable diagnostic pathway. Rather, the legal system evaluates whether a physician acted **reasonably** under similar circumstances—defined traditionally as exercising the degree of care, skill, and intelligence ordinarily possessed by competent practitioners in the same specialty (Black, 2007).

Recent shifts in legal scholarship, such as revisions by the American Law Institute, have further solidified that the standard of care is increasingly focused on a patient-centered concept of "reasonable medical care" and evidence-based practice guidelines, rather than blind adherence to hyper-defensive customary practices (Aaron et al., 2025). The law expects clinical competence and logical diagnostic reasoning, not exhaustive, low-yield testing that lacks clear clinical utility.

2. The Medicolegal Risks of Overtesting and Incidental Findings

Far from providing absolute protection, overtesting can actively expose clinicians to new vectors of malpractice liability. Literature identifying the drivers and outcomes of medical overuse highlights a "cascade of harms" triggered by unnecessary diagnostics, including false positives, misdiagnoses, and psychological distress (Lam et al., 2020).

A major legal vulnerability introduced by overtesting is the detection of **incidentalomas**—abnormalities discovered on imaging or lab work completely unrelated to the primary indication for testing (Morgan et al., 2019).

The Incidental Findings Trap: Systematic data demonstrates that incidental findings are staggeringly common, appearing in roughly 22% of brain MRIs and up to 38% of CT colonographies (Morgan et al., 2019).

From a tort perspective, once a defensive test reveals an incidental finding, the physician inherits a fresh

legal duty to accurately interpret, disclose, and follow up on that finding (Evans, 2013). If a clinician orders an unnecessary scan "just to be safe," overlooks a minor nodule mentioned in the radiologist's report, and that nodule later metastasizes, the physician can be held liable for a failure to diagnose—a liability that would never have existed had the unjustified baseline test omitted (Evans, 2013). Furthermore, unnecessary invasive procedures driven by overtesting carry inherent physical risks, and any subsequent procedural injury can form the basis of a negligence suit (Black, 2007).

3. Distortion of the Standard of Care

Legal and ethical scholars express growing concern over how defensive medicine improperly distorts the practical standard of care. Because the legal definition of medical malpractice relies heavily on what a community of peers customarily does, widespread defensive overtesting risks creating a feedback loop where baseline, evidence-supported practice is displaced by anxiety-driven medical overutilization (Black, 2007).

When a critical mass of practitioners routinely orders non-indicated diagnostic suites out of legal fear, that unscientific behavior threatens to become the "new normal" or customary practice (Black, 2007). This improperly elevates the standard of care beyond what the law or medical science actually requires, punishing high-value, conservative clinicians who practice evidence-based medicine.

Table 4: Consequences of Over-Testing

Domain	Impact
Patient Safety	Radiation exposure
Clinical	Incidentalomas
Financial	Increased healthcare costs
Operational	ED overcrowding
Ethical	Low-value care
Psychological	Increased patient anxiety

Examples

Chest Pain

Low-risk patients frequently receive the following: ECG, Troponin, Repeat troponins, Chest CT, Stress testing, Recent research suggests medicolegal concerns contribute to unnecessary high-sensitivity troponin testing in non-cardiac presentations.

Minor Head Injury

Guidelines such as validated clinical decision rules recommend selective CT imaging.

However, many physicians still order CT scans for reassurance.

Low Back Pain

Despite absence of neurological deficits, MRI may be ordered solely to exclude litigation risk.

Beneficence

Supports clinically justified investigations.

Non-maleficence

Excessive testing may: expose patients to radiation, generate false positives, lead to unnecessary invasive procedures.

Justice

Resources devoted to unnecessary testing reduce availability for higher-value care.

Autonomy

Shared decision-making can reduce unnecessary investigations while respecting patient preferences.

Emergency Department Case Analysis

Case 1

A 28-year-old presents with reproducible chest wall pain.

Evidence suggests low risk.

Physician orders:

ECG, Troponin ×3, CT angiography

Outcome:

Negative investigations.

Analysis

Testing exceeds guideline-supported management and reflects positive defensive medicine rather than evidence-based care.

Case 2

A 75-year-old presents with sudden neurological deficit.

Immediate CT brain ordered.

Outcome:

Acute ischemic stroke diagnosed.

Analysis

Testing meets accepted standard of care.

Table 2. Estimated Effects of Defensive Testing

Variable	Standard Care	Defensive Practice
Average Laboratory Tests	5	10
CT Utilization	Moderate	High
ED Length of Stay	3 hours	6 hours
Cost per Patient	Moderate	High
Radiation Exposure	Low	High

Malpractice reforms alone have shown limited reductions in imaging use and emergency department resource intensity, indicating that defensive behavior is influenced by more than liability rules alone.

11. AI and Clinical Decision Support

The modern healthcare landscape is characterized by an exponential growth of medical data, presenting both an opportunity and a cognitive burden for healthcare professionals. Clinical Decision Support Systems (CDSS) have transitioned from rigid, rule-based software into dynamic, artificial intelligence (AI)-driven systems powered by machine learning (ML), natural language processing (NLP), and deep learning architectures (Hasan, 2025). A primary objective of contemporary AI-CDSS implementation is the reduction of unnecessary diagnostic testing, over-hospitalization, and resource misallocation, which inflate healthcare costs and expose patients to potential harms (Daly, 2026).

This literature review synthesizes current research on how AI optimizes clinical workflows and restricts diagnostic redundancy through six core capabilities, while reinforcing the foundational principle that these technologies must augment—rather than supplant—human clinical judgment.

Technical Mechanisms for Reducing Unnecessary Testing

1. Risk Prediction

Advanced predictive AI-CDSS tools continuously analyze multi-parametric data from Electronic Health Records (EHRs)—including longitudinal vitals, laboratory trends, and demographic profiles—to calculate real-time patient risk trajectories. In acute care settings, such as cardiovascular intensive care units, these models anticipate adverse events like sepsis or hemodynamic collapse before clinical symptoms fully manifest (Moazemi et al., 2023). By identifying low-risk cohorts with high statistical specificity, AI-CDSS permits clinicians to safely omit routine, defensive, or repetitive diagnostic workups, narrowing the focus to patients demonstrating genuine physiological divergence.

2. Guideline Integration

Traditional clinical practice guidelines are frequently underutilized due to their static format and the cognitive effort required to apply complex, multi-tiered criteria during a brief patient encounter. Modern AI-CDSS dynamically integrates evidence-based guidelines directly into the clinician's digital workflow (Hasan,

2025). By cross-referencing patient-specific data against massive medical databases, the system generates targeted alerts only when a requested test violates established criteria (e.g., advising against an immediate CT scan for low-risk mild traumatic brain injury). This real-time filtering directly curtails defensive medicine and curbs reflexive, low-value ordering.

3. Probability Estimation

Determining the pre-test probability of a disease is fundamental to sound diagnostic reasoning. AI models excel at evaluating complex, non-linear relationships across heterogeneous datasets to calculate highly precise diagnostic and prognostic probabilities (Daly, 2026). When an AI-CDSS establishes an exceptionally low post-test or pre-test probability for a specific condition, it provides the quantitative validation necessary for a clinician to confidently adopt a "watchful waiting" approach, avoiding a cascade of unnecessary, invasive, or expensive diagnostic procedures.

4. Documentation Assistance and Diagnostic Checklists

Administrative burnout and rushed documentation are major drivers of diagnostic errors and subsequent over-testing. Ambient clinical intelligence and NLP-driven documentation assistance streamline data entry, extracting unstructured text from clinical narratives to automatically populate structured fields. Concurrently, AI-driven diagnostic checklists act as cognitive forcing functions at the point of care. By organizing diagnostic pathways and verifying that mandatory clinical pre-requisites are met before an order can be finalized, these combined administrative and diagnostic tools eliminate duplicate testing born out of fragmented documentation or missing historical lab results.

The Augmentation Paradigm and Implementation Barriers

Despite high technical validation and strong specificity in controlled environments, a critical gap persists between algorithmic performance and real-world clinical utility (Waldock et al., 2026). Current literature emphasizes that AI tools must be viewed strictly as assistive

mechanisms engineered to **augment, not replace, clinical judgment**.

Several systemic challenges prevent the unfettered deployment of these systems:

The "Black Box" Problem: The opacity of deep learning architectures creates significant interpretability and trust barriers for healthcare workers (Salimparsa, 2025). Without Explainable AI (XAI) frameworks that clarify *why* a certain risk score or recommendation was generated, clinicians are prone to either outright rejection of the system or over-reliance on it (automation bias).

Algorithmic Bias and Population Shifts: AI models are susceptible to dataset shift and population bias. If an algorithm is trained on a highly specific demographic, its predictive performance frequently degrades when deployed in different healthcare centers, potentially leading to inaccurate risk estimations and inappropriate testing recommendations (Oei, 2025).

Workflow Friction: Improperly designed alerts cause severe alert fatigue. For an AI-CDSS to successfully reduce unnecessary testing, its recommendations must align with human-centered design principles and seamlessly integrate into existing clinical routines without introducing cognitive friction (Daly, 2026).

Conclusion

Defensive medicine remains a significant driver of unnecessary diagnostic testing in emergency departments. While intended to reduce perceived legal exposure, excessive investigations often exceed the legal standard of care and may introduce new clinical, ethical, and economic harms. The legal benchmark remains the conduct of a reasonably competent physician acting on current evidence—not exhaustive testing. Strengthening evidence-based practice, clinician education, high-quality documentation, shared decision-making, and thoughtfully implemented AI decision support can help align emergency care with both patient safety and legal expectations.

References

Raposo VL. *Defensive Medicine and the Imposition of a More Demanding Standard of Care*. Journal of Legal Medicine. 2019.

Ries N, Jansen J. *Physicians' Views and Experiences of Defensive Medicine*. Health Policy. 2021.

Melnick ER, et al. *The Effect of Malpractice Reform on Emergency Department Care*. New England Journal of Medicine. 2015.

Delice O, et al. *Defensive Medicine in Hospital Emergency Services*. Eurasian Journal of Emergency Medicine.

Kachalia A, Mello MM. *Defensive Medicine—Legally Necessary but Ethically Wrong?* JAMA Internal Medicine. 2013.

Saks MJ, Landsman S. *The Paradoxes of Defensive Medicine*. Health Matrix. 2020.

Recent emergency department research on high-sensitivity cardiac troponin testing and medicolegal pressure.

Riotta S, Bruccoleri M. *Defensive Behavior in Healthcare: The Role of Organizational Factors and Perceived Litigation Risk*. Operations Management Research. 2026.

Baungaard, N., Skovvang, P. L., Assing Hvidt, E., Gerbild, H., Kirstine Andersen, M., & Lykkegaard, J. (2022). How defensive medicine is defined in European medical literature: a systematic review. *BMJ Open*, *12*(12), e057169. https://doi.org/10.1136/bmjopen-2021-057169 Cited by: 88

Delice, O., Tekin, E., & Yılmaz, S. (2019). Defensive medicine in the emergency department: A cross-sectional study from the perspective of emergency medical specialists. *Eurasian Journal of Emergency Medicine*, *18*(4), 178-184. https://doi.org/10.4274/eajem.galenos.2019.49404 Cited by: 12

Mais, A. (2024). Is defensive medicine increasing or decreasing risk of lawsuits. *Health Law Outlook*, *14*(1), 1-27. https://doi.org/10.60095/kxao7512

Sekhar, M. S., & Vyas, N. (2013). Defensive medicine: A bane to healthcare. *Annals of Medical and Health Sciences Research*, *3*(2), 295–

299. https://doi.org/10.4103/2141-9248.113688 Cited by: 209

Tawfik, A. M. (2024). Comparison of accusations against physicians and the practice of defensive medicine between surgical and non-surgical specialties. *PLOS One*, *19*(12), e0343807. https://doi.org/10.1371/journal.pone.0343807

Bal, S. B. (2009). The expert witness in medical malpractice litigation. *Clinical Orthopaedics & Related Research*, *467*(2), 383-391. https://doi.org/10.1007/s11999-008-0634-4 Cited by: 52

Dumitru, L. P. (2021). Error or negligence in medicine: A literature review. *Romanian Journal of Oral Rehabilitation*, *13*(2). Cited by: 1

Mackey, T. K. (2011). The role of practice guidelines in medical malpractice litigation. *AMA Journal of Ethics*, *13*(1), 36-41. Cited by: 63

Peters Jr, P. G. (2024). Modernizing the medical malpractice standard of care. *Southwestern Law Review*, *53*(3).

Antoci, A., Fiori Maccioni, A., & Russu, P. (2016). The ecology of defensive medicine and malpractice litigation. *PLOS ONE*, *11*(3), e0150523. https://doi.org/10.1371/journal.pone.0150523 Cited by: 51

Arafa, A., Negida, A., Elsheikh, M., Emadeldin, M., Hegazi, H., & Senosy, S. (2023). Defensive medicine practices as a result of malpractice claims and workplace physical violence: a cross-sectional study from Egypt. *Scientific Reports*, *13*(1). https://doi.org/10.1038/s41598-023-47720-6 Cited by: 27

Baungaard, N., Skovvang, P. L., Assing Hvidt, E., Gerbild, H., Kirstine Andersen, M., & Lykkegaard, J. (2022). How defensive medicine is defined in European medical literature: a systematic review. *BMJ Open*, *12*(1), e057169. https://doi.org/10.1136/bmjopen-2021-057169 Cited by: 88

Katz, E. (2019). Defensive medicine: A case and review of its status and possible solutions. *Clinical Practice and Cases in Emergency Medicine*, *3*(4), 329–332. https://doi.org/10.5811/cpcem.2019.9.43975 Cited by: 59

Pischedda, G., Marinò, L., & Corsi, K. (2023). Defensive medicine through the lens of the managerial perspective: a literature review. *BMC Health Services Research*, *23*(1). https://doi.org/10.1186/s12913-023-10089-3

Alalshaikh, A., Alyahya, B., Almohawes, M., Alnowiser, M., Ghandour, M., Alyousef, M., Abuguyan, F., Almehlisi, A., Altuwaijri, F., & Alageel, M. (2022). Emergency Medicine Physicians' Views on Providing Unnecessary Management in the Emergency Department. *Open Access Emergency Medicine*, *14*, 183–193. https://doi.org/10.2147/oaem.s341709 Cited by: 11

Lam, J. H., Pickles, K., Stanaway, F., & Bell, K. J. (2020). Why clinicians overtest: development of a thematic framework. *Research Square*. https://doi.org/10.21203/rs.3.rs-43690/v2 Cited by: 107

Newton, E. H. (2017). Addressing overuse in emergency medicine: evidence of a role for greater patient engagement. *Clinical and Experimental Emergency Medicine*, *4*(4), 189–200. https://doi.org/10.15441/ceem.17.233 Cited by: 45

Shaik, T., Mahmood, R., Kanagala, S. G., Kaur, H., Mendpara, V., Gupta, V., Aggarwal, P., Anamika, F., Garg, N., & Jain, R. (2023). Lab testing overload: a comprehensive analysis of overutilization in hospital-based settings. *Baylor University Medical Center Proceedings*, *37*(2), 312–316. https://doi.org/10.1080/08998280.2023.2288788 Cited by: 35

Tung, M., Sharma, R., Hinson, M., Nothelle, S., Pannikottu, J., & Segal, J. B. (2018). Factors associated with imaging overuse in the emergency department: A systematic review. *The American Journal of Emergency Medicine*, *36*(2), 301–309. https://doi.org/10.1016/j.ajem.2017.10.049 Cited by: 102

Yen, C. (2024). Toward Safer Diagnoses: A SEIPS-Based Narrative Review of Diagnostic Errors. *Diagnostics*, *16*(2), 347.

Aaron, D. G., Robertson, C. T., King, L. P., & Sage, W. M. (2025). A new legal standard for medical malpractice. *JAMA*.

https://doi.org/10.1001/jama.2025.0097

Black, L. (2007). Effects of malpractice law on the practice of medicine. *AMA Journal of Ethics*, *9*(6).

Evans, B. J. (2013). Minimizing liability risks under the ACMG recommendations for reporting incidental findings in clinical exome and genome sequencing. *Genetics in Medicine*, *15*(12), 915–920. https://doi.org/10.1038/gim.2013.135 Cited by: 35

Katz, E. (2019). Defensive medicine: A case and review of its status and possible solutions. *Clinical Practice and Cases in Emergency Medicine*, *3*(4), 329–332. https://doi.org/10.5811/cpcem.2019.9.43975 Cited by: 59

Lam, J. H., Pickles, K., Stanaway, F., & Bell, K. J. (2020). Why clinicians overtest: development of a thematic framework. *Research Square Platform LLC*. https://doi.org/10.21203/rs.3.rs-43690/v2 Cited by: 107

Morgan, D. J., Dhruva, S. S., Coon, E. R., Wright, S. M., & Korenstein, D. (2019). 2019 update on medical overuse. *JAMA Internal Medicine*, *179*(11), 1568. https://doi.org/10.1001/jamainternmed.2019.3842 Cited by: 63

Nahed, B. V., Babu, M. A., Smith, T. R., & Heary, R. F. (2012). Malpractice liability and defensive medicine: A national survey of neurosurgeons. *PLoS ONE*, *7*(6), e39237. https://doi.org/10.1371/journal.pone.0039237