Diagnostic Error in Medicine: What We Know Now

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Azizi is Manager of the Risk Management and Patient Safety Department at LAMMICO, a medical professional liability insurance organization. He oversees continuing medical education programs, risk management prevention and intervention programs, and hospital and facility risk management programs. Azizi is also the Vice President of Operations for Medical Interactive Community (MI), a wholly-owned subsidiary of LAMMICO. MI provides medical professional liability risk management products and services to a national audience.

Azizi has over 15 years of hospital experience with emphasis in risk management and performance improvement. At Lafayette General Medical Center (LGMC) in Lafayette, La., he served as a phlebotomy educator/preceptor in the Pathology Lab Department followed by Assistant Director and Service Line Manager for the following departments: ER, Critical Care Units, Cardiology, Cardiac Cath, Pulmonary and Wound Care & Hyperbaric. Azizi was responsible for overseeing operations, education, Quality Improvement, Joint Commission preparation for hospital accreditation, and new business ventures for the service line. At LGMC, he managed seven managers and 390 employees.

Azizi served as Director of Risk Management and Performance Improvement at Tulane Medical Center. His responsibilities included system wide Risk Management, Claim, Medical Staff Peer Review, Safety, Joint Commission preparation and accreditation. Azizi was responsible for purchasing the book of insurance, totaling $3.5 million in premium annually for HPL, CGL, P&C, D&O, Crime and Fleet Auto.
Description
Diagnostic error is the primary cause of malpractice claims for most specialties but until very recently, it flew under the patient safety radar. The Institute of Medicine (IOM) recently released a report on the issue, and a coalition of numerous medical societies has taken up the task of identifying what can be done within their own specialties to improve diagnosis. This lecture will review what is known now about diagnostic error, and will present improvement strategies physicians can use in their own practice, including technological aids.

Intended Audience
Physicians of all specialties. Other interested healthcare practitioners are also welcome to attend.

Objectives
Upon successful completion of this activity, participants should be able to:
1) Identify the role of cognitive bias, systems/communication failures, and patient factors in diagnostic error.
2) Describe the roles of system and cognitive factors in diagnostic error.
3) Explain the role of the patient and the medical team in reducing diagnostic error.
4) Describe the roles of differential diagnosis and debasing strategies in improving diagnosis.

Disclosure
Dr. Rhea and planning committee members have no relevant financial relationships to disclose.

Risk Management Credit
LAMMICO insureds may earn one (1) Risk Management Premium Discount Credit.

Not Legal Advice
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1. Please place your signature next to your name on the sign-in roster. The only verification LAMMICO will accept for attendance is your signature placed at the time of attendance on the sign-in roster or a completed yellow information sheet at the time of attendance (See #2).

2. If your name does not appear on the sign-in sheet, fill out a separate yellow information sheet and give it to the LAMMICO rep at the sign-in table.

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If you have any questions, please call LAMMICO’s Risk Management Department,
(504) 841-5211 or (800) 452-2120,
The New Diagnosis

- 25 y/o female receives ED care
- Symptoms of abdominal pain, vaginal bleeding, and amenorrhea for 6 weeks.
- Serum human chorionic gonadotropin (HCG) level elevated
- Pelvic ultrasound read by radiology chief resident and OB attending MD as empty uterus
- Dx possible ectopic pregnancy
- Patient advised and treated with methotrexate
- Following AM attending radiologist amends report....to “normal intrauterine pregnancy”

Missed Vessel

- 45 y/o white male with chest pain
- Testing showed cardiac vessel blockage
- CABG completed with double bypass
- Two months later with continued Sx, further studies by second MD showed wrong artery had been bypassed
- Additional surgery completed
- No physician discussion with patient
- Malpractice litigation for $7.5 million....settled
4. Diagnostic Error

5. Media & Wrong Diagnosis

- Washington Post
- September 22, 2015
- "Most Americans will get a wrong or late diagnosis at least once in their lives"
  - 2015 Report issued by the Institute of Medicine
  - Third study by the IOM
  - "...sometimes with terrible consequences..."
  - "...such errors affect at least 12 million adults each year..."
  - "...about 5 percent of adults who seek outpatient care."

6. Diagnostic Error

- "missed, delayed, or wrong diagnosis... based on a retrospective review of the case, and knowing the true diagnosis from some definitive source."
  - Missed: No diagnosis ever made
  - Delayed: A correct diagnosis made, but not in a timely manner. Difficult to define specific time
  - Wrong: A diagnosis made, but not the correct diagnosis

- IOM: "the failure to (a) establish an accurate and timely explanation of the patient’s health problem(s) or (b) communicate that explanation to the patient." [2015]

- Literature shows some 25 “error” definitions requiring careful use of term
Fearing Diagnostic Error

- Survey of 2,201 adults
- Outpatient medical care
- Greatest concern
- Not simply medical error
- Medical problem of misdiagnosis or diagnostic error

Reason for Concern

- "Diagnostic Error is the new frontier in medicine and the top cause of medical malpractice claims"
- Diagnostic error in malpractice claims
  - Double those of medication errors
  - 2nd of top 4 misadventures
    - Improper performance of procedure
    - Diagnostic error
    - Failure to supervise or monitor case
    - Medication errors
- Study conclusion
  - "...diagnostic errors appear to be the most common, most costly and most dangerous of medical mistakes"

Historic Lack of Attention to Dx Error

- IOM Study in 1999
- Types of errors mentioned

2 Diagnostic Errors
70 Medication Errors
Less Attention to Error & More Diseases

- Agency for Healthcare Research & Quality (AHRQ)
  - 20 Evidence based patient safety indicators
- National Quality Forum
  - 30 Safe Practices
- None measured the “failure to diagnosis”
- Of 93 different patient safety projects one on “misdiagnosis”
- International Classification of Diseases (ICD)
  - 12,000+ diseases
- National Library of Medicine (NLM)
  - 8,000 diagnoses MESH (medical subject headings system) adding 200+/year

Case

- 60 y/o male
- Routine ophthalmic exam
- No complaints
- Normal exam with mild retinal arteriosclerosis and refractive error
- Sx of transient vision loss 1-2 sec over 1-3 months
- Amaurosis fugax
- Ultrasound evaluation completed
- Carotid blockage 95% bilateral!

Poor Disease Recognition & High Cost

- Outpatient death and disability
  - Transient or mild symptoms with missed diagnosis
  - Stroke
- Unrecognized and unreported
- Study cerebrovascular events
  - 9% of all events missed initially
  - Increase estimate 5 X with 5x mild or transient
- 5% of autopsies “reveal lethal diagnostic errors for which a correct diagnosis coupled with treatment could have averted death.”
- Diagnostic errors “...represent an enormous unmeasured source of preventable mortality, morbidity, and costs.”
Diagnostic Error & Harm

- Multiple retrospective studies of cases based on a known true diagnosis from some source
- Indicate estimate incidence of 1 in 10
- Caution of too wide use of “diagnostic error”
- 2015 IOM definition vs working definition of error that leads to patient harm
- Some definitions do not account for whether or not patient is harmed
- Important element for malpractice claims
- Similar retrospective studies
- Indicate estimate incidence of only 1 in 1000

Reference:
1. Diagnostic Error in the Practice of Medicine. AHRQ

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Diagnostic Error & Harm

- Primary objective is the reduction of harm
- Not all medical errors or medical diagnostic errors result in harm, and
- Not all harm is the result of medical errors or medical diagnostic errors
- Adverse events can occur whether or not medical or diagnostic “error” existed
- The bad combination:
  - Error resulting in adverse event and patient harm

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Diagnostic Error and Harm

- Possible combinations
- Estimated “one in every 1000” diagnoses “result in harm”
Diagnostic Errors are Common?

- In autopsy major diagnostic errors are found in 10 – 20% of cases
- Up to 30% of breast cancer is missed on mammograms
- Breast biopsies miss 2% or more of cancer
- Median delay in correct diagnosis of asthma 3 years
- Fatal diagnosis delay in 33% of aortic dissections
- In ambulatory settings diagnosis missed in 13% of patients with common conditions, e.g. COPD, rheumatoid arthritis

Serious Consideration of Diagnostic Errors?

- Clear connection “One in every 1000” with harm
- Less likely to recognize harm in practice due to low harm percentage
- AJM Study 2008 little recall of errors
- Groups of MDs questioned about diagnostic errors
- Less than 1% recalled having made any such error!
- Study conclusion: “The concept that they, personally, could err at a significant rate is inconceivable to most physicians”
- Survey of clinicians found known diagnostic errors once or twice per month

How Rare?

- Prevalent physician feeling that diagnostic error is rare
- Though concern for patient care problems and malpractice claims
- Gap in perception of “near perfect” practice and “1 in 10” statistic
- Causes of perception
  - Opinion most diagnostic errors are caught or don’t matter
  - Many diagnostic errors not reported to the MD
    - Reluctance of patients
    - Reluctance of peer MDs to discuss
    - Trend of fewer autopsies
  - Opinion substantial harm rare from diagnostic error
    - Aggregate harm high and low for individual
Diagnostic Error Characteristics

- Diagnosis: "...quite possibly the most difficult cognitive challenge in medicine."
- Historically underappreciated
- Diagnostic problems frequently complex
- Errors frequently hard to detect & measure
- More frequent than recognized
- Originate from different sources
- Not always under control of MD
- Not recognized as a significant problem by some MDs
- Frequently not reported back to physicians

The Complicating Variables

- Patient Variables
  - Stage of disease
  - How it manifests
  - How perceived and described
- System Problems
  - Disjointed uncoordinated care
  - Access to care & production pressure
  - Communication problems
- Physician Variables
  - Knowledge & experience
  - Access to data, tests, consults
  - Stress, distractions, "time to think"

Error in the Process?

- The Diagnostic Process
  - All the "...steps involved in deriving and confirming the diagnosis..."
  - Breakdown "...in one or more steps of the diagnostic process..."
    - History
    - Physical Exam
    - Hypotheses
    - Synthesis
    - Tests
    - Consults, Follow Up
Example

- 64 year old male chronic smoker
- Symptoms of upper respiratory problems
- Cough and fever
- Examined with Rx oral antibiotics
- Fever resolves and cough persists
- Chest X-ray shows consolidation area lower lobe, hilar adenopathy...suggestive of malignancy
- Report sent to ordering MD who has moved to another city
- No review until 3 months later by a new MD

Example

- Delayed diagnosis
- Could and should have been detected earlier
- Original physician was responsible for missing follow up
- System for relaying critical test results ineffective and failed
- No instruction to patient on getting test results
- No adequate process to prevent errors
- Multiple areas of failure

A Sources Classification

- One Classification
- No fault errors
  - Masked or unusual disease presentation
- System related errors
  - Technical failure & equipment problems
  - Organizations flaws
- Physician cognitive errors
  - Faulty knowledge
  - Faulty data gathering
  - Faulty synthesis
- Combination of system and cognitive errors
The System Factors

System Factors

- Two of every three cases of diagnostic error have one or more system contributing factors

The Perfect System?

- Intent of all medical systems to be designed without flaws
- Intent to design a process that will reduce errors and also patient harm
- All system-related problems in diagnostic errors are preventable
- Large numbers of system elements involved
- "...all systems have subtle but inevitable design flaws..."
- Combination "virtually guarantees" that there will be problems
Patient Related Issues

- **Access** to medical care
  - First requirement for successful diagnosis
  - Most "common reason for missed or delayed diagnosis..."
    - Lack of transportation
    - Underserved areas
    - Overcrowded clinics or Eds
    - Financial/Insurance problems
    - Night or weekend access
  - Establish and maintain the MD/patient relationship
  - Establishing trust
  - Communication
    - A leading factor contributing to medical malpractice cases

Source: See: Diagnosis—How Far Have We Come? System Related Factors

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Patient Related Issues

- **Critical communication**
  - Estimate that history alone allows diagnosis 80 – 90%
  - Poor communication decreases diagnostic reliability
  - Increases diagnostic error
  - The "18 second Rule"
    - "That's the average time it takes for a doctor to interrupt you as you're describing your symptoms... by that point, your doctor has in mind what the answer is, and he or she is probably right about 80 percent of the time—not bad, but not good enough" - Maynard Cochrane, MD

Source: See: Diagnosis—How Far Have We Come? System Related Factors

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Critical Communication

- Communication and coordination of care problems
  - Top of the list in medical adverse events and diagnostic error
- Communication with other healthcare providers
  - Relates to the progression of diagnosis over time
  - Patient evaluations in multiple areas
  - Single breakdown may lead to diagnostic error
  - Greater number of involved providers and areas the greater possibility of breakdown and error
  - Greater possibility of resultant adverse event

Source: See: Diagnosis—How Far Have We Come? System Related Factors
Patient Related Issues

- Patient Handoffs
  - Opportunity for pick up of diagnostic errors
  - Frequently incomplete, inadequate, or absent
- Documentation Failures
  - Key area related to medical malpractice defense
  - Diagnostic errors relate to record information unavailable, unreadable, or incomplete
  - EHR altering the medical environment with some areas of improvement and new problem areas
    - Failure of electronic recognition
    - Software complexity
    - Overall increase of MD time required with less patient time

Time & Communication

- Time for diagnosis
  - Increased number of patients
  - Demand by system
  - Demand by necessity for shorter exam time
  - Some believe single most important cause of error
- Consult and referral
  - Failures of communication to staff
  - Failures of communication to other providers
  - No communication
  - Inadequate communication

  “The great enemy of communication is the illusion of it.”
  - William L. Wyke

Diagnostic Testing Issues

- Decline of failures in analytical areas of testing
  - 80% errors in testing phase
    - Ordering wrong test or series
    - Delay in reading / interpreting results
    - Delay in acting on results
  - Failed notification/document 7%+
  - “Test related problems” found in range of 50% - 80% of diagnostic errors
Top System Related Failures

- Policies and procedures [33%]
  - Failure to account for error prone conditions
  - Inefficient procedures
- Teamwork & communications [27%]
  - No or poor sharing of needed information
- Patient neglect [23%]
  - Necessary care not provided e.g. information, availability
- Coordination of care [18%]
  - Failed provider interactions & handoff problems

The Conclusion

- System related problems found in large numbers of diagnostic errors
- Inadequate communications and coordination of care
- Most common system factors in diagnostic error
- High reliance on accurate and timely diagnostic testing
- Large areas under control of the physician
- Systems for safer sign outs
  - Tool from EMP3F (Emergency Medicine Patient Safety Foundation)
- Medication error prevention in discharge & transition
  - Tool from AHRQ (Agency for Healthcare Quality)

The Cognitive Factors
The Cause of Death

• Physicians in IC unit
• Estimate confidence about cause of death
• Rated by
  • Complete certainty
  • Minor Uncertainty
  • Major Uncertainty

Fatal potentially treatable errors

The Confidence Trap

• Multiple studies
  • Tendency for physicians to be overconfident.
• Initially very confident
• Little high quality feedback
• Fewer autopsies
• Providers reluctant to tell other providers of errors
• Patients experiencing errors go to other providers
• Consistent studies
  • Physicians unable to predict with accuracy which of their diagnoses were right or wrong
• Studies in other fields: over rating one’s own decision making

Overcoming Overconfidence

• Given near constant uncertainty of medical diagnosis
• Do the recommended “reflection” on “what else”
• Diagnostic “time out”
• Construct a differential diagnosis
  • Increased diagnostic error when no differential Dx
• Involve relevant people in diagnostic process, e.g. the patient and family
  • Encourage and make possible feed back, i.e. Sx changes
  • Office and patients receiving test results
• Don’t rely on intuition...
The Cognitive Problems

- Cognitive problems involved in some 75% of medical diagnostic errors
  - Multiple types along or in combination with system problems
- The Process
  - Collecting of all the facts ["data gathering"]
  - Applying knowledge [synthesis]
  - Diagnosis
- Knowledge and skills are minor factors
  - Most conditions common
  - Estimate 100 conditions account for 95% of diagnoses in a practice year

Three major areas of cognitive problems in Dx Error

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>83%</td>
<td>Synthesis of Material</td>
</tr>
<tr>
<td>14%</td>
<td>Data Gathering</td>
</tr>
<tr>
<td>3%</td>
<td>Skills</td>
</tr>
</tbody>
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Failure of “Data Gathering”

- CASE: Evaluation of patient post auto accident with miss of subdural hematoma
- Reflects less than adequate collection of information
  - Poor history
  - No physical examination, e.g. reliance on other information
  - No use of other provider information
  - Over reliance on other provider information
  - Inadequate examination & missing key findings
  - Problems in ordering diagnostic tests
  - Failing to review test results
  - Inappropriate evaluation of test results
  - Less than the whole story
Synthesis & Dual Thinking Process

- Most common cause of diagnostic error [study 83%]
  - Generating "the diagnostic possibilities to consider"
- The Role of "Recognition"
  - Situation is recognized
    - Diagnosis is immediately apparent
    - Intuitive
    - Subconscious
  - Automatic process
  - Known as "Type 1" or "System 1" thinking
  - Characterizes "expert level problem solving"

Source: M. Diagnostic Error Part Two: Gare Decker/Sand

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Synthesis & the Dual Thinking Process

- Situation is not recognized
  - Diagnosis is not immediately apparent
  - Conscious thought process
  - Deliberate thought process
  - Requires full attention
  - Known as "Type 2" or "System 2" thinking
  - Characterizes lesser levels of experience
- Initially difficult, time consuming, and error prone
- Repetition of Type 2 increases speed with time
- In time becomes more "automatic"

Source: M. Diagnostic Error Part Two: Gare Decker/Sand

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The Comparison

- SYSTEM 1 thinking vs SYSTEM 2 thinking
  - Intuitive & Instantaneous vs Deductive, rational
  - Fast thinking vs Slow thinking
  - Jump over intermediate steps vs Methodical, step by step
  - Increases with age/experience vs Predominant in trainees
  - ART of medicine vs SCIENCE of medicine
- Experts typically use System 1 thinking
- System 1 widely used in everyday activities
- Trust in familiar activities
- Leads to confidence in accuracy of decisions
- Easily transferred to medical care.....trusting intuition

Source: M. Diagnostic Error Part Two: Gare Decker/Sand
**Evolution of Thinking**

- Beginning as a novice diagnostician
- Almost exclusive use of System 2
- Over time progression toward System 1
- Increasing experience and building the “knowledgebase”
  - Situation provides a clue
  - Leading to use of stored information
  - Leading to an answer
- “Intuition is nothing more and nothing less than recognition”

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**Experience Progression to Less Errors**

- More Time & Effort
- Mix & Match
- System 1 Intuitive
- Less Time & Effort

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**Failures in System 2 Thinking**

- Neither System 1 nor System 2 thinking are free from error
- Failures in System 2 methodical thinking in following “rules” of diagnostic process
  - Missed key part of history
  - Inept physical exam
  - Failure to review medical record of available data
  - Lacking skills in decision making
  - Failing to consider possibility of false + or – testing
- Failure of System 2 to do oversight of System 1 and a bad reliance on trust of diagnostic intuition.
- Most diagnostic errors are related to bias in System 1 thinking
Failures in System 1 Thinking

- System 1 thinking subject to a number of problems
- Together or in combination contribute to diagnostic error
- Primary problem
  - Inappropriate reliance on shortcuts or “heuristic bias”
  - Mental shortcuts at a subconscious level
- Major types of problem bias leading to error
  - “Framing” errors
  - Premature closure
  - Affective bias
  - Confirmation bias and “anchoring”
  - Availability bias

Types of Bias

- “Framing” bias
  - Accepting a diagnosis as represented by another provider or source
  - A patient is referred with a stated problem of decompensated heart failure
  - Diagnosis accepted without consideration of other etiology of SOB and edema
- Premature Closure
  - An early conclusion of diagnosis with no further consideration.
  - Auto accident with diagnosis of musculoskeletal pain and later diagnosis of ruptured spleen
  - Failure to look for evidence to the contrary

Types of Bias

- Availability bias
  - The diagnosis immediately comes to mind
  - Judging something to be more likely if it is thought of quickly
  - An available thought by recent experience
    - Patient with vomiting and fever has flu because many patients have been seen with similar sx
- Affective bias
  - Both negative and positive affective
  - Positive with treatment of friends and less likely to order invasive testing or necessary testing
  - Negative affect by unpleasant patients and less objective diagnosis consideration
Debiasing Strategy

- Debiasing efforts to counter cognitive bias
  - Obtain your own complete history
  - Perform a “purposeful” and “focused” exam
  - Generate some initial hypotheses
  - Differentiate with questioning, additional exam, and testing
  - Pause for “diagnostic time out”
    - Was I comprehensive?
    - Considered the inherent flaws in System 1 thinking?
    - Judgment affected by bias?
    - What are the “don’t miss entities”?
    - What else could this be?
- Begin a plan acknowledging uncertainty
- Assure follow up

Summary

- IOM Report emphasized and continued true
  - “...most medical errors occur as the result of failures of complex medical systems and not individual negligence or incompetence.”
  - Poor training and skills not primary reason for diagnostic errors
- Most diagnostic errors are related to system and cognitive problems with cognitive being the greater
- Every diagnosis is derived by a combination of subconscious intuitive thinking [System 1] and deliberative consideration thinking [Type 2]
- Most cognitive problems are related to failures in System 1 cognition assisted by failures in System 2 thinking

Suggestions for Error Reduction

- Understand the types of thinking that are taking place in every situation
- Remember the difficulty of confidence in accuracy and natural tendency toward over confidence
- Create a differential diagnosis to avoid narrow focus and bias
- Consider “diagnostic time out”
- Consider alternate explanations
- Knowing the potential problems use tools and methods to prevent System 1 areas of bias, e.g., debiasing strategies

Note: H. Diagnostic Error: The Fear, AAMC
Note: "Is diagnosis error an appropriate label for an expression performance problem?"
Suggestion for Error Reduction

- “Establish a work system and culture that supports the diagnostic process and improvements in diagnostic performance.”
- Non-punitive and value feedback
- Engage patients and family in the diagnostic process
  - Environment that allow input
  - Instruction assistance
  - Patient checklist
  - “Empower patients to be proactive”
  - JC Speak Up Program

Suggestion for Error Reduction

- Utilize diagnostic health information technology (HIT)
- “…decision support tools have become available in recent years, offering greater than 90% sensitivity in suggesting the correct diagnosis.”
- Software examples: (alphabetical listing)
  - DxPlain® http://dxtplan.org/dxplan_faq.html
  - Isabel http://www.isabelhealthcare.com/home/default
  - Up-to-Date® http://www.uptodate.com/home
  - VisualDx http://www.visualdx.com/

IOM Recommendation Goals 2015

- One: Facilitate effective teamwork in the Dx process
- Two: Enhance health care professional education & training in the Dx process
- Three: Ensure that health information technologies support patients & health care professionals in Dx process
- Four: Develop approaches to ID, learn from, and Dx errors
- Five: Establish a work system and culture that supports the Dx process
- Six: Develop a reporting environment / liability system that facilitates improved Dx
- Seven: Develop payment & care delivery supporting Dx
- Eight: Funding for research on the Dx process

Greater Involvement

- The IOM Committee and 2015 report on Dx Error was initiated at the behest of the Society to Improve Diagnosis in Medicine (SIDM)
- SIDM has organized and leads a new coalition of medical societies and organizations to launch initiatives within their organizations on Dx error.
- Participating medical organizations
  - [http://www.improveddiagnosis.org/?page=CID](http://www.improveddiagnosis.org/?page=CID)
  - Contact: info@improveddiagnosis.org
- Medical Interactive has created Diagnosis University
  (Subsidiary of LAMMICO)

MI Diagnosis University (DXU)

- Largest collection of online diagnostic titles that currently exists
Following are alphabetic references, some of which are not specifically cited in the lecture slides, providing additional useful guidance on material related to this presentation.

Note: Web links can change over time. If link no longer works, web-search the article by title.


Dr. Rhea received his engineering degree from GM Institute of Technology in Flint, Michigan, his Bachelor of Arts degree from Westminster College in Fulton, Missouri, and his Doctorate in Medicine degree from Vanderbilt University School of Medicine in Nashville, Tennessee. He completed surgical internship at Indiana University Medical Center and residencies in neurosurgery, ophthalmology, and associated neuropathology research. He served in the United States Navy.

In private practice, Dr. Rhea was Director of Medicine and Surgery at Texas Medical Care, Deputy and Medical Consultant to Harris County Sheriffs Department in Houston, and Director of Clinical Ophthalmology for South Texas Eye Physicians.

Dr. Rhea has lectured and developed education programs in clinical medicine, medical management, project management, and healthcare risk management. His organization affiliations have included the American Medical Association, American Academy of Ophthalmology, American College of Eye Surgeons, American Society of Ophthalmic Administrators, American College of Legal Medicine, American Academy of Medical Ethics, and the American Society for Healthcare Risk Management. He has been a member of the Medical Advisory Committee and the Committee for Telemedicine of the Physician Insurers Association of America (PIAA). He has written and lectured on federal privacy regulations (HIPAA) and is a member of the ASTME-31 Committees for Healthcare Informatics and Homeland Security.

Dr. Rhea is currently a LAMMICO Physician Consultant and has served on the LAMMICO Claims, Underwriting, and Risk Management Committees. He founded and built the Continuing Medical Education program at LAMMICO.