


A routine admission for pancreatitis: Strategies to reduce diagnostic errors

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Overview

- Case presentation
 - Diagnostic errors
 - Misdiagnosis related harm
 - Causes of diagnostic errors
 - Strategies to reduce diagnostic error
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Presentation

90 y/o woman presents with epigastric pain and a lipase of 8000. Called up from the emergency room as a routine admission for pancreatitis


History

- Epigastric and LUQ pain starting the AM of admission, progressively worsening
- Nonbloody, nonbilious emesis
- Recent PCP visit with adjustment of clonidine and addition of amlodipine for uncontrolled hypertension
- Difficult to obtain: poor historian and hard of hearing

History

- Past Medical History
 - DM -2
 - CKD – Stage III
 - HTN
 - Recurrent UTIs
 - Hyperlipidemia
 - GERD
 - Reactive Airways Disease

Medications

- Pioglitazone
 - Amlodipine
 - Clonidine
 - HCTZ
 - Atorvastatin
 - Esomperazole
 - Ranitidine
 - Calcium with Vitamin D
 - Albuterol
- 

History

- Initial ROS – unable to obtain
- Social History – no illicits, tobacco, etoh.
Lives with son.
- Cor Status – Unable to confirm with patient. Son over the phone full code

Physical exam

➤ Vitals

- T- 35.9 P -93 RR -16 BP -195/54 O2– RA 99%

➤ Exam

- Well appearing
- Mild tenderness to palpation over her epigastrium and LUQ. No rebound or guarding.

Objective Data

- CBC
 - chronic normocytic anemia
- Chemistry panel
 - Creatinine 2.9mg/dL (baseline)
- Liver function tests
 - Normal
- Lactate
 - 1.9

Objective Data

- Abdominal X ray – 3 way
 - Normal bowel gas pattern
 - No free air
 - No cardiomegaly, infiltrates or effusions
- EKG
 - NSR, RBBB (unchanged from prior)

Differential Diagnosis

- Abdominal Pain with Nausea/Vomiting
 - Likely pancreatitis but could be perforated viscus
 - Etiology of Pancreatitis
 - Drugs – HCTZ
 - Pancreatic Mass
 - Gallbladder disease
 - Plan
 - IVF, pain control
 - Order U/S
 - Pancreas -not well visualized
 - Gallbladder- well distended without stones
 - Normal gallbladder wall thickness measures 2 mm.
 - No sonographic Murphy's sign.
 - No biliary ductal dilation

Overnight events

Patient became progressively tachycardiac to the 120s – 130s

Intervention:

- Recheck EKG – unchanged except for rate
- IVF bolus with Normal Saline

AM Rounds

- Additional EKG ordered
- Patient re interviewed
 - Asked to point to her pain – points to her LUQ
- Stat troponin ordered: returns 30 minutes later at 5.63 ng/mL

AM Rounds

- Cardiology and Critical Care Team contacted
 - Transferred to the ICU
 - Becomes hypotensive to the 80s, and HR begin to fall
 - PEA arrest – resuscitated with atropine and epinephrine
 - PEA arrest – two more times, family arrives and patient made comfort care

WHAT WENT WRONG?



Diagnostic errors vs. harm

➤ Diagnostic errors

- Diagnosis that is missed, wrong, or delayed – detected by subsequent testing

➤ Not all misdiagnosis result in harm

➤ Misdiagnosis related harm

- Preventable harm that results from delay or failure to treat the condition actually present
- Preventable harm from treatment of the condition not actually present


Diagnostic Errors

- 5% of autopsies reveal lethal diagnostic errors
- Harvard Medical Practice Study
 - adverse events more likely to be diagnostic than drug related (14% vs. 9%)
- Diagnostic errors
 - higher morbidity than other types of medical errors
 - Up to 80,000 annual hospital deaths/year

Diagnostic errors

- Too ERR is Human: Patient Safety
 - Medication errors - 70 times
 - Diagnostic errors – 2 times
- Specialties at greatest risk for diagnostic errors are family medicine, internal medicine, and emergency medicine

Top Missed Diagnoses

- Metastatic Cancer
 - Fractures
 - Pulmonary Embolism
 - Acute Coronary Syndrome
 - Appendicitis
- 

Causes of Diagnostic Errors

➤ No Fault

- Masked or unusual presentation of a disease
- Patient related error (pt is uncooperative, altered, or deceptive)

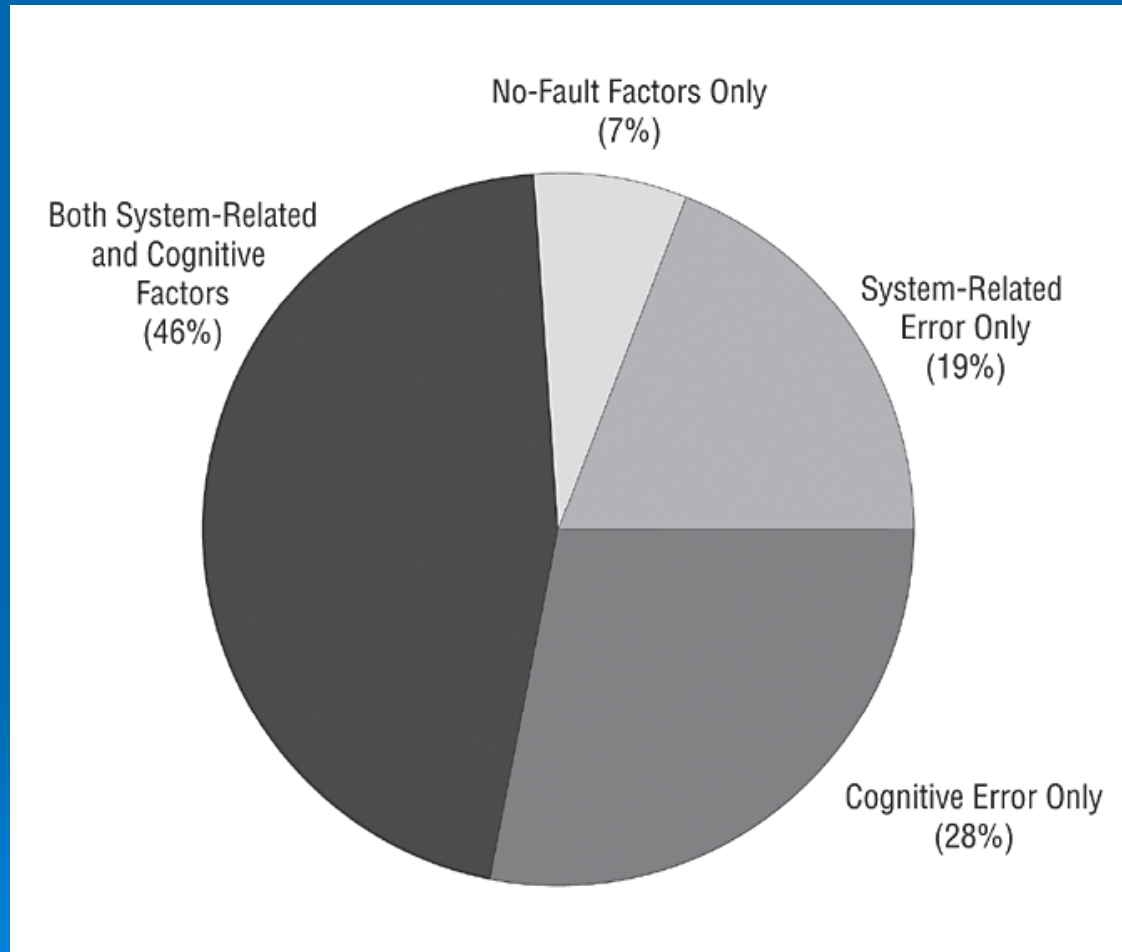
➤ Systems Errors

- Technical Failures
- Institutional Failures

➤ Cognitive

- Lack of knowledge
- Faulty data gathering: incomplete history or exam
- Cognitive: Heuristics and Bias

Causes of Diagnostic Errors



Heuristics

- Mental short cuts: experience-based techniques for problem solving
 - Rule of thumb, common sense
- Generate a solution as rapidly as possible
- Example
 - Occam's razor
 - Advises us to chose a single disease process to explain a patient's presentation

Heuristics

➤ Representative Heuristics

- Using mental matching to diagnose conditions with characteristic presentation that can predispose physicians to a lack of differential diagnosis

➤ Availability Heuristics

- Tendency to accept a diagnosis due to ease in recalling a past similar event rather than on statistical prevalence

Cognitive Bias

➤ Anchoring

- Staying with the original diagnosis despite evidence to the contrary

➤ Premature Closure

- Narrowing the choice of possibilities too early in the diagnostic process

➤ Confirmation Bias

- Tendency to only seek out data to confirm one's original diagnosis rather than alternative diagnoses

Cognitive Bias

- Playing the odds
 - Tendency in an ambiguous presentation to opt for a benign diagnoses on the basis that it is more likely than a serious one
- Ascertainment Bias
 - Physician thinking is shaped by prior experience (stereotyping)
- Overconfidence Bias
 - Universal tendency to believe we know more than we actually do

Physician Overconfidence

- Compared residents & faculty
 - Correct diagnoses
 - Faculty – 50%
 - Residents – 44%
 - Faulty confidence
 - 41% residents
 - 36% faculty

Cognitive Debiasing Training

- Develop insight/awareness
- Simulation
- Cognitive forcing strategies: Metacognition
- Accountability
- Feedback



System Errors

- Diagnostic errors are often seen as individual physician failures
- Focus has been on cognition debiasing training instead of development of system based approaches
- Institute of Medicine
 - Most powerful way to reduce error is to focus on a system level improvement

System Errors

Table 1. System-Related Contributions to Diagnostic Error

| No. of Encounters | Type | Definition | Example |
|---------------------------------|--|---|---|
| Technical (n = 13) | | | |
| 13 | Technical failure and equipment problems | Test instruments are faulty, miscalibrated, or unavailable | Wrong glucose reading on incorrectly calibrated glucometer |
| Organizational (n = 215) | | | |
| 35 | Clustering | Repeating instances of the same error type | Repeated instances of incorrect readings of x-ray studies in the emergency department, by covering physicians; radiologists not available; administration aware |
| 33 | Policy and procedures | Policies that fail to account for certain conditions or that actively create error-prone situations | Recurrent colon cancer missed: no policy to ensure regular follow-up of patients after colon cancer surgery |
| 32 | Inefficient processes | Standardized processes resulting in unnecessary delay; absence of expedited pathways | 9-Month delay in diagnosis of colon cancer, reflecting additive delays in scheduling clinic visits, procedures, and surgery |
| 27 | Teamwork or communications | Failure to share needed information or skills | Alarming increase in PSA levels never effectively communicated to a provider who had changed clinic sites |
| 23 | Patient neglect | Failure to provide necessary care | Biopsy report of cancer never communicated to patient who missed a clinic appointment |
| 20 | Management | Failed oversight of system issues | Multiple x-ray studies not read in a timely manner; films repeatedly lost or misplaced |
| 18 | Coordination of care | Clumsy interactions between caregivers or sites of care; hand-off problems | Delayed workup of pulmonary nodule; consultation request lost and, when found, not acted on promptly |
| 8 | Supervision | Failed oversight of trainees | Delayed diagnosis of peritonitis; reinsertion of a percutaneous gastric feeding tube not appropriately supervised |
| 8 | Expertise unavailable | Required specialist not available in a timely manner | Radiologist not available to read a key film on a holiday evening |
| 7 | Training and orientation | Clinicians not made aware of correct processes, policy, or procedures | Delay in diagnosis of Wegener granulomatosis; staff not aware that ANCA testing required special approvals |
| 4 | Personnel | Clinician laziness, rude behavior, or known to have recurring problems with communication or teamwork | Clinician known to commonly skip elements of the physical examination missed detection of gangrenous toes |
| 0 | External interference | Interference with proper care by corporate or government institutions | None encountered |

Abbreviations: ANCA, antineutrophil cytoplasmic autoantibody; PSA, prostate-specific antigen.

Examples of Systems Errors

- Policy and Procedures
 - Recurrent colon cancer missed: no procedure to ensure regular follow up of colon cancer patients after surgery
- Management
 - X-rays lost or not read in a timely fashion
- Failures in communication
 - Cancer biopsy report never communicated to provider
- Failures in coordination of care
 - Inadequate information relayed during handoffs
- Inadequate Supervision
 - Inadequate oversight of procedures performed by trainees
- Expertise Unavailable
 - Required consultation with specialist not available in a timely manner

Systems Solutions

- Policy and procedures → develop routine procedures for follow up of abnormal test results
- Failures in coordination of care → standard protocol for verbal and written hand offs
- Failed communication and teamwork → culture of constructive intervention
- Inadequate supervision → instructional standards for attending supervision with an open door policy for residents

Aids to Decrease Reliance on Memory

- Acutely ill patients → “do not miss diagnosis” check lists and use of decision support systems
- Routine ambulatory patients → cancer screening checklists at well visits
- Patients with rare symptoms → streamline specialist consultation and use of internet or pubmed searches

Diagnostic Decision Support Systems

➤ Isabel Diagnosis Checklist System

- Designed to be used in a clinical setting at the point of care
- Input clinical features → a checklist of likely diagnoses and causative drugs.

➤ Isabel is not an 'expert system' or designed to be used in diagnostic dilemmas.

- Remind clinician of key diagnostic possibilities
- Useful for stressful, fast paced situations
- Decision making is left to the physician

ISABEL

enter clinical features **synonyms** **diagnoses**

age*

gender female male

pregnancy

Refine search:

travel history:

show me:

diagnoses

causative drugs

bioterrorist agents

Enter clinical features, no negatives, no numbers:

| |
|---------------------------|
| intermittent paresthesias |
| slurred speech |
| ataxia |
| nausea |
| daily headaches |
| photophobia |
| phonophobia |
| dizziness |
| loss of balance |
| vomiting |
| facial droop |
| visual hallucinations |

+ add a clinical feature

get checklist >

Most Relevant

sort by: most relevant **action:** -select-

show: 10 20 30 all

| | |
|--|-----------------------------|
| <input checked="" type="checkbox"/> Migraine | ? NEURO |
| Multiple Sclerosis | ? NEURO |
| Lyme Disease | ? INFEC |
| <input checked="" type="checkbox"/> Arterial Aneurysms / Dissection | ? VASC |
| <input type="checkbox"/> Non-Hodgkin's Lymphoma | <input type="radio"/> NEOPL |
| ↳ Intravascular Large B-Cell Lymphoma | |
| Why did this diagnosis come up ? | |
| We matched the terms: slurred speech ataxia ataxy photophobia dizziness cizzy dizzyness loss of balance intermttent facial droop | |
| Degree of match between query entered and Isabel database (Not clinical probability): 64% | |
| <input checked="" type="checkbox"/> Transient Ischemic Attack | ? NEURO |
| CVA / Stroke | ? NEURO |
| Arachnid Cysts | ? NEURO |
| <input checked="" type="checkbox"/> Intracranial Hypertension | ? NEURO |
| Acoustic Neuroma | ? EAR |



ISABEL

- Isabel reminded subjects to consider at least one clinically important diagnosis in 1 in 8 case episodes, and prompted them to order an important test in 1 in 10 case episodes.
- Median time for DSS consultation was 1 minute

ISABEL

- 594 patients evaluated in three emergency departments
 - 70% seen by junior physicians
 - 46% were admitted
- Final discharge diagnosis was listed as potential diagnosis in 95% of inpatients
- 90% of “must-not-miss” diagnoses were listed (as suggested by the expert panel)

ISABEL

- “More on Googling for a Diagnosis”
 - 50 sequential case records from NEJM
 - Manually entered key findings
 - 48/50 correct diagnoses were listed in the generated list of correct diagnoses (sensitivity of 96%)

No Fault Errors in the Case

➤ Patient factors

- Poor historian
- Hard of hearing
- No family members present

Cognitive Errors in the Case

- Overreliance on memory
- Representative Heuristics
- Cognitive Bias
 - Premature Closure
 - Overconfidence Bias
 - Ascertainment Bias
 - Playing the odds


5 Minute Clinical Consult

- Differential Diagnosis of Acute Pancreatitis
 - Penetrating or perforated peptic ulcer
 - Acute cholecystitis
 - Choledocholithiasis
 - Mesenteric vascular obstruction and/or infarction
 - Perforation of a viscus
 - Intestinal Obstruction
 - **Inferior wall myocardial infarction**

System Errors in the Case

- Hand offs
 - 4 care providers in 17 hours.
- Time pressure
 - Inadequate time for reflection
- Work load
 - Admitting physician: 9 admits in an 8 hour shift

Summary

- Diagnostic errors are an important facet of patient safety
 - Both cognitive errors and system errors need to be identified
 - Need more research on interventions to reduce diagnostic error
 - Diagnostic decision support systems may play a role in the future
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