Why doctors fail the diagnosis?

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European School of Internal Medicine in Riga 2015


My first medical error…

1. What is a diagnostic error?
2. How often diagnostic errors occur?
3. When errors occur?
4. Why doctors fail the diagnosis?
5. What can we do to prevent diagnostic errors?

1. What is a diagnostic error?

Conceptual Framework for the International Classification for Patient Safety (WHO 2009)

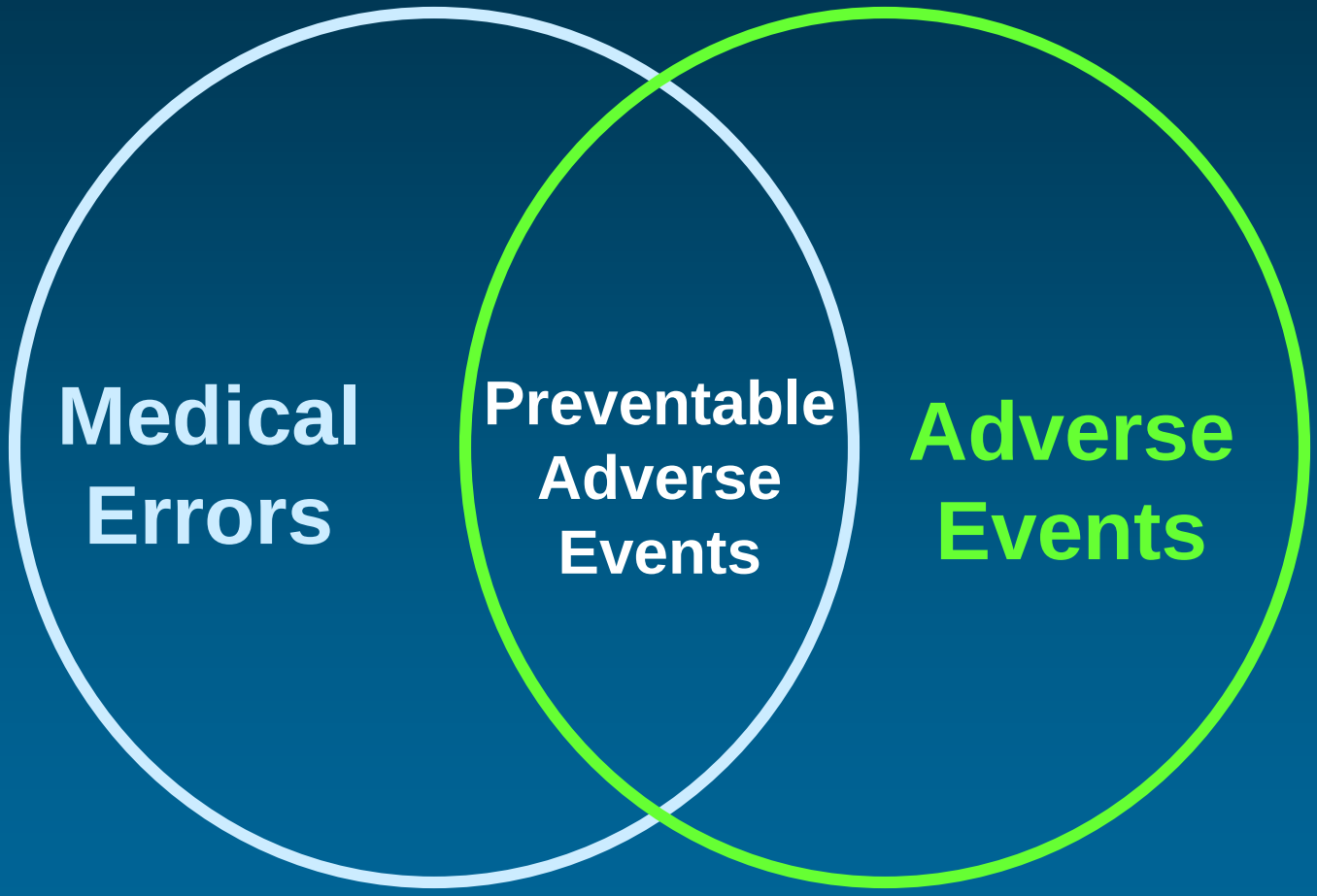
- An **error** is a failure to carry out a planned action as intended or application of an incorrect plan.

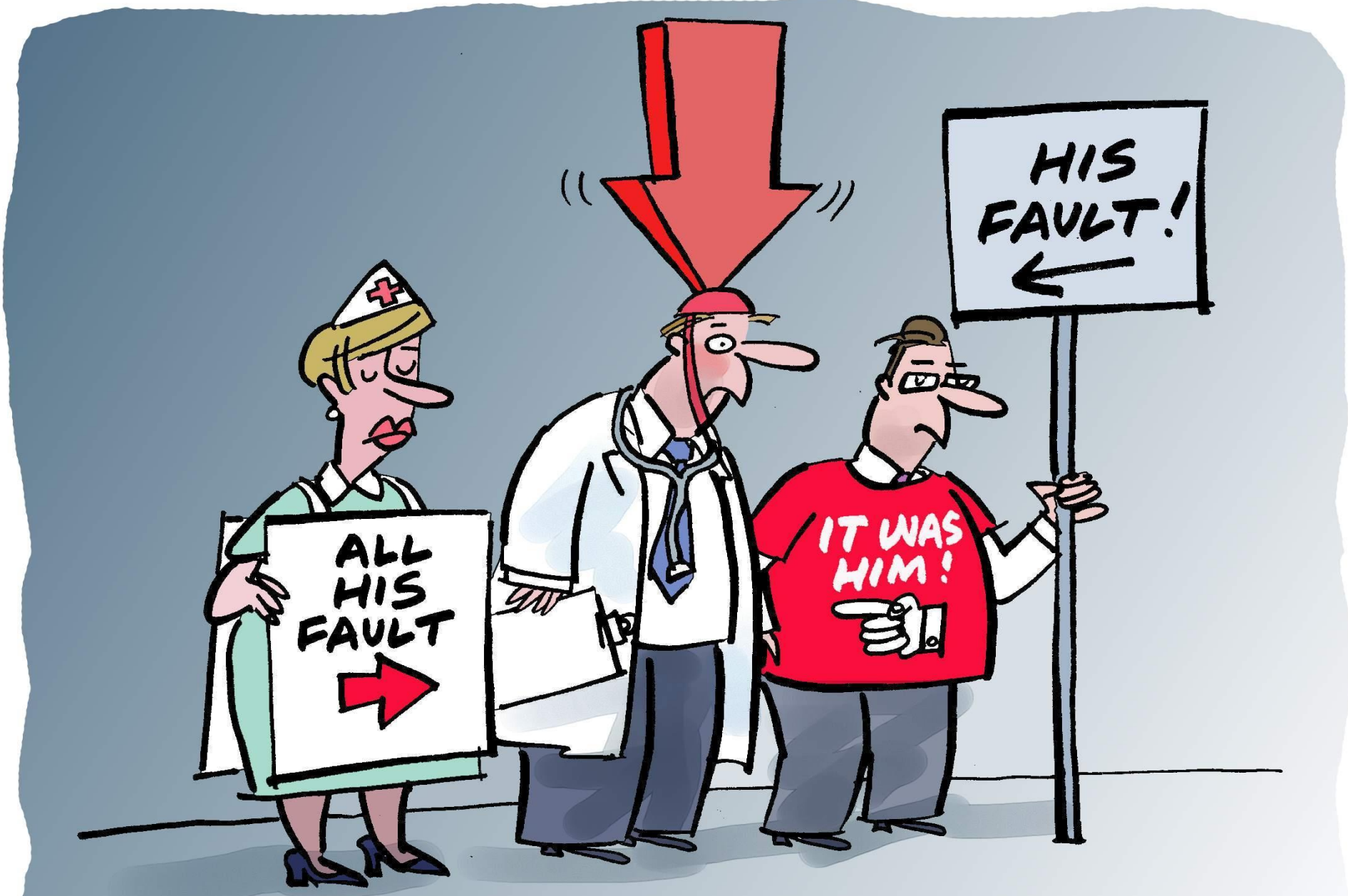
- A **violation** is a deliberate deviation from an operating procedure, standard or rule.

- **An adverse event** is an incident that results in harm to a patient

- A **near miss** is an incident which did not reach the patient.

Relationship between medical errors and adverse events



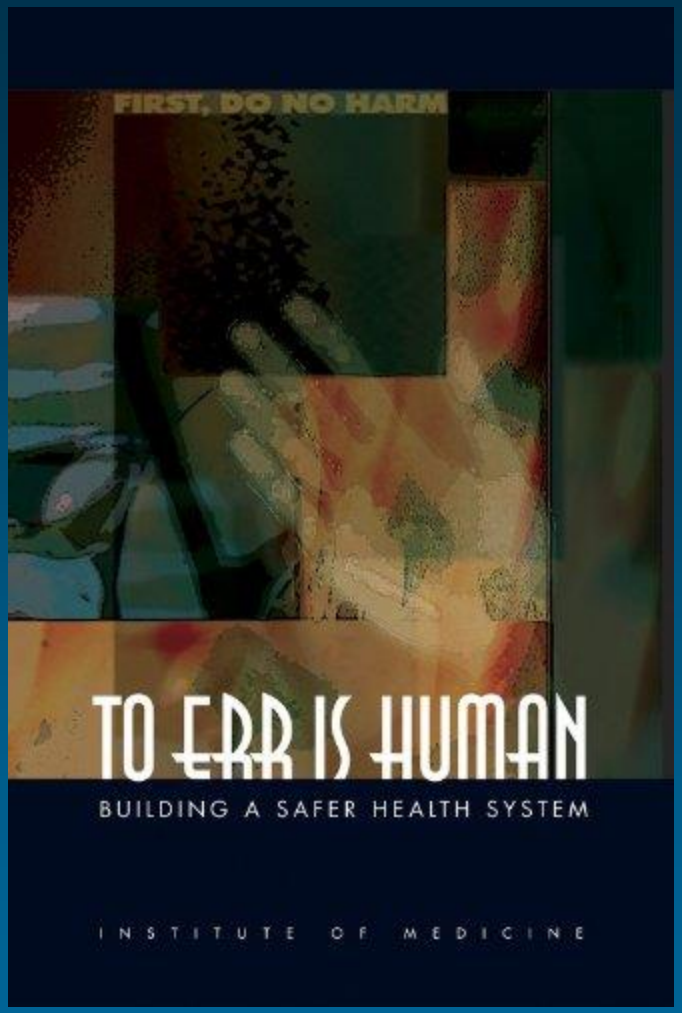


"DR. SIMPKINS DREW THE SHORT STRAW AT THE PRE-INSPECTION MEETING"

What are Diagnostic Errors?

- Misdiagnosis
- Missed diagnosis
- Delayed diagnosis
- Error in assessing the severity
- Failure to detect complications

2. How often diagnostic errors occur?



44.000 to 98.000 Americans die every year from medical errors.

Institute of Medicine.

To Err is Human: National Academy Press, 2000

pends, the true number of premature deaths associated with preventable harm to patients was estimated at more than 400,000 per year. Serious harm seems to be 10- to 20-fold more common than lethal harm.

James JT, *J Patient Safety 2013; 9:122-128*

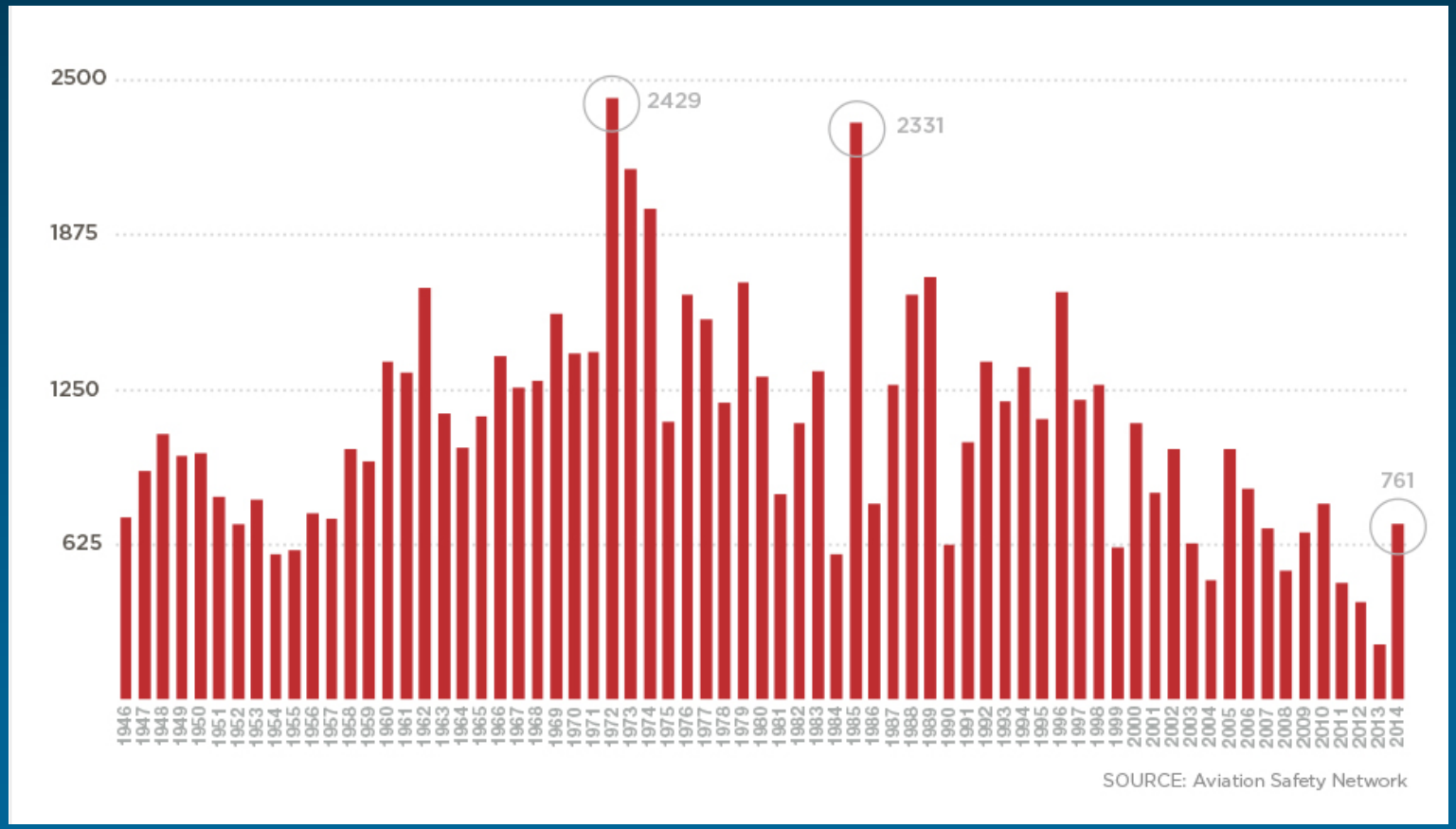
Hospitals are dangerous places ...

Risk of death due to error or accident ...

1: 300

1: 18.000.000

Evolution of commercial aviation deaths per year (1946-2014)



Sexton JB, BMJ 2000; 320:745-749

Incidence of Adverse Events (AE)

- 1 / 10 hospital admissions
- 5 /1000 of AE cause irreversible damages
- 50% could be avoided

Miller GC, 2006; Baker GR, 2004; Bates DW, 1995; Fragata J, 2009; Brennan TA, 2001

HEALTH CARE

Diagnostic Errors Are the Most Common Type of Medical Mistake

By Alexandra Sifferlin | April 24, 2013 | 1 Comment

When Dr. David Newman-Toker was a medical resident at a Boston hospital, he witnessed what he calls tragic cases in which otherwise healthy people suffered serious consequences from misdiagnoses that could have been prevented.

BEN EDWARDS / GETTY IMAGES

Newman-Toker, now an associate professor of neurology at the Johns Hopkins University School of Medicine, recalls an 18-year-old aspiring Olympic skater who fell on a ski slope and came to the hospital with weakness on one side of her body and a headache. She was told she had a migraine and was sent home. Six days later, she returned to the

Compensation for medical malpractice in the US (1986-2010) N = 350 706

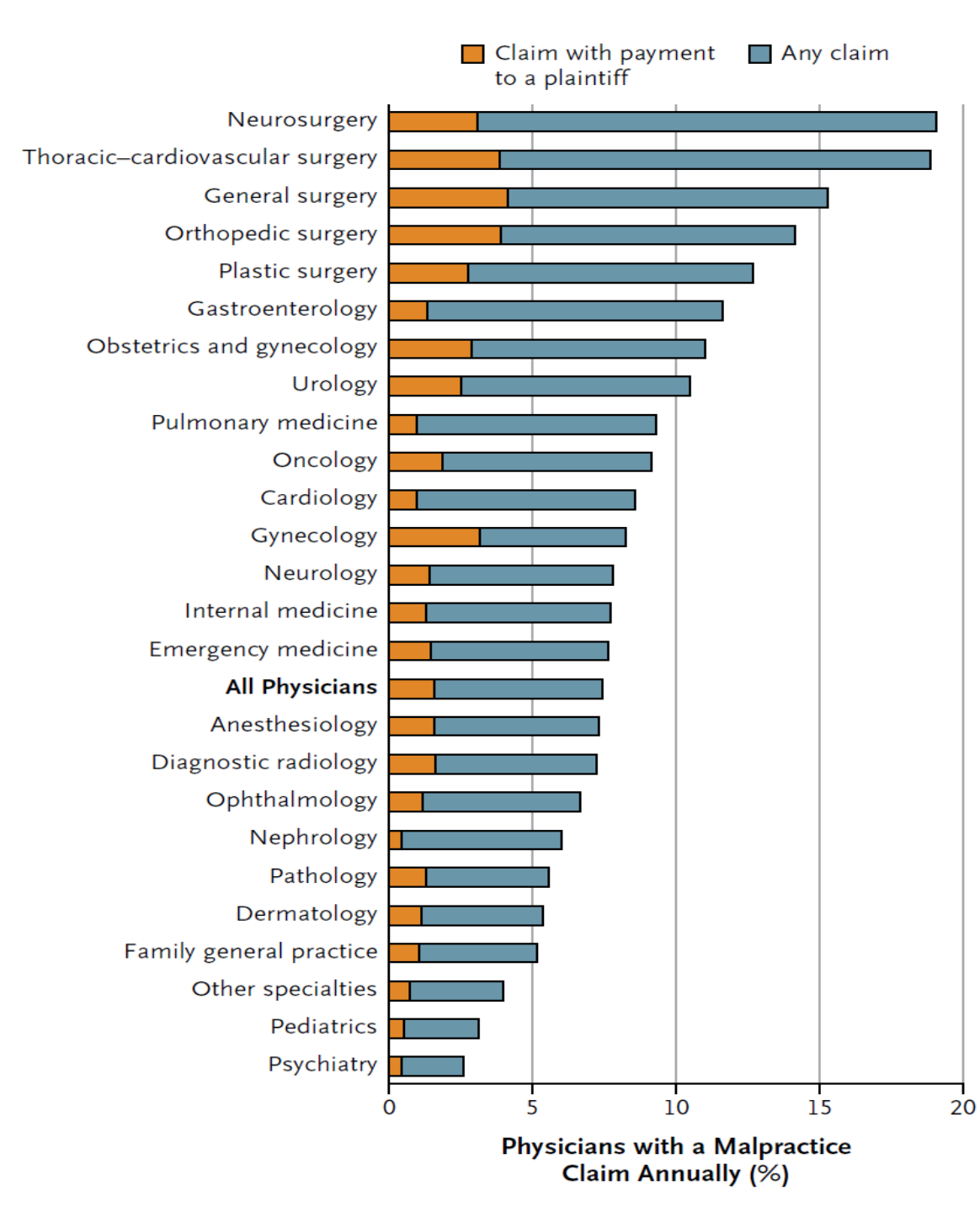
- Diagnostic errors are the most common cause of claims (28.6%) for the largest volume (35.2%) and those who more lead to death (40.9% vs. 20.9%).
- In recent years the amount of compensation for misdiagnosis was $ 38.8 billion (Average = $ 386,849).
- The most frequent diagnostic errors are the lost diagnoses (54.2%) and occur in outpatient setting (68.8% vs. 31.2%).

Tehrani ASS, et al. Quality and Safety in Healthcare 2013;0:1-9 doi: 10.1136

Distribution of malpractice allegations and payments by primary allegation group (1986–2010)

Malpractice allegation group	n	(%)	Mean US$	US Malpractice payments in US$millions
Diagnosis related	100.249	28.6	386.849	38.781
Treatment related	95.635	27.2	196.960	18.836
Surgery related	84.980	24.2	280.257	23.816
Obstetrics related	22.951	6.5	651.670	14.956
Medication related	18.697	5.3	257.333	4.811
Anesthesia related	10.525	3	419.126	4.411
Monitoring related	7.101	2	354.131	2.514
Other miscellaneous	6.929	2	176.781	1.224
Equipment/product related	1.872	0.5	128.204	239
Intravenous and blood-products related	1.080	0.3	294.011	317
Behavioral health related	687	0.1	212.494	145
Total	350.706	100	313.813	110.055

Saber Tehrani AS, et al. Quality and Safety in Health Care 2013;0:1–9.



Physicians facing a malpractice claim annually, according to the specialty (1991-2005)

Jena AB. NEJM 2011; 365: 629-36

The variable epidemiology of diagnostic error

- Self report
- Chart audits
- Trigger tools
- Patient complaints
- Malpractice claims
- Indicators monitorization

ORIGINAL INVESTIGATION

HEALTH CARE REFORM

Diagnostic Error in Medicine

Analysis of 583 Physician-Reported Errors

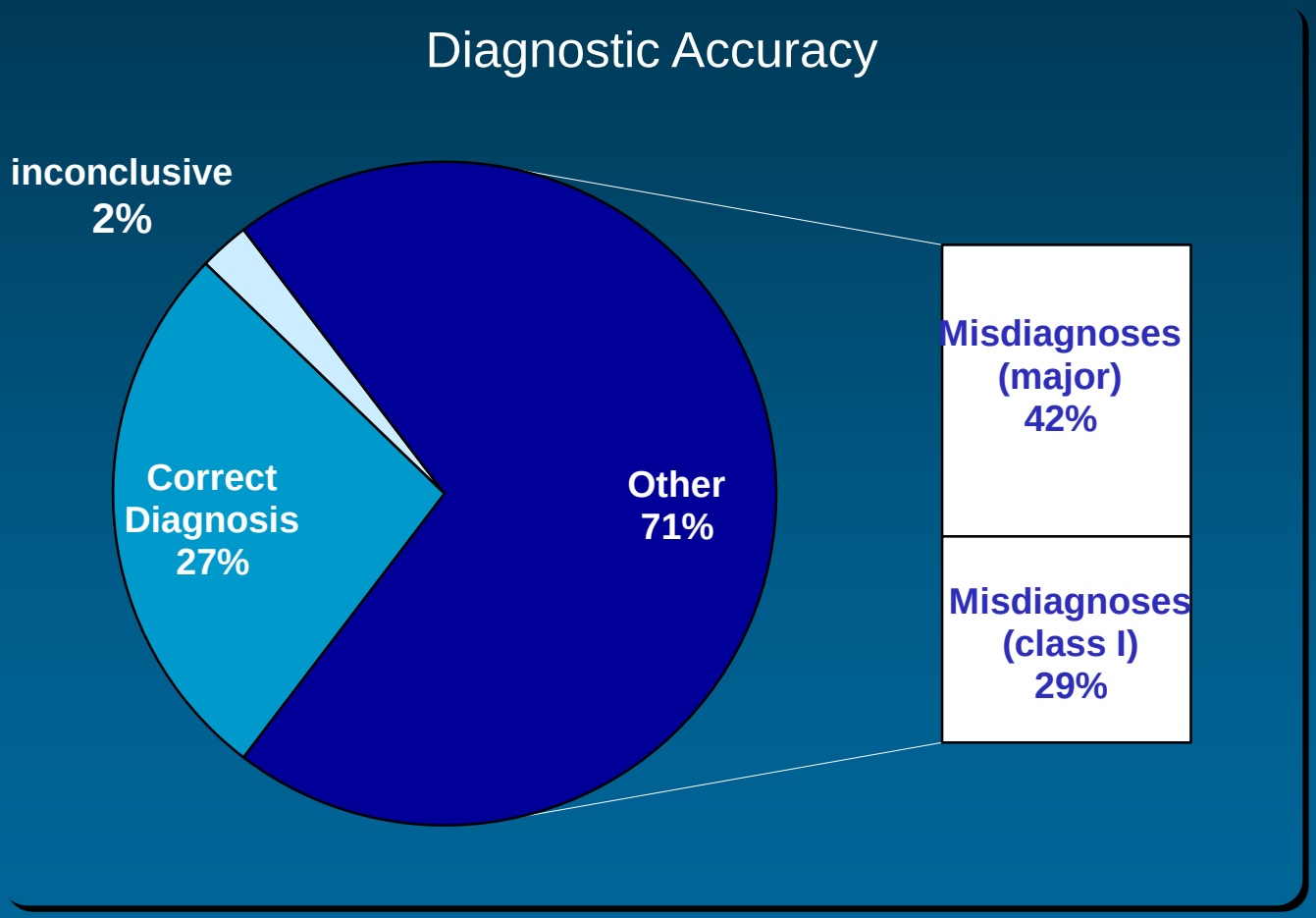
Gordon D. Schiff, MD; Omar Hasan, MD; Seijeoung Kim, RN, PhD; Richard Abrams, MD; Karen Cosby, MD; Bruce L. Lambert, PhD; Arthur S. Elstein, PhD; Scott Hasler, MD; Martin L. Kabongo, MD; Nela Krosnjar; Richard Odwazny, MBA; Mary F. Wisniewski, RN; Robert A. McNutt, MD

- Pulmonary Embolism (4,5%),
- Drug reactions or overdose (4,5%)
- Lung Cancer (3,9%)
- Colorectal cancer (3,3%)
- Acute coronary syndrome (3,1%)
- Breast cancer (3,1%)
- Stroke (2,6%)

Schiff GD et al. *Arch Intern Med* 2009; 169: 1881-1887

Clinical Autopsies in ER of a Central Hospital

54 autopsies in 885 deaths (2003-2005)

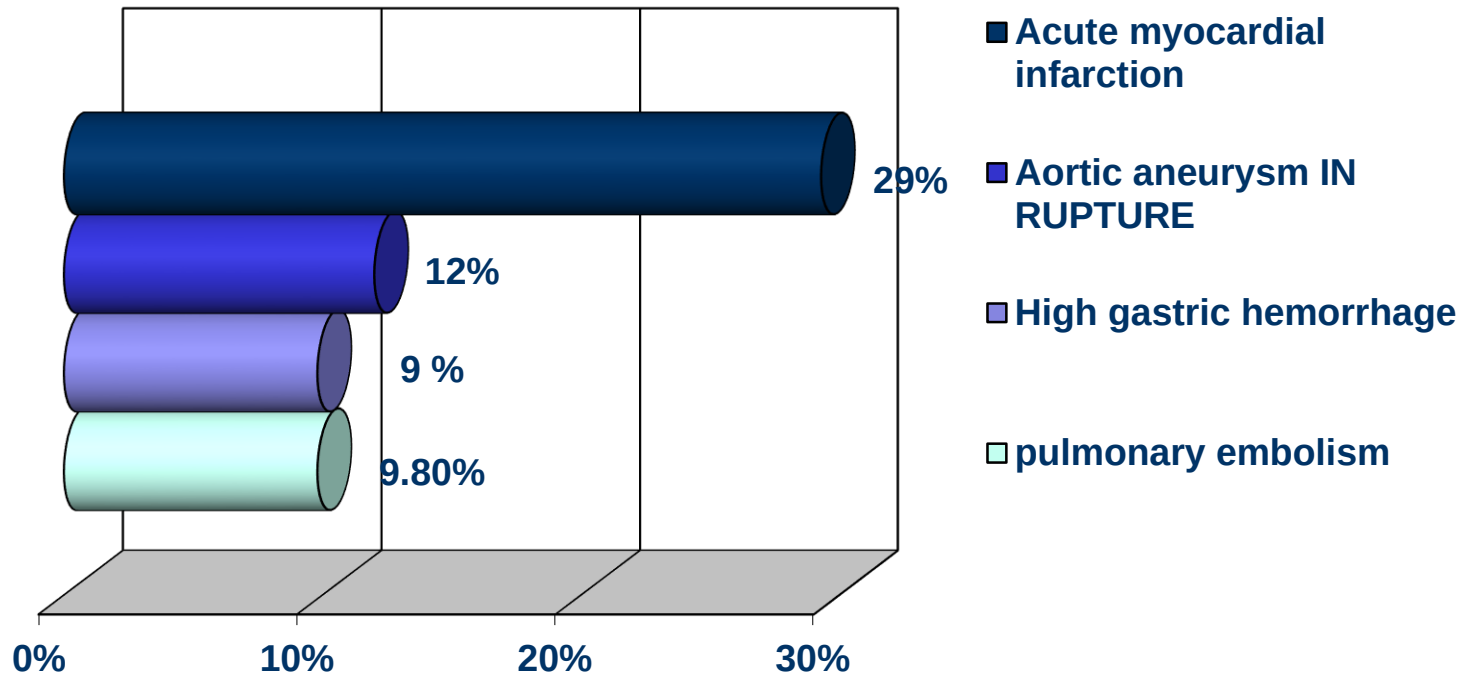


M. Monteiro, L Campos. 11º Congresso Nacional de Medicina Interna, 2005

Clinical Autopsies in ER of a Central Hospital

54 autopsies in 885 deaths (2003-2005)

Most frequent post-mortem diagnoses



M. Monteiro, L Campos, 11º Congresso Nacional de Medicina Interna, 2005

Clinical impact of diagnostic errors

1. **No impact** - no impact at all

2. **Minor** - patient inconvenience or dissatisfaction

3. **Moderate** - short-term morbidity, increased length of stay, need for higher level of care or invasive procedure

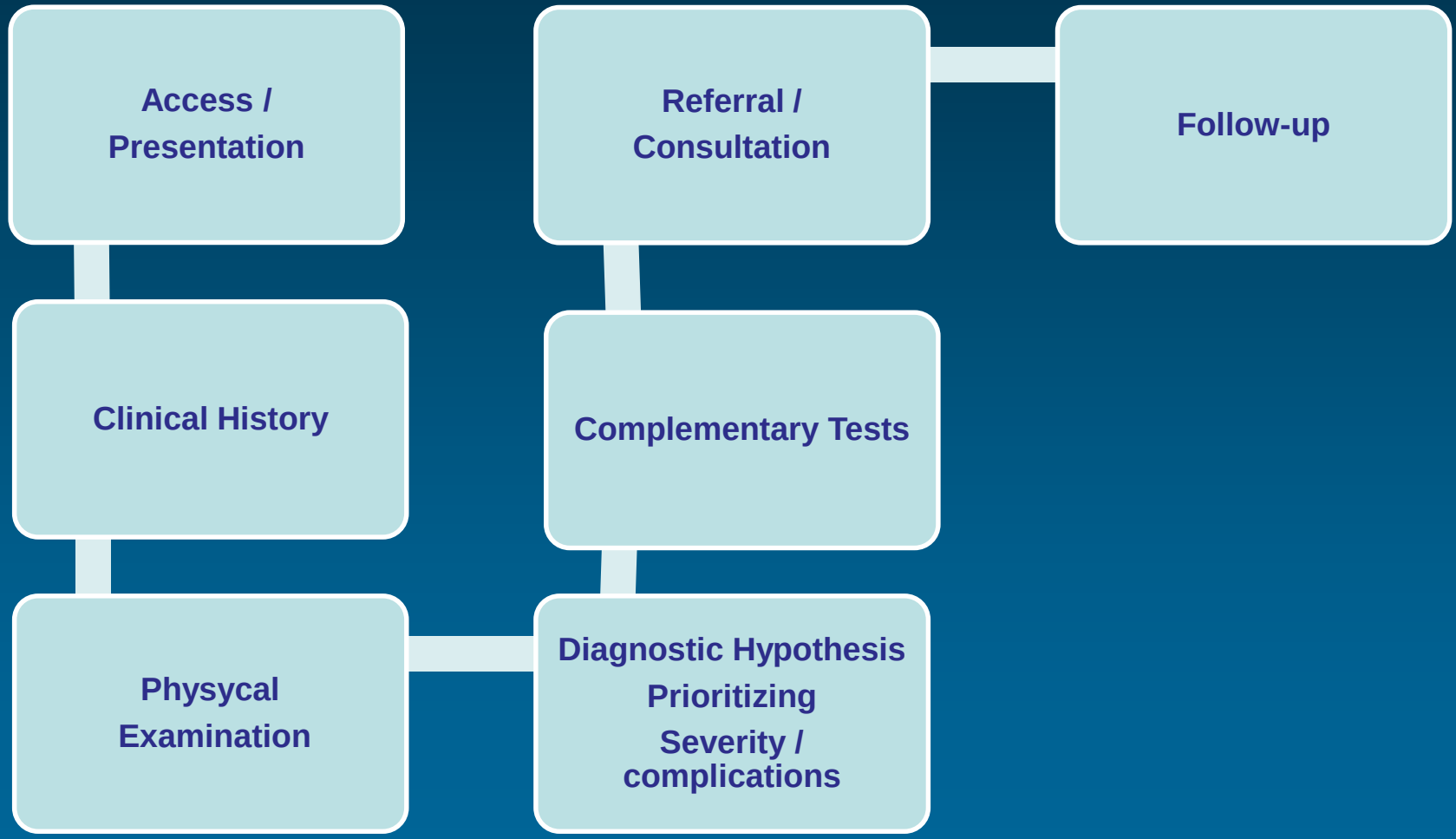
4. **Major** - death, permanent disability, or near-life threatening event

Schiff GD et al. *Arch Intern Med* 2009; 169: 1881-1887

3. When diagnostic errors occur?

When diagnostic errors occur?

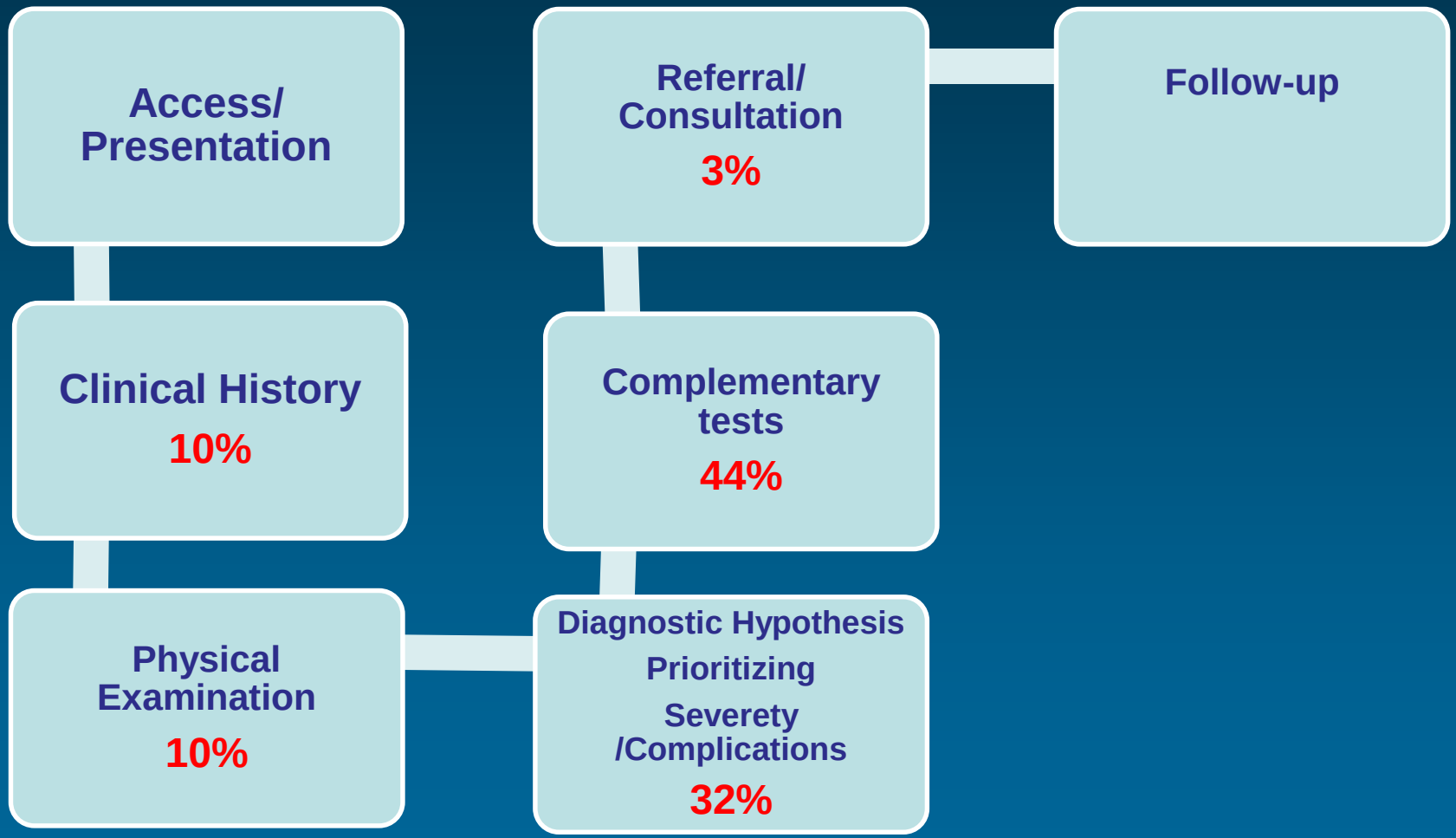
Error Diagnostic Evaluation and Research (DEER)



Schiff GD. Agency for Healthcare Research and Quality (AHRQ). 2005

When diagnostic errors occur?

Analysis of 583 physicians-reported diagnostic errors



Schiff GD et al. *Arch Intern Med* 2009; 169: 1881-1887

4. Why doctors fail the diagnosis?

Relative importance of causes of error in healthcare

- Human factors - represent about 60-70% of the causes

- Factors attributable to the organization or system, around 20 to 30%

Fragata J, 2009

Causes of Diagnostic Errors (Graber)

- No-fault errors

  (Masked or unusual presentation of disease, patient-related errors)

- System-related errors

  (technical failures, equipment problems or organization flaws)

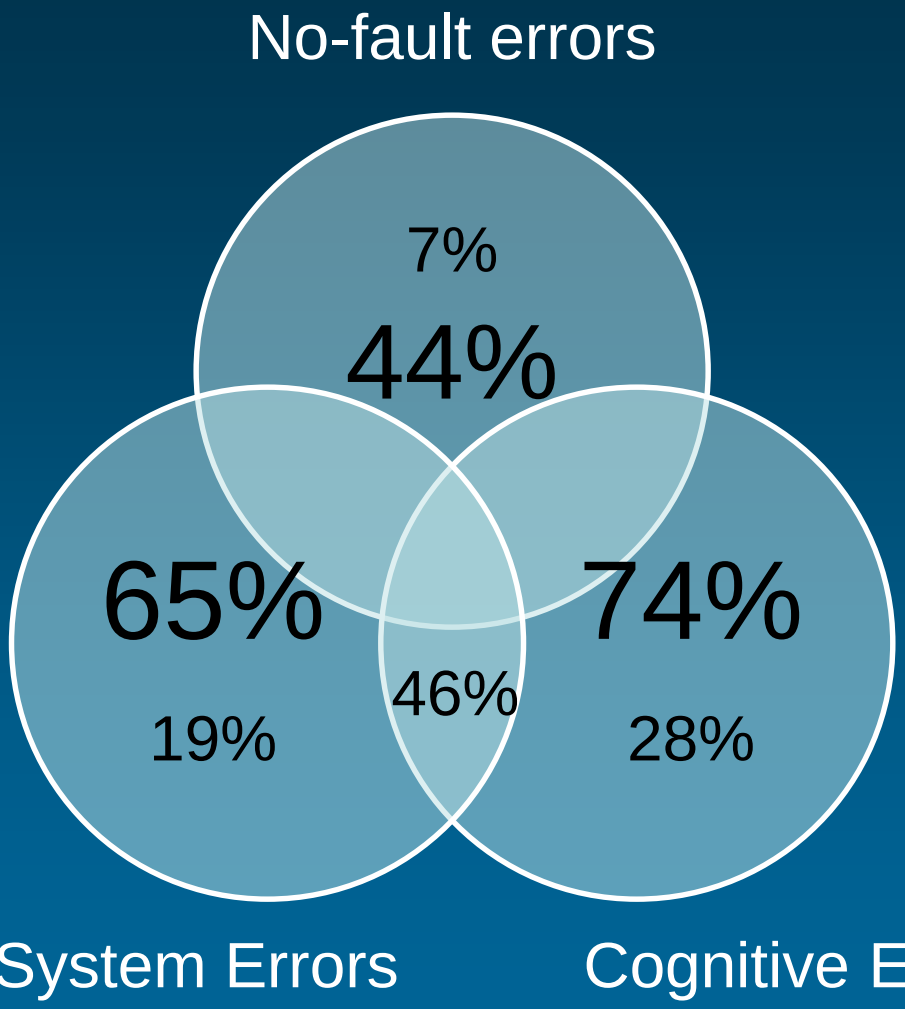
- Cognitive errors

  (Faulty knowledge, faulty data gathering or faulty synthesis)

(Graber ML et al. *Arch Intern Med* 2005; 165:1493-1499)

Em média foram identificados 5,9 factores por erro

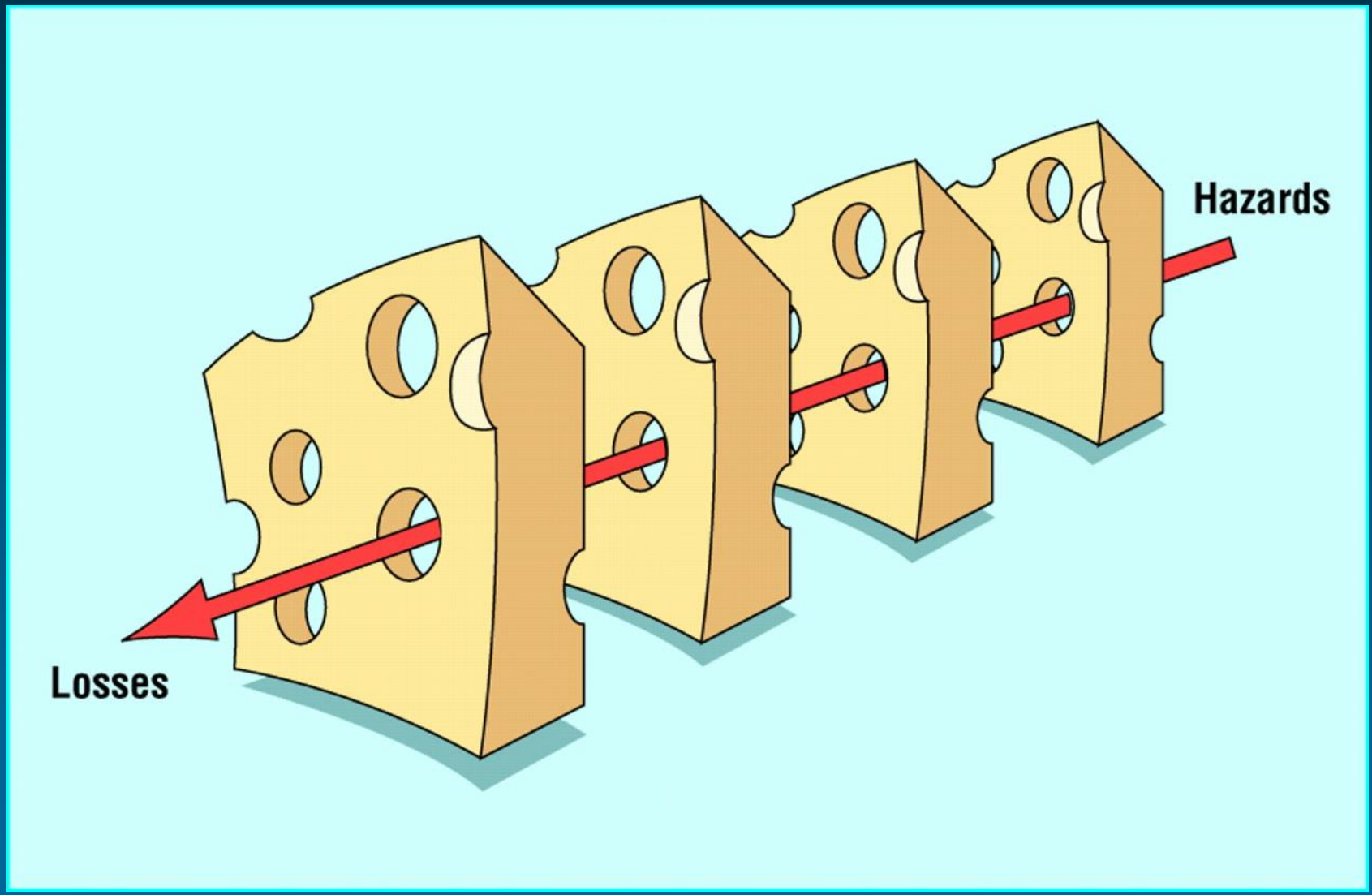
Category of factors contributing to Diagnostic Errors in Internal Medicine



On average 5.9 factors per case have been reported in 548 total factors

(Graber ML et al. *Arch Intern Med* 2005; 165:1493-1499)

Reason's Theory



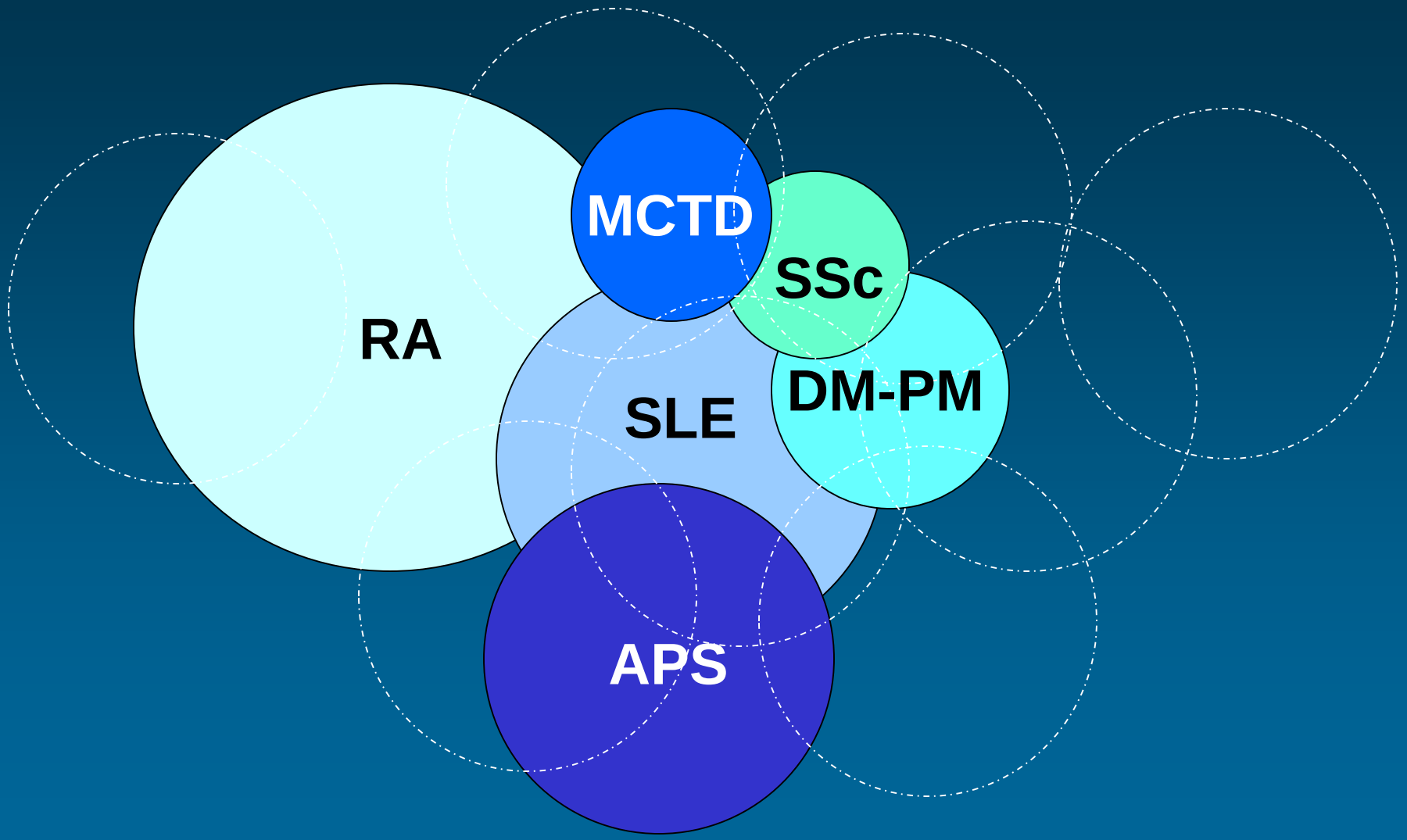
No-fault Errors

- 30-40% of what we do, have no evidence to support it
- Not yet identified or difficult to define diseases, atypical cases, overlap syndromes, undifferentiated presentations
- Gestures and findings in physical examination that have low sensitivity and specificity
- Complementary tests with low sensitivity and specificity

Errors in judgment must occur in the practice of an art which consists largely in balancing probabilities…

Sir William Osler (1849-1920)

Clinical Spectrum of Autoimmune Diseases



Courtesy Carlos Vasconcelos

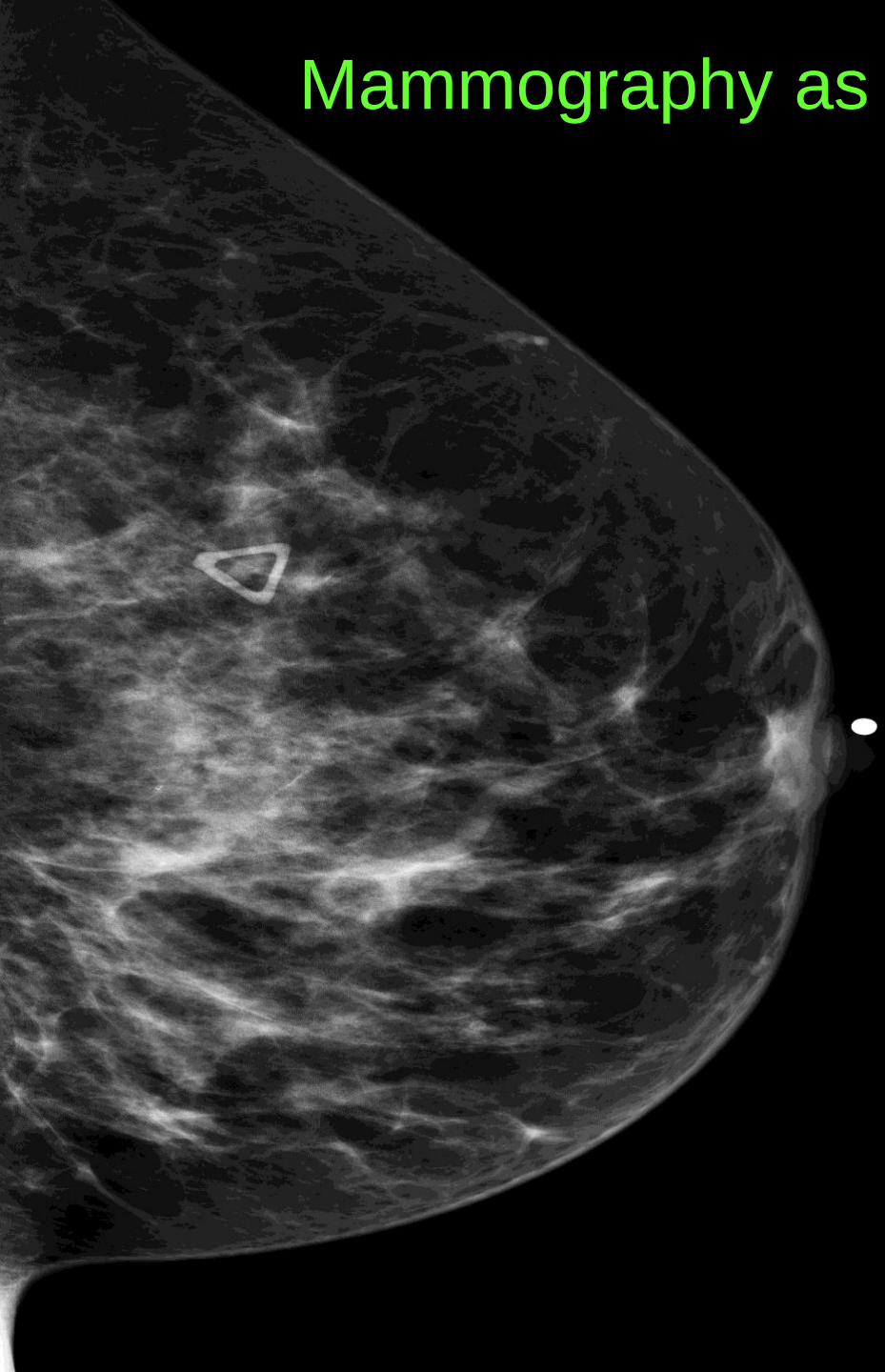
Patients referred to a tertiary rheumatology clinic for a positive ANA test (232 pts)

Reported ANA Titer	No. of Patients	No. of Patients with AARD (and Specific Diagnoses)
≥1:40 (and <1:80)	27	0
≥1:80 (and <1:160)	28	0
≥1:160 (and <1:320)	71	1 (SLE)
≥1:320 (and <1:640)	34	1 (SjS)
≥1:640 (and <1:1280)	31	4 (2 SLE, 2 SjS)
≥1:1280 (and <1:2560)	23	8 (2 SLE, 4 SjS, 1 SSc, 1 UCTD)
≥1:2560 (and <1:5120)	6	2 (1 SSc, 1 SjS)
≥1:5120	7	4 (1 MCTD, 1 SSc, 2 SjS)
No titer	5	1 (UCTD)

More than 90% of the patients had no evidence of Autoimmune disease

Abeles AM et al. Am J Med 2013; 1126:342-348

Mammography as a screening method



One in four breast cancer cases the cancer is detected after a normal mammography

(Fenton JJ, 2007)

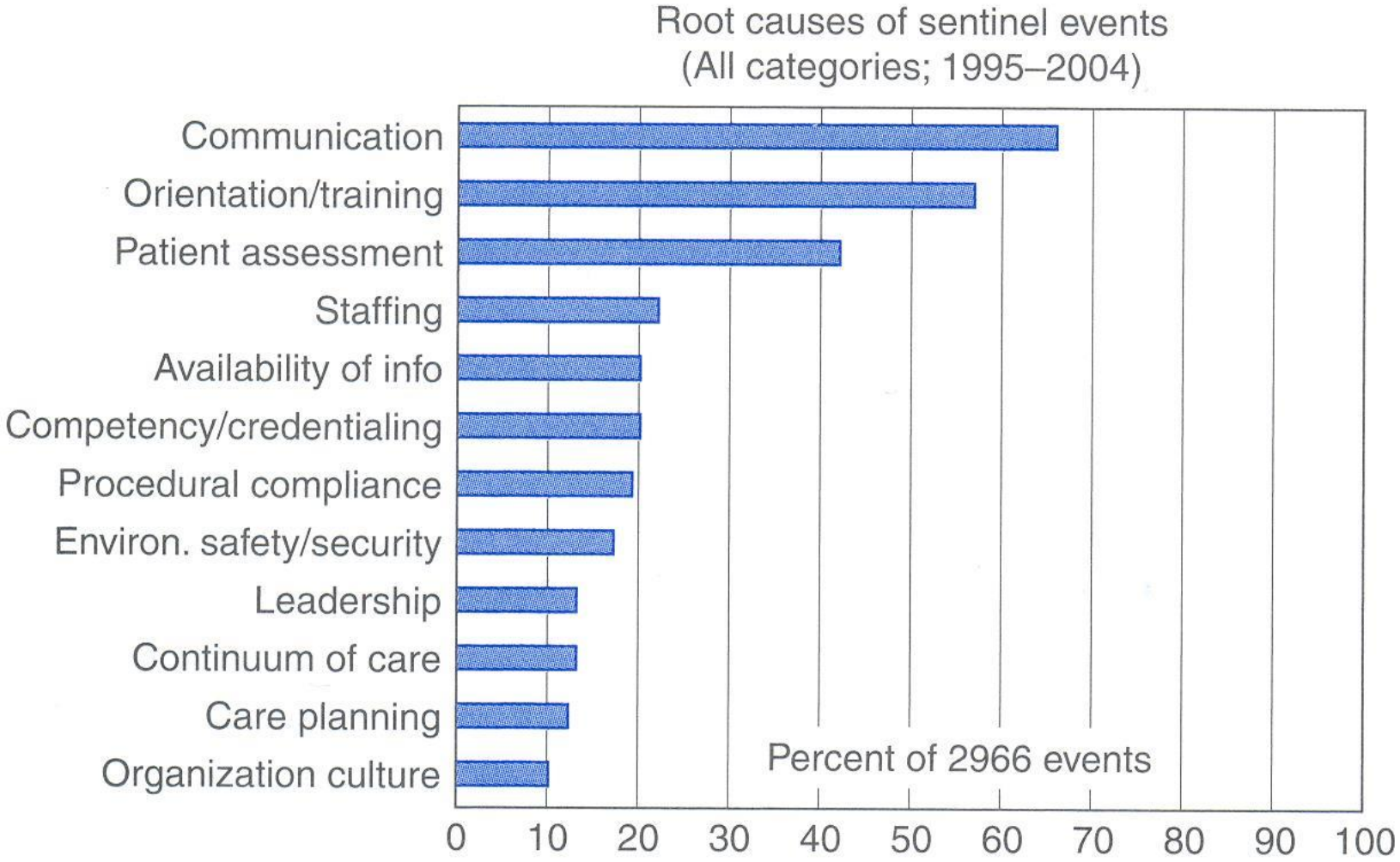
- The probability of a false positive after 10 mammographies is 50% and one third of the women will be submitted to a unnecessary biopsy

(Elmore JG, 1998)

When it is system's fault…

- Equipment (breakdowns, problems of calibration or just missing)
- Organisation (communication, teamwork, supervision, coordination, policies and protocols, process design, training)
- Staff (number, competence, workload)

Main causes of sentinel events



Joint Commission, 2006

When it is patient's fault ...

Choose your specialist and you will choose the disease ...

Anonymous aphorism

\

"I have been in so many doctors in the last few months,
I need a physician to put it all together (...)"

One patient in the USA ED (Quoted by Barbara Starfield)

When it is doctor's fault ...
Cognitive Errors

- Faulty Knowledge +
- Faulty Skills +
- Faulty data gathering + + (clinical history, physical examination, test ordering, consulting registers, screening tests)
- Faulty synthesis
- Faulty information processing + + + + (interpretation of symptoms, signs or tests, over or undervaluation, heuristics failures)
- Faulty follow-up + + +

The case of a man who became shorter…

When it is doctor's fault ...

Factors related to the characteristics of the physicians

- Age, physical condition, qualifications, experience, personality, workload, institutional context, remuneration model or incentives
- Knowledge and skills
- Behavioral features: opportunity, sense, intuition, communication skills and "concern"

When it is doctor's fault ...

Factors related to the characteristics of the physicians

- The experience and number of cases improve outcomes in many procedures or pathologies (Posnett J 2002)
- There is a decrease of knowledge and performance with age (Choudry NK, 2005)
- A Heavy call (80-90 h / week) increases the risk of misdiagnosis 5.6 times (Landrigan CP, 2004)
- There is a relationship between communication skills and outcomes (Stavropoulou C, 2011)

You WILL listen to me!!

Not ordering tests or asking the wrong exams ...

In cases of avoidable delay in the diagnosis:

- In 50% of the cases there was omission of tests that were indicated
- In 32% of cases there was failures in performance facing the results of tests performed
- In 1% of the cases there was inadequate use of tests for the situation

(Graber ML, 2005)

Incorrect reports or non detection of anomalies…

- The errors of laboratory tests may reach 20%, but only a quarter occurs within the laboratory (Stroobants AK, 2003). Of these errors, 18% are liable to cause any damage, either economic or related to the patient's health (Hickner J, 2008).

- There are errors on the order of 23% in the interpretation of chest radiographs (GR Tudor, 1997).

- The inter-observer variability in reading RMN can reach 23% (Wakeley CJ, 1995).

Lack of clinical records or review…

- In the U.S. 1/7 admissions are due to lack of access to the Clinical Process of the patient and 20% of laboratory tests are ordered by lack of access to previous results

- 20-60% of laboratory tests are not reviewed by the physician, a percentage that may be 75% in case of Emergency

(Callen J, 2011)

Heuristic Factors in diagnostic hypothesis

- **Availability heuristic:** the physician makes the diagnosis by similarity to past cases
- **Anchorage heuristic:** the physician sticks to the first impression
- **Framing effect**: the same clinical condition may lead to different decisions as the information is presented or framed
- **Blind obedience:** the doctor accepts the opinion of a respected colleague in the area, or the report of a supplementary examination, with undue deference
- **Premature closure:** a reluctance to seek alternative diagnoses, once a commitment has been established

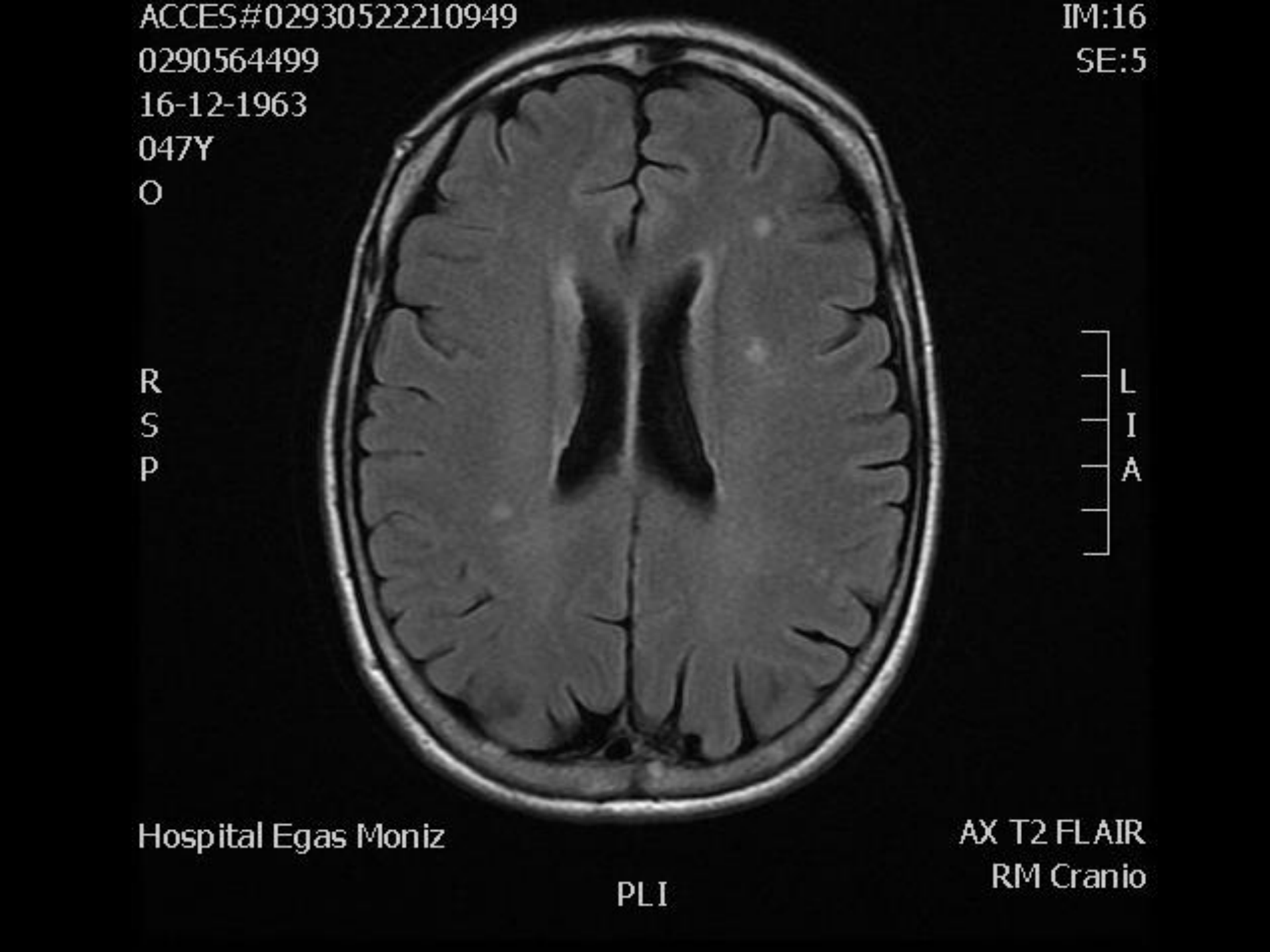
(Croskerry P. et al.*Acad Emerg Med* 2002; 9: 1184–204 2002)

A case of paranoia…

- 48 yo female with multiple admissions in psiquiatry for paranoid delusional ideation, personality disorders type cluster type B.

  Last admission for attempt to defenestration, psycho motor agitation, catatonia, mental confusion and sphincters incontinence. Resistence to therapy, 9 sessions of electroconvulsive therapy.

- History of chronic diarrhea aggravated in recent months with weight loss and peripheral edema.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A case of celiac disease type 3…
(Marsh-Oberhuber classification)

Motivo de exame: Diarreia crónica
Anemia

Relatório de exame:

ESÓFAGO com morfologia mantida e mucosa sem alterações.
Cárdia sem lesões.

ESTÔMAGO com morfologia mantida. Boa distensibilidade das paredes com insuflação. Mucosa do fundo observada em inversão, sem alterações. Mucosa do corpo e antro sem alterações. Píloro centrado e permeável.

DUODENO: Bulbo com mucosa de aspecto granitado (F2- biopsias). D2 com mucosa fina e lisa, ligeiramente hiperemiada, com franco apagamento das vilosidades (F1).

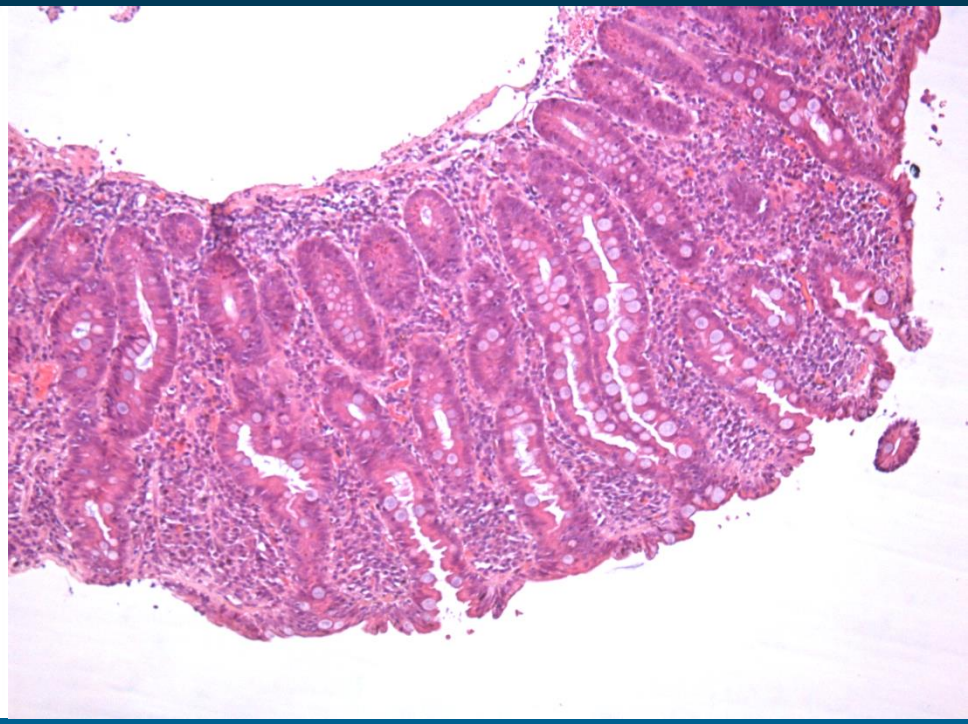
Procedimentos: - 1 Biópsias transendoscópicas

Impressões Diagnósticas:
bulbopatia a definir histologicamente
Mucosa duodenal (D2) atrófica (Doença celíaca?)


Bulbo


Bulbo- Pos biopsias


D2



Initiation of gluten free diet, progressive return to normality

5. What can we do to prevent diagnostic errors?

Blame and shame game  Systems Thinking

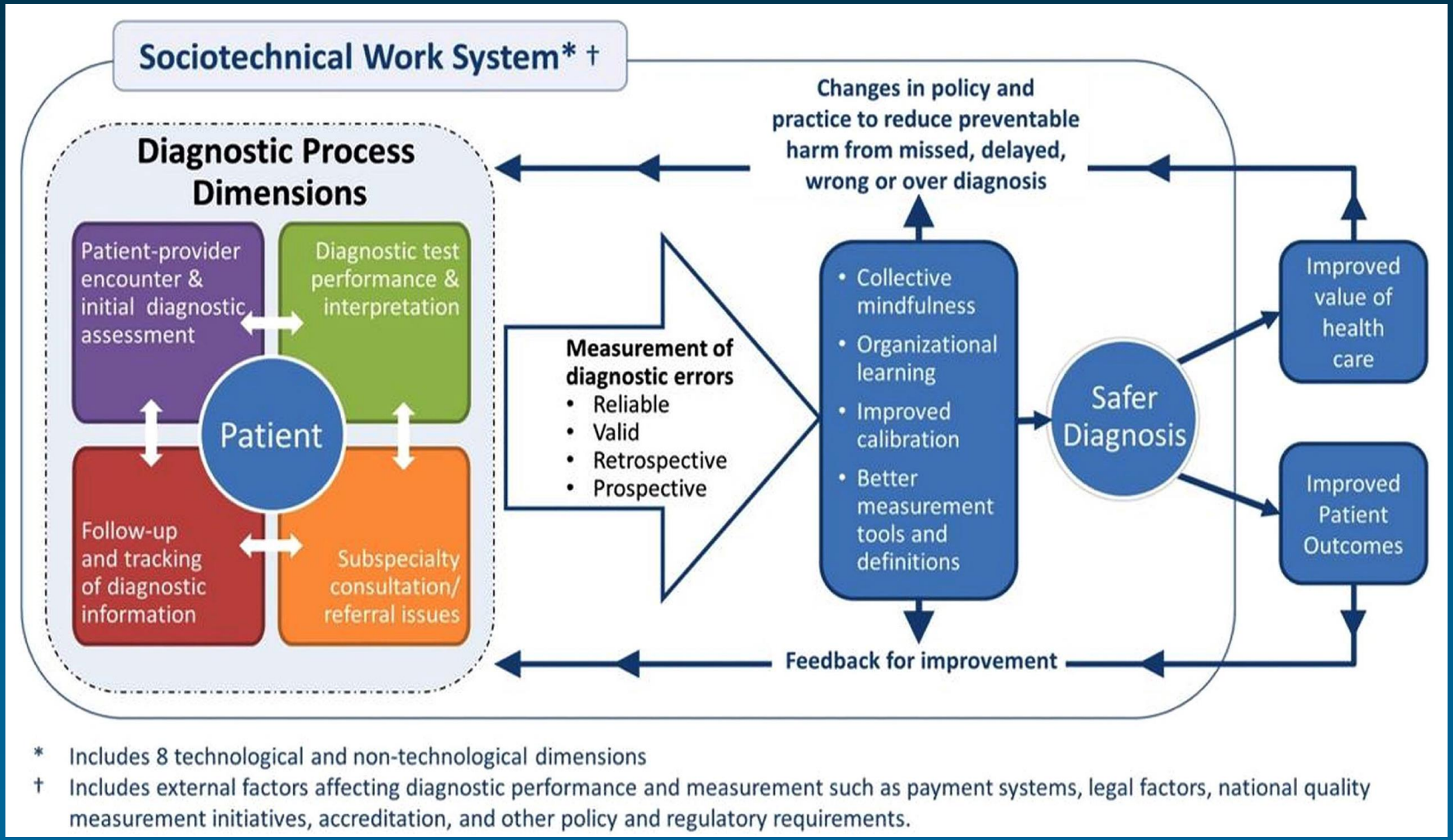
Systems thinking

Humans err, the safety depends on creating systems that anticipate errors and either prevent or catch them before they cause harm

General principles of patient safety improvement strategies

- Improve culture of safety
- Create incident reporting systems
- Standartization and simplification of processes
- Introduce forcing functions in the interface with machines
- Improving communication and teamwork
- Learn from one`s mistakes
- Well trained, staffed and rested wokforce

The safer Dx framework for measurement and reduction of diagnostic errors



* Includes 8 technological and non-technological dimensions

† Includes external factors affecting diagnostic performance and measurement such as payment systems, legal factors, national quality measurement initiatives, accreditation, and other policy and regulatory requirements.

Singh H et al. *BMJ Qual Safety* 2015; 24, 103-110

Which interventions change physician`s behaviour?

TYPE OF INTERVENTION	Nº OF STUDIES	RATE OF SUCCESS
Reminders	28	++
Web-based education	Short LM 2006	++
Educational Outreach visits	69	++
Local Opinion Leaders	18	++

http://epoc.cochrane.org/epoc-reviews Accessed 7th May 2013

Which interventions change physician`s behaviour?

TYPE OF INTERVENTION	Nº OF STUDIES	RATE OF SUCCESS
Mandated practices/ Policies / Formularies	29	+++
Information and communication technology	100	++
Continuous Quality Improvement	54 (USA)	++
Combined interventions	36	+++

http://epoc.cochrane.org/epoc-reviews Accessed 7th May 2012

Impact of the implementation of ICT in quality of care

	Impact on care
computerized reminders (Kuperman GJ, 1999; Dexter PR, 2005, Shojania KG, 2009)	Effective in behavior change, but less evidence in results
Access to health information (Mc Gowan JL, 2009)	?
computerized prescription (Mirco A, 2005; Schiff GD, 2009; Fischer MA, 2008)	Effectiveness in reducing medication errors and reducing costs
Decision support systems (Haynes RB, 2010)	Improvement of physician performance, but less evidence in outcomes
Computerized medical education (Fordis M, 2005)	Sustained gains in knowledge

Portability is an indispensable characteristic of information technology

Internal Medicine Department HSFX Lisbon

Teamwork

Surgical blocks

Cockpits

- Authority centered
- Poor distribution of tasks
- Poor supervision
- Rare check-listing
- Culture of infallibility
- Culture of blame

- Hierarchies <marked
- Better communication
- Perception of fatigue
- CRM (Team Training)
- Self-reporting without guilt
- Near Miss Reporting

(Fragata J 2005, adaptação de Helmereich, 1990)

Analysis of a medical error

09/04/2011
05h22m
Sala Operatória
Diário de Enfermagem

09/04/2011
05h45m
Sala Operatória
Diário de Enfermagem

09/04/2011
05h55m
Sala Operatória
Folha de Anestesia

Extracção de feto morto com malformação

Doente hemodinamicamente instável

Tentativa de colocação de CVC jugular

Paragem cárdio-respiratória

AESP

Iniciado SAV

Cardiologista, M. Interna, Anestesia, Obstetrícia

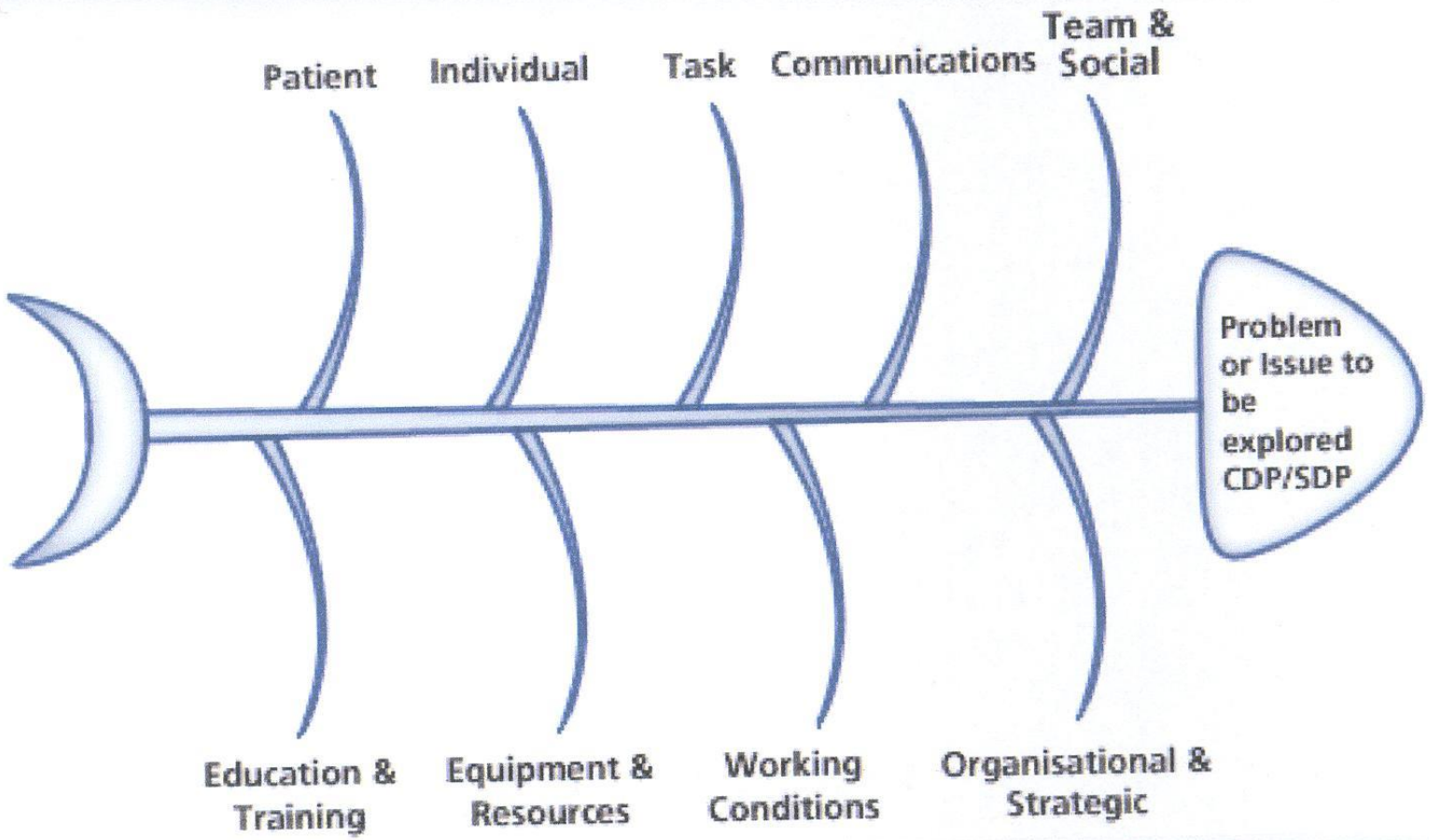
Óbito às 6h33min

Rx Tórax disponível em película às 05h30:
ARDS

EcoTT (05h50): VE e cavidades direitas não dilatadas. Sem derrame pericárdico. PSAP 38. VCI 20mm

Inicial recuperação de pulso às 6h02
Nova PCR em AESP às 6h12

Ishikawa's Diagram



Report.npsa.nhs.uk/rzcatookit/course

Recommendations to Prevent Diagnostic Errors

1. It is no shame to have doubts, but is a shame to take decisions without trying to minimize them.
2. Listen to the patients!
3. Never fail to examine your patient!
4. Be aware of the sensitivities and specificities of clinical findings!
5. Think first of common diseases but don't stop if subsists a more severe hypothesis.
6. Do not rely on first impressions, not everything is what it seems.
7. Do not rely on memory: assess the likelihood of diagnosis in reliable casuistic.

Luís Campos, 2014

Recommendations to Prevent Diagnostic Errors

8. Be aware of dissonant information that might question the initial diagnosis;

9. Order tests providing the relevant clinical information;

10. Read the exams depending on the clinical context;

11. Keep in mind the possibility of false positives results, false negatives and errors in reporting;

12. Discuss with the professionals that perform complementary tests;

Recommendations to Prevent Diagnostic Errors

13. The sources of clinical information must be accessible when they are useful, ie when facing the patient;

14. Ask who knows, but remember that nobody knows everything;

15. Don’t despise the disagreements of the younger!

16. The differentiation within each unit increases the collective knowledge of the team ;

17. Never facilitate to anybody! Always do in any circumstances what should be done;

18. Never make corridor consultations! This is particularly true for family, colleagues and friends;

23 Recommendations to Prevent Diagnostic Errors

19. Clinical records are essential for the continuity of care and to reduce errors;

20. Before decision making review the clinical records;

21. The best results are obtained with the cooperation between generalists and sub-specialists;

22. The sub-specialists should avoid acting outside their area of expertise.

23. Diagnostic errors should be reported as safety incidents.


I'm
Sorry.
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