

# Primary Care and Diagnosis Error

Donabedian Award Session Nov 6, 2006

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Professor of Medicine – Rush University

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# Diagnosis Errors and Delay

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- Common

- NPSF Harris poll- 1/6 personally experienced

- Important

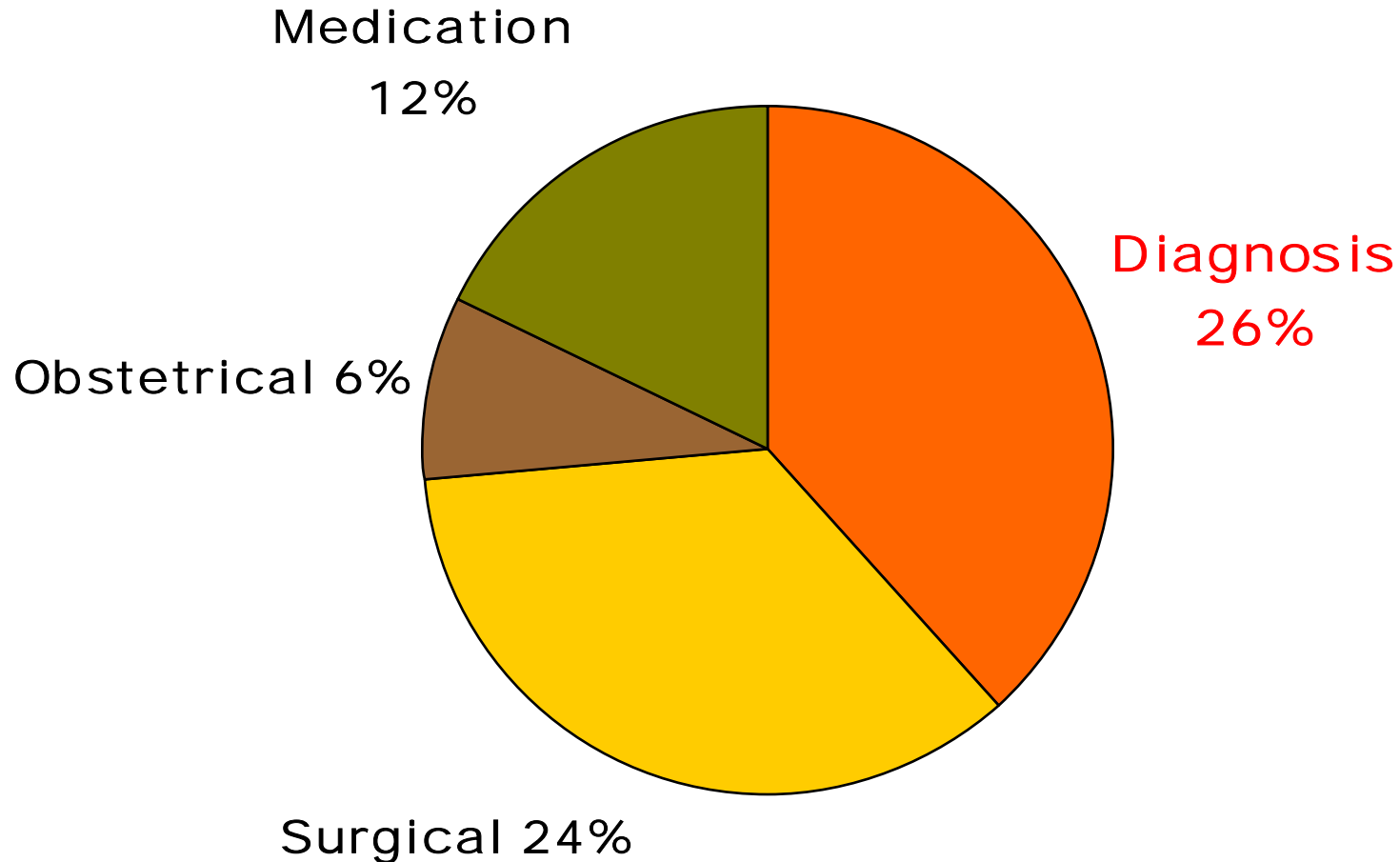
- If Dx in error...best delivered rx is still wrong
- Cascade effects
- Patient dismay when becomes apparent

- Under-emphasized

- Only 1 of 93 AHRQ 2002 Safety Grants

# Leading Cause Malpractice Suits

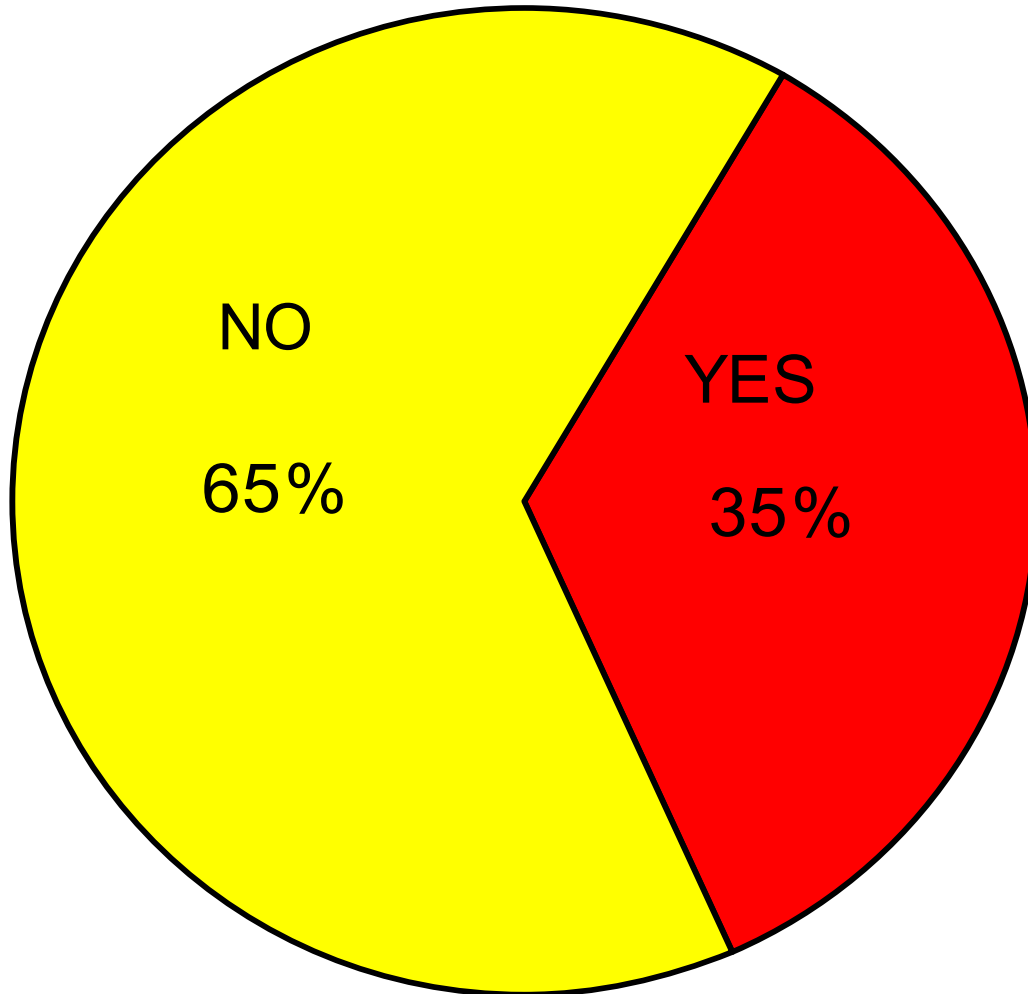
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Harvard Risk Management Foundation  
Jt Comm JI Quality 8/01

# 1 in 6 Reports Diagnosis Error

Experienced a Medical Error?

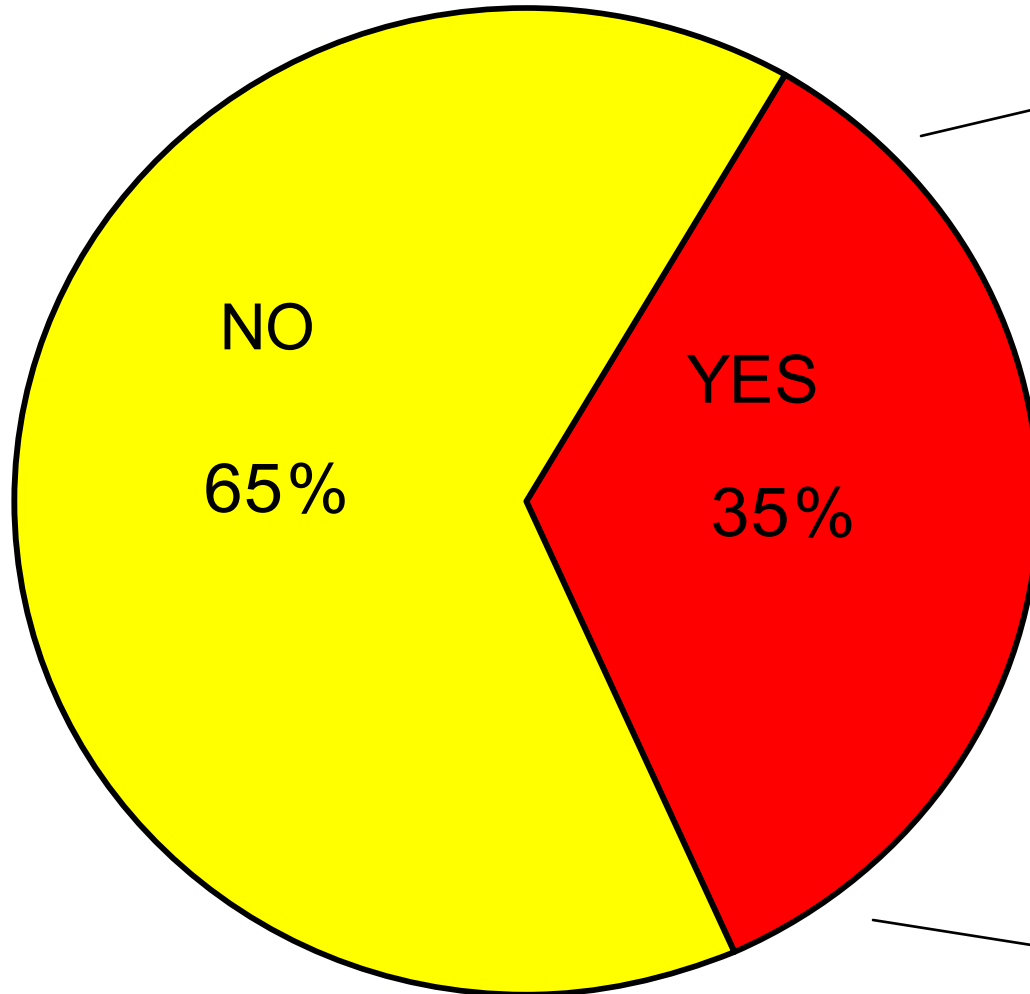


N=2201

11/05 Isabelhealthcare.com

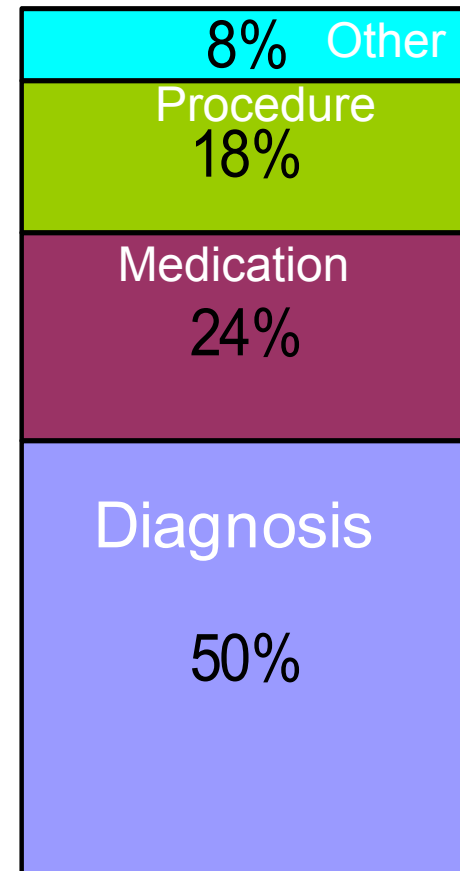
# 1 in 6 Reports Diagnosis Error

Experienced a Medical Error?



N=2201

Type of Error?



11/05 Isabelhealthcare.com

<b>Diagnosis</b>	<b>Error Rates</b>	<b>Description</b>	<b>Reference</b>
Pulmonary tuberculosis	50%	Autopsy studies of TB. Cases found not suspected antemortem.	Shojania 2002
Pulmonary embolism	55%	Fatal embolism over a 5 year period at a single institution. Of 67 pt died PE, dx not suspected in 37	Pidenda 2001
Ruptured aortic aneurysms	61%  35%	All cases single med center 7 year period. 23 cases abdom aneurysms, dx initially missed in 14 Dissecting aneurysm proximal aorta w/ chestpain missed in 35%	von Kodolits 2000
Subarach hemorrhage	30%	Lit review: mis-dxed on initial evaluation	Edlow 2005
Cancer detection	44%	Autopsy study at single hospital. Of 250 malignant tumors, 111 either mis-dxed or undiagnosed In 57 cases cause of death judged related to the cancer	Burton 1998

Breast cancer	21%	50 accredited centers agreed to re-review mammograms of 79 women, 45 w/ breast cancer. Would have been missed in 9.	Beam 1996
Melanoma	1.1-11% FN 1.2% FP	Second review of 5136 biopsy samples. 1.1-11% dx changed from benign to malignant. 1.2% from malignant to benign; 8% had a change in tumor grade.	McGinnis 2002
Bipolar disorder	69%	Initial dx wrong; often w/ prolonged delays in establishing correct dx	Perlis 2005
Appendicitis	10.5% FP 18.6% FN	Retrospective study at 12 hospitals patients w/ abdominal pain and operations for appendicitis. Of 1026 patients who had surgery, no appendicitis in 110 (10.5%). Of 916 patients with a final diagnosis of appendicitis, the initial diagnosis was missed or wrong in 170 (18.6%)	Graff 2000
Cancer pathol Gyne	5-12% 2-9%	4 hospitals over a 1 yr pathol diagnosis Errors: sampling deficiencies, preparation problems, histologic interpretation	Raab 2005

Psoriatic arthritis	39%	One of 2 standardized patients w/psoriatic arthritis visited 23 rheumatologists. Dx missed or wrong in 9 visits	Gorter 2002
Atrial Fibrillation	18%	Automated ECG interpretations for a-fib. 35% mis-dx by machine; Error detected by reviewing MD in only 76%	Bogun 2004
Infant botulism	50%	129 infants in California over 5 year period Only half suspected at the time of admission.	Arnon 2006
Recognition of diabetes	18%	Retrospective review 1426 patients w/ glucose > 200 or HbA1c >7 No mention of DM in the medical record.	Edelman 2002
CXR in ED	33%	X-rays incorrectly interpreted by the ED staff, compared to the final readings by Radiologists.	Russel 1988
Malaria recognition developed world	59% 40%	Canada- 59% of malaria pts were missed on first presentation U.S.- 40% pts w/ fatal malaria not dxed on 1st presentation	Newman 2004
Long QT syndrome	41% FP	176 self referred pts at Mayo prev given dx. No LQTS-73 (41%); 56 (32%) questionable	Taggart 2007



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Genius diagnosticians make great stories, but they don't make great health care.

The idea is to make accuracy reliable, not heroic

Don Berwick  
Boston Globe 7/14/2002

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"Health in the United States is poor relative to other comparable nations despite costs that are much higher than elsewhere and more than double that in many countries," Dr. Starfield said. "To a large extent, this is a result of a very inefficient, inequitable, and often ineffective health system. One manifestation of the failure to plan adequately to meet population health needs is the overspecialization of the physician workforce, despite evidence of the health-enhancing effects of a health system organized about a strong primary care base, buttressed by a coordinated system of specialty services." Starfield explained that primary care physician supply is consistently associated with improved health outcomes (all-cause, cancer, heart disease, stroke, infant mortality, low birth weight, life expectancy, self-rated health). In the United States, an increase of 1 primary care doctor is associated with 1.44 fewer deaths per 10,000 population, she said.

**Primary care and specialty care:**  
**Relevance for the Inland Empire**

# Primary Care & Diagnosis Error

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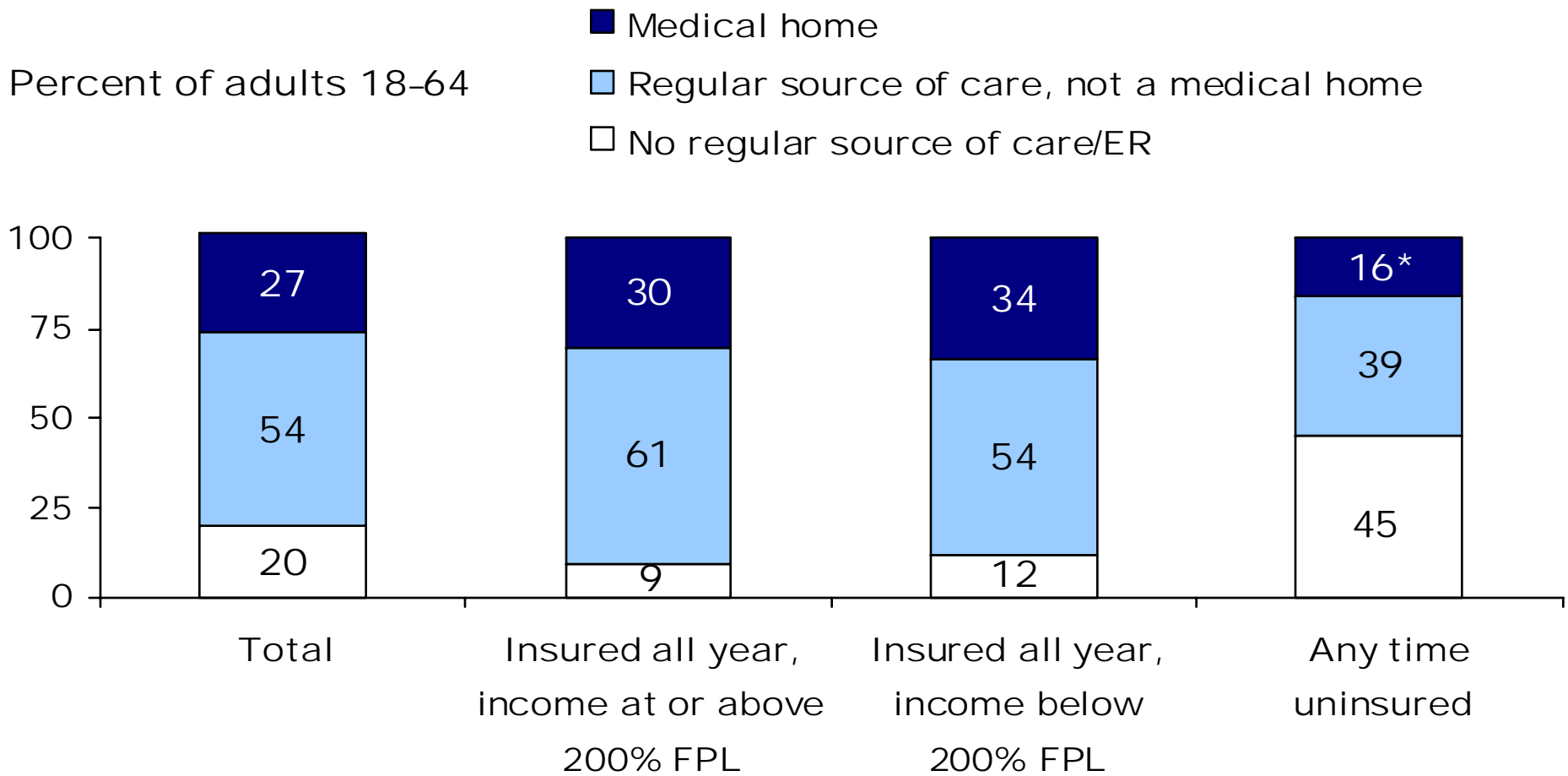
1. Earlier diagnosis 2<sup>o</sup> fewer access hurdles
2. Knowing the patient
3. Patient trust, communication
4. Longitudinal records (notes, labs)
5. Emphasis on good history, listening
6. Broader, knowledge
7. Continuity: ↓ opportunity for dropped handoffs
8. Best poised for test-of-time, conservative practices
9. Enables closed loop feedback, learning
10. Accountability

# 1. Earlier diagnosis 2<sup>o</sup> fewer access hurdles

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- Telephone access
  - To schedule early appointment
  - Phone questions
- ↓ inhibition vs. ED visit (cost, wait)
- “Pull” systems
  - Same-day-access
- Door open for follow-up if not better
- Of course, insurance is key to access door

# Figure ES-3. Uninsured Are Least Likely to Have a Medical Home and Many Do Not Have a Regular Source of Care



Note: Medical home includes having a regular provider or place of care, reporting no difficulty contacting provider by phone or getting advice and medical care on weekends or evenings, and always or often finding office visits well organized and running on time.

\* Compared with insured with income at or above 200% FPL, differences are statistically significant.

Source: Commonwealth Fund 2006 Health Care Quality Survey.

## Percentage of Sicker Adults Who Had Continuity of Care or Reported Access Problems, International Comparison, 2005

<i>Key: gold = best country performance and red = worst country performance)</i>	<b>AUS</b>	<b>CAN</b>	<b>GER</b>	<b>NZ</b>	<b>UK</b>	<b>US</b>
<b>CONTINUITY OF CARE</b> (higher rates are better)						
<b>Have regular doctor</b>	92	92	97	94	96	84
<b>With same doctor 5 years or more</b> (among those with a regular doctor)	61	65	78	61	69	50
<b>ACCESS PROBLEMS</b> (lower rates are better)						
<b>Unmet need due to cost in past 2 years</b> (prescription, doctor visit when sick, or test or follow-up recommended by a doctor)	34	26	28	38	13	51
<b>Very difficult to get care on nights, weekends, holidays without going to the ER</b> (among those who sought care)	36	29	11	13	22	39

Data: 2005 Commonwealth Fund International Health Policy Survey (Schoen, C. et al. 2005. *Health Affairs* Web Exclusive W5-509–25). AUS = Australia; CAN = Canada; GER = Germany; NZ = New Zealand; UK = United Kingdom; US = United States. Sicker adults have a high incidence of chronic disease and recent intensive use of health care.



# 2. Knowing the Patient

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- Baseline knowledge
  - 6<sup>th</sup> sense of pt, appreciate subtle changes
  - Knowing what don't know about pt
- Sorting out signal:noise
  - Knowing when, which patients "crying wolf"
  - Able to be supportive for psychosocial issues
- Knowing larger contexts
  - Family, community, social issues
  - Where to turn for additional information
  - Shared experiences

# 3. Patient trust, communication

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- “Knowing” -2 way street
- Comfortable sharing information
- Trust in caring professional, relationship
- Out-loud mutual hypothesis sharing/testing
- Poisonous role of conflict of interest
  - Managed care, financial incentives
- Patients consider #1 importance
- Time-trusting in future open door



**Special Article: Distinguished Paper From the 2000 North American Primary Care Research Group Meeting**

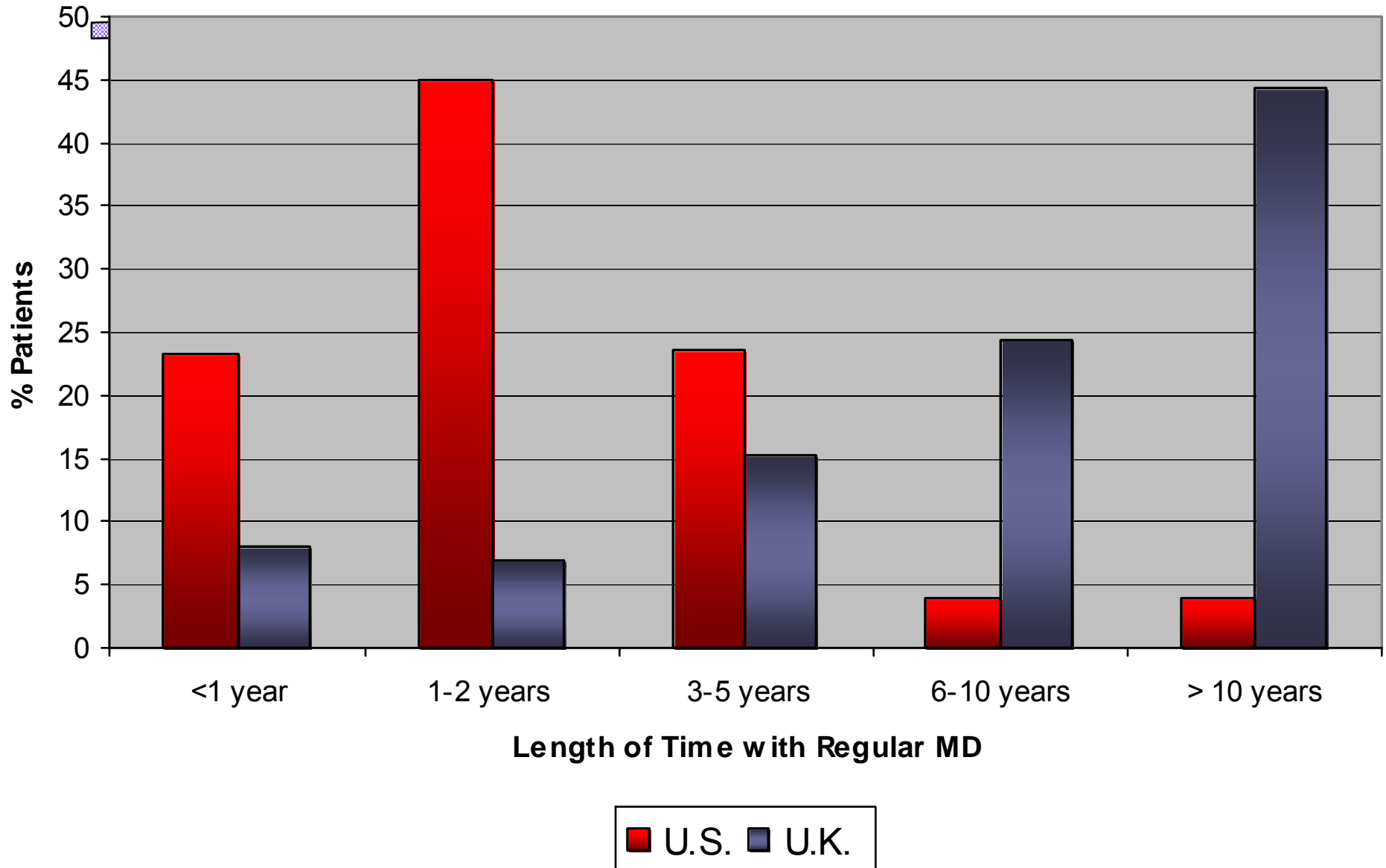
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## **Continuity of Care and Trust in One's Physician: Evidence From Primary Care in the United States and the United Kingdom**

**Arch G. Mainous III, PhD; Richard Baker, MD, FRCGP; Margaret M. Love, PhD;  
Denis Pereira Gray, OBE, FRCGP; James M. Gill, MD, MPH**

*Background and Objectives:* Patients' trust in their physician to act in their best interest contributes to the effectiveness of medical care and may be related to the structure of the health care system. This study explored the relationship between continuity of care and trust in one's physician, particularly in terms of differences between the United States and the United Kingdom (UK). *Methods:* We conducted a cross-sectional survey of adult patients ( $n=418$  in the United States and  $n=650$  in the UK) who presented in outpatient primary care settings in the United States (Charleston, SC, and Lexington, Ky) and in the UK (Leicester and Exeter). *Results:* A high percentage of both groups of patients reported having a usual place of care and doctor. A total of 69.8% of UK patients and 8.0% of US patients have had their regular physician for  $\geq 6$  years. US patients (92.4%) are more likely than UK patients (70.8%) to value continuity with a doctor. Both groups had high levels of trust in their regular doctor. Trust was related to one continuity measure (length of time for the relationship) but not to another (usual provider continuity index more than 1 year). In a multivariate model, country of residence had no independent relationship with trust, but continuity of care was significantly related. *Conclusions:* Higher continuity is associated with a higher level of trust between a patient and a physician. Efforts to improve the relationship between patients and physicians may improve the quality and outcomes of care.

8% in U.S. vs. 70% in U.K. had regular MD  $\geq$  6 years



## Commentary

# Endangered: diagnosing rare diseases under managed care

By Joshua R. Shua-Haim, FACP,  
and Joel S. Gross, FACP

Under managed care, physicians face increasingly difficult ethical dilemmas regarding patient care. Managed care often forces physicians to reconsider how to deliver health care in order to satisfy their masters (HMO administrators). This strategy is not always in the best interest of the patient.

Capitation, for example, encourages physicians to reduce hospitalization rates and use of specialists. Physicians can easily profit under capitation if they change their practice habits. HMOs encourage this new breed of managed care physician to practice "profitable" medicine, since both will financially benefit from it.

We anticipate that as a result of managed care, rare diseases will become even rarer, to the point that their diagnosis will virtually disappear. How

is this possible? One of the many challenges facing the internist is the diagnosis of disorders that may require a great deal of physician time, testing, consultations and further investigations. Rare diseases fit into this category because they are

Recently we cared for a 67-year-old man who suffered long-standing, poorly controlled hypertension. He had been seen by several primary care physicians, but none spent the necessary time to consider the rare causes of hypertension. He was compliant with medications, but still his blood pressure remained elevated. After an extensive history and physical examination, we



*Joshua R. Shua-Haim, FACP, takes time to talk to a patient (center) and her relatives, an activity he fears managed care discourages.*

decided to test for a rare but curable form of hypertension, a pheochromocytoma.

This diagnosis was established and the benign tumor of the adrenal gland was successfully removed. The patient's blood

physician fees and hospital charges was more than \$50,000.

Would such a rare condition be caught in a managed care environment? And even if such a condition was diagnosed, would a managed care company feel the costs for the surgery were justified? To control costs, managed care organizations often discourage referrals to specialists and for hospitalizations. Thus the complicated and challenging elderly patient may not get the necessary services and consultants to be correctly diagnosed and treated.

One important way to determine the prevalence of rare conditions is to perform autopsies on patients. This procedure determines beyond any reasonable doubt whether certain illnesses have been misdiagnosed, underdiagnosed or improperly treated. HMOs we contacted did not disclose the percent of autopsies being performed in managed care settings. We feel that implies that the managed care companies do not wish to see if they are "burying their mistakes" or do not want to know if rare diseases were missed.

We feel that declining autopsy rates combined with limited availability of spe-

cialist fees and hospital charges was more than \$50,000. in the near future. Managed care companies will not eradicate these conditions but will deter physicians from providing the time and access to specialists needed to discover them. We agree with the five proposals ACP outlined in the Feb. 15 issue of *Annals of Internal Medicine* regarding reformation of managed care. Additionally, we suggest HCFA might consider the following:

1. HMOs and their administrators should not be allowed to dictate guidelines on how to practice medicine. This should be reserved for medical schools, universities and residency training programs.

2. HMOs should not be permitted to dismiss physicians based solely on economic practice patterns but must also consider quality of care and cost-effectiveness.

3. If a subspecialist wishes to practice primary care, HMOs should not be able to decline that service solely because of that physician's subspecialty training.

4. HMOs should be regulated in a manner that allows participating physicians to practice as they were trained. If there is catastrophic illness, rare disease, or if an expensive work-up or treatment is needed, physicians should be able to practice to the patient's benefit rather than to the organization's financial advantage. ■

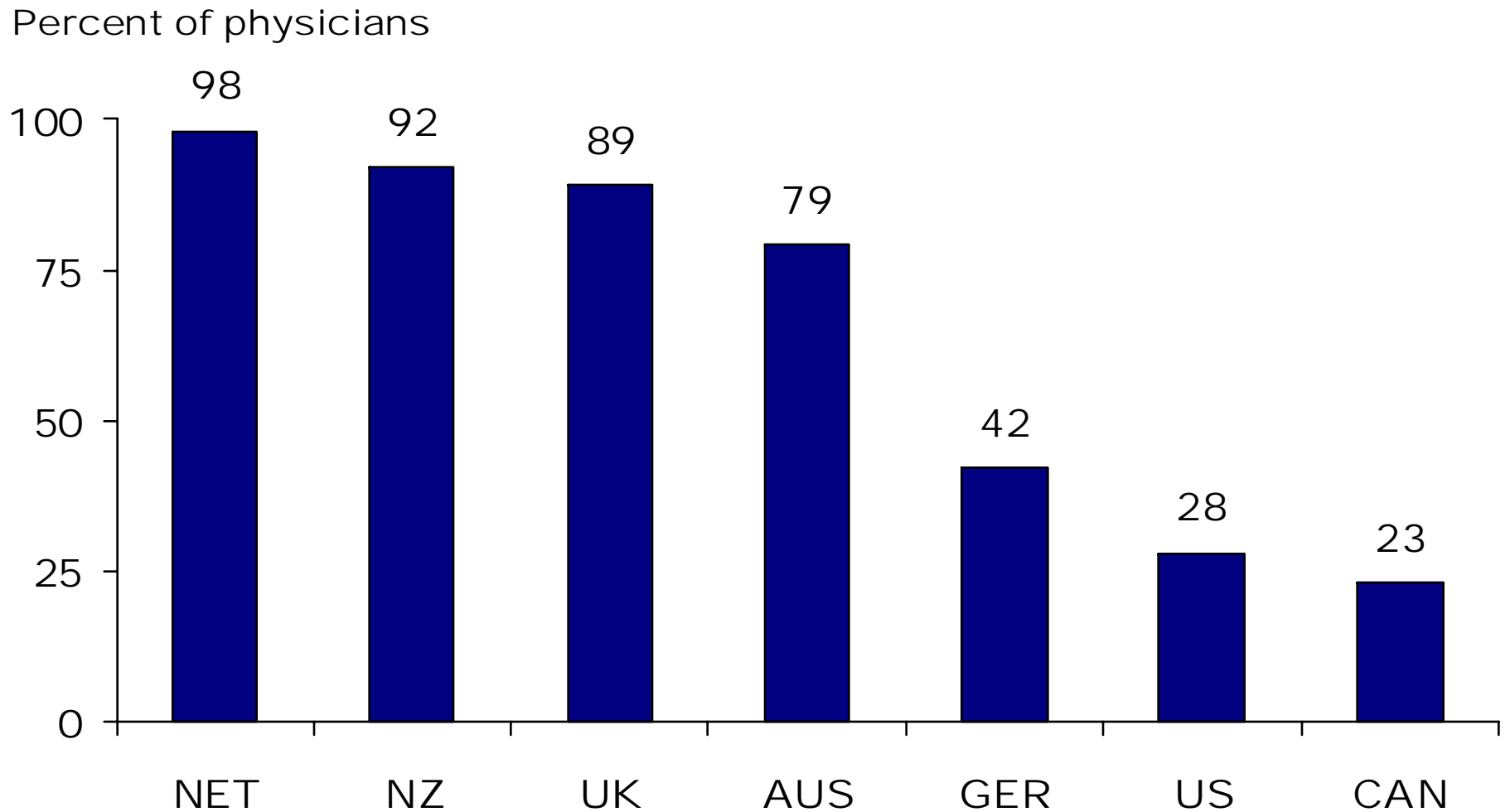
*Joshua R. Shua-Haim, FACP, and Joel S. Gross, FACP, are internist/geriatricians at MedWise Center, affiliated with Jersey*

# 4. Longitudinal records

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- Unfortunately, today only likely place where previous medical info resides
- Memory joggers
  - Electronic decision support
    - Linking lab and pharmacy data to diagnose drug reactions
- Raises multiple issues
  - Data display/access efficiencies
  - Data recording documentation ease
  - HIPAA – (where is the “P”)

# Primary Care Doctors Use of Electronic Patient Medical Records, 2006



Source: 2006 Commonwealth Fund International Health Policy Survey of Primary Care Physicians

Fulfilling the Promise Canada Health Infoway Inc. Annual Report 2005-2006



Canada Health Infoway Inforoute Santé du Canada



Canada Health  
Infoway

Federal Govt  
\$1.2 Billion to date

# 5. Emphasis on good history and listening

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- Long tradition of primary care skill
  - Vs. specialists: tests & procedures
    - Specialists “integrate” dx and rx: risk conflict
- Pt knowledge, trust, and time synergize
- Confidence, experience communication skills

# A Chronic Dose

A twenty-something writer's take on life with multiple chronic illnesses--the good, the bad, and of course, the humorous.

SATURDAY, SEPTEMBER 29, 2007

## ➤ Specialists, Specialists Everywhere, But for the Little Things, Not a Doc to Spare

The last time I had any sort of primary care doctor was when I was in first grade, up until the pediatrician who referred me as a baby to the ENT and immunology doctors handed me off to them altogether. It appeared I wasn't exactly an ideal candidate for generalized care. Considering the strep that sent most little kids to the doctor's office for a quick swab test and some meds ended up spewing from my ears and lodged in my knees, I can't really argue with his logic.

For most of my childhood and young adulthood, I rotated among specialists for a confounding array of ailments: an asthma/allergy doctor for my lungs (and we all know how well *that* went); an



### About Me

**Name:**

Laurie Edwards

**Location:**

Massachusetts, United States

The Essentials: I'm 27, married,



# 6. Broader, knowledge

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- Comprehensiveness: of experience, considerations, services
- Knowledge, skills of broad range of diagnoses non-atrophied
- Experience to zero in on “don’t miss” dx e.g. neurosurgical, cardiac, ENT.
- Ability to more accurately weigh rare vs. common
  - Better Bayesians



Rev. Thomas Bayes (1702 — 1761),

# 7. Continuity; ↓ fumbled handoffs

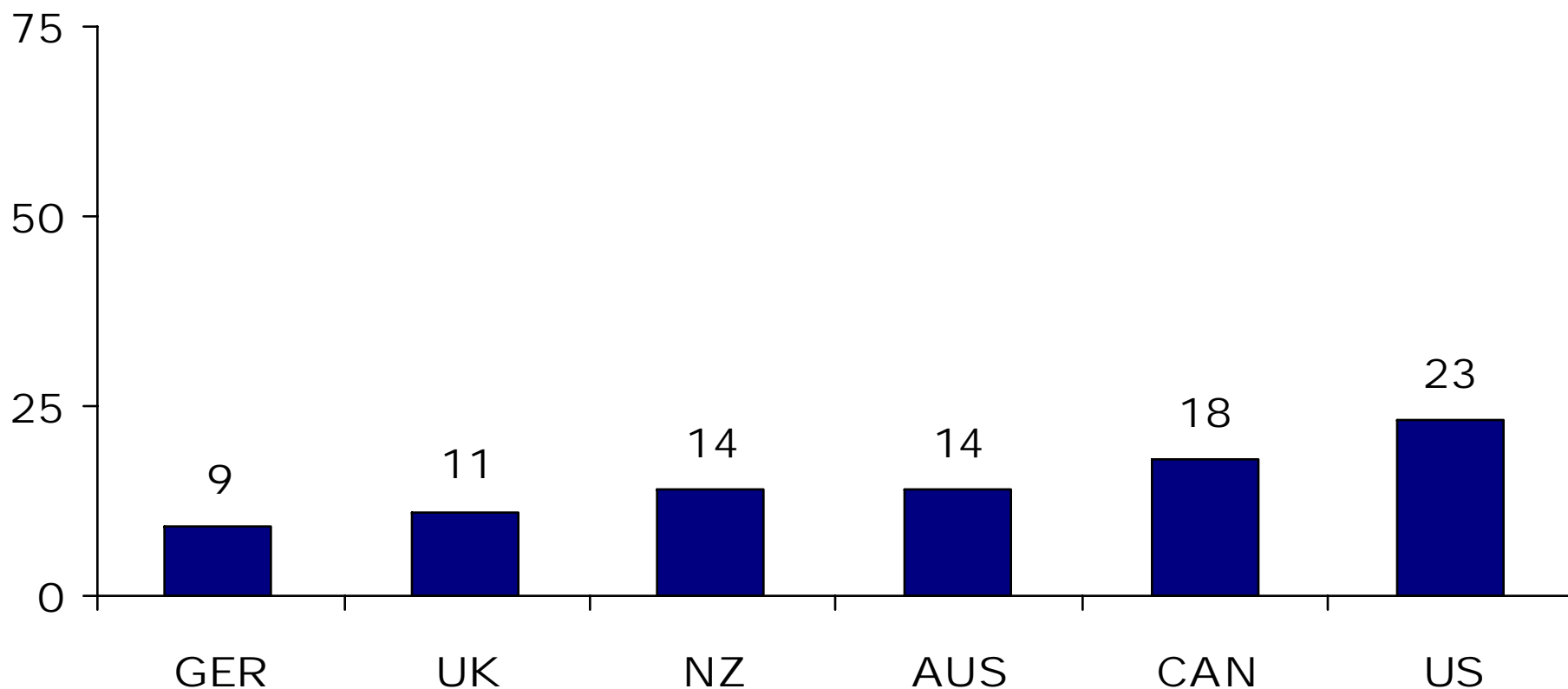
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- Dropped balls
- Example: Critical/abnl test f/up
- Multiple dimensions of continuity

# Incorrect Lab/Diagnostic Test or Delay

## Receiving Abnormal Test Results, Sicker Adults, 2005

Percent reporting either lab test error in past two years



2005 Commonwealth Fund International Health Policy Survey of Sicker Adults

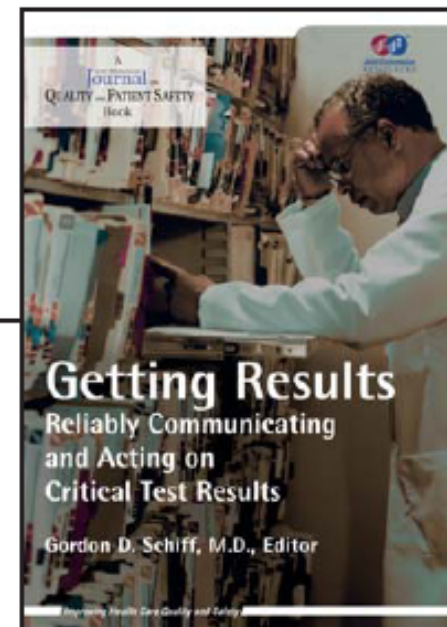
Goal	# 2 Top JCAHO Citation	1 <sup>st</sup> Qtr 2007	2006	2005	2004	2003
Number of surveys		330	1,429	1,573	1,528	1,249
1A Two patient identifiers		96.1	91.9	95.3	95.9	96.2
1B "Time-out" before surgery*		78.8	74.2	82.7	92.0	91.1
2A Read back verbal orders		94.5	84.3	87.7	91.8	92.6
2B "Do not use" abbreviations		63.9	63.1	61.4	75.2	76.5
2C Reporting critical test results		64.2	73.1	90.5	--	--
2E Hand-off communication		94.2	93.9	--	--	--
3A Restrict concentrated electrolytes		--	--	98.6	98.1	97.0
3B Standardize drug concentrations		99.4	98.3	98.5	99.1	99.4
3C Look-alike, sound-alike drugs		93.6	92.6	97.6	--	--
3D Labeling medications & solutions		84.8	91.1	--	--	--
4A Preoperative verification process*		99.7	97.1	95.5	94.6	98.5
4B Surgical site marking*		95.2	93.4	96.7	95.4	93.8
5A Infusion pump free-flow protection		--	--	99.9	99.9	99.7
6A Maintain & test alarm systems		--	--	--	99.9	98.6
6B Alarms set properly & audible		--	--	--	98.3	97.9
7A CDC hand hygiene guidelines		93.6	91.2	96.4	98.8	--
7B Health-care associated infection		100	99.9	100	99.9	--
8A Medication list & reconciliation		81.8	66.1	99.9	--	--
8B Transfer/discharge reconciliation		81.5	72.5	99.7	--	--
9A Fall risk assessment		--	--	95.5	--	--
9B Fall prevention program**		93.3	93.5	--	--	--
13A Patient involvement		98.5	--	--	--	--
15A Suicide risk assessment		95.8	--	--	--	--

# Getting Results: Reliably Communicating and Acting on Critical Test Results

edited by **Gordon Schiff, M.D.**

patient safety leaders David Bates and Lucian Leape urge health care organizations to ensure that “no critical test result is lost and that all such results are managed with a speed appropriate to their urgency.”

This book includes seminal articles from the *Joint Commission Journal on Quality and Patient Safety* and adds new chapters to describe what hospitals, laboratories, and outpatient practices are doing to improve communication of critical test results.



## Patient Information Needed to Interpret and Decide on Best Action in Response to Test Result

1. Reason for test (what is being sought to rule out or in?)
2. Diagnosis (prior diagnoses?)
3. Previous results (is it new? how has it changed?)
4. Drugs- being prescribed/taken (if microbiology culture was empiric, the antibiotic given?)
5. How abnormal is the result?
6. Quality of the test performance (for example, is it hemolyzed, contaminated, was it fasting, adequate bowel preparation?)
7. Qualitative interpretation of the test result (for example, radiologist differential on the MRI image?)
8. When is the patient's next scheduled appointment? (plus other patient logistical issues, notification preferences)

# Dimensions of Continuity

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- Record continuity
- Clinician continuity
- Site continuity
- Continuity as a continuum of care
- Continuity as an attitudinal contract and construct

GW Center to Improve Care of Dying  
<http://www.gwu.edu/~cicd/toolkit/contin.htm>



- *Experienced Continuity*  
Experience of co-ordinated smooth care from pt's point of view
- *Information continuity*
  - Excellent information transfer following pt
- *Cross-boundary and team continuity*
  - Effective communication between professionals and services w/ pts
- *Flexible continuity*
  - Flexibly adjust to the needs of the individual over time
- *Longitudinal continuity*
  - Continuing care from as few professionals as possible
- *Relational or interpersonal continuity*
  - One or more named professionals with whom pt can develop a therapeutic and interpersonal relationship

## 8. Best poised for test of time-practicing conservative medicine

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- Amalgamation and culmination of trust, continuity, familiarity, experience
- # tests, referrals, and empiric treatments inversely related to “comfort” w/ watchful waiting strategy for that patient

# 9. Best poised for follow-up, feedback, learning

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- Currently Open Loop System
- Need Closed loop system for follow-up, feedback and learning

# Open Loop System

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Water goes on the same time each day, regardless of whether it is raining or lawn is flooded

# Diagnosis Error? Case

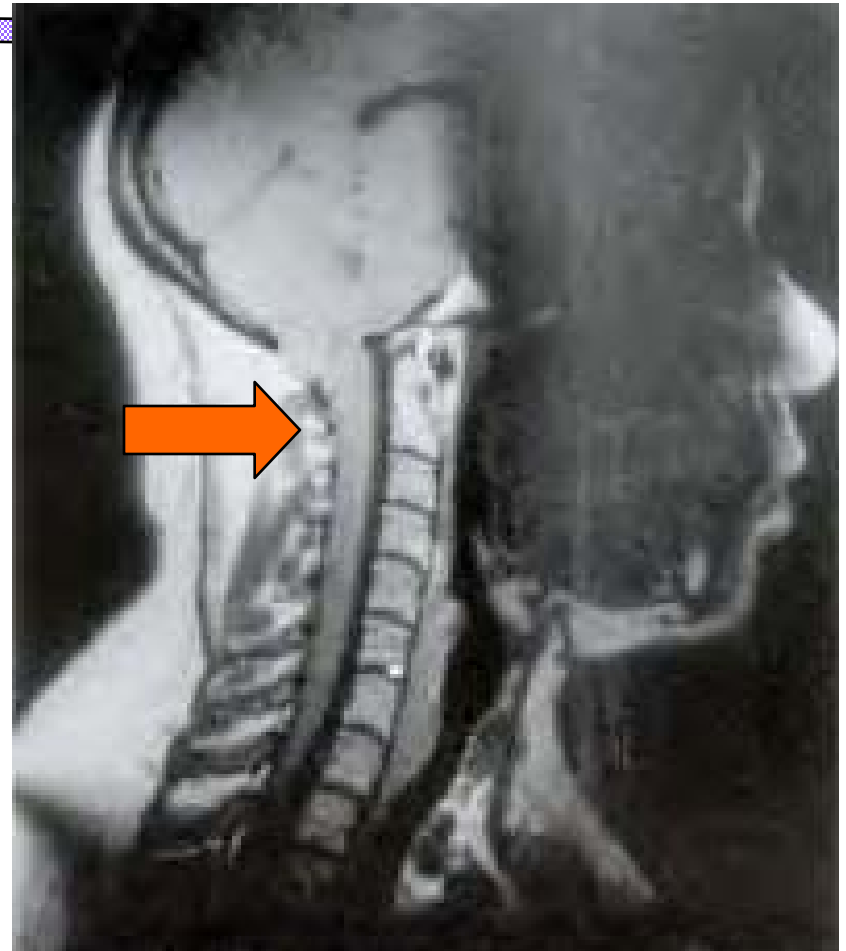
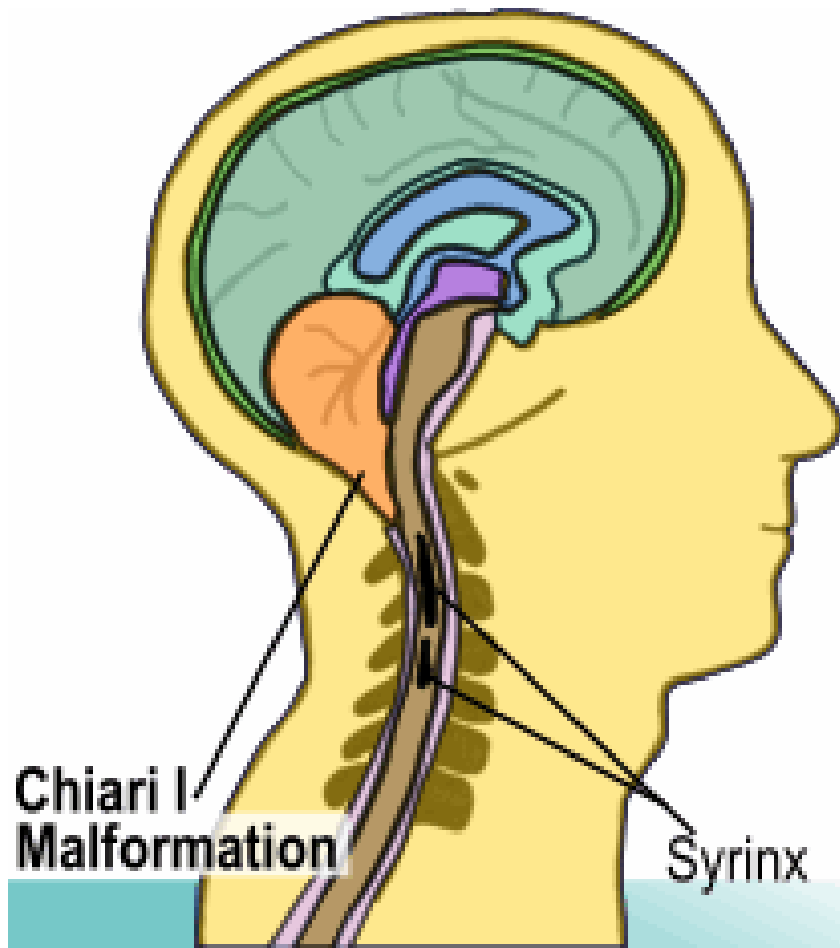
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- 23 y.o. man with multiple visits for psychiatric sx and dx of anxiety, depression, headaches
- Walk-in clinic for "med refill;" giving non-specific hx of pressure on back on head and periodic "total body numbness"
  - Uncannily same in computer 8 mos back
- cursory neurologic exam: hyper-reflexia and clonus (4 beats)

# Diagnosis Error? Case

---

- 23 y.o. man with multiple visits for psychiatric sx and dx of anxiety, depression, headaches
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  - Uncannily same in computer 8 mos back
- cursory neurologic exam: hyper-reflexia and clonus (4 beats)
- **Is this c-spine basilar invagination Chiari malformation?**



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# Wrong Diagnosis?

see for yourself



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▼ Diseases

▼ Diagnosis

▼ Centers

▼ Fun

▼ Boards

## Clonus:

Causes ▶

Diagnostic Guides ▶

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### Narcolepsy Symptoms

How Narcolepsy affects

[Symptoms](#) » [Clonus](#) » [Causes](#)

## Causes of Clonus

This section discusses 15  
medical conditions causing  
Clonus. A simple discussion of  
these causes with additional  
information is [below](#).

For detailed discussions of the  
causes and diagnosis of Clonus,  
refer to our [online medical  
textbook sections for Clonus](#)  
(free online access, no  
registration required).

### [Manic Depression Info](#)

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## Causes of Clonus:

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# Wrong Diagnosis?

see for yourself



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[www.UltraCare-Dialysis.com](http://www.UltraCare-Dialysis.com)

### [Symptoms of Slipped Disc](#)

## Causes of Clonus and Hyperreflexia and Paralysis symptoms

See what causes (diseases) are shown to have all of the symptoms you have selected. You can also see what other disease causes have at least one of those symptoms. Look deeper by selecting more symptoms from the box marked "Add Another Symptom". (Or [start again with new symptoms.](#))

### Selected Symptoms ([Start Over](#))

#### ■ Clonus

[More About Causes of this symptom](#)

[Remove](#)

■ [Introduction: Clonus](#)

■ [Causes \(15 conditions\)](#)

# 10. Accountability

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- Not hit and run diagnosis
- Assuming responsibility to pursue unexplained concerns
- Responsible for referring where needed and f/up on these referrals



Donabedian: “Trajectory studies”

*“useful probes to track patients with particular diagnoses through their course of care, thereby systematically examining and illuminating the quality of care.”*

# 10. Accountability

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- Not hit and run diagnosis
- Assuming responsibility to pursue unexplained concerns
- Responsible for referring where needed and f/up on these referrals
- Larger systems responsibilities for populations

# Donabedian:

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Quality assurance should reflect an identification with, rather than an alienation from, the monitoring enterprise, so that the feeling is that the enterprise is “ours” rather than “theirs”  
= Property of “Ownership”

# Countervailing Factors/Arguments

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- Lack familiarity rarer conditions
  - Thus less likely to consider
- Prejudiced by base rates common illnesses
  - Thus more likely to dismiss
- Fresh eyes phenomenon
  - Rethinking diagnosis from scratch
- Not as up-to-date on specialized dx
- Time, time, time

# Starfield: focus not on diagnosis but on presenting problem

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- Most assessments of the quality of diagnostic workup start with a study of the diagnosis and retrospectively examine the adequacy or appropriateness of the procedures used to reach it.
- Instead need emphasis on “presenting problem, ” especially in primary care because half of diagnoses in primary care do not resolve into codable diagnostic entities
- Because many systems depend on a diagnosis for reimbursement, the information that derives from official records or claims forms generally provides overestimates of the incidence and prevalence of specific diagnoses.

Starfield Primary Care pp. 32-3 1998

# Starfield Re-Casts Diagnosis

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*Not just “making a diagnosis”*

*Rather reconceptualizes as:*

- Problem Recognition
- Diagnosis
- Management
- Reassessment.

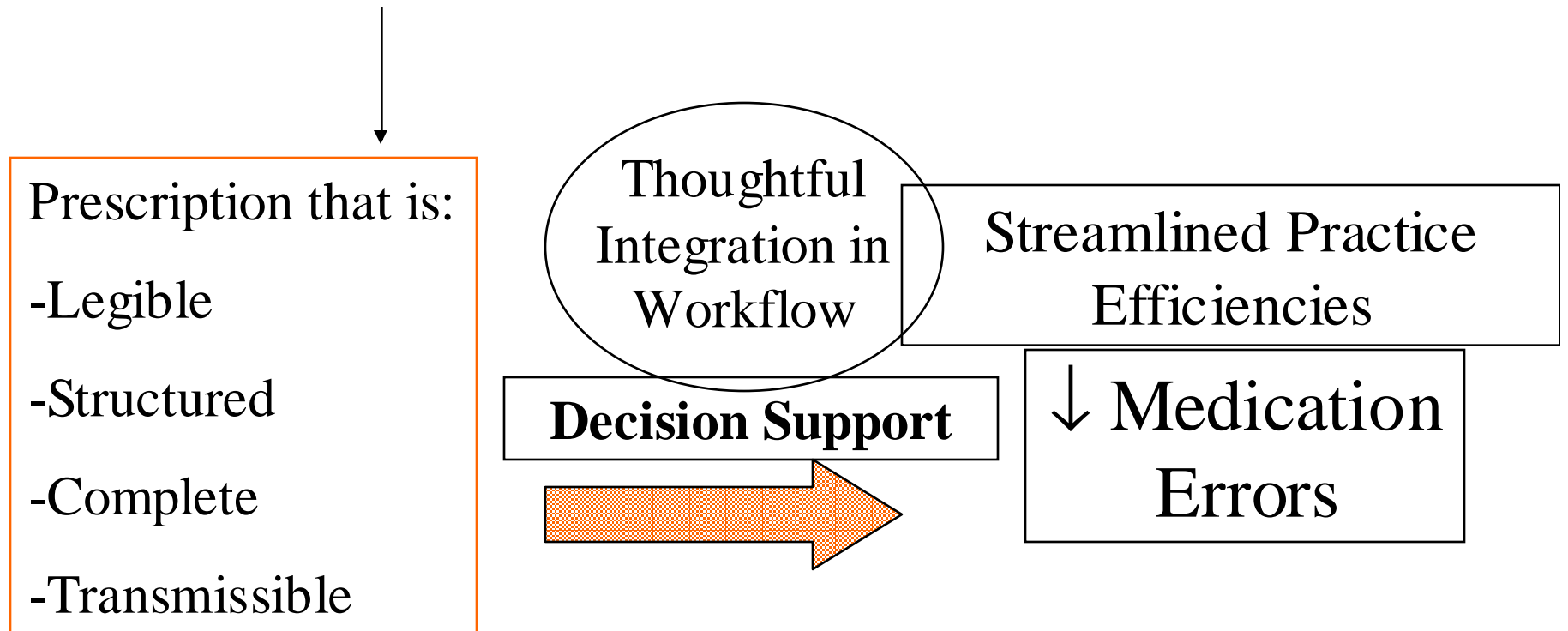
Starfield Primary Care 1998 fig 2.1



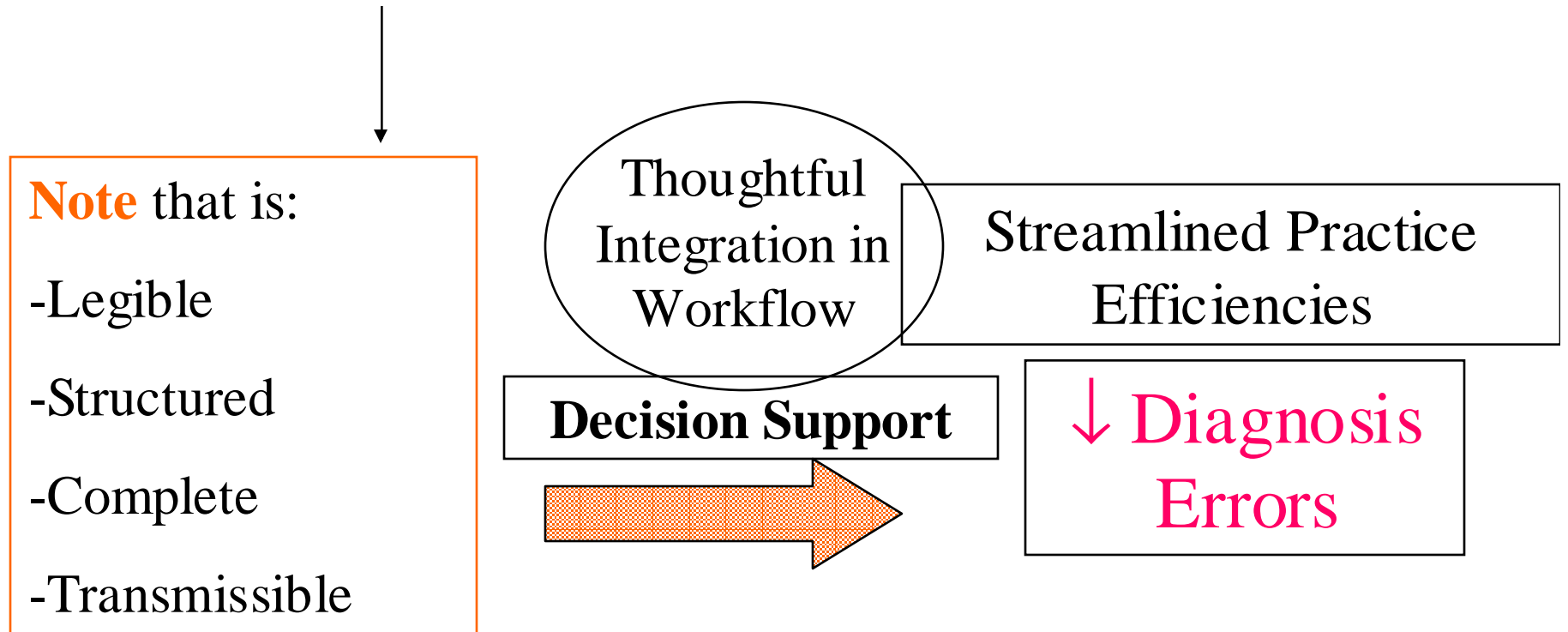




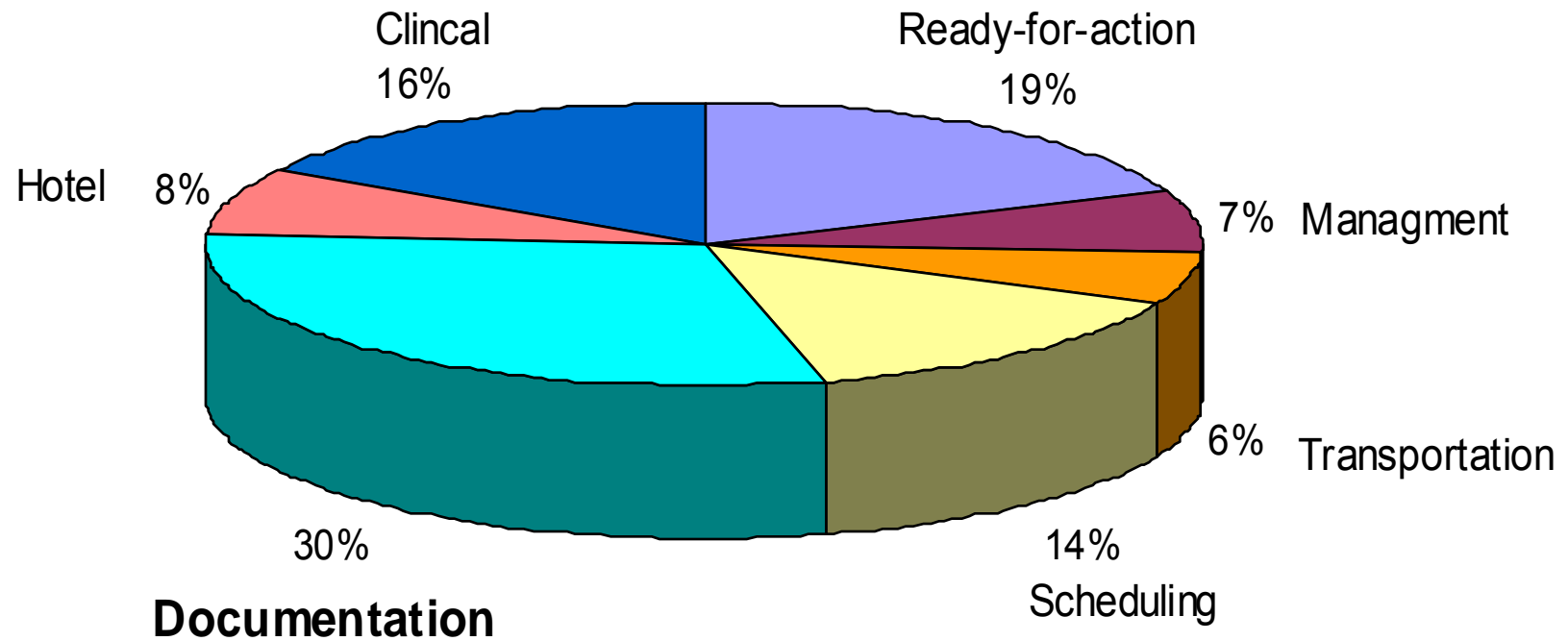
# Computerized Provider Order Entry (CPOE)



# Computerized Clinical Documentation (CDD)



# How Clinical Staff Spend Their Time



From Lathrop, P in Black, A BMJ 2002

# **Clinical Documentation to Help Organize, Structure, Inform Thinking**

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- A. Data Access/Quality/Continuity/Efficiency**
- B. Info Linkages, Display, Organization**
- C. Decision Support**
- D. Integration with Systems Re-engineering**



# Donabedian

## “The Contents of Process Criteria”

---

- B. Elements of content primarily oriented to quality, the attention centered on the practitioner’s responsibility to the individual patient
- 1. Verification of the Diagnosis
- *Reasonableness* of the admission diagnosis
- *Confirmation* of the admission diagnosis
- *Justification* of the final diagnosis

Explorations Volume I Appendix B

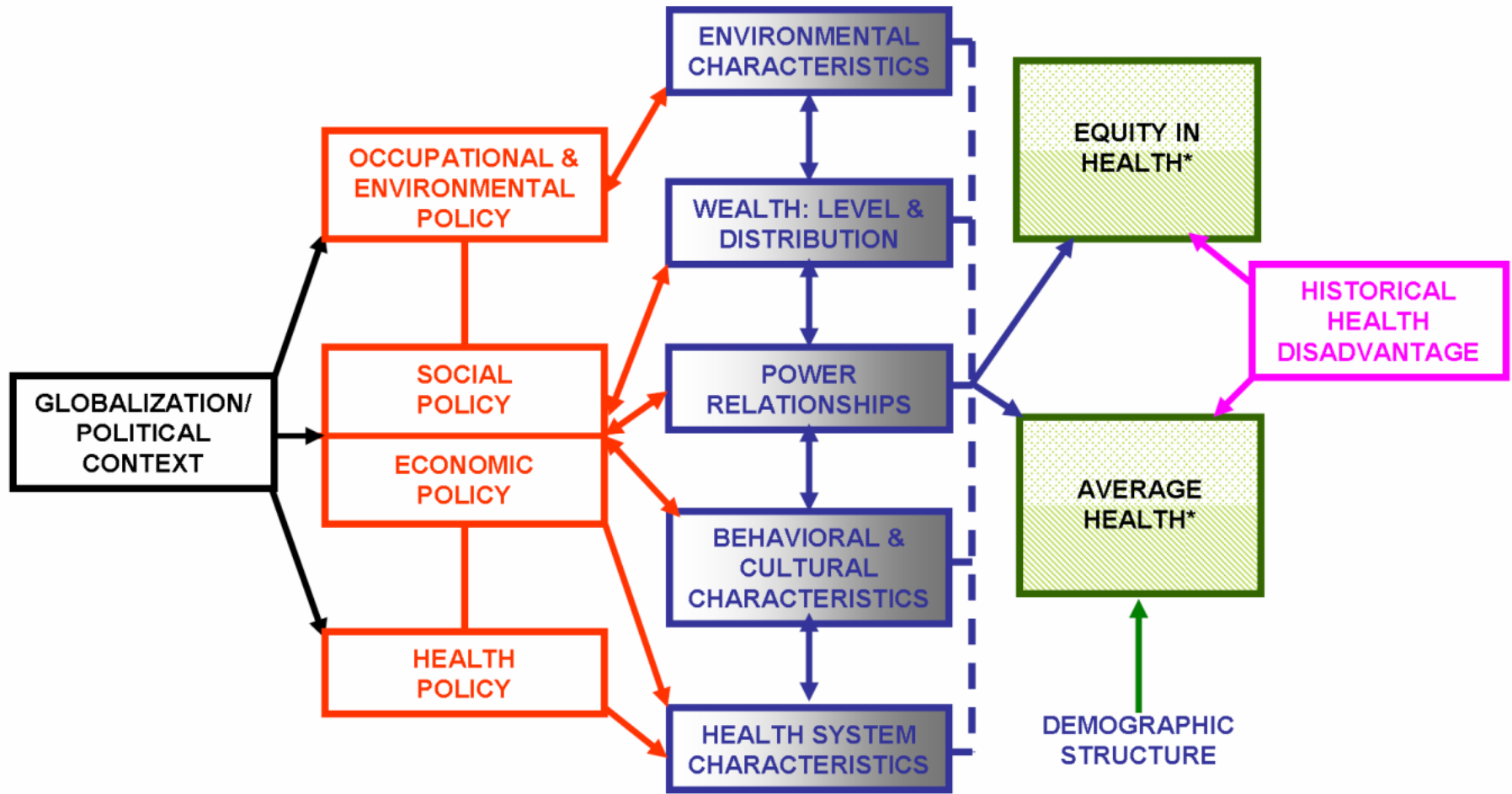


# Process--Outcome Interplay

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- While process is the primary *object* of assessment, the *basis* for judgement of quality is what is know about the relationship between process and outcome
- Was more concerned going forward from process to outcome rather than the opposite
- Wrote repeatedly how outcomes lack “specificity”

# Societal Influences on the Health of Populations



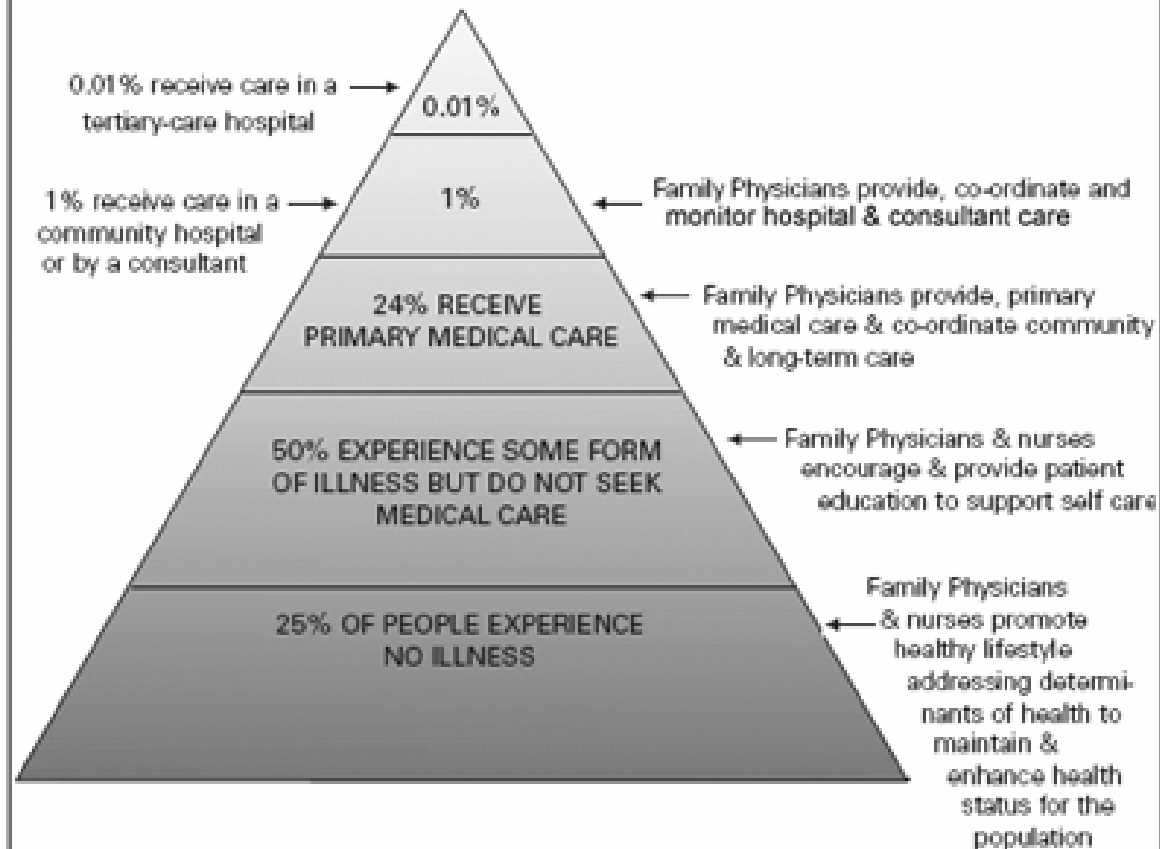
Dashed lines indicate the existence of pathways through individual-level characteristics that most proximally influence health.

Shading represents degree to which characteristics are measured at the ecological level (lighter color) or at the individual level aggregated to community.

\*"Health" has two aspects: occurrence (incidence) and intensity (severity).

Starfield 06/06  
IH 3425

**TABLE 3:** Describing Illness in the Community:  
Illness for 1000 Persons During a One-Month Period



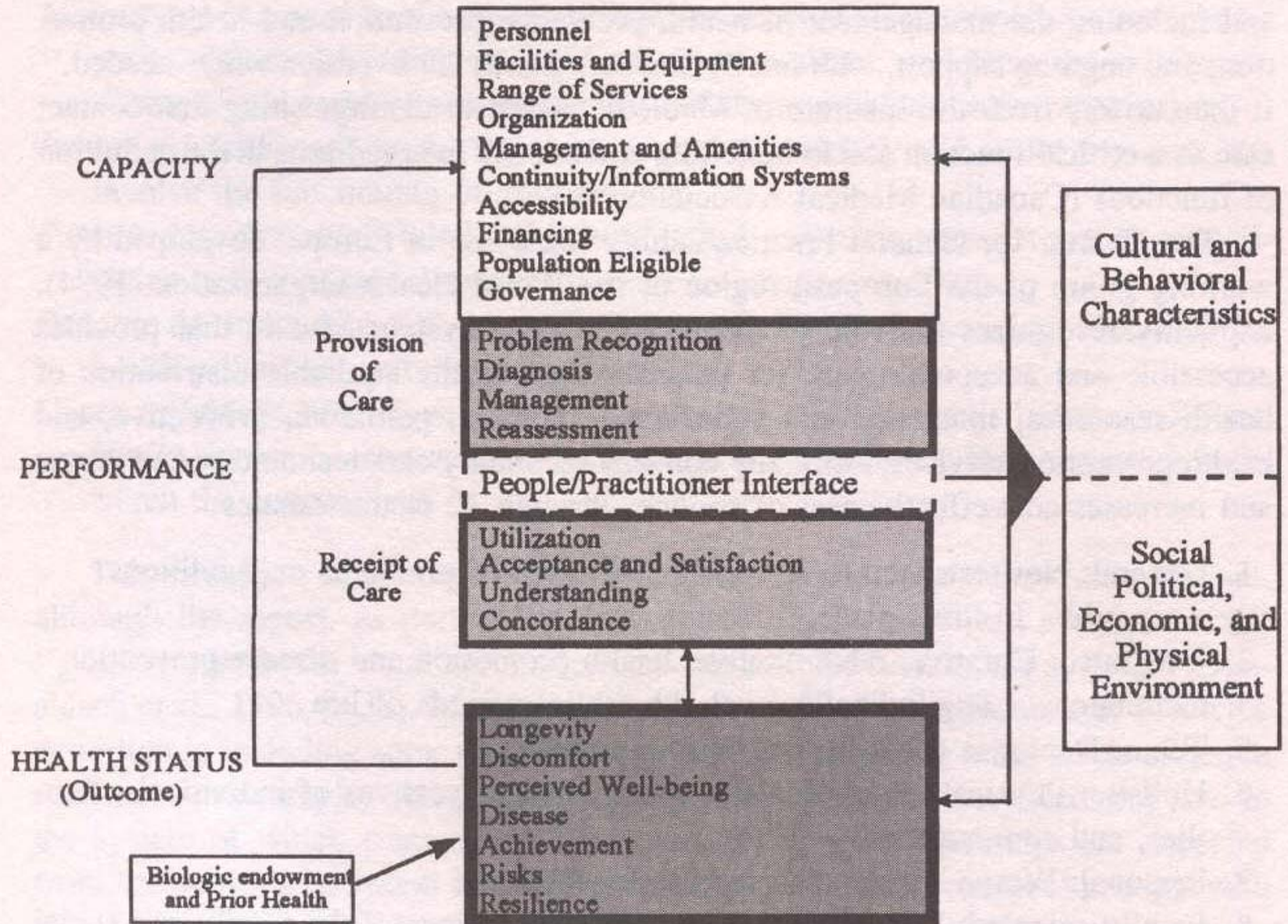


Figure 2.1. The health services system. Source: Starfield (1992).

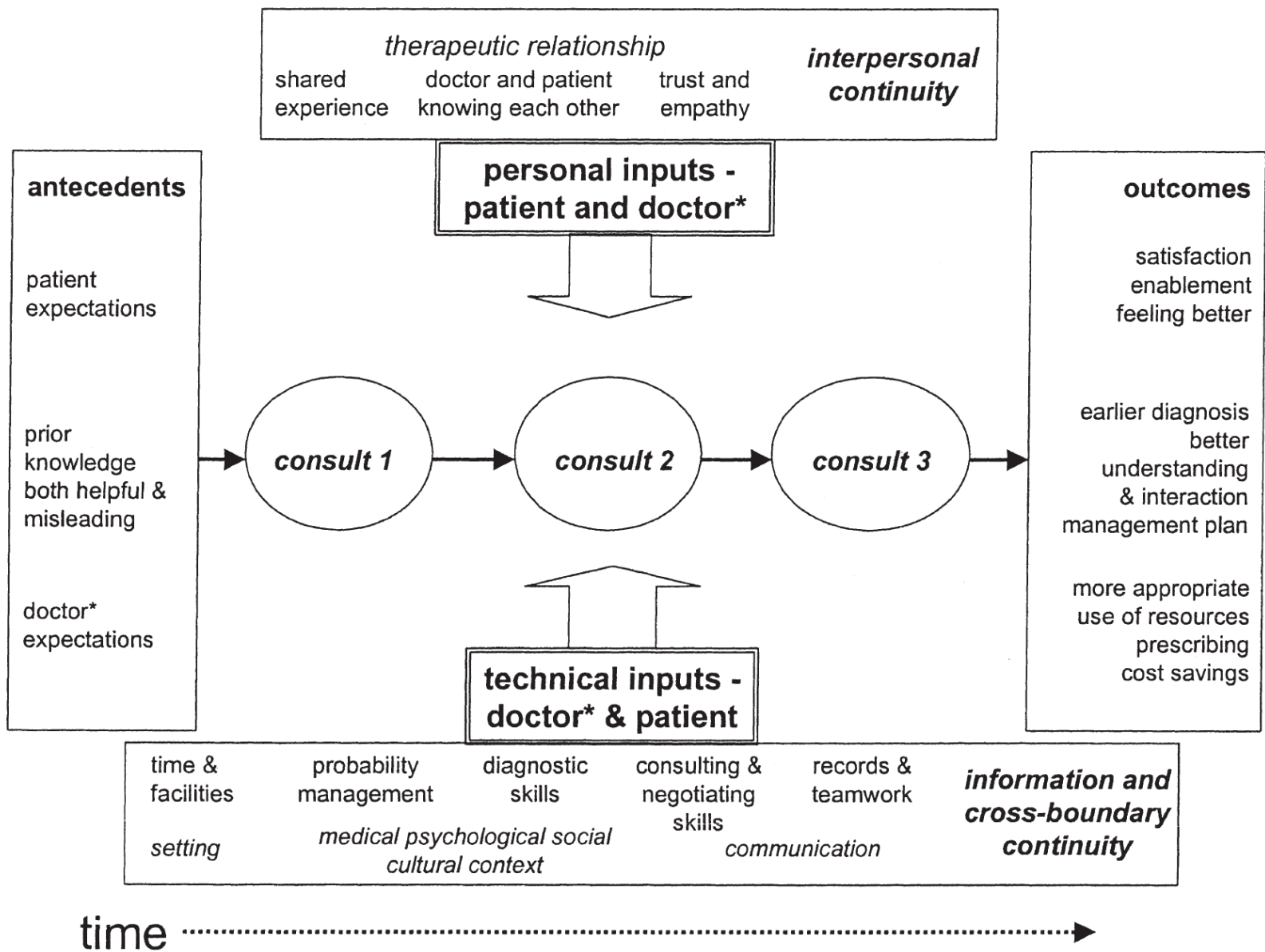


FIGURE 1 *Personal and technical inputs to consultations and their links with continuity elements over time. \*Note that, while we have specified doctor, these concepts apply equally to nurse practitioners and other primary care professionals*

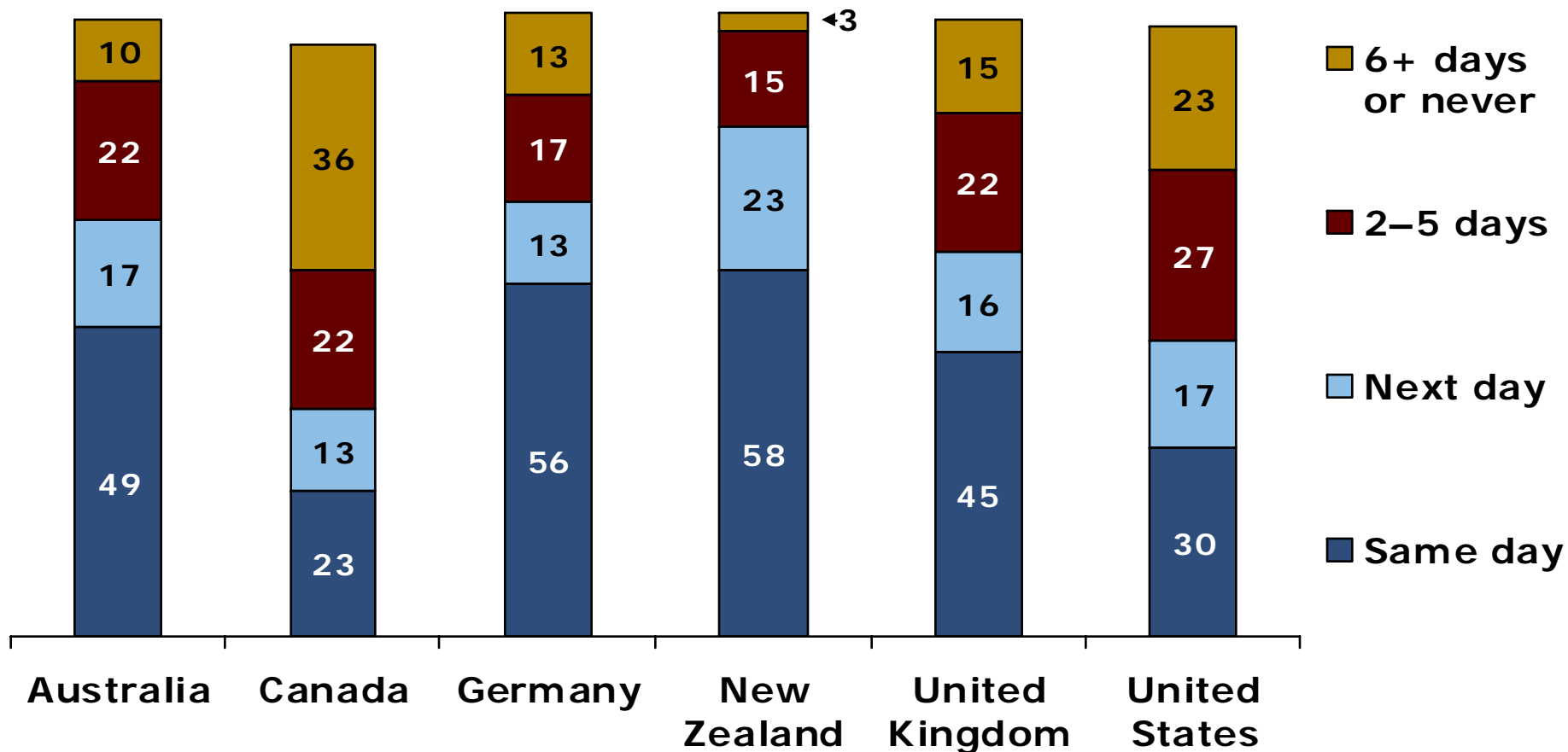
## Percentage of Sicker Adults Who Reported Long Waiting Times for Care, International Comparison, 2005

<i>Key: Lower rates are better (gold = best and red = worst country performance)</i>	<b>AUS</b>	<b>CAN</b>	<b>GER</b>	<b>NZ</b>	<b>UK</b>	<b>US</b>
<b>Waited 6 days or longer for a doctor appointment</b> (last time sick or needed medical attention)	<b>10</b>	<b>36</b>	<b>13</b>	<b>3</b>	<b>15</b>	<b>23</b>
<b>Waited 4 hours or longer to be seen in the emergency room</b> (among those who visited an ER in the past 2 years)	<b>17</b>	<b>24</b>	<b>4</b>	<b>12</b>	<b>14</b>	<b>12</b>
<b>Waited 4 weeks or longer to see a specialist</b> (among those who needed to see a specialist in the past 2 years)	<b>46</b>	<b>57</b>	<b>22</b>	<b>40</b>	<b>60</b>	<b>23</b>
<b>Waited 4 months or longer for elective surgery</b> (among those who needed elective surgery in the past 2 years)	<b>19</b>	<b>33</b>	<b>6</b>	<b>20</b>	<b>41</b>	<b>8</b>

Data: 2005 Commonwealth Fund International Health Policy Survey (Schoen, C. et al. 2005. *Health Affairs* Web Exclusive W5-509-25). AUS = Australia; CAN = Canada; GER = Germany; NZ = New Zealand; UK = United Kingdom; US = United States. Sicker adults have a high incidence of chronic disease and recent intensive use of health care.



## Waiting Times for a Doctor's Appointment When Sick or Needed Medical Attention: Percentage of Sicker Adults, International Comparison, 2005



Data: 2005 Commonwealth Fund International Health Policy Survey (The Commonwealth Fund 2005). Sicker adults have a high incidence of chronic disease and recent intensive use of health care. Percentages do not add to 100 because some respondents did not answer or were not sure.



# Diagnosis Error DEER Project

## Change Ideas: Perspectives

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- Diagnosis as part of a system
  - Diagnostic accuracy as a system property rather than what happens between MD's ears
- Rely less on human memory
  - For triggering, weighing, f/up
- Removing individual adversarial/blame
  - Open "breathing space" to honestly reflect & discuss
- Collaboration
  - Everyone doesn't have to make same mistake
  - Multidisciplinary perspectives (Elstein, Lambert, RNs)





Diagnostic  
Process Errors



## Diagnostic Process Errors

*Long Delay in CT Access*

*Scheduler overlook "urgent" on form*

*My failure to follow-up to fight for earlier*



Diagnostic  
Process Errors


## Diagnostic Process Errors

*Failure to take drug history in pt w/ cough*


*MD fails to examine abdomen in pt w/ abdom pain*

*Blood sample switched between 2 pts*

*CXR coin lesion not followed up*



Diagnosis  
Errors

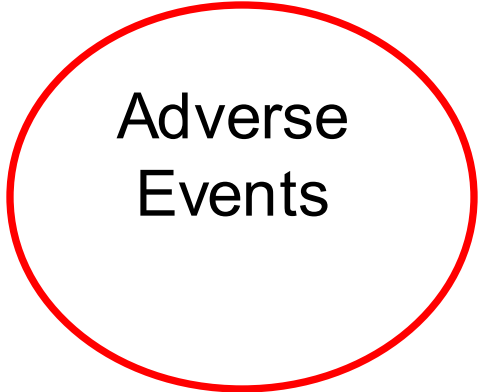


## Diagnosis Errors

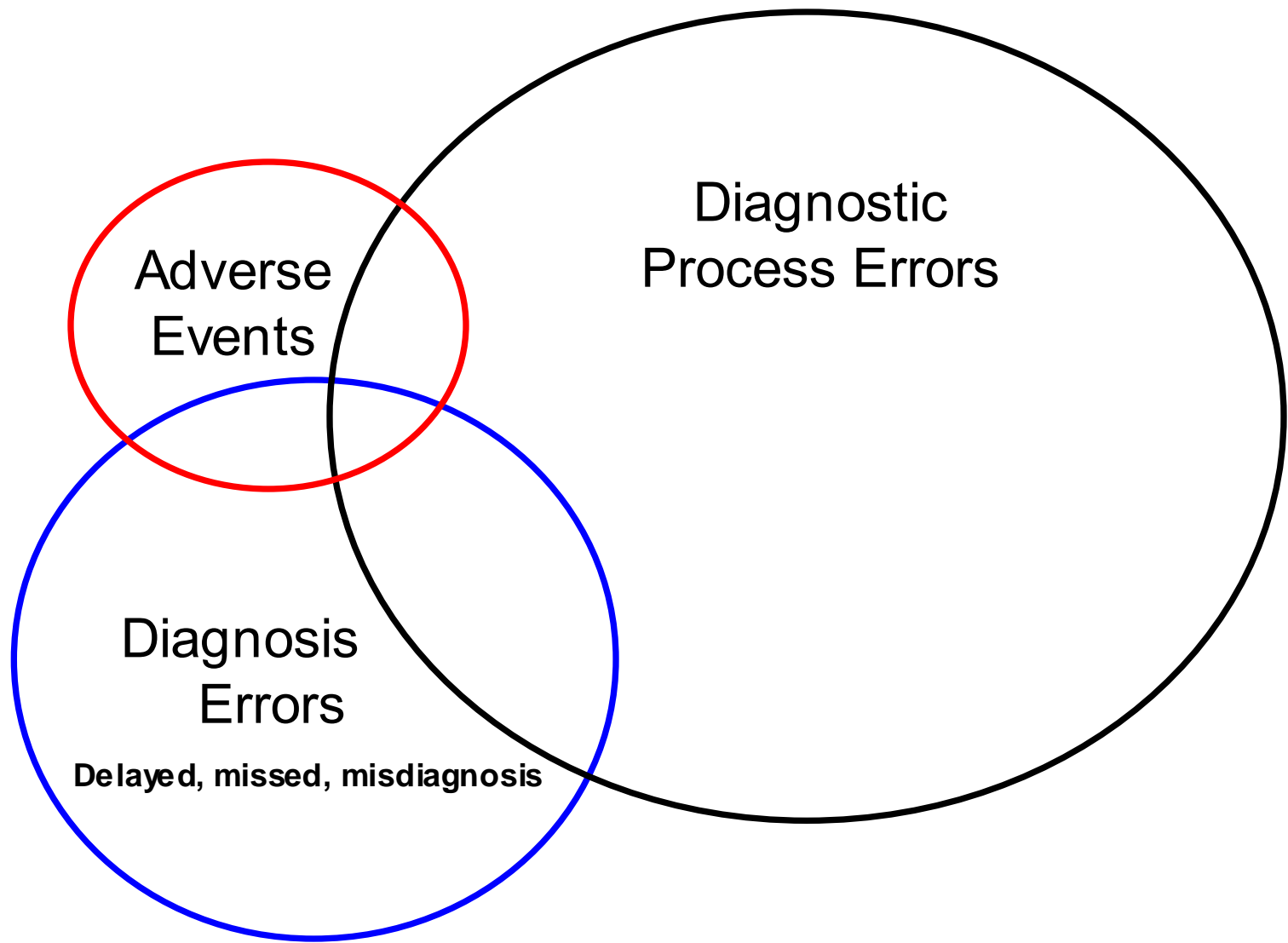
*Misdiagnosis*

*Delayed Dx*

*Missed Dx*



Adverse  
Events



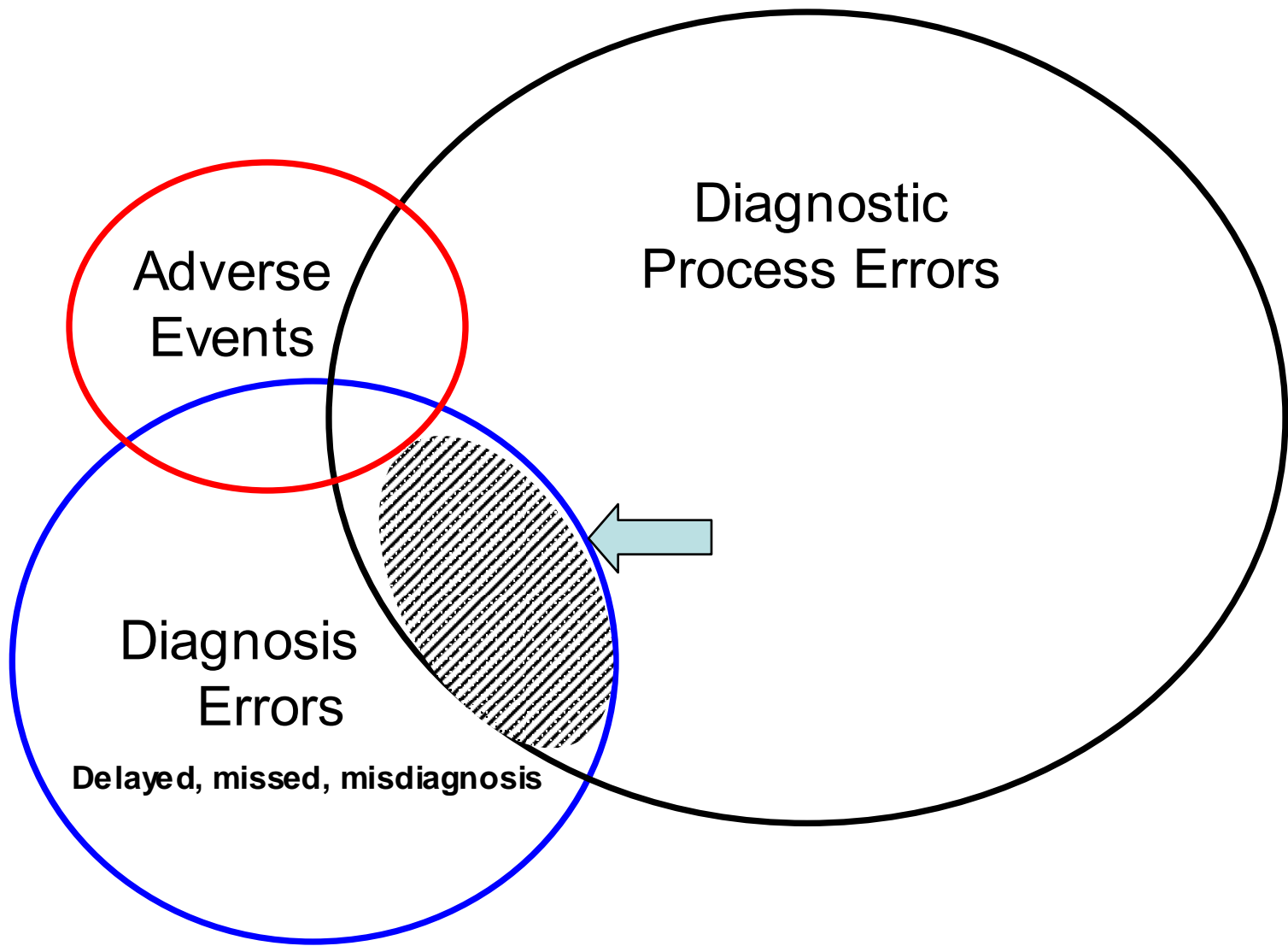
Adverse  
Events

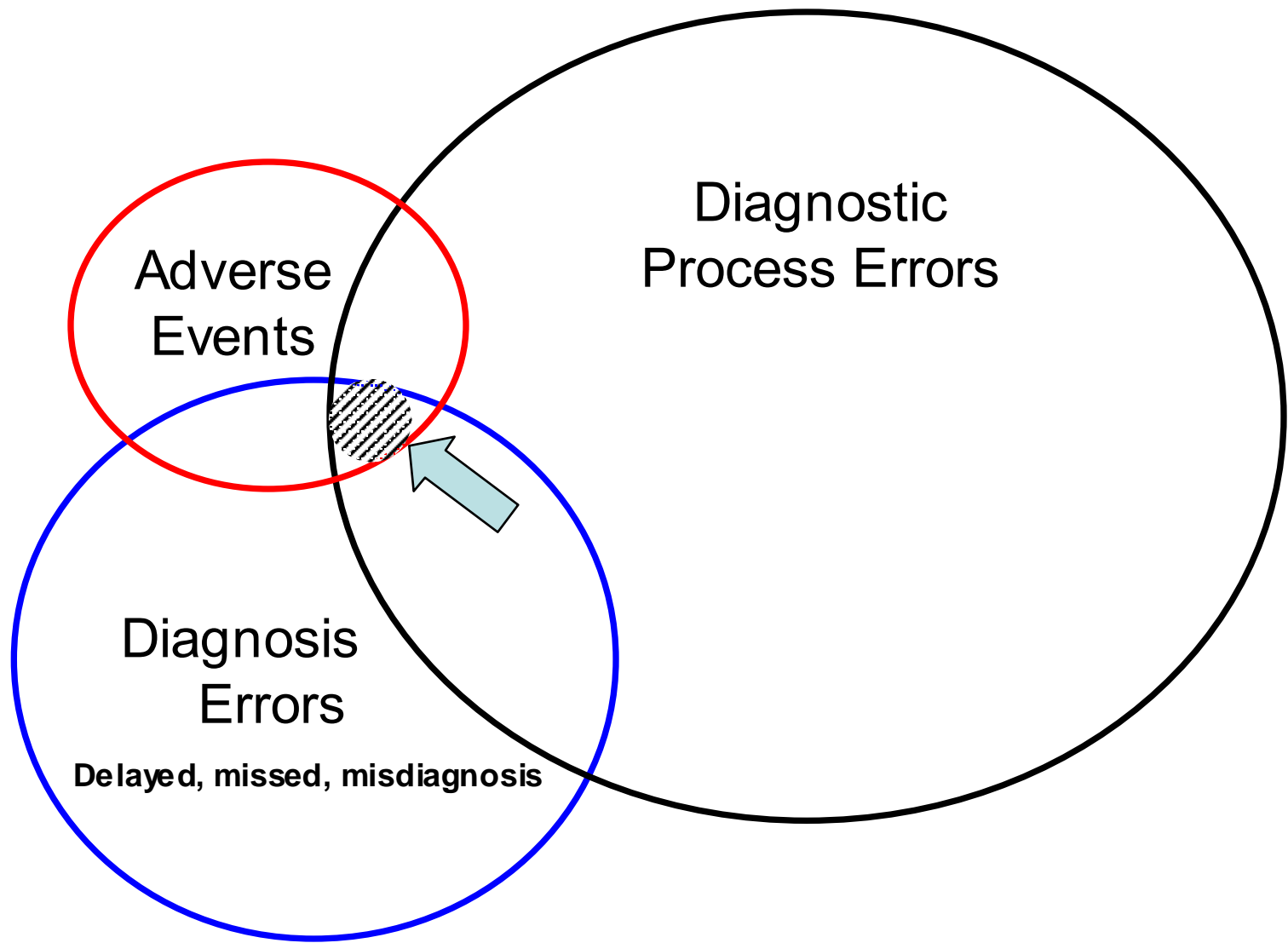
Diagnostic  
Process Errors

Diagnosis  
Errors

Delayed, missed, misdiagnosis







# **12 Questions Challenging DEER Investigators in Assessing Diagnosis Error Cases**

# Uncertainties about diagnosis & findings

1. What *is* the correct dx?
  - How much certainty do we have, *even now*, about what is the correct diagnosis?
2. What *were* the findings at various times
  - At points in time when pt seen; how much certainty that particular dx and findings were present at time(s) we are positing an error?

# Relationship between diagnosis failure and adverse outcomes

3. What is the probability that the “error” resulted in the adverse outcome?
  - How *treatable* is the condition?
  - How *critical is timely dx and rx* for outcome (in general and this case)?
  
4. How did the error in the diagnostic process contribute to making wrong dx and giving wrong treatment?

# Clinician assessment & actions

5. What *was* MD's diagnostic assessment?
  - How much consideration given to correct dx?
    - Often difficult to reconstruct as differential dx not well documented
  
6. How good was dx assessment based on evidence MD *had on hand* at that time?
  - Obvious, vs no way anyone could have suspected?

## Clinician assessment & actions

7. How “erroneous” was diagnosis based on difficulty in making dx at this point?
  - Difficult “signal to noise” situation; rare low-probability diagnosis; atypical presentation
  
8. How “justifiable” was failure to obtain additional information (history, tests)?
  - Both absolutely, & relative to constraints
    - How difficult to obtain missing/needed data:
    - Patient withholding/refusing to give accurate hx
    - Resource constraints: test backlog, cost

# Improvement opportunities?

9. Was there problem in assessment of the severity of the illness?

- With resulting failure to closely observe or follow-up in more timely way
  - Both absolutely and relative to constraints

10. To what extent did clinician actions deviate from “standard of care?”

- Negligent care: failure to follow accepted guidelines, expected practices, pursue abnl finding that should never be ignored?



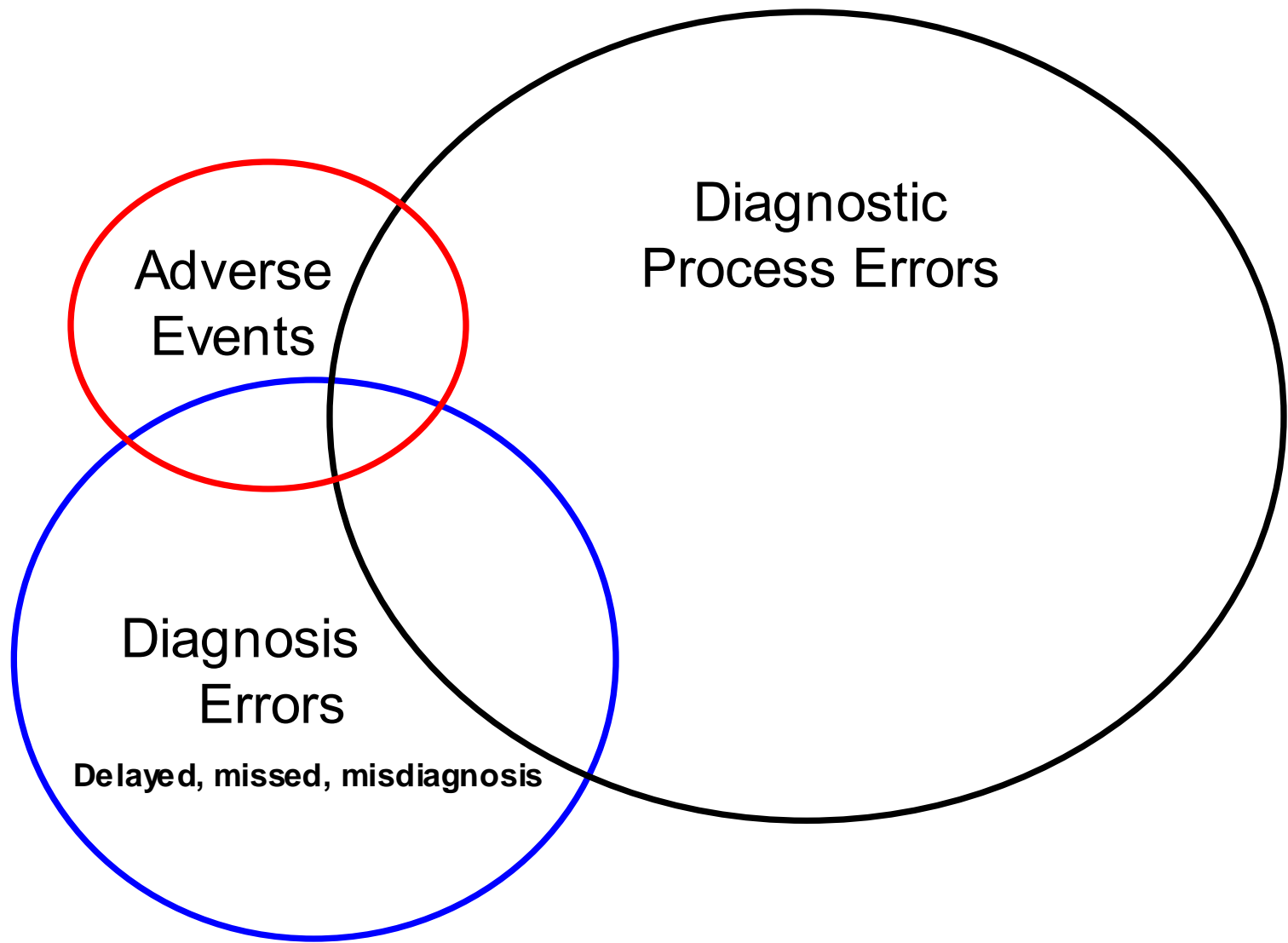
# Improvement opportunities?

11. How preventable is error in future?

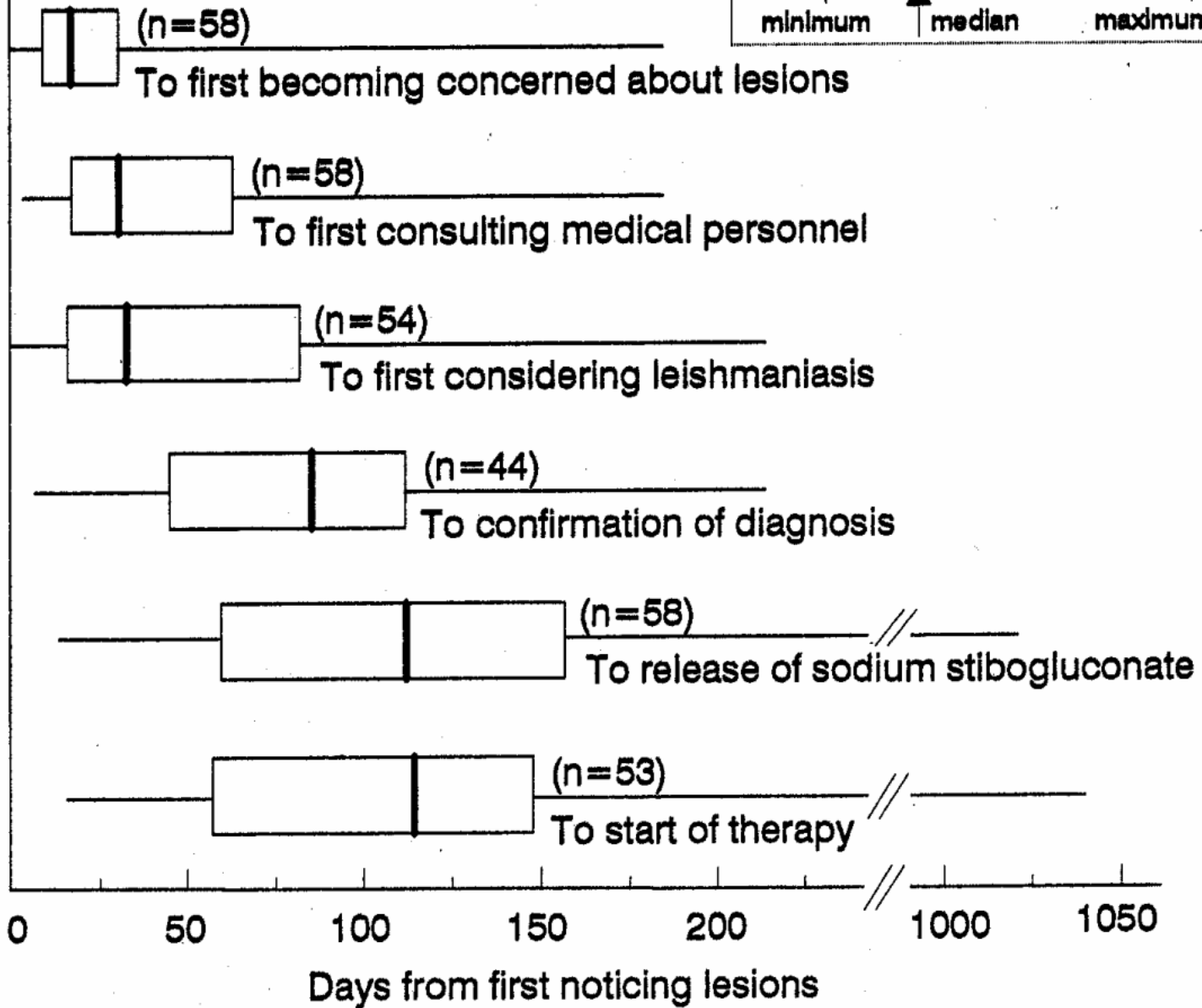
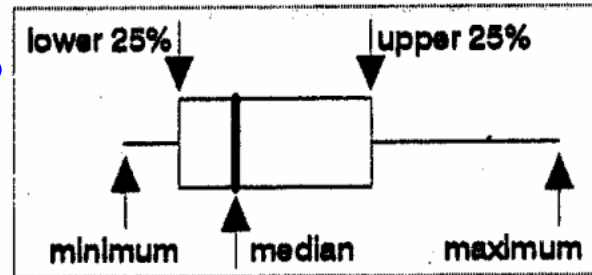
- How ameliorable or amenable to change are factors/problems that contributed to the error?
- What would the changes cost?

12. What should we do better next time we encounter similar pt or situation?

- Is there general rule, or systemic measures
- How to ensure these are reliably done next/each time?



# Leishmaniasis Dx Delays



Ann Intern  
Med 5/93

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Safer practice can only come about from acknowledging the potential for error and building in error reduction strategies at each stage of clinical practice

L. Leape

1. Access/Presentation	<input type="checkbox"/>	Denied care			
	<input type="checkbox"/>	Delayed presentation			
2. History	<input type="checkbox"/>	Failure/delay in <i>eliciting</i> critical piece of history data			
	<input type="checkbox"/>	Inaccurate/misinterpretation "			
	<input type="checkbox"/>	Suboptimal weighing "			
	<input type="checkbox"/>	Failure/delay to follow-up "			
3. Physical Exam	<input type="checkbox"/>	Failure/delay in eliciting critical physical exam finding			
	<input type="checkbox"/>	Inaccurate/misinterpreted "			
	<input type="checkbox"/>	Suboptimal weighing "			
	<input type="checkbox"/>	Failure/delay to follow-up "			
4. Tests (Lab/Radiology)	<input type="checkbox"/>	<b>Ordering</b>			
	<input type="checkbox"/>	Failure/delay in ordering needed test(s)			
	<input type="checkbox"/>	Failure/delay in performing ordered test(s)			

4. Tests (Lab/Radiology)		<b>Ordering</b>		
	<input type="checkbox"/>	Failure/delay in ordering needed test(s)		
	<input type="checkbox"/>	Failure/delay in performing ordered test(s)		
	<input type="checkbox"/>	Suboptimal test sequencing		
	<input type="checkbox"/>	Ordering of unnecessary test(s)		
		<b>Performance</b>		
	<input type="checkbox"/>	Sample mixup/mislabeled (eg wrong patient)		
	<input type="checkbox"/>	Technical errors/poor processing of specimen/test		
	<input type="checkbox"/>	Erroneous lab/radiol reading of test		
	<input type="checkbox"/>	Failed/delayed communication of test		
		<b>Clinician processing</b>		
	<input type="checkbox"/>	Failed/delayed follow-up of test		
	<input type="checkbox"/>	Erroneous clinician interpretation of test		

5. Assessment		<b>Hypothesis Generation</b>		
		Failure/delay in <i>considering</i> important diagnosis		
		<b>Suboptimal weighing/prioritizing</b>		
		Too much weight to low(er) probability/priority dx		
		Too little consideration of high(er) probability/priority dx		
		Too much weight on <i>competing</i> diagnosis		
		<b>Recognizing Urgency/Complications</b>		
		Failure to appreciate urgency/acuity of illness		
		Failure/delay in recognizing complication(s)		
6. Referral/Consultation		Failed/Delayed in needed referral		
		Inappropriate/unneeded referral		
		Suboptimal consultation diagnostic performance		
		Failed/delayed communication/followup of consultation		
7. Followup		Failure to refer patient to close/safe setting/monitoring		
		Failure/delay in timely follow-up/rechecking of patient		

# Diagnosis Error Reports (DEER Survey)

	MDs	# Errors
Total Reports	185	562

## Leading Diagnoses

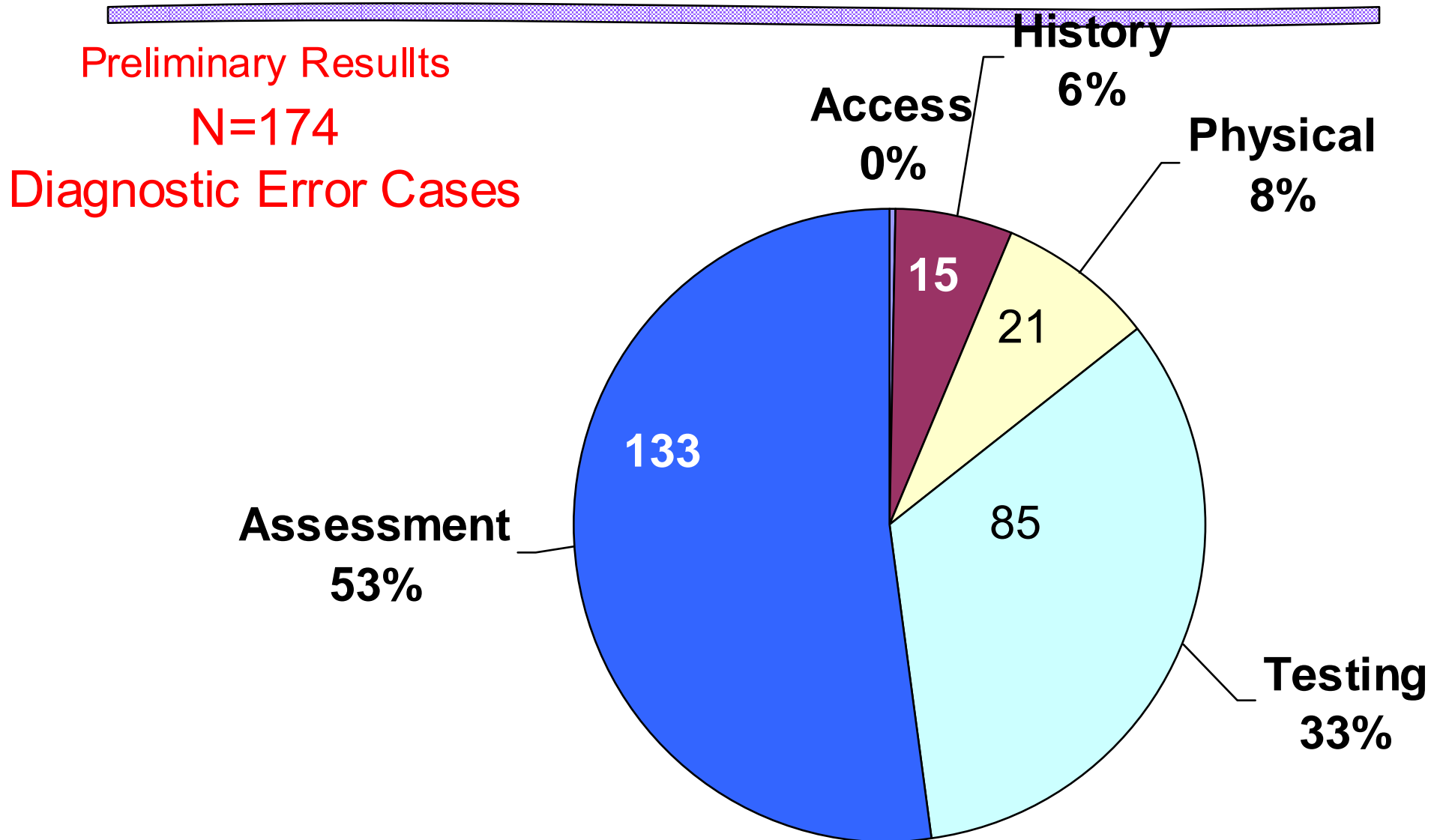
Dx	#
PE	20
Breast CA	13
Lung CA	11
CHF	8
Depression	8
DM	8
Fracture	8
Poisoning	8



<b>Dx</b>	<b>#</b>
<b>Esophageal CA</b>	<b>5</b>
<b>MI</b>	<b>5</b>
<b>Poisoning</b>	<b>5</b>
<b>Tuberculosis</b>	<b>5</b>
<b>Appendicitis</b>	<b>4</b>
<b>CAD</b>	<b>4</b>
<b>DKA</b>	<b>4</b>
<b>Pneumonia</b>	<b>4</b>
<b>Rectal CA</b>	<b>4</b>
<b>Renal Failure</b>	<b>4</b>

<b>Dx</b>	<b>#</b>
<b>Cervical CA</b>	<b>3</b>
<b>Prostate</b>	<b>3</b>
<b>Hypothyroidism</b>	<b>3</b>
<b>Osteomyelitis</b>	<b>3</b>
<b>Sarcodiosis</b>	<b>3</b>
<b>Lymphoma</b>	<b>3</b>
<b>Brain Tumor</b>	<b>3</b>
<b>Aneurysm</b>	<b>3</b>

# WHERE IN DIAGNOSTIC PROCESS DX ERROR OCCUR?



# Change Ideas

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- Reliable test f/up
- Imaging/test reading
- Resident supervision
- Red flag dx/situations
- Clinical documentation
- Check lists
- Patient engagement
- IT tools

From Table 4 Advances in Patient Safety Vol 2 Schiff et al 2005

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# **Computerized Provider Order Entry (CPOE): Medication Errors**

# **Computerized Clinical Documentation (CDD): Diagnosis Errors**

# A. Data

## Access/Quality/Continuity/Efficiency

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- Better access
  - Ensuring that always available, timesaving
- Keeps information from getting lost
- Automated “feeds”
  - Save documenting time; ensure completeness
  - From monitoring devices/instruments,
- Better capturing clinician’s thinking/assessment
- Continuity/audit trail
  - Helps communication identifying previous caregivers
- Problem lists
  - How to really make “work”

## B. Information Linkages, Display, Organization

---

- Linkages of diverse data sources
  - Both as error check and creating new “knowledge”
  - Lab-pharmacy linkages as model

## B. Information Linkages, Display, Organization

---

- Linkages of diverse data sources
  - Both as error check and creating new “knowledge”
  - Lab-pharmacy linkages as model
- Display serial data over time
  - Revealing patterns, signaling changes
- Organize information easier to find & not miss
  - Smart displays
  - Filtering; enhanced signal to noise
- Continuously updated
  - Avoid poring over voluminous past data
- Information overload: terrible, growing, problem

# C. Decision Support

---

- Role in structuring diagnostic problems
- Diagnostic reminders/alerts
  - Prompts of abnormalities, reminders to f/up
  - Reminders when screening, other tests due
  - Barely in infancy
- Rapid access to knowledge sources
  - Problem-knowledge coupling
- Aid to weigh probabilities
  - Serial Bayes
  - Clinical prediction rules



# D. Integration with Systems/Workflow Re-engineering

---

- Automating more fail-safe followup
  - Not just critical abnormal lab (but important start)
- Facilitating communication with patient
  - Sharing of diagnostic “theories” (facilitated transparency/dialogue)
  - More rapid communication when unexpected symptoms/worsening
- Enhanced communication among caregivers
  - Especially specialists and primary care
  - Radiology and clinicians
  - Rounding and coverage handoffs

# D. Integration with Systems/Workflow Re-engineering

---

- Supports just-in-time decisionmaking processes
  - Preventing dropped balls, forgetting details, interruptions/distractions
  - Facilitates decisions w/ patient in front of MD
    - More synchronous, less asynchronous
- ?? More time to think
  - Better production efficiency
  - Overcoming duplicative documentation steps

# Maybe Making (exact) Right Dx Doesn't Matter

---

## *Precise diagnosis matters less than:*

- Recognizing patient is acutely "sick"
  - Or even that pt is chronically "sick"
- Door open for follow-up
  - Low hurdle for access if not getting better
  - Pull system for soliciting f/up & feedback
  - For mitigating harm, and for learning
- Conditions of continuity and trust
- Modesty, openness to revise diagnosis
  - Knowing limitations of tests, personal, knowledge
  - Habits of looking up or asking where don't know
- Documentation/information infrastructure
  - To keep info on problems, drugs, exposures from getting lost
  - To record and recall clinician thinking

# Re-Claim Medicine

## Reuniting Patient Safety w/ Clinical Medicine

---

- Dx Error & Improvement: Clinically relevant
- Leave no room for complacency
- At heart of what doctors pride in themselves
- Liberating by lifting blame
- Uniting practice and learning
- Capitalizing on curiosity
- Can do, candor and teamwork w/ patient



# “Other” types of diagnosis/error paradims

---

- Diagnosis of severity/acuity
  - Failure to recognize patient needs to be hospitalized or sent to ICU
- Diagnosis of complication of disease or a drug or a surgery
- Diagnosis of recurrence
  - What f/up surveillance
- Diagnosis of failure to respond, cure
- Diagnosis of a misdiagnosis

- 
- MD lack of time and systematic approaches
    - Unrealistic to expect to rely on memory or ad hoc methods
  - Often don't need dx to treat
    - Blunts MD's interest in feedback/follow-up
    - Legitimately seen as purely academic question
  - Frequency of sx no definite dx ever established
    - Self-limited nature of many symptom/diagnoses
    - Non-specific symptoms for which no "organic" etiology identify

# Red Flags – Models

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- “Red flag” diagnoses
- “Red flag” situations
  - Awareness and analysis of risk-prone situations
  - Anticipating adverse events
- “Trap” diagnoses
  - Cellulitis



<b>Table 1. Red Flags for Potentially Serious Conditions</b>		
<b>Possible Fracture</b>	<b>Possible Tumor or Infection</b>	<b>Possible Cauda Equina Syndrome</b>
FROM MEDICAL HISTORY		
<ul style="list-style-type: none"> <li>-Major trauma, such as vehicle accident or fall from height.</li> <li>-Minor trauma or even strenuous lifting (in older or potentially osteoporotic patient).</li> </ul>	<ul style="list-style-type: none"> <li>-Age over 50 or under 20.</li> <li>-History of cancer.</li> <li>-Constitutional symptoms, such as recent fever or chills or unexplained weight loss.</li> <li>-Risk factors for spinal infection: recent bacterial infection (e.g., urinary tract infection); IV drug abuse; or immune suppression (from steroids, transplant, or HIV).</li> <li>-Pain that worsens when supine; severe nighttime pain.</li> </ul>	<ul style="list-style-type: none"> <li>-Saddle anesthesia.</li> <li>-Recent onset of bladder dysfunction, such as urinary retention, increased frequency, or overflow incontinence.</li> <li>-Severe or progressive neurologic deficit in the lower extremity.</li> </ul>
FROM PHYSICAL EXAMINATION		
		<ul style="list-style-type: none"> <li>-Unexpected laxity of the anal sphincter.</li> <li>-Perianal/perineal sensory loss.</li> <li>-Major motor weakness: quadriceps (knee extension weakness); ankle plantar flexors, evertors, and dorsiflexors (foot drop).</li> </ul>

A Model for  
Diagnosis Error  
Prevention?

## Acute Low Back Pain Problems in Adults

**U.S. Agency  
for Health Care  
Policy and  
Research  
(1994)**

<b>“Red Flag” Condition</b>	<b>Symptoms/Typical Features</b>	<b>Usual Action</b>
Cauda Equina Syndrome	<ul style="list-style-type: none"> <li>✓ major motor weakness and numbness, or progressing neurological deficit</li> <li>✓ sphincter disturbance (urinary retention, bowel or bladder incontinence)</li> <li>✓ saddle anesthesia</li> </ul>	Immediate consultation for emergency MRI or CT and definitive treatment.
Infection, Tumor or Pathologic Fracture	<ul style="list-style-type: none"> <li>✓ non-mechanical pain (unrelenting, unaffected by position, severe nighttime pain)</li> <li>✓ history of cancer or suspicious physical finding (i.e.; acute localized bone pain)</li> <li>✓ unexplained weight loss</li> <li>✓ fever, night sweats</li> <li>✓ HIV, IV drug use, immunosuppression</li> </ul>	CBC, ESR and UA PSA (when appropriate) Plain films – AP and lateral of lumbar spine (oblique views rarely indicated) Consider bone scan MRI is appropriate for suspected epidural abscess, diskitis and/or osteomyelitis or for spinal neoplasm with potential cord or nerve compression
Fracture	<ul style="list-style-type: none"> <li>✓ Recent significant trauma</li> <li>✓ Known or suspected osteoporosis with or without recent trauma</li> </ul>	Plain films Consider bone scan after 10 days duration if X-rays inconclusive

*The information offered here is not intended in any way to interfere with or prohibit clinical decisions you make as the treating physician for the care and available treatment options for your patients.*

現地現物

Genchi-genbutsu

*Go and see for yourself to  
thoroughly understand the  
situation*