Agency for Healthcare Research and Quality
Advancing Excellewnce in Health Care

Clinical Decision Support at Point-of-Care:

Visual Diagnostic System to Reduce Diagnostic Errors and Improve Clinical Outcomes

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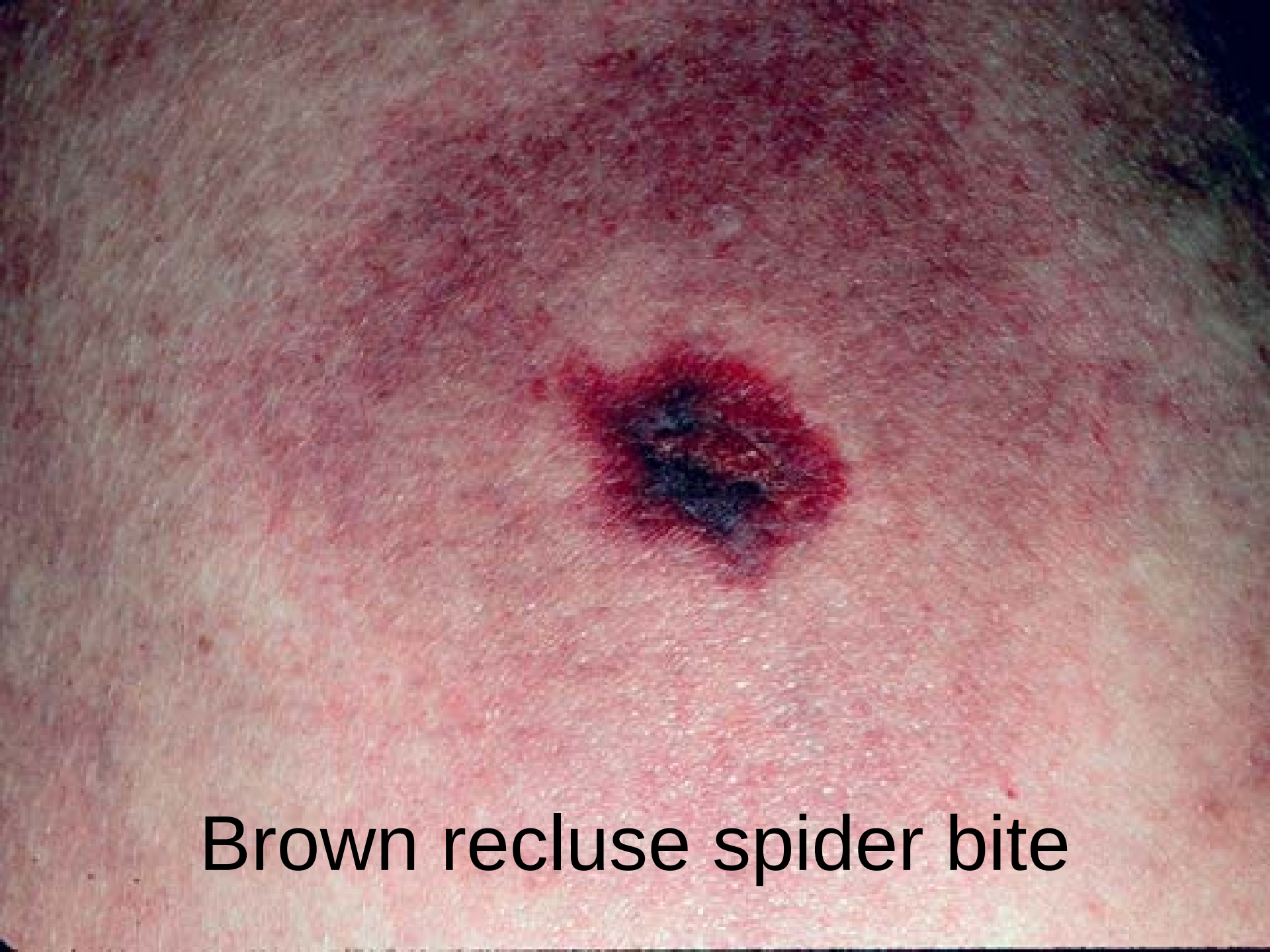


Brown recluse spider bite

Ricketsialpox

Aspergillosis

Tularemia

Cutaneous anthrax

African Tick Bite fever

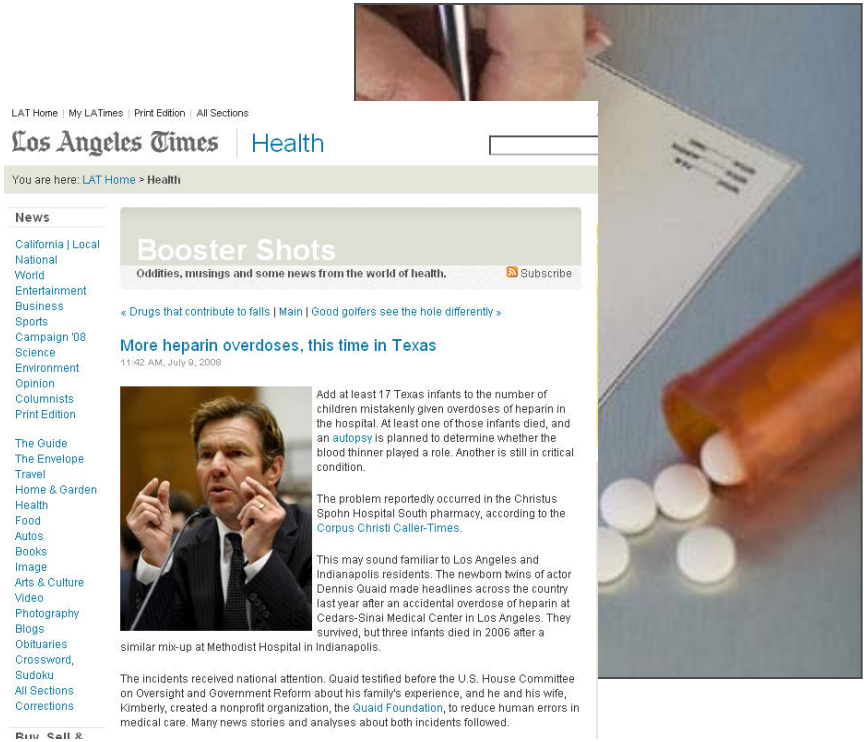
Cutaneous amebiasis

Leishmaniasis

Leading medical errors?

Since the publication of the IOM "To Err is Human" report, order entry and surgical errors have been "center stage"

- Easy concepts for the media and public to understand:
- Illegible prescriptions leading to wrong dose and death
- Wrong limb amputated or organ (kidney) removed at surgery



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More heparin overdoses, this time in Texas

11:42 AM, July 9, 2008

Add at least 17 Texas infants to the number of children mistakenly given overdoses of heparin in the hospital. At least one of those infants died, and an autopsy is planned to determine whether the blood thinner played a role. Another is still in critical condition.

The problem reportedly occurred in the Christus Spohn Hospital South pharmacy, according to the Corpus Christi Caller-Times.

This may sound familiar to Los Angeles and Indianapolis residents. The newborn twins of actor Dennis Quaid made headlines across the country last year after an accidental overdose of heparin at Cedars-Sinai Medical Center in Los Angeles. They survived, but three infants died in 2006 after a similar mix-up at Methodist Hospital in Indianapolis.

The incidents received national attention. Quaid testified before the U.S. House Committee on Oversight and Government Reform about his family's experience, and he and his wife, Kimberly, created a nonprofit organization, the Quaid Foundation, to reduce human errors in medical care. Many news stories and analyses about both incidents followed.

Dennis Quaid testifying before Congress

Diagnostic Error

- Diagnostic error and delay is the leading cause of malpractice outpacing surgical and medication dose error by at least 3 times
- Why the avoidance of diagnostic error?

Medication and Surgical ERROR
Diagnostic and
Management
Error

Implications of the Hidden Iceberg

Inaccurate Diagnosis

Inappropriate treatments

Prolonged patient stays

Dissatisfied patients

Negative perception of provider, clinic and hospital

Death

Diagnostic Error: Hidden

- Diagnostic delay and clinical management error and is often hidden from the patient, policy makers, and even the physician
- In every office and every hospital each day, efficient “fast and frugal” decisions often lead to error
- Variant presentations of common diseases are as much a factor in error as are rare diagnoses
- Innovation in HIT, desktop, and mobile knowledge sources are quickly evolving to address diagnostic error

Issues with Traditional Way of Arriving at Diagnosis

- Look up in a text book
  - organized by diagnoses
  - If presumed diagnosis is incorrect, difficult to search for other diagnoses
  - Not recognizing potential relevant differential diagnoses
- Look up the index
  - Search one term at a time
  - Cross-referencing variable
  - Complexity of index varies

Disparities in Knowledge

Meningococcemia in different skin types. Do our resources really address healthcare in all people?

Professional Tools: VisualDx and VisualDx Mobile

- Diagnostic decision support
  - Browser based
  - Search by patient factors
  - Develop a ***visual*** differential diagnosis
  - Capture variation
    - Body location
    - Immune status
    - Skin color
    - Morphology
  - Graphical representation of knowledge
  - 10,000,000 images viewed in 2009 across sites

Comprehensive medical image collection

Our collection is culled from over 1.5 million images from which we have selected and licensed the best quality images in the world:

- NYU
- UCLA
- Wisconsin
- University of Rochester
- Nancy Esterly, other private collections, etc.
- Pediatrics , Occupational, Rheumatologic, Eye, Oral, etc.

Expertise:

- Dermatology
- Pediatrics
- Emergency Medicine
- Immunology/HIV
- Infectious Disease
- Medical Informatics
- Gynecology
- Ophthalmology
- Oral Medicine & Dentistry
- Pharmacology
- Radiology
- Tropical & International Medicine
- Chemical and Bioterrorism

DEMO

Study 50 physicians randomized

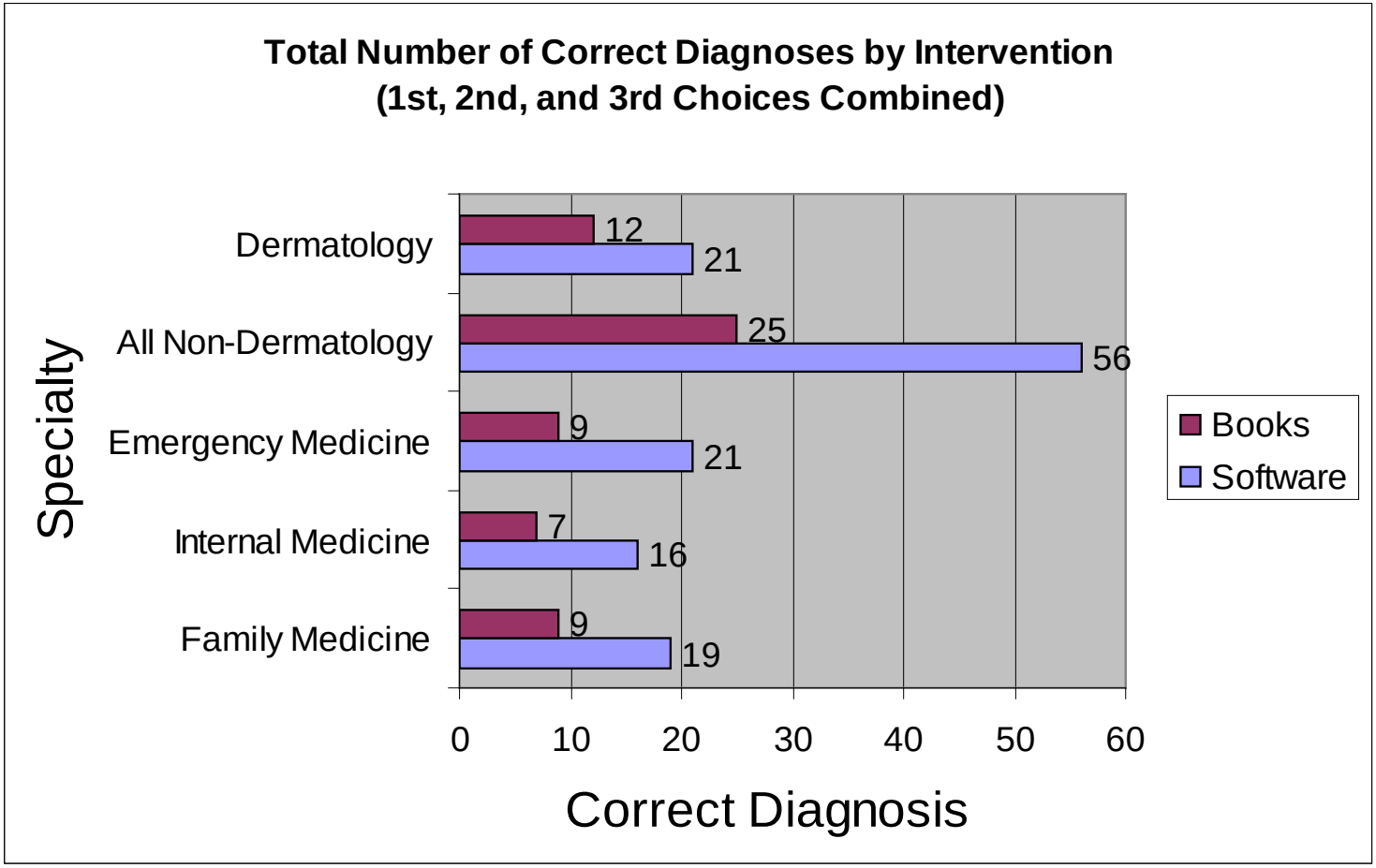
Text-Based Image Reference

- Versus -

Software Decision Support

- **4 Cases Presented as Unknowns**
- **Archives of Dermatology "Off-Center Fold"**
- **Chose Difficult Cases: Physicians seek reference for rare presentations**

Results: Doubling Diagnostic Accuracy



A Paradigm Shift:

Print Resources		Computer Resources
Space constraints		Unlimited images
Small images	→	Large color images
Indexing limitations		Multiaxial indexing
Memory Based Care		Decision Support
Usually the Expert		Improves non-expert

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