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
Rickettsialpox
Aspergillosis
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
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 ➔

Inaccurate Diagnosis ➔

Inappropriate treatments ➔
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
Meningococccemia 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

Total Number of Correct Diagnoses by Intervention
(1st, 2nd, and 3rd Choices Combined)

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Books
Software
A Paradigm Shift:

**Print Resources**
- Space constraints
- Small images
- Indexing limitations
- Memory Based Care
- Usually the Expert

**Computer Resources**
- Unlimited images
- Large color images
- Multiaxial indexing
- Decision Support
- Improves non-expert
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