Medical Thinking: What Should We Do?

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Decision Support Lies at the Heart of Biomedical Informatics

• Essentially all clinical applications of computing are intended to provide decision support

• Biomedical informatics is inherently aimed at enhancing the quality of decisions made by health professionals and patients
  – Implication #1: We are trying to enhance medical thinking as well
  – Implication #2: We need to understand medical thinking if we seek to improve it
Stated Goals of this Meeting

• Take stock of this highly interdisciplinary field and contribute to updating the work for Prof. Steven Schwartz

• If the issues and approaches appear promising, seek funds for a larger meeting on a similar theme in the near future

• Produce a short report to be made available on OpenClinical website
Unstated Goals of this Meeting

• How can we attract more funding for research in this area?
• How can we get the clinical world to appreciate and value the insights that we provide?
• How can we influence the actual decisions that clinicians make?
  – producing tools?
  – educating clinicians?
  – affecting medical education?

“I don’t get no respect” – Henny Youngman
Pragmatics Must Drive Our Research

• “Neats” versus “scruffies”
• It is not enough to offer studies that show interesting phenomena in medical thinking
• We must draw conclusions about the implications of our work related to the goal of influencing the quality of care and the reduction of errors
  – What should we be teaching?
  – How should we be teaching it?
  – How should we be designing tools?
  – How should we be integrating decision support with workflow?
• If our research is viewed as “interesting” but self-centered and of no practical value, it will not be supported and our impact will be limited
Myths Regarding Decision-Support Systems

Myth:
Diagnosis is the dominant decision-making issue in medicine

Typical questions are not “What does this patient have?” but, rather, “What should I do for this patient?”
Limitations of Computer-Based Diagnosis

Rapid pulse, sweating, shallow breathing. According to the computer, you’ve got gallstones
Myths Regarding Decision-Support Systems

Myth:
Clinicians will use knowledge-based systems if the programs can be shown to function at the level of experts.

What do we know about “expertise” and the associated cognitive factors?
Cognitive Science and the Nature of Clinical Expertise

- Tremendous variation in practice, even among “experts”
- Need to understand better how experts meld personal heuristics and experience with data, and knowledge from the literature, in order to arrive at decisions (medical cognition)
  - Can we better teach such skills?
  - How could improved understanding affect the way decision-support systems offer their advice or information?
  - How will such insights affect our understanding of clinicians as computer users?
Myths Regarding Decision-Support Systems

Myth:
Clinicians will use stand-alone decision-support tools

The death of the “Greek Oracle” model → Integrated decision support in the context of routine workflow
The Cycle We Envision

Physicians Caring for Patients

Information, Decision-Support, and Order-Entry Systems

Electronic Medical Records

Regional and National Registries

Creation of Protocols, Guidelines, and Educational Materials

Standards for Prevention and Treatment

Medical Thinking Research

Biomedical Research
Event Monitoring = Clinical Alerting

Lab System  Radiology System  Pharmacy System

Clinical Data Repository  EMR Software  Alert Delivery Software

Medical Logic Modules  Pagers / cell phones  Email messages  Secure web pages
Clinical Guidelines ("Weak AI")

- Recommendations on screening, diagnosis, workup, referral, or management of patients
  - Consensus-based
  - Evidence-based
- Recurring theme for at least thirty years
  - Clinical algorithms in early 1970s
  - Triage applications
  - Early experiments with computer implementations
- Comparable to “rules” for clinical trials or research protocols
Typical Concerns

• “Cookbook medicine”
  – *Guidelines*, not absolute dogma

• Ambiguous
  – Evidence often does not support a single approach
  – Range of options often appropriate

• Run counter to accepted practices
  – Evidence does not always support accepted practices
Typical Process

- Literature Review
- Consensus Process
- Evidence Evaluation

Guideline Creation, Review, and Approval

Guideline Publication (article or monograph)

Guideline Dissemination

Assume: Practitioners will internalize and thereby follow the guideline

Assume: Practitioners will read the guideline

Assume: Health care will benefit
Conclusions: Decision Support

- Integration with routine workflow is the key
- Transparency helps to assure acceptance
- The Web is a great facilitator of integration
  - Does not avoid the need for standardized terminologies and data-sharing protocols
- Quality of decision-support tools and their influence on clinicians can be greatly enhanced by research on medical cognition
Conclusions: Medical Thinking

• Topic is important, but only if we explain the practical implications of what we do.

• Topic is of broad interest, with fascinating interdisciplinary appeal.

• Topic needs funding, but will get it only if we show the practical value of the work in terms of:
  – Patient-care quality
  – Error reduction
  – Medical (clinical) education
  – Patient education and satisfaction