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# Tracing Persistent Highly Visible Research Themes in Medical Informatics

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## Introduction

We present a longitudinal citation analysis of a significant portion of the Medical Informatics periodical literature 1994-2005, focusing on the identification of strings (linear citation patterns) and networks (multi-branched citation patterns) of highly cited MI-related articles indexed in the Web of Science. These temporal strings are representative of persistent, highly visible research themes in MI.

## Methods

HistCite (www.histcite.com) provides tools for identifying and visualizing the development of research topics by showing them as chronologically sequenced citation links between highly cited works in bibliographies. Because scientific research builds on previous work, themes of persistent interest will be recognized by persistent citation links to the older relevant literature.

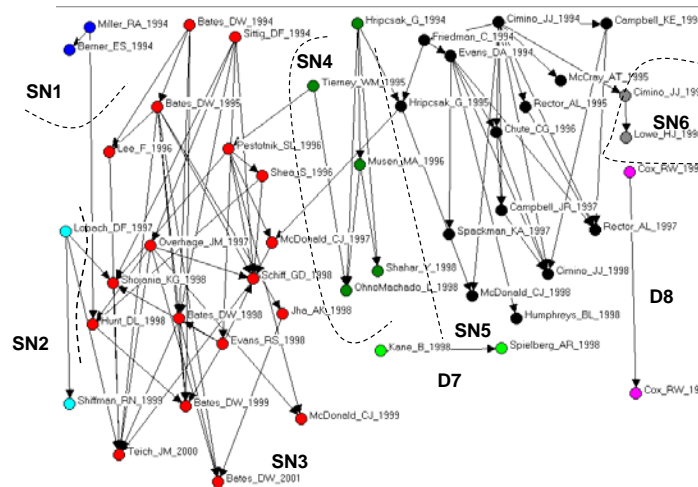
Here, the Medical Informatics literature is represented by two data sets extracted from the Web of Science in the years 1994-October 2005:

- (1) all articles citing at least one article published in a set of core interconnected MI journals (*JAMIA*, *Computers & Biomedical Informatics (C&BI)*, *International Journal of Medical Informatics (IJMI)*, *Journal of Biomedical Informatics (JBI)*, *Methods of Information in Medicine (MIM)* and *Medical and Biological Engineering and Computing (MBEC)*);
- (2) all articles citing at least one article in *Medical Decision Making (MDM)* (which, on inspection appears to be a somewhat separate corpus of medical informatics literature).

For clarity, we limit the visual display to articles cited above an heuristically-determined threshold—the **Local Citation Score** (the number of citations received from other articles in the bibliography)

The above-LCS networks are visualized and coherent structural units identified using UCInets' NetDraw and the Newman-Girvan procedure (Girvan, M & Newman, MEJ 2002 *PNAS* 99, 7821-7826; Newman, MEJ & Girvan, M 2004 *Phys Rev E* 69, (2) Art # 026133)

## Research Themes in Medical Informatics *sensu lato* \* (focal cited journals JAMIA, C&BI, IJMI, JBI, MIM, MBEC) LCS=55+ citations



### Subnetworks

1. Medical Diagnostic Systems  
NEJM, JAMIA
2. DSS Evaluation AJM, JAMIA
3. CPOE/Medical Records/Error Prevention  
JAMIA (10), JAMA (4), AIM (2), NEJM, IJMI
4. Clinical Guidelines Computerization  
JAMIA (3), AIM, C&BI

### Subnetworks

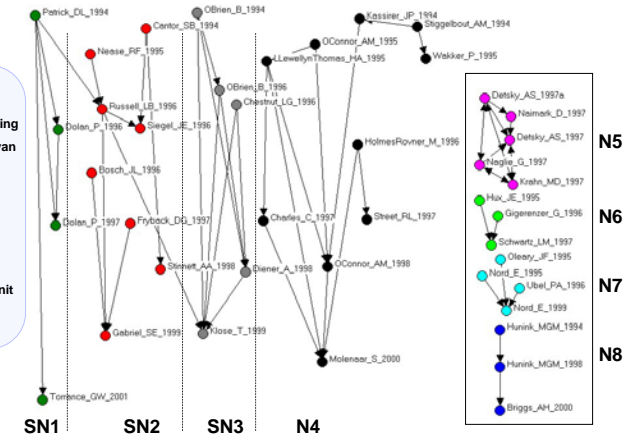
5. Clinical Classifications & Vocabularies  
JAMIA (8), MIM (3), AIM, AIM, IJMI
  6. Internet/WWW  
JAMIA (2)
- ### Dyads
7. E-mail/Physician-Patient Communication  
JAMIA, JAMA
  8. MRI Imaging CABR, MRIM

## Conclusions

1. Two groups of topics predominate. These include issues of high social visibility (that is, "hot" issues in the consumer and clinical press) and the related subdomains that underlie these issues.
2. Themes not represented, e.g. sociotechnical issues, ethics and legal issues in medical informatics, information technology & health professions education, and telemedicine, may represent a gap in research and authorship. This suggests that medical informatics research and training, while facilitating the improvement of healthcare, may itself benefit from an evaluation of these themes. (see Friedman et al. *JAMIA* 2004; 11: 167-172).
3. The lack of interconnection between the two data sets suggests a gap in intra-specialty awareness. Medical Informatics appears to be partitioned into two distinct discourse communities, at least as viewed through the lens of the published research literature.

\* A complete list of highly cited articles and a short bibliography are available as a handout and at <http://ischool.drexel.edu/faculty/ssilverstein/cited.doc>

## Research Themes in Medical Decision Making \* (focal cited journal MDM) LCS=45+ citations



### Subnetworks

1. End of Life Care Preferences  
MDM(2), Health Econ, Med Care
2. Cost-Effectiveness Analysis Issues  
MDM (5), JAMA (3)
3. Patient Willingness to Pay  
MDM (3), Health Econ, Health Policy

### Networks

4. Patient Involvement in Clinical Decision Making  
MDM (8), NEJM, SS&M

### Networks

5. Basics of Medical Decision Analysis  
MDM (5)
6. Patient Understanding of Preventive Care  
MDM (2), AIM
7. Mixture of above – no clear theme  
MDM (2), Health Econ
8. Uncertainty in Clinical Care  
MDM (2), Pharmacoeconomics