Applied Science: “... the application of pure science to particular classes of problems.”

Medical practice is applied science but not practiced as one.

Clinical data to define patients’ problems are not collected completely, accurately or according to a standard method.

Medicine Not Practiced as Applied Science

Consequences

Poor outcomes for patients

Between the health care we have and the care we could have lies not just a gap, but a chasm. (IOM)

Dysfunctional clinical research

Observational research not sustainable for lack of clinical data.

High cost of “controlled” prospective trials limits the number of issues studied.

Results from CPTs are not replicable.

Disconnect between -omics research and clinical phenotypes.

Physicians as collectors of clinical data

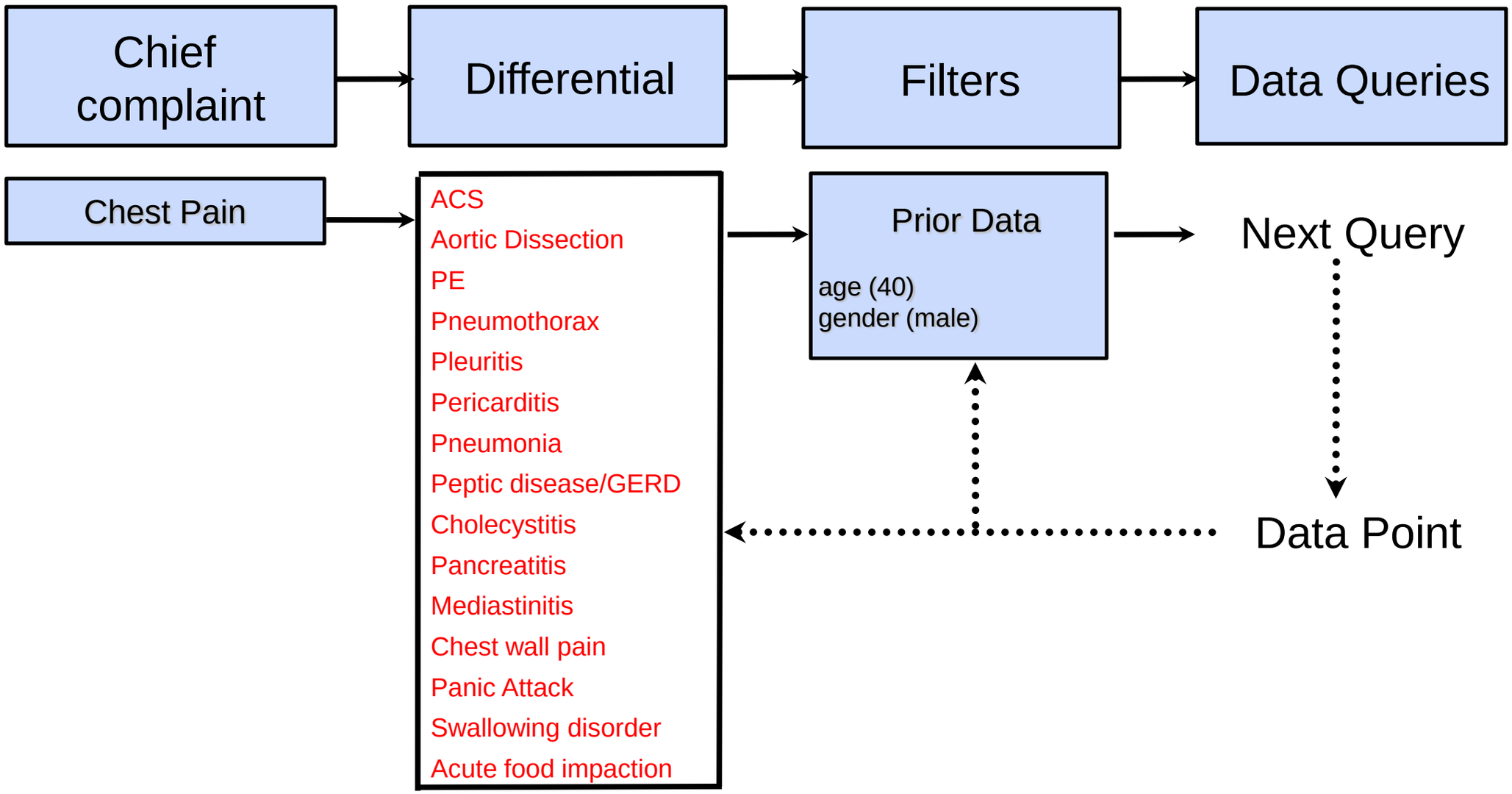
Not trained as scientists.

Overwhelmed by cognitive demand.

Limited time to interact with patients.

An alternative method for collecting clinical data is needed.

Continuous Processing as Clinical Date are Collected



Analytic, Standardized Collection of Clinical Data According to Rules of Pathophysiology + Standardized Data for Patient-Environment Interactions

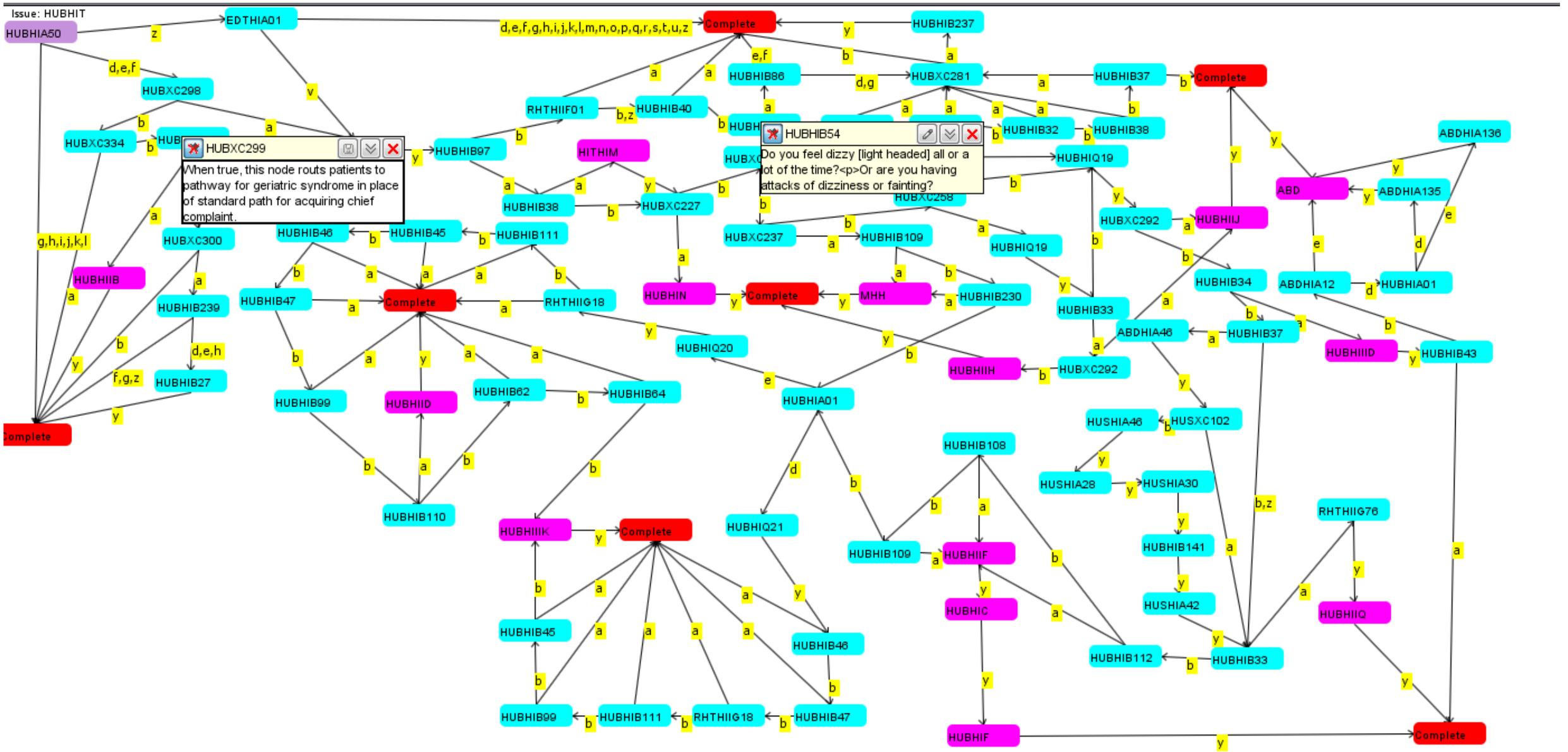


STANDARDIZED, longitudinal database on behavior of disease.

Data exactly comparable for all patients.

Knowledge Representation as Decision Graphs

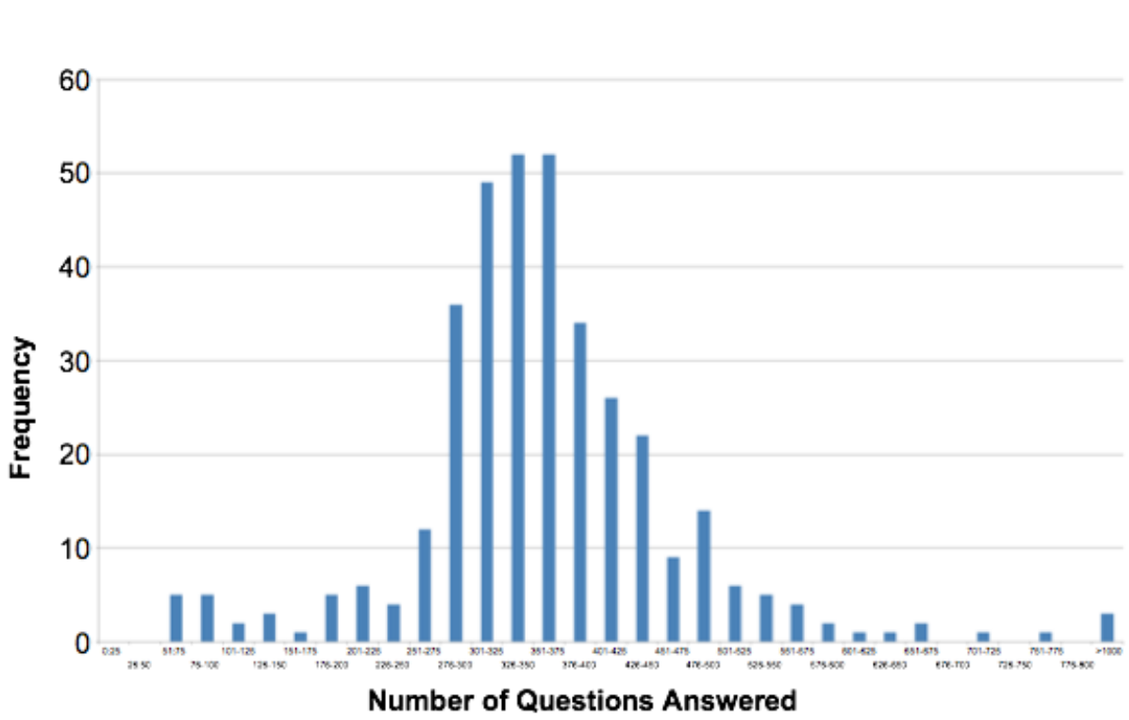
Nodes represent specific questions to the patient [light blue], e.g., HUBHIB54, or issue-specific modules [magenta]. Nodes with XC codes, e.g., HUBXC299, are inferences for which arguments are some set of answers to prior questions, laboratory values or physical findings. Arrows depict pathways through the graph directed by answers encoded by lower-case letters.

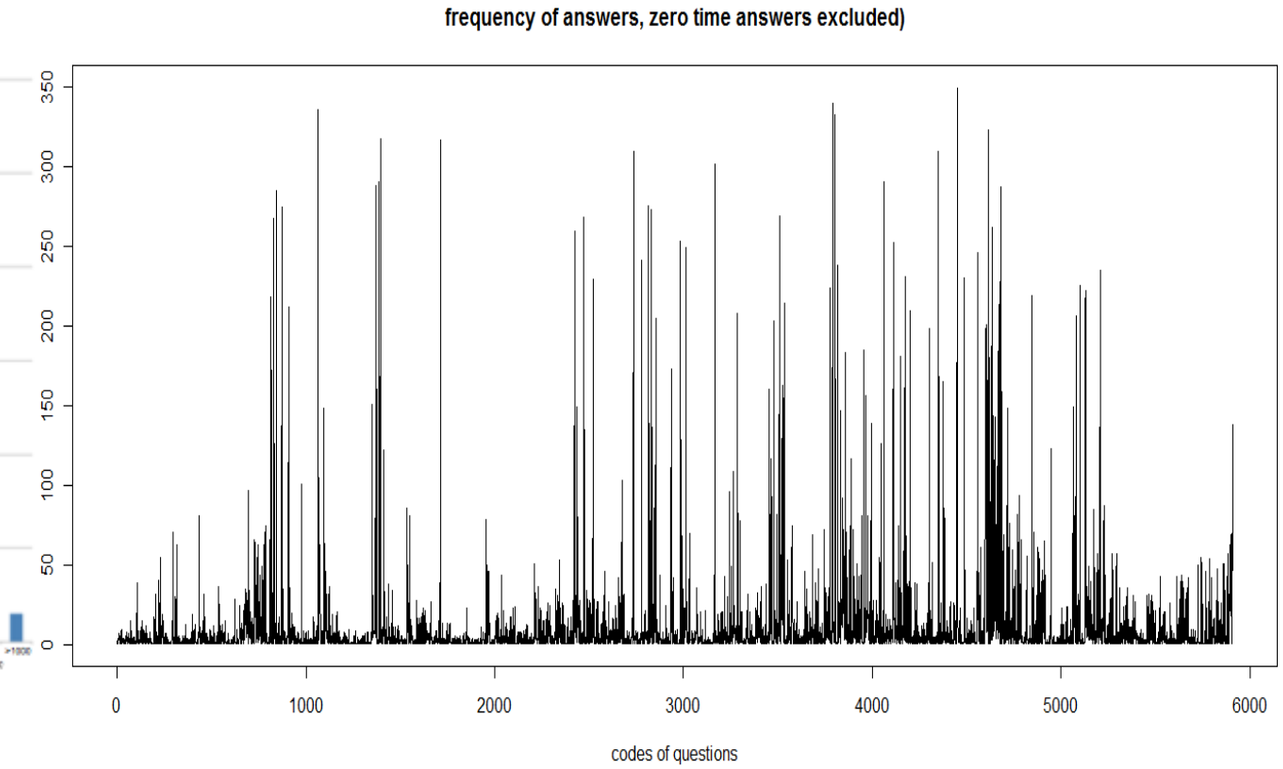


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Number of Fields Populated/Patient [left panel] and Selectivity of Questions [right panel]

Panel on left is number of data fields populated/patient. Panel on right is the frequency of use [374 patients] of 6000 different pages of questions. Data show the program collects a large amount of data/patient and performs selectively in posing questsions.

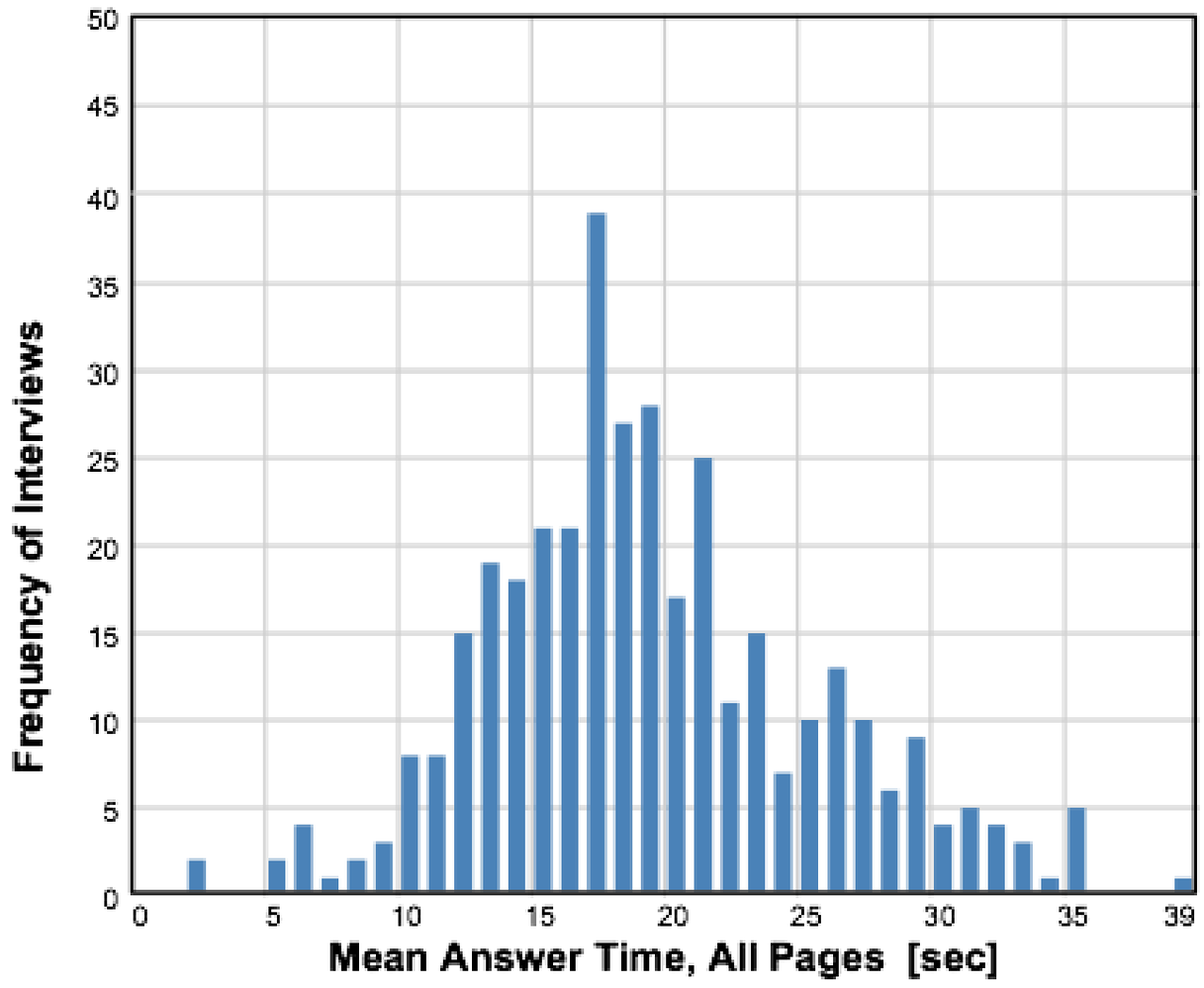




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Distribution of Mean Answer Times/Page (374 Interviews)

Average patient, who had at least 1 chronic illness, completed an interview in 64 minutes.



Mean times/page and mean number answers/interview

No significant differences between mean answer time by age or by number of questions posed. The average patient needed 64 min to complete interview. The majority of older patients had not previously used a computer. Older patients answered more questions.

Age		Mean answer time (sec)/completed page		mean number of answers/interview	
	N	Mean	sd	mean	sd
20-29	41	17.22	5.42	339	128
30-39	49	18.76	6,34	365	184
40-49	69	19.20	8.00	327	131
50-59	64	20.28	7.00	364	144
60-69	73	20.44	8.60	371	94
70-79	51	21.20	7.51	365	157
>80	27	17.89	5.41	386	97

CLEOS® System: Narrative Report

http://172.16.1.32/scripts/latest/PatReport.asp?p=y - Microsoft Internet Explorer bereitgestellt von Robert-Bosch-Krankenhaus

ZMEDIX CLINICAL EXPERT OPERATING SYSTEM CLEOS

NOTE: Conclusions, guidelines and recommendations generated by CLEOS are currently being tested and are included for the purpose of obtaining physician feedback. Diagnostic or treatment actions suggested or recommended are not intended to influence physician behavior during this beta test.

Office ID: RBK081 Hx Taken: 4/19/2006

Patient is Caucasian male born in 1948. Self-reported height: 1.7 m; weight: 60 kg. , BMI: 21

Occupation: Human Resources

Chief Complaint: **This is the patient's first admission to this hospital. This is an emergent admission. The patient does not think they are admitted to undergo specific planned tests or procedures. The patient has active complaints and has been admitted for - persistent/recurring cough.**

Present Illness: **Cough (10 - 14 day duration) is only respiratory complaint. Cough started as part of a URI. Cough is intermittent. The cough is productive of sputum described as viscous. Patient has felt feverish and has had a highest recorded temperature of 38. 0. Has had one shaking chill. Patient has episodes of persistent cough on a regular basis at least yearly. Patient presents with cough that began about within the last month. Physical activity not limited by exacerbations. Cough provoked by tickling sensation in throat. Cough does not vary from day to night. Patient is not hoarse and does not have a sore throat from cough. Patient feels that coughing clears lungs. Cough does not worsen once it starts. No associated nasal stuffiness.**
The patient stopped smoking within the last year. Primary tobacco source: cigarettes. Typical habit is 1 pack/day. Years smoked: > 20 years. Symptoms triggered by lying down. Symptoms triggered by exercise.
Taking no meds for persistent/recurring cough.
Positive history pneumonia once. Event: 3 - 5 years ago. Hospitalized: no.
No history TB. No history exposure to TB. Never skin tested for TB.

MEDICATIONS	
Drugs	Indication
none	

ALLERGIES
none

ACTIVE PROBLEMS
Cough of less than 4 weeks dur'n.

PROCEDURES
Thyroid nodule treated by surgical extirpation.

PAST HISTORY
The patient is a former smoker (Typical habit is 1 pack/day for > 20 years). Stopped within the last year. History thyroid nodule (treatment: surgical extirpation.).

FAMILY HISTORY
No data entered.

PREVENTION ISSUES
Does not take daily ASA. Never colonoscoped (as screen for colon cancer risk). Not immunized for HBV. No history of immunization for tetanus. Patient does not know values for LDL-cholesterol or other lipids. Measure HDL and LDL-cholesterol as well as triglycerides to sort out how to proceed.

REVIEW OF SYSTEMS

Cardiac

.

GI

No past history rectal bleeding.
Patient has never had a colonoscopy or sigmoidoscopy.

Liver

Not immunized for HBV.

Endocrine

The patient has no prior dx of hypo or hyperthyroidism but has had a thyroid nodule. This dx was made about > 4 years ago. The nodule was treated by surgical extirpation.

GU

No significant history for GU disease.

ENT/Eyes

Start | Posteingang - Microsoft O... | Microsoft PowerPoint - [G... | ZMedix - Microsoft Intern... | http://172.16.1.32/scr... | 15:16

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Clinical Performance

Zakim D. Braun N. Fritz P. Alscher MD. (2008) Underutilization of Information and Knowledge in Everyday Medical Practice: Evaluation of a Computer-based Solution. BMC Medical Informatics and Decision Making, 8:50 doi:10.1186/1472-6947-8-50.

As compared with physician histories and data in the hospital chart plus discharge letter, computer histories reported 3.5 problems/ patient that were both acute and chronic and across a range of organ systems. In addition, computer histories detected a significant number of issues important for preventing further morbidity, which were not recorded in the hospital record.

Zakim, D. Fritz C. Braun N. Fritz P. Alscher MD. (2010) Computerized history-taking as a tool to manage dyslipidemia. Vascular Health Risk Mgmt 6: 1039- 1046.

The computerized interview program outperformed routine care in collecting historical data relevant to stratifying risk, assigning treatment targets, and clarifying the presence of hypercholesterolemia relative to risk. Computerized history-taking coupled with automated analysis of the clinical data outperforms routine medical care in applying NCEP guidelines for stratifying risk and identifying patients with hypercholesterolemia in relation to risk.

CLEOS®

High throughput method for standardized collection of clinical phenotype

No heuristics

Independent of professional time

Functions across time to follow patients

Databases created automatically as consequence of routine operation

Databases subject to sophisticated mathematical analyses

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Protecting the public interest

CLEOS® is owned by a charity - Institute of Digital Medicine Foundation:

To insure that the knowledge and data bases remain in the commons

Prevent corruption for narrow commercial gain,

Prevent data mining by commercial interests,

Prevent monetization of medical knowledge.

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