What’s *Really* Wrong with Today’s Electronic Health Records?

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How Did We End Up Here and Where Can We Go?

- EHR as diary: an historical perspective
- Strategy versus tactics
- UAB initiatives
In attempting to arrive at the truth, I have applied everywhere for information, but in scarcely an instance have I been able to obtain hospital records fit for any purposes of comparison. If they could be obtained they would show subscribers how their money was being spent, what amount of good was really being done with it, or whether the money was not doing mischief rather than good.

Nightingale F. Notes on Hospitals. London: Longmans, Green and Company; 1863:176

“A general purpose [health] record system would serve to improve the quality, planning and administration of health services, to help in the evaluation of comparative therapies, and to forward research on epidemiology and human genetics, and problems of diagnosis and especially on the natural history of disease.”

“We recommend the establishment of a special standing committee…to guide the development of a general purpose health record system…”

- President's Science Advisory Committee
  Life Sciences Panel, 1963
MEDICAL RECORDS THAT GUIDE AND TEACH—WEED

SPECIAL ARTICLE

MEDICAL RECORDS THAT GUIDE AND TEACH

LAWRENCE L. WEED, M.D.*

9/10

Pt. received 40 units of regular insulin yest. because of B & 4+ urine sugars. Got 2000 cc Amigen yest. & 500 cc D₅W. Was febrile all night up to 40 at 8 PM this gradually came down to 39. 8 PM yest. suctioned & coughed up ĉ return of ½ cup of thick white sputum – cultured also blood cultures. Was in must. tent ĉ mucostist overnight. At 4 PM yest had B-R base. Sputum smear unremarkable – WBC’s but no bacteria.

9/10-12:30


9/11-9 AM

Urine 3+ given 10 U reg. insulin. Pt. was hiccupsing all night & this AM. Levine tube passed ĉ 900-1000 cc bileous fluid removed. Jejunostomy tubes have been draining minimally. Will have Levine tube down.

(THREE PAGES OF SIMILAR NOTES FOLLOW UNTIL 9/26/67)
Rheumatoid Arthritis — maintained on Aspirin gram 15 q.4.h. and Prednisone 5 milligrams twice a day.

Anemia — probably related to blood loss by G.I. tract but also rule out persistent folic acid deficiency and hypothyroidism. R/O myxedema & folic acid def.

Peripheral neuritis — uncertain etiology

Peripheral edema — uncertain etiology — malnutrition

Depression and memory impairment or slowing up of thought processes — uncertain etiology — myxedema.

PLANS:

1. Continue same regime although would suggest elevating head of bed, addition of Belladonna and Maalox PC and HS.

2. Serum Iron, folic acid, total protein AG ratio. PBI.

3. Continue multiple vitamin possibly should add folic acid. Folic acid level to be checked.

4. Evaluate serum protein level as well as PBI.

5. Probably I am overly impressed by her skin texture suggesting myxedema and her voice changes which may be due to the Thorazine. If the PBI is normal, then perhaps a more vigorous or intensive trial on antidepressants, more rapidly acting such as Pertofrane or Aventyl should be given or possibly shock therapy employed.
What Did Weed Want?

• Each medical record should have a complete list of all the patient's problems, including both clearly established diagnoses and all other unexplained findings that are not yet clear manifestations of a specific diagnosis, such as abnormal physical findings or symptoms.

• Careful analysis and follow-through on each problem as revealed in the titled progress notes, requiring that the proper data be collected and that the conclusions drawn from this data are logical and relevant.
Tactics versus Strategy

**Tactics** - an action or method that is planned and used to achieve a particular goal

**Strategy** - a careful plan or method for achieving a particular goal usually over a long period of time
Tactics

• Improved decision support
Tactic: Improving Decision Support

We’ve been doing this for over 40 years!
Automated Clinical Decision Support

Alerting and Reminder System
Infobuttons

Anticipate Need and Provide Queries
### Sodium, Sweat

**Laboratory Specialty Laboratory**

**Request Form General**

**Phone** (212) 305-6569

**Availability** By appointment only

**Turnaround Time** 1 day

**Special Instructions** Schedule appointment with laboratory to collect sweat at (212) 305-6569.

**Specimen** Sweat

**Minimum Volume** 75 mg

**Collection** Specimen will be collected by laboratory personnel.

**Storage Instructions** Refrigerate

**Causes for Rejection** Insufficient sweat yield

**Reference Range** Negative: <40 mmol/L; borderline: 40-60 mmol/L; consistent with the diagnosis of cystic fibrosis: >60 mmol/L

**Use** Establish the diagnosis of cystic fibrosis

**Methodology** Flame photometry

<table>
<thead>
<tr>
<th>Test</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA-SWEAT TEST</td>
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<tr>
<td>CL-SWEAT TEST</td>
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<tr>
<td>SWEAT WEIGHT</td>
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Digoxin

DrugPoint® Summary

Adverse Effects

Common
- Neurologic: Headache

Serious
- Cardiovascular: Cardiac dysrhythmia
- Hematologic: Thrombocytopenia (rare)
Tactics

- Improved decision support
- Personalized medicine
- Precision medicine
- Accurate medicine™
Improving the Lives of Patients Through Genetically Informed Medicine

- Discover Multidimensional Genomic & Clinical Data
- Identify Targets & Functions
- Assess Potential Agents
- Produce High-Quality Agents
- Conduct Toxicology & Preclinical Testing
- Conduct Marker-Driven Clinical Trials
- Targeted Interventions

Private Sector/Academic Research Labs

Research, Patient, & Clinical Data

Genetically Informed Medicine at Point of Care
Tactics

• Improved decision support

• Accurate medicine

• Learning health system
Use of the best evidence for the collaborative health care choices of each patient and provider; to drive the process of discovery as a natural outgrowth of patient care; and, ultimately, to ensure innovation, quality, safety, and value in health care.
The Learning Health System

Interoperability standards and services

Certification of HIT to accelerate interoperability
Privacy and Security Protections
Supportive business, clinical, and regulatory environments
Rules of Engagement and Governance

Clinical Decision Support
Public Health Policy
Clinical Guidelines
Tactics

- Improved decision support
- Accurate medicine
- Learning health system

A common short-term strategy: Improving the electronic health record

- Learning health system
The Problem-Oriented Medical Records: (SOAP)
In the beginning, there was....
The Beancounters Triumph!
Can you say: Return on Investment?
Sometimes, the informaticians get to be in charge
Dawn of Computer-Based Clinical Documentation

Clinical Decision Support

Orders
Results
Billing
Alert

Subjective
Objective
Assessment
Plan
Putting IBM Watson to Work in Healthcare

A New Class of Industry Specific Analytical Solutions.
There Are Still Pieces Missing

Clinical Decision Support

Subjective
Objective
Assessment
Plan

Orders
Results
Billing
Alert
Cook #1: Vegan
Cook #2: North Carolinian
Cook #3: Informatician
We Need to Make the Computer a Full Partner

Clinical Decision Support

- Subjective
  - Coded Symptoms
- Objective
  - Coded Signs
- Assessment
  - Relate Findings to Assessment
- Plan
  - What is the Strategy?

Orders

Results

Billing

Alert
Re-Using EHR Data for Better Evidence

Analytics

Clinical Decision Support

Subjective

Coded Symptoms

Objective

Coded Signs

Assessment

Relate Findings to Assessment

Plan

What is the Strategy?

Orders

Results

Billing

Alert
Re-Using EHR Data for Better Decision Support

Clinical Decision Support

Subjective
- Coded Symptoms

Objective
- Coded Signs
- Relate Findings to Assessment
- What is the Strategy?

Assessment

Plan

Analytics

Orders

Results

Billing

Alert
Better Reuse For Research (and Workflow)

Clinical Decision Support

Subjective
- Coded Symptoms
Objective
- Coded Signs
Assessment
- Relate Findings to Assessment
Plan
- What is the Strategy?

Orders
Results
Billing
Alert

Research
UAB Initiatives

• Center for Genomic Medicine
• Personalized Medicine Institute
• Informatics Institute
The Agenda of the UAB Informatics Institute

Center for Genomic Medicine
- Coordinating Genomics Research with Clinical Research Activities

Personalized Medicine Institute
- Relating Biobanks to Research Needs; Delivering Knowledge to the Point of Care
- Informatics Research to Address Researcher Information Needs and Improve Workflow

Center for Clinical and Translational Science
- Integration of New Data Record; Integration of New Decision Support Tools
- Helping Patients Understand their Health; Helping them Contribute to their Record

UAB Health System Electronic Health Record (Cerner)

Informatics Institute
- Improving Access to and Re-Use of Clinical Data to Support the Learning Health System
- Support Institutional Decision-Making

Research
- Relating Biobanks to Research Needs; Delivering Knowledge to the Point of Care
- Informatics Research to Address Researcher Information Needs and Improve Workflow

Operations
- Improving Access to and Re-Use of Clinical Data to Support the Learning Health System
- Support Institutional Decision-Making

Patient Care
- Delivering Next Generation Decision Support to All Stakeholders

Informatics Education
- Teaching Basic Informatics to Clinical Trainees; Training the Next Generation of Informaticians
- Teaching Clinical Trainees How to Use and Contribute to the ERH

Clinical Education
- Relating Biobanks to Research Needs; Delivering Knowledge to the Point of Care
- Informatics Research to Address Researcher Information Needs and Improve Workflow

Patient Education (Patient School)
- Relating Biobanks to Research Needs; Delivering Knowledge to the Point of Care
- Informatics Research to Address Researcher Information Needs and Improve Workflow
The Secret Agenda of the UAB Informatics Institute

1\textsuperscript{st} Generation EHR – Home-grown by academic informatics groups
2\textsuperscript{nd} Generation EHR – Early commercial efforts to recreate paper record
3\textsuperscript{rd} Generation EHR - Mature commercial efforts to recreate paper record plus decision support
4\textsuperscript{th} Generation EHR – Creation of an intelligent assistant for the twenty-first century

Data Extracts

Current Electronic Health Record

"Meaningful Use" Requirement

New Data Capture Technology

"Meaningful Use" Requirement

Knowledge-Based Representation of Patient Information

New Decision Support Technology

"Meaningful Use" Requirement

Clinicians and Patients

Informatics Research Needed to Define this

Education Research Needed to Learn How to Teach Proper Use

Informatics Research Needed to Define this

Everyone Wins if Record is Comprehensive and Computable

EHRs Can Do this Now, Even if They Don't Understand the "Blob" of Data

Can Be Stand-Alone Apps or Integrated with EHR for "Look and Feel"
Conclusions

- We have been ready for the promise of better EHRs for years
- Viewing the EHR as something other than a diary is a fundamental challenge
- Center for Human Genomics will provide the genetic knowledge
- Personalized Medicine Institute will deliver it
- Informatics Institute will provide the data and tools to succeed