Robert Wachter has indicated his conflict of interest
The Digital Doctor: Hope, Hype and Harm at the Dawn of Medicine’s Computer Age

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Professor, Associate Chairman, and Chief, Division of Hospital Medicine
University of California, San Francisco
Author, The Digital Doctor (April, 2015)
Conflict of Interest: Absolutely

"Well told and eye opening . . . I kept thinking, 'Exactly!' while reading it."
—Atul Gawande,
Author of *Being Mortal*
I am not a Luddite!
“By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care.”
Budget of Office of the National Coordinator for Health IT (ONC)

2005: $42M
2009: $30B

A 71 THOUSAND PERCENT INCREASE
IT Adoption Skyrocketing: Now >70%

From Adler-Milstein & Jha
Richard Baron on the Trauma of Computerizing His Philadelphia Office Practice

“The staff came to work one day and nobody knew how to do their job.”
Arizona General Hospital will be coming to The Grand Canyon State later this year!! Located in Laveen, Arizona, a suburb of Phoenix, Arizona General Hospital is a 40,000 square-foot boutique general hospital.

Services offered include:

• Emergency Room
• Radiology Suite inc. CT, X-Ray, and Fluoroscopy
• Two State-Of-The-Art Operating Rooms
• Outpatient Surgery
• 16 Inpatient Rooms
• NO EMR
In Patient Safety, We’ve Been Waiting Patiently for Health IT, But…

- Digital radiology: the canary in the coal mine
- The iPatient and scribes
- IT and the birth of new kinds of medical errors
- Some final thoughts on IT and the humanity of healthcare
The Demise of Radiology Rounds

“The man who ruined radiology”
– Paul Chang’s dad
Digital Radiology as the Canary in the Coal Mine

- The digitization of the thing creates the opportunity for infinite scalability/distribution
- Social relationships and communication patterns that previously depended on gathering around the thing will wither
- Power relationships mediated by who controls the thing will be renegotiated
- What happens when the thing isn’t the film, it’s the medical record…
Residents’ Room Vs. The Ward
“The patient is still at the center, but more as an icon for another entity clothed in binary garments: the ‘iPatient.’ Often, emergency room personnel have already scanned, tested, and diagnosed, so that interns meet a fully formed iPatient long before seeing the real patient. The iPatient’s blood counts and emanations are tracked and trended like a Dow Jones Index, and pop-up flags remind caregivers to feed or bleed. iPatients are handily discussed (or ‘card-flipped’) in the bunker [the team’s conference room], while the real patients keep the beds warm and ensure that the folders bearing their names stay alive on the computer.”

Abraham Verghese, *NEJM* 2008
A 7-year-old Girl’s Depiction of her MD Visit

Toll E. The cost of technology. *JAMA* 2012
DALLAS — Amid the controlled chaos that defines an average afternoon in an urban emergency department, Dr. Marian Bednar, an emergency room physician at Texas Health Presbyterian Hospital Dallas, entered the exam room of an older woman who had fallen while walking her dog. Like any doctor, she asked questions, conducted an exam and gave a diagnosis — in this case, a fractured hand — while also doing something many physicians in today’s computerized world are no longer free to do: She gave the patient her full attention.

Standing a few feet away, tapping quickly and quietly at a laptop computer cradled in the crook of her elbow, she instructed a scribe in Scrubs: "Amanda, what’s the address of this woman?" and "Amanda, what’s the social security number of this woman?"

"She’s very old," Dr. Bednar explained, before giving a specific address to the scribe. "She’s a Texan; she’s got a nice house in the suburbs."

"Amanda, do you know the woman’s phone number?" Dr. Bednar asked.

"No, she didn’t give me her phone number, just her address," the scribe replied.

"Well, what I’m used to doing is calling and getting the address and the phone number and then calling her family member who can give me their phone number," Dr. Bednar explained.

"She’s 89, and she’s been in the hospital for five days," Dr. Bednar said. "And she has a daughter who’s a nurse and a son who’s a lawyer."

"Amanda, do you know the name of this woman’s daughter?"

"Yes, it’s Jennifer," the scribe replied.

"And you know Jennifer’s phone number?"

"Yes, it’s 214-555-1234," the scribe said.

"Great, do you know Jennifer’s name?"

"Yes, it’s Jennifer," the scribe replied.

"Okay, Amanda, you’ve got it. Go ahead and call Jennifer."

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Dr. Marian Bednar, an emergency room physician in Dallas, left, with Amanda Nieto, 27, her scribe and constant shadow. Mark Graham for The New York Times
The Case

- A 16-year-old boy, weighing 38.6 kg, with a chronic immunodeficiency, was admitted for colonoscopy as part of a workup for GI bleeding.

- The patient was on multiple home medications, including trimethoprim-sulfamethoxazole (Septra ds) 160 mg tablet twice daily for prophylaxis.

- The medical center recently installed a state of the art electronic health record/CPOE system.
The Order and the Aftermath

- At 1:09 pm, the admission orders were written, including an order to administer 38.5 Septra ds tablets
- 9 hours later, he took this dose
- 14 hours later, the patient had a grand mal seizure; a Code Blue was called
- A week later, he left the ICU
- Thankfully, he’s doing well today
How Could This Happen?
The Resident’s Intended Order

One double-strength Septra bid
Ordering One Septra ds With CPOE

<table>
<thead>
<tr>
<th>Reference Links:</th>
<th>1. Lexi-Comp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose:</td>
<td>5 mg/kg of trimethoprim</td>
</tr>
<tr>
<td>Weight Type:</td>
<td>Actual</td>
</tr>
<tr>
<td>Weight:</td>
<td>38.6 kg</td>
</tr>
<tr>
<td>Actual weight:</td>
<td>38.6 kg (recorded 11 hours ago)</td>
</tr>
</tbody>
</table>

⚠️ 160 mg of trimethoprim is the nearest dose that can be administered using available products (a decrease of 17% from 5 mg/kg of trimethoprim).

Administer Dose: 160 mg of trimethoprim

5 mg/kg of trimethoprim × 38.6 kg (Weight as of Tue Sep 10, 201X) = 193 mg of trimethoprim × 1 tablet/160 mg of trimethoprim = 1 tablet × 160 mg of trimethoprim/tablet (rounded to the nearest 0.5 tablet) = 160 mg of trimethoprim = 4.15 mg/kg of trimethoprim

Administer Amount: 1 tablet

(rouned to the nearest 0.5 tablet from 1.2063 tablet)

< 40 kg: Must use weight-based dosing
By policy, doses rounded > 5% must be confirmed/signed by ordering MD.
Resident Returns to CPOE Screen and Enters “160”

Notice a problem?
“My resident told me to ignore all the alerts.”
Alert Fatigue: A Clear and Present Danger

- One month in UCSF ICUs (70 beds)
  - 2,558,760 alerts
  - One audible alert every 7 minutes
  - What would get a nurse scared?

- vs. Boeing’s thoughtful approach to alerts
  - The principles of user-centered design

Drew B. *Plos One* 2014
Remote pharmacy: Cramped, multitasking
- Staffing tight
- Pharmacists simultaneously answering phones, receiving visitors, and manning computers

Pharmacist receives signed order from MD
She approves the order, then gets similar alert to resident’s
For much the same reason, she overrides it
The Patient’s Nurse

- First year nurse, who was “floating” – unfamiliar with this ward or its types of patients
- Thought this seemed like unusually large dose
- Considers asking charge nurse
  - But she’s busy giving chemo to other patient
  - Feeling some time pressure due to 30 minute rule
- Considers asking patient’s mom
  - She is off the floor with her other child, also ill
- Counts on bar-code medication administration system (BCMA) to confirm that order is right
BCMA Instructs Her to Give Full Dose of 38.5 Pills

Administration Warning

Dose entered is less than dose ordered for the following order(s):

sulfamethoxazole-trimethoprim (BACTRIM DS, SEPTRA DS)
800-160 mg tablet 6,160 mg of trimethoprim
Entered: 160 mg of trimethoprim
Ordered: 6,160 mg of trimethoprim

Cancel and re-evaluate the dose or select an override reason.

Override reason: [ ] [Accept] [Cancel]
They’re having me take an awful lot of pills and drink an awful lot of liquid
What Are The Lessons From This Case?
The “Swiss Cheese Model” of Major Accidents & Errors

- Confirmation Bias
- Alert Fatigue
- Overreliance on the Machines
- Stressed workforce, difficult working conditions, production pressure
- CPOE policies demand extra steps; No hard stops
- No “Stop the Line” culture
- An Overdose of Septra

James Reason, Human Error
Adaptive vs. Technical Problems

“... problems that require people themselves to change. In adaptive problems, the people are the problem and the people are the solution. And leadership then is about mobilizing and engaging the people with the problem rather than trying to anesthetize them so that you can just go off and solve it on your own.”

– Ronald Heifetz, Kennedy School of Government
The “IOM Report” (December 1999) launches the patient safety field

“I know there’s a proverb that says ‘To err is human,’ but a human error is nothing compared to what a computer can do if it tries.”

Agatha Christie
One Final Thought About Health
IT and Medical Practice