Electronic health records: underused in the ICU?

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Disclosures

• Research funding:
  – NIH / NIGMS K23 award
  – Surgical Infection Society

• Consulting fees from Beckman Coulter on sepsis biomarkers

• No tobacco relationships
Caveats

• My clinical translational research focuses on sepsis

• I spend more time thinking about biomarkers than bioinformatics

• And yet...
THE DIGITAL DOCTOR
Hope, Hype, and Harm at the Dawn of Medicine’s Computer Age

ROBERT WACHTER
But I’m not alone

Google trends search: “EHR”
Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act of 2009

- Goal to promote the adoption and meaningful use of health information technology
- $6.5 billion investment in adoption of EHRs
“No other industry, to our knowledge, has been under a universal mandate to adopt a new technology before its effects are fully understood, and before the technology has reached a level of usability that is acceptable to its core users.”

RAND, Friedberg et al., *Health Affairs*, 2014
But there are redeeming features?

- Integration of EHR data in prediction tools
- Clinical decision support and minimizing errors

Royal College of Physicians, accessed 2015
Objectives

• Briefly address epidemiology if EHRs

• Explore the tension of EHR adoption in the ICU
  – Potential benefit
  – Perceived threats to care

• Illustrative case studies
Adoption and spending is increasing

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Office of the Auditor General Canada, 2013
ONC Data Brief No. 23 April 2015, accessed HealthIT.gov
Perceived benefits of the EHR

- Overcome bad hand writing
- Provide platform for quality care and clinical decision support
- Promotes billing practice
- Gather and trend patient, unit, hospital data
- Interoperability of patient data
- Improve efficiencies
- Secure private patient information

Thakker et al., 2006 Perspect Health Inf Manag
Perceived barriers

- EHR usability that did not match clinical workflows
- Time-consuming data entry
- Interference with face-to-face patient care
- Overwhelming numbers of electronic messages and alerts
- A design to optimize billing – through quality
  - Only as good as the quality metrics the measure

RAND, Friedberg et al., *Health Affairs*, 2014
Lack of data?

Rahurkar et al., *Health Affairs*, 2014
Example of workflow changes

Rural 400-bed tertiary-care medical center
3 ICUs
26 Attending physicians

Carayon et al., *Int J Med Informatics*, 2015
Meaningful use?

- Clinical decision support
- Interoperable patient data
- Reduce costs
- Accuracy of orders (CPOE)
- Smart alerts
- Enrollment in randomized trials
- Medication errors
- Alerts for sick patients
- Quality of care
Can EHR help with RCTs?

- Screening for eligible patients
- Nest interventions in the computerized order sets
- Record compliance with interventions
- Ease of platform trials
- Follow up / outcomes already tracked as part of clinical care

Angus DC, JAMA, 2015
Case study: POC trial of insulin

Fiore et al, Clin Trials, 2011
Case study: smart alerts

• “To Err is Human”
• Current ability to detect unusual patient management are knowledge based – rely on prior knowledge input into the system

• EHR could learn typical care of ICU patients
  • Leverage updating statistics on anomalies in care

• Create alerts for clinical care outliers, conditional on usual practice patterns
Case study: smart alerts for outlier care

\[ y = 0.4483x + 0.2357 \]
Case study: smart alerts for outlier care

• Require balance
  • Low frequency
  • High quality
  • Low override rate

• Independent and self learning
  • Don’t require outside “expert” input
  • Directly informed by concurrent and past practice in the EHR
Perspective

Use of Health IT for Higher-Value Critical Care

Lena M. Chen, M.D., Edward H. Kennedy, M.S., Anne Sales, Ph.D., R.N., and Timothy P. Hofer, M.D.

ICU care helps these people
Case study: smart alerts for ICU triage


Admissions related to illness severity

Admissions unrelated to illness severity
Case study: smart alerts for ICU triage

- Multiple prognostic tools exist (e.g. LAPS2 from Kaiser, among others)
- Deploy real time, use admission and physiologic data in the EHR
- Appropriately target the “sick” for ICU admission
- Need RCTs
Conclusions

• Adoption of the EHR is rapidly expanding in the US and Canada

• We spend A LOT of time with it

• Despite absence of controlled trials, the use of EHR will increase in the ICU

• Think creatively about efficient uses in the ICU – not just for QI or billing agendas
  • Promote trial enrollment (research)
  • “Smart” alerts (adjuncts to our clinical practice)
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