Engineering solutions to close the EHR usability gap

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  - The American Medical Association (AMA) Practice Transformation Initiative
  - The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the American Medical Association.

Poor Usability & the Burden of EHR Use

The current design of the EHR platform is *distracting*, *impeding, and frustrating* to use for providers.
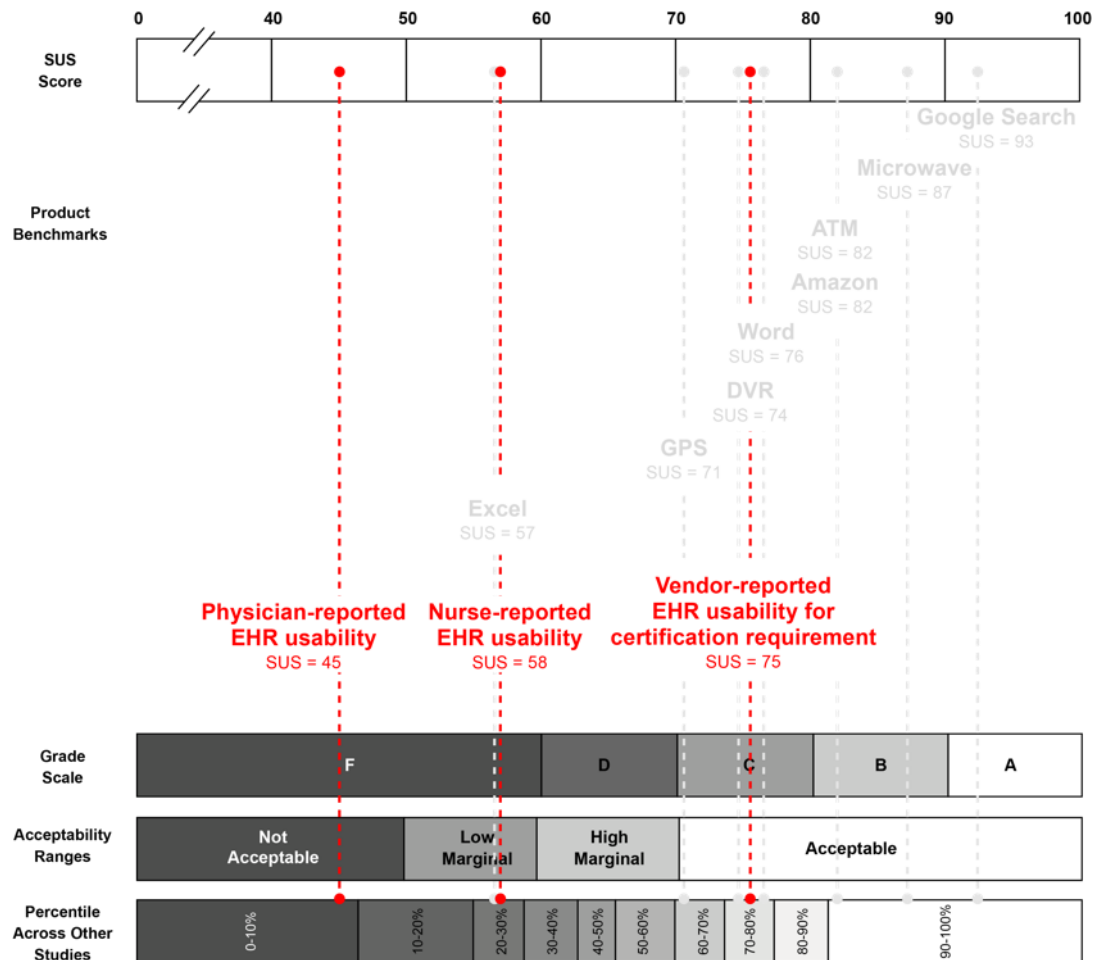
Figure:

System Usability Scale (SUS) Score
Gomes & Ratwani. JAMA Netw Open. 2019;2(12):e1916651
Melnick et al. Mayo Clin Proc 2020;95(3):476-487
Melnick et al. JAMIA 2021; 28(8):1632-41.

Unintended consequences of CDS

Hard-stop alert that was repeatedly delivered to *all clinicians* on the patient's care team *each time* they opened a patient's chart with AKI.

Drove *small change in clinician behavior, no effect on AKI,* dialysis. Associated with significantly *higher risk of death* at 14 days in non-teaching hospitals
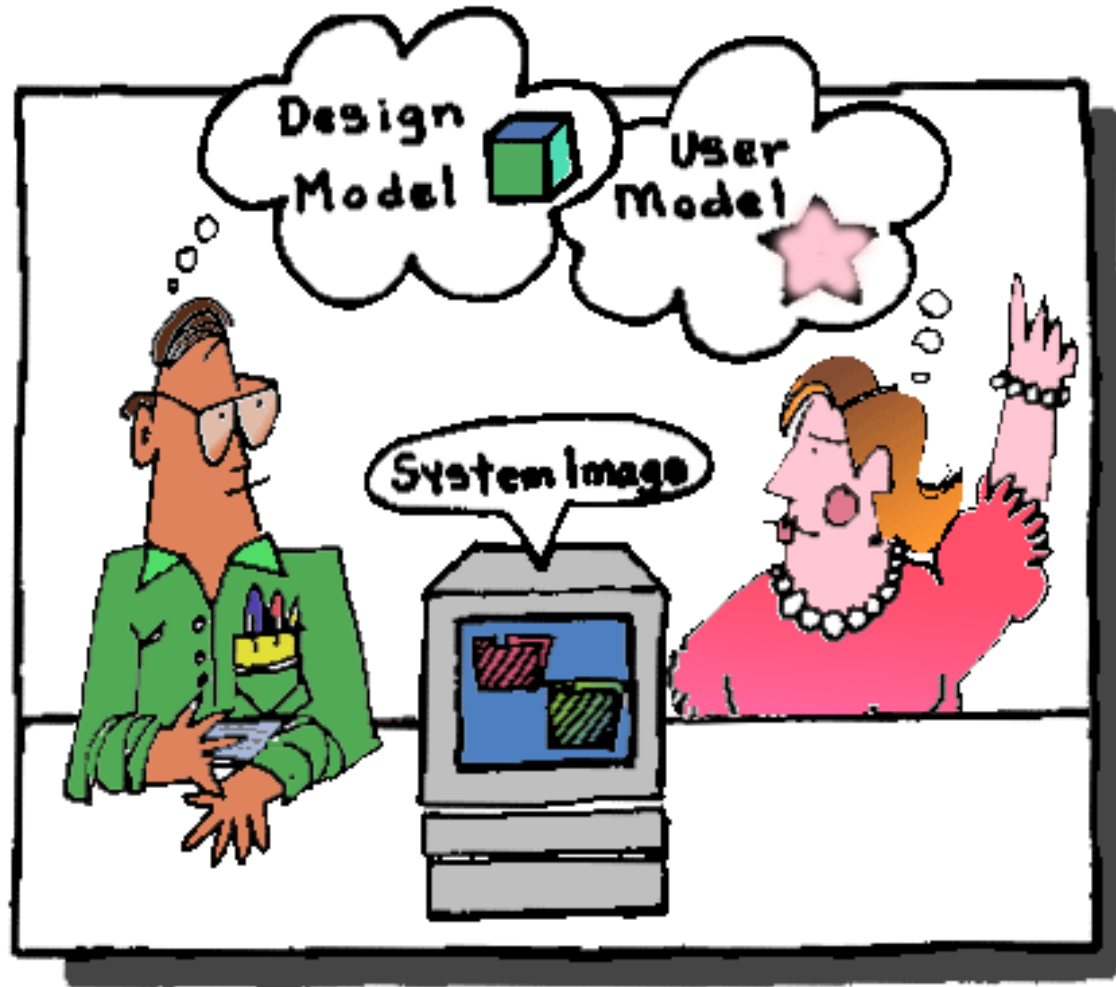
Figures:

Wilson et al. *BMJ*. 2021;372:m4786

"**Simple** can be harder than complex. You have to **work hard to get your thinking clean to make it simple**. But it's worth it in the end because once you get there, you can **move mountains**."
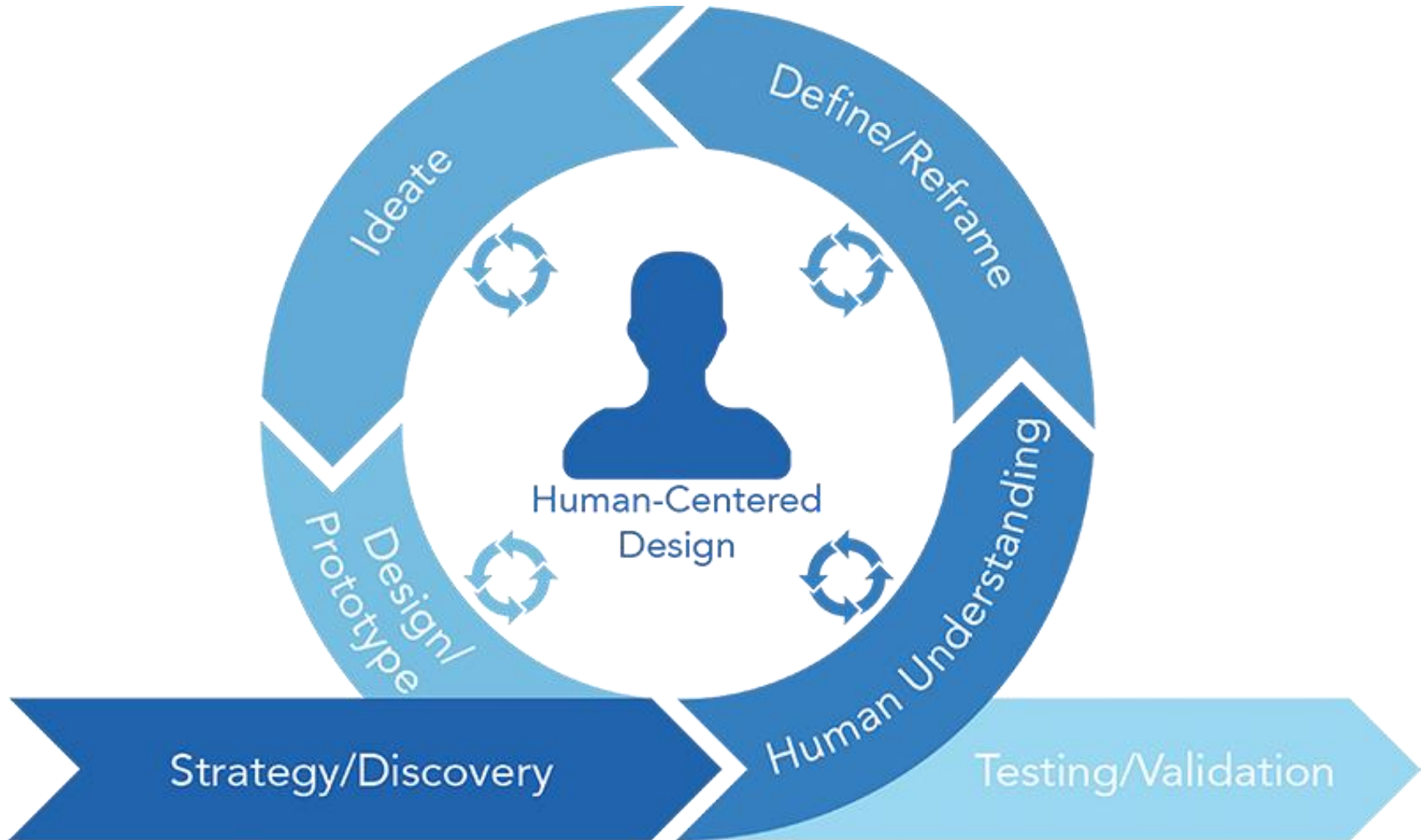
STEVE JOBS

Design vs System vs User Model

https://www.asktog.com/columns/069ScottAdamsMeltdown.html

User-Centered Design

Use Case

EMBED:
PRAGMATIC TRIAL OF USER-CENTERED CLINICAL DECISION
SUPPORT TO IMPLEMENT EMERGENCY DEPARTMENT-INITIATED
BUPRENORPHINE FOR OPIOID USE DISORDER

Buprenorphine (an effective treatment for OUD) can be safely initiated in the emergency department

1 The opioid crisis

- Overdose deaths soared to 93,000 in 2020
- >4M Americans have or have had OUD
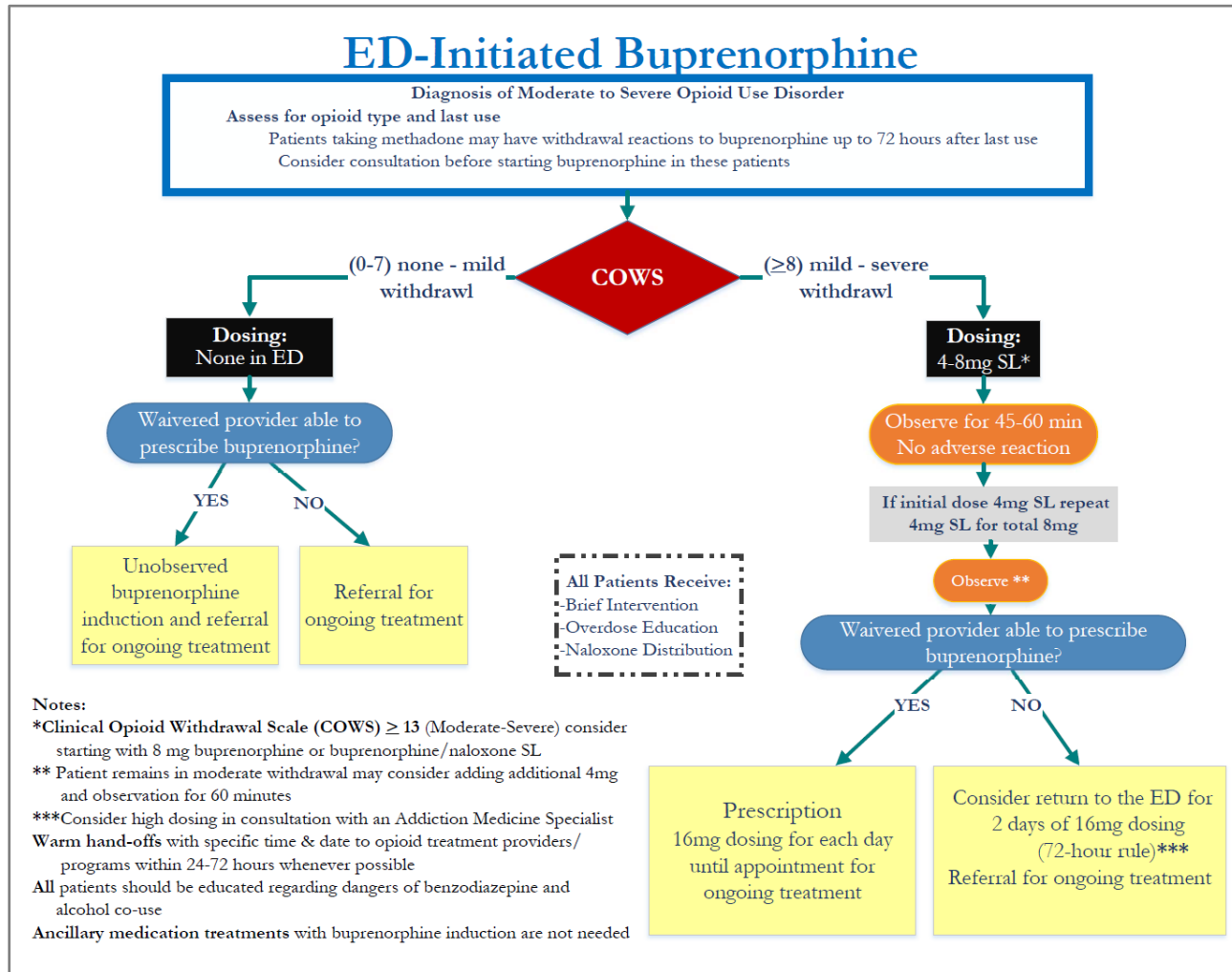
2 Medication treatment gaps

Less than 1 in 5 receive medication treatment

3 ED as critical access point

- 30% increase in ED visits in 2016, rising through pandemic
- 5% mortality year after overdose

To simplify the process from an unfamiliar, static algorithm...

…to a simple, automated application
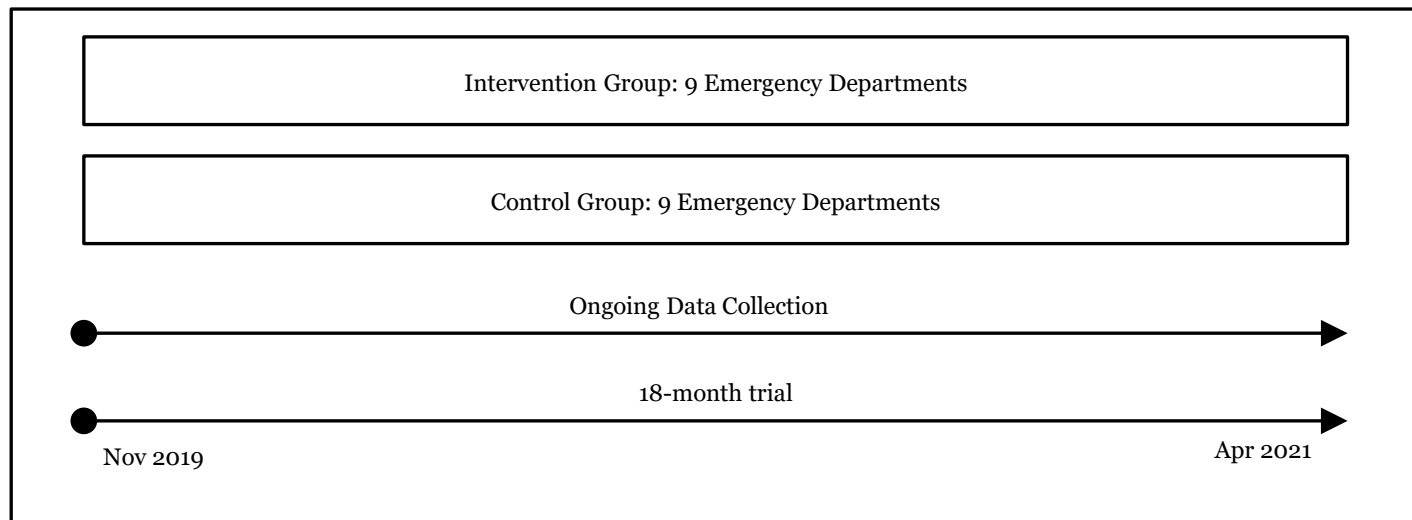
Clinicians continue in their current Epic workflow

Evaluate effectiveness with Pragmatic Trials

- 18-month pragmatic, parallel, group randomized trial

- 18 ED clusters in 5 healthcare systems randomly allocated in 1:1 ratio to intervention versus usual care arm

- Intervention: CDS to support diagnosis & withdrawal assessment & automate orders, notes, Rx, AVS, referral

- Primary outcome: initiation of BUP in ED

Intervention Group: 9 Emergency Departments

Control Group: 9 Emergency Departments

Ongoing Data Collection

18-month trial

Nov 2019   Apr 2021

Protocol.
BMJ Open, 2019
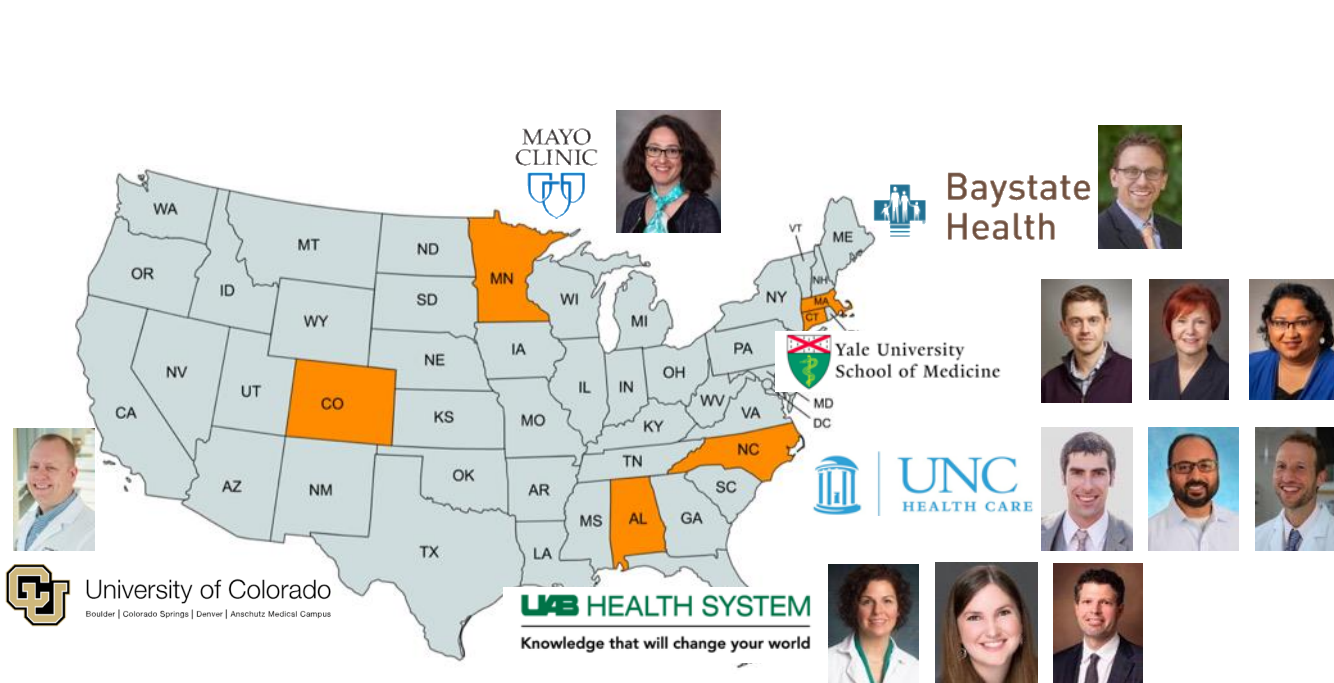
The EMBED Team

Metric Example

Why Are We Stuck?

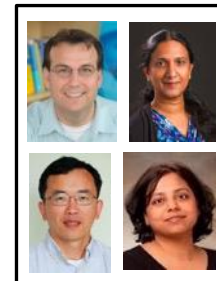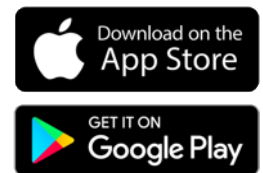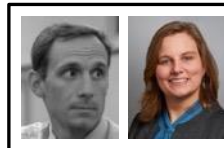Hospitals and medical practices lack valid and reliable information about their users' experience with the EHR

Why?

Lack of tools or metrics to change this landscape

Why?

Policy levers do not currently drive improvements in user experience

Why?

Market Realities—Limited competitive incentives to improve

Ideal State of Digital Health

Create and maintain the technical tools needed to:

- Improve the digital health user experience

- Reduce clinician EHR burden

- Identify EHR usability issues that may contribute to patient harm

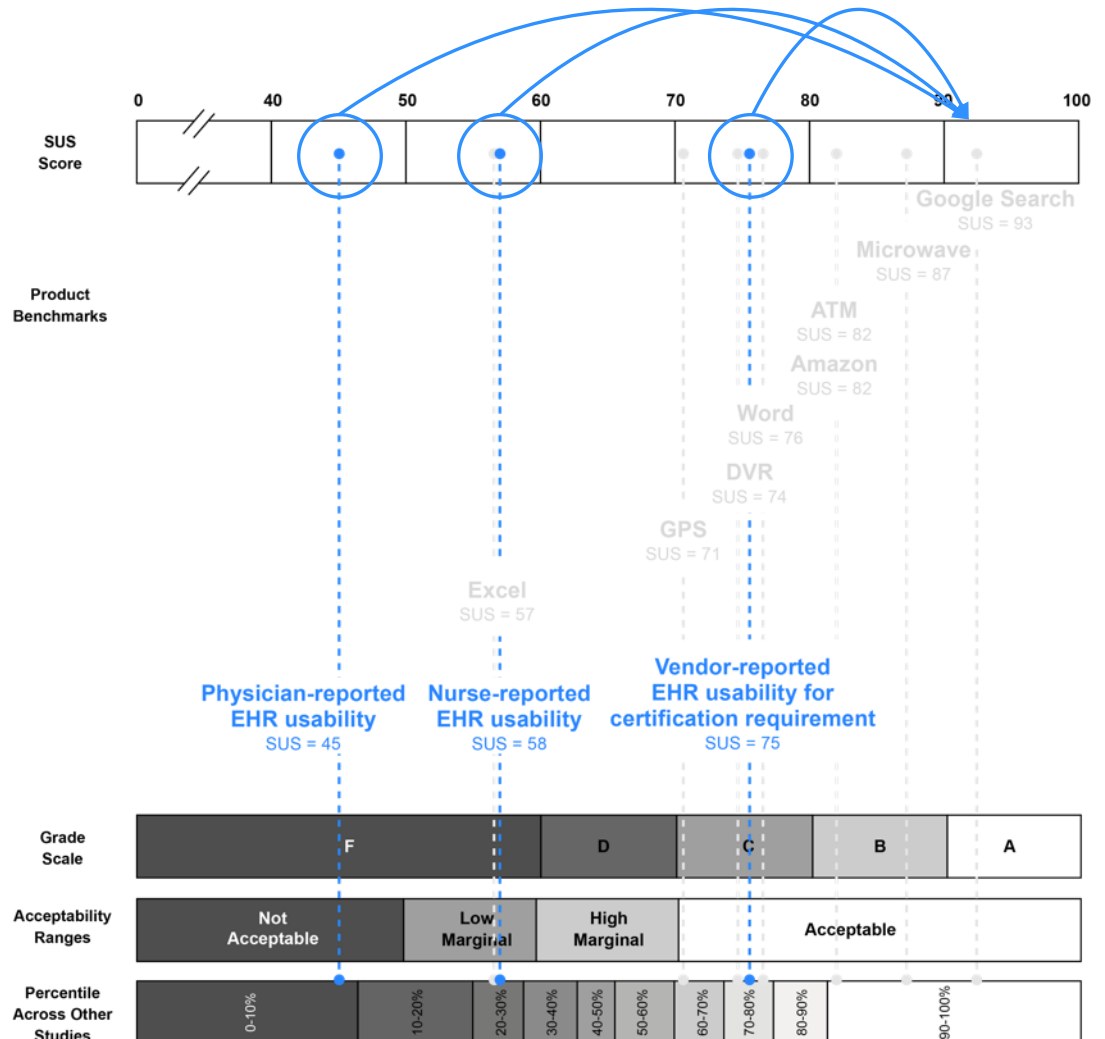- Allow real-world EHR testing at scale—accountability and transparency

Figure:

System Usability Scale (SUS) Score
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Proposed Core EHR Use Measures

Measure	Abbreviation	Definition and Example
Total EHR time	**EHR-Time$_8$**	Total time on EHR (during and outside of clinic sessions) per 8 hours of patient scheduled time. Example: A physician with 32 patient-scheduled hours per week, 20 hours of EHR-time during schedule hours, 10 hours of WOW each week would have EHR-Time$_8$ of 30/32 x 8 = 7.5
Work outside of scheduled clinical hours	**WOW$_8$**	Time on EHR outside of scheduled patient hours per 8 hours of patient scheduled time. Example: A physician with 32 scheduled patient hours per week and a total of 10 hours of EHR time outside of these scheduled hours, would have WOW$_n$ = 10/32 x 8 = 2.5
Time on inbox	**IB-Time$_8$**	Total time on inbox per 8 hours of patient scheduled time Example: A physician working with a team that is empowered to pend, send orders by protocol or operationalize verbal orders, may compose 25% of the orders from start to finish on their own, while the rest are pended or completed by team members for the physician's co-signature. In this case TW$_{ORD}$ = 75%

Metrics for assessing physician activity using electronic health record log data
Sinsky. JAMIA 2020;27(4):639-643

Preliminary Findings: EHR Use Measurement

- First study to measure EHR use across vendor products in a standardized way

- 5 of 7 proposed metrics for care could be measured for ambulatory, non-teaching physicians only

- After adjusting for age, specialty, vendor, & hrs worked, female physicians spend +30 min more time on EHR than male colleagues for every 8 hrs of clinical time

- Greater transparency, granularity & consistency of data definitions still necessary

- Recruiting participants for consensus process to overcome implementation barriers across stakeholder groups
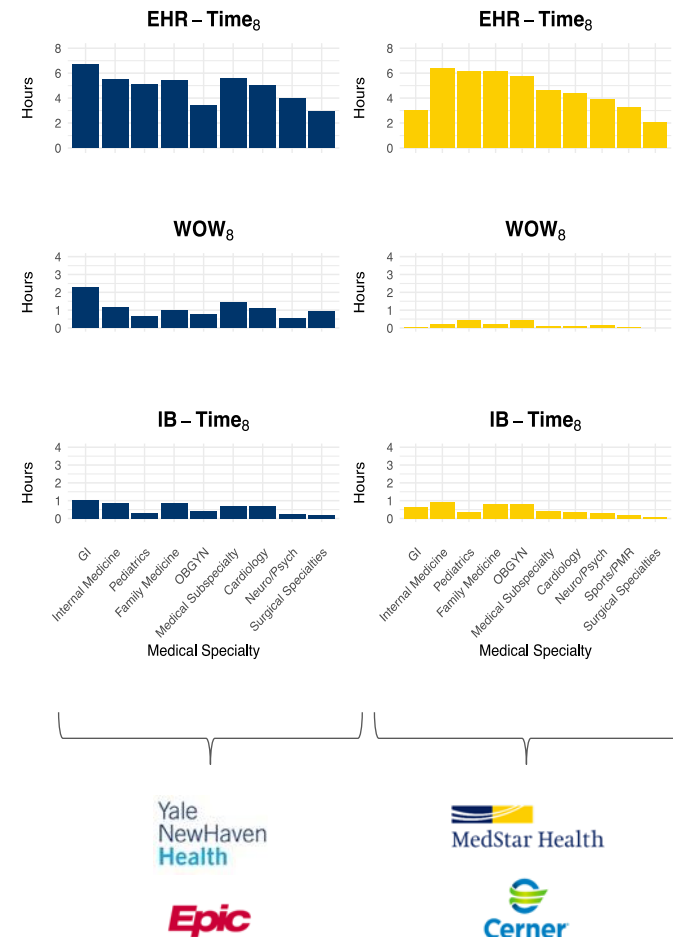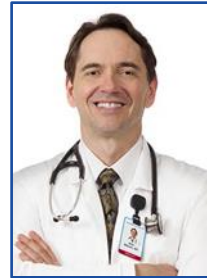
Figure:

Characterizing physician EHR use with vendor derived data

Melnick et al. JAMIA 2021;28(7):1383-92.

Projects, People, Organizations, and Vendors

Healthcare Usability Maturity Model

Thank you.

Questions?

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