# Seeing CLIIR-ly: Policy-relevant Insights from UCSF's Center for Clinical Informatics and Improvement Research

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UCSF
Osher Mini Med School
May 19, 2022

# CENTER FOR CLINICAL INFORMATICS AND IMPROVEMENT RESEARCH

## VALUES

We are a collaborative research center that believes in the importance of maximizing the impact of digital health on health system performance.

## MISSION

CLIIR uses innovative approaches to advance discovery of how to improve the use and impact of digital health on health outcomes.

## VISION

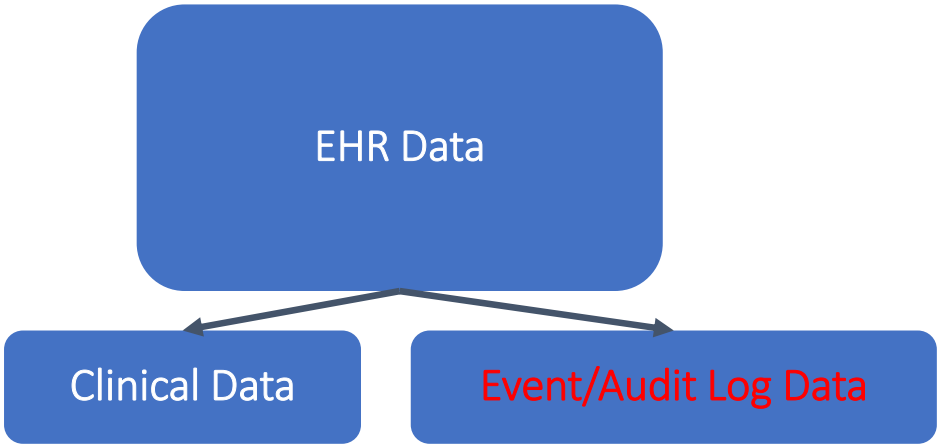
CLIIR leverages data from UCSF and UC Health to serve as a learning lab and leading academic research and policy hub in digital health.

## MOTIVATION

While EHRs have been widely implemented, we do not yet understand how to use them and other sources of digital data to *improve the clinical decisions* that drive the quality and cost of care.

# Opportunity to Derive New Insights from Enterprise EHR Data – Beyond Clinical Data

**ENTERPRISE DATA SOURCES**



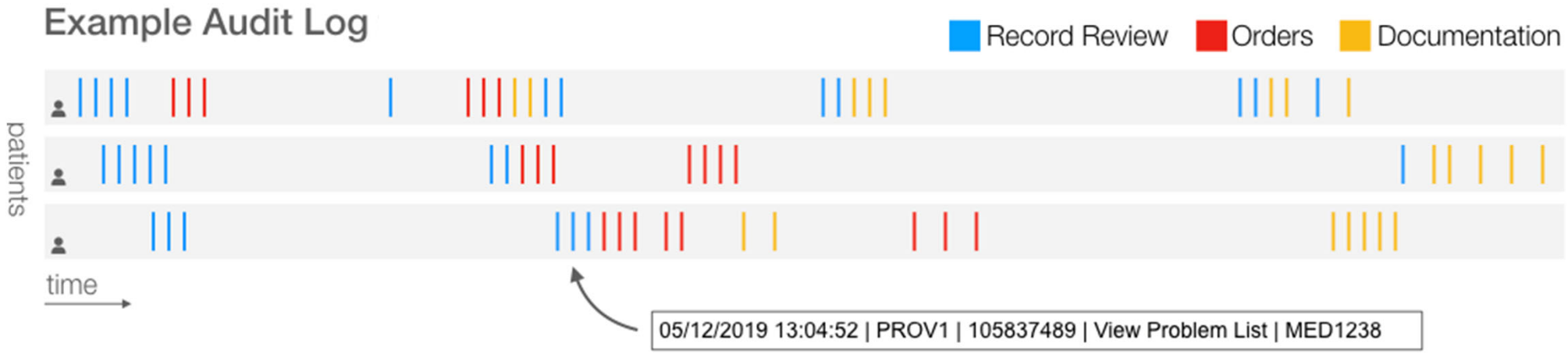

AUDIT LOG DATA:

Captures *who* is doing *what* and *when* – to measure e.g.,

- What information is viewed before making a decision or before an adverse event
- Communication patterns with patients or other providers

Offers a novel window into clinical decision making and healthcare delivery processes to better understand what predicts good/bad outcomes

# Audit Logs

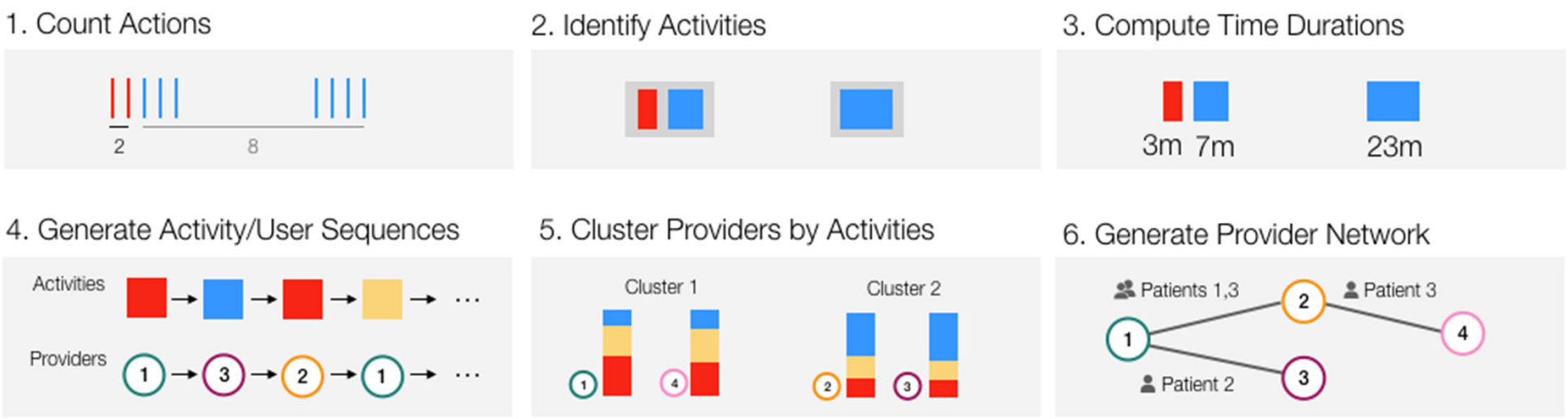



Log entries contain:

- Who accessed
- What patient
- When
- What action

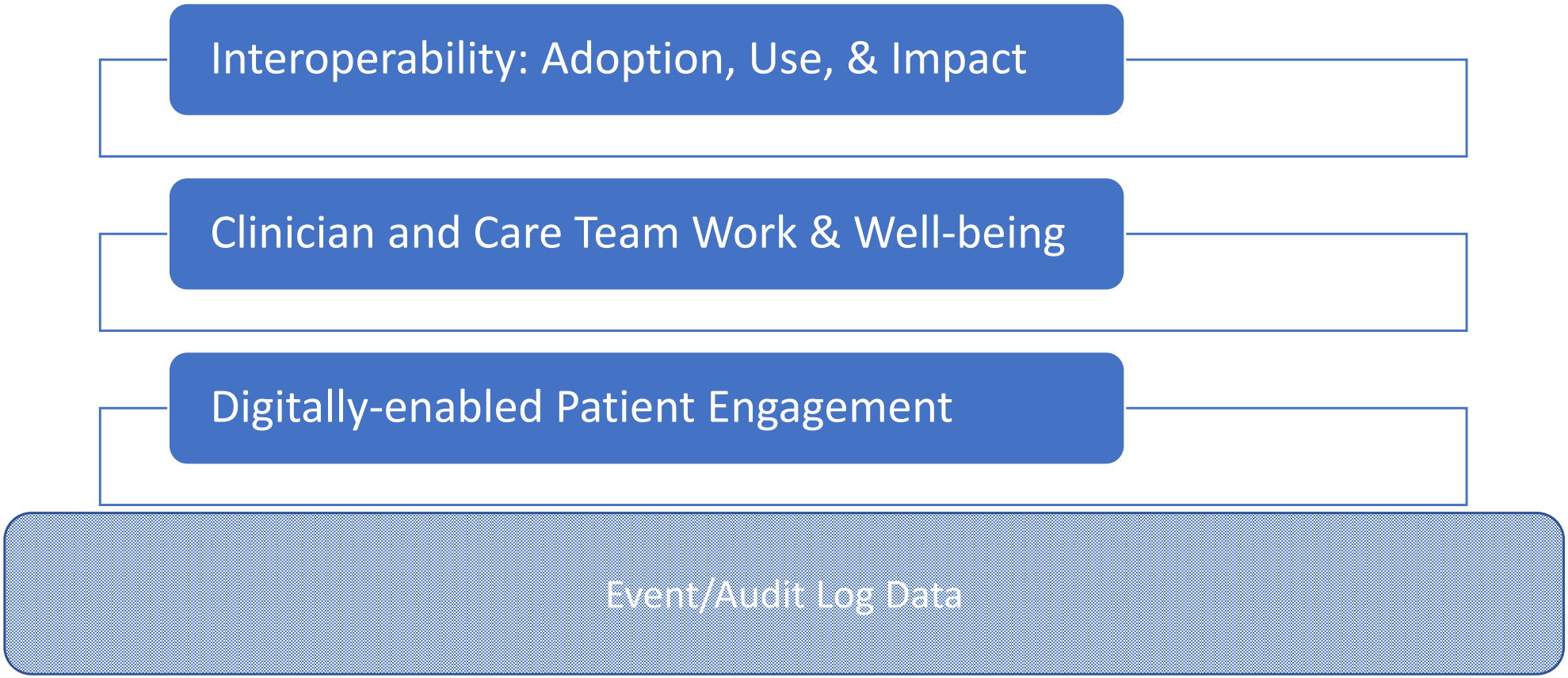
Figure credit: Adam Ru

# Audit Log Measures




Rule A, Chiang MF, Hribar MR. Using Electronic Health Record Audit Logs to Study Clinical Activity: A Systematic Review of Aims, Measures, and Methods. JAMIA. To appear.

# CLIIR Research "Pillars"



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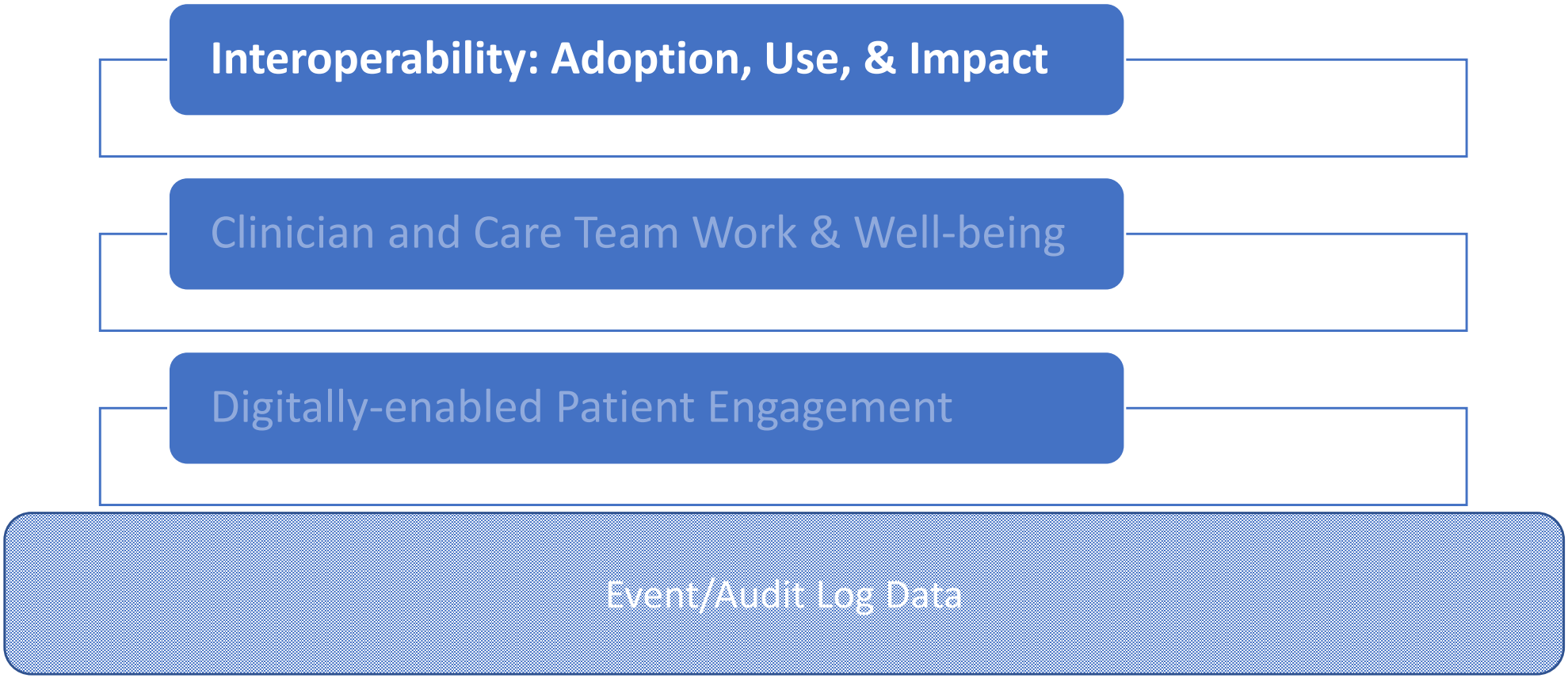


# Project 1: Policy Context

Interoperability of health data is a major policy priority

>80% of US hospitals exchanging data electronically

But, 34% of those hospitals report rarely or never using outside data available electronically.

When asked why, they said:

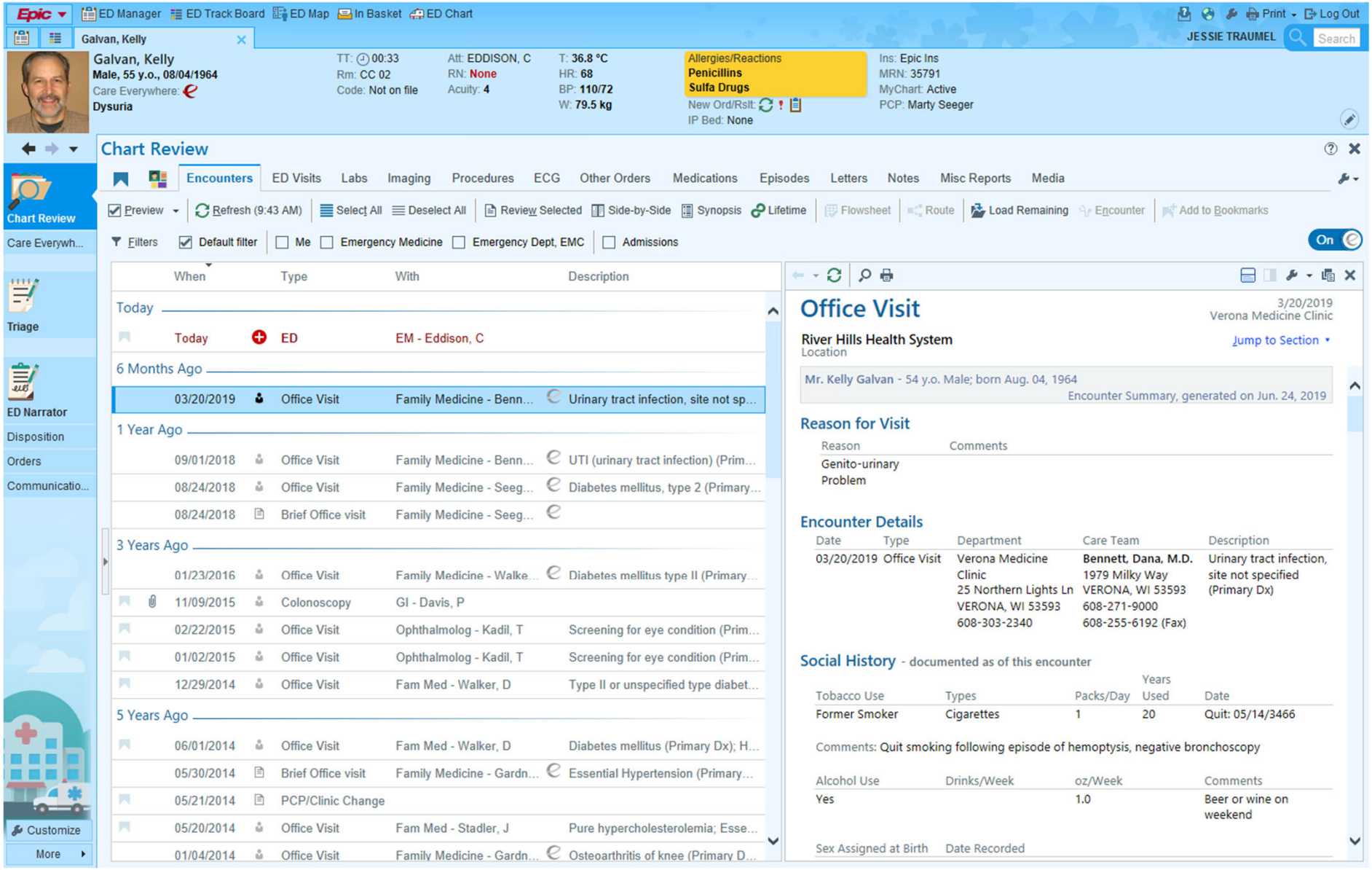
**Table 2:** Reasons for rarely or never using patient health information received electronically from providers or sources outside their health system when treating patients, 2017.

| Reason | 2017 |
|---|---|
| Difficult to integrate information in EHR | 55% |
| Information not always available when needed (e.g. timely) | 47% |
| Information not presented in a useful format | 31% |
| Information that is specific and relevant is hard to find | 20% |
| Information available and integrated into EHR but not part of clinicians' workflow | 16% |
| Do not trust accuracy of information | 10% |
| Vocabulary and/or semantic representation differences limit use | 7% |

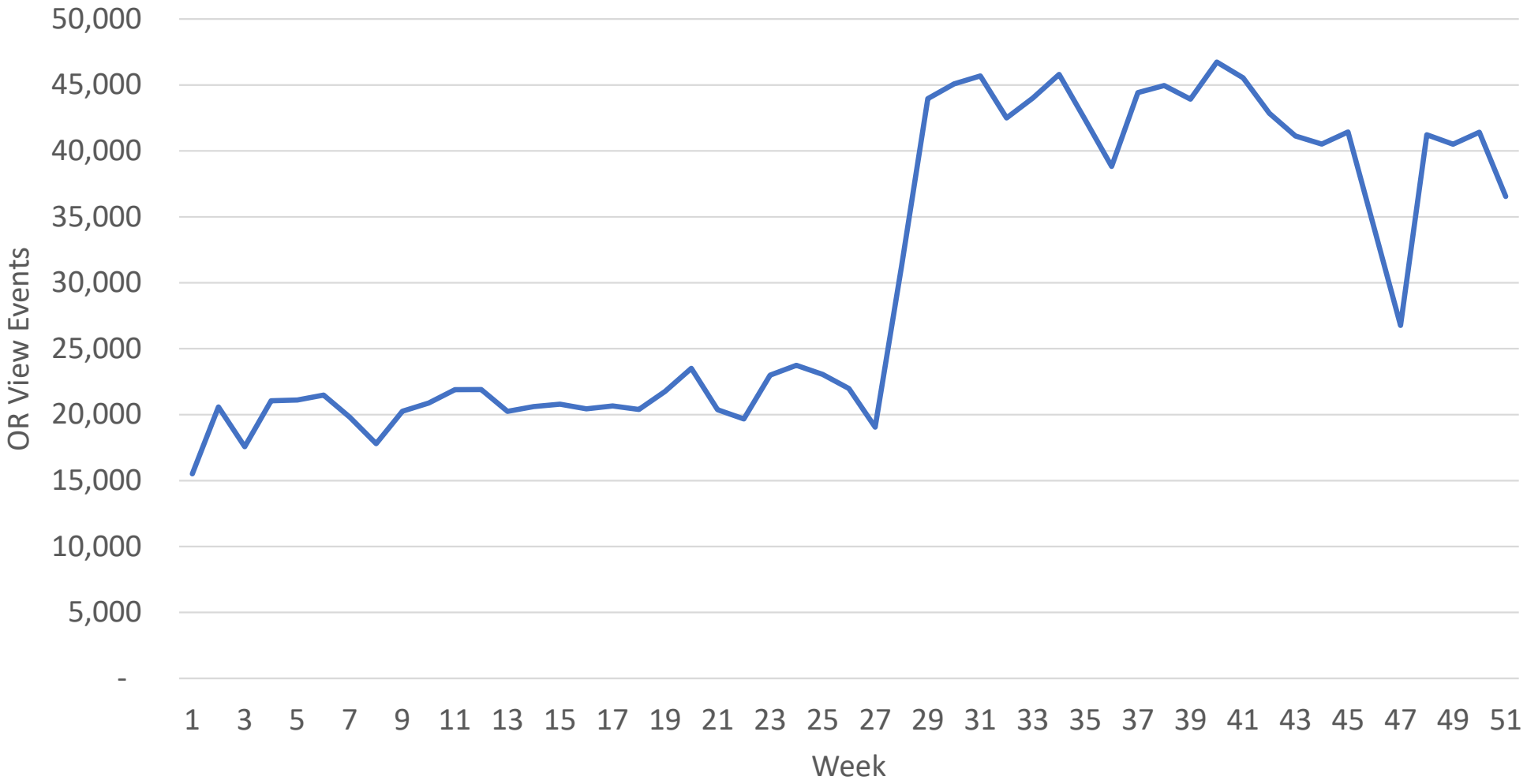
Source: 2017 AHA Annual Survey Information Technology Supplement.

Notes: *Significantly different from previous year ($p<0.05$).

# Project 1: Impact of Changing User Interface Design on Viewing of Outside Records

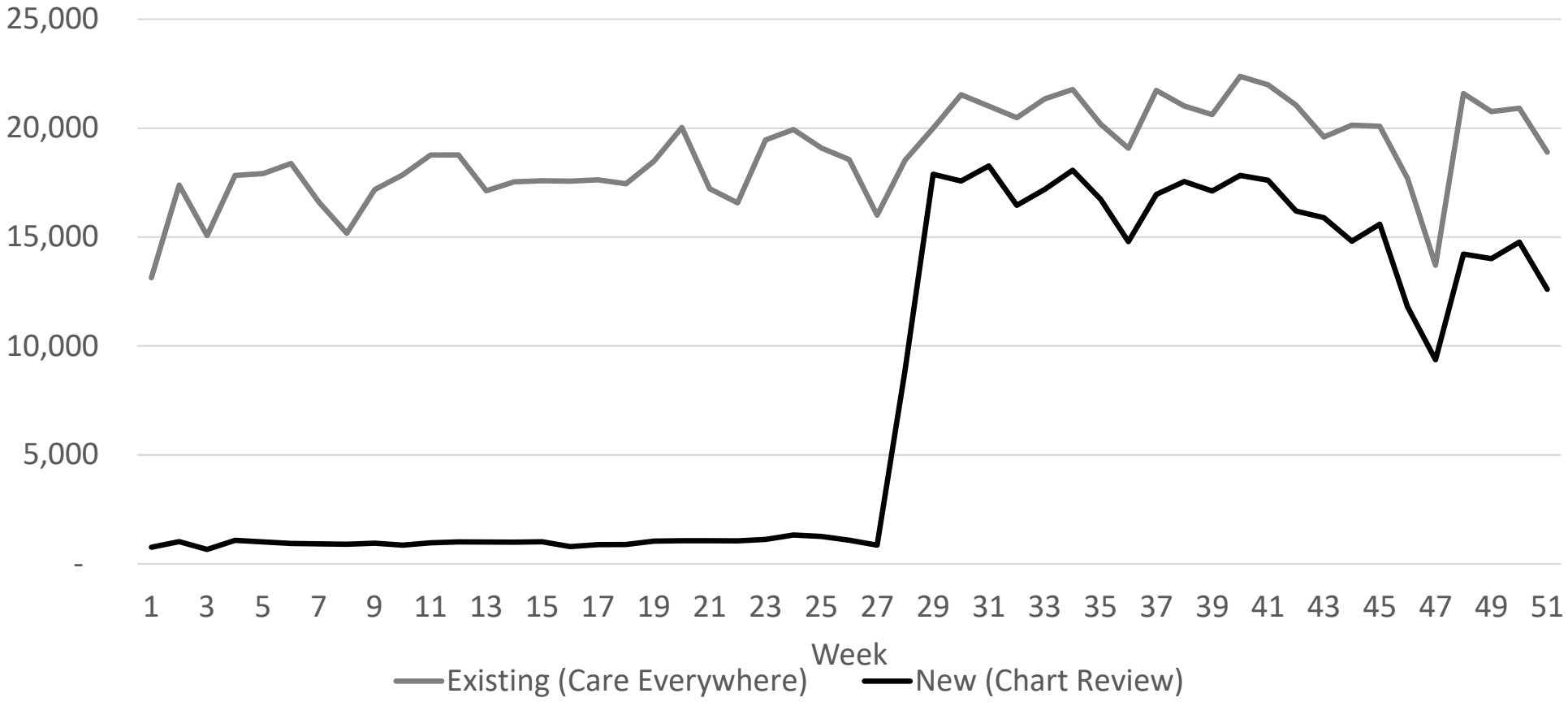


# Impact of Integrated Encounters on Viewing of Outside Records




Significant increase in level: 29,921 outside record views per week ($p<0.001$)

# Impact of Integrated Encounters on Viewing of Outside Records: via Chart Review versus Care Everywhere

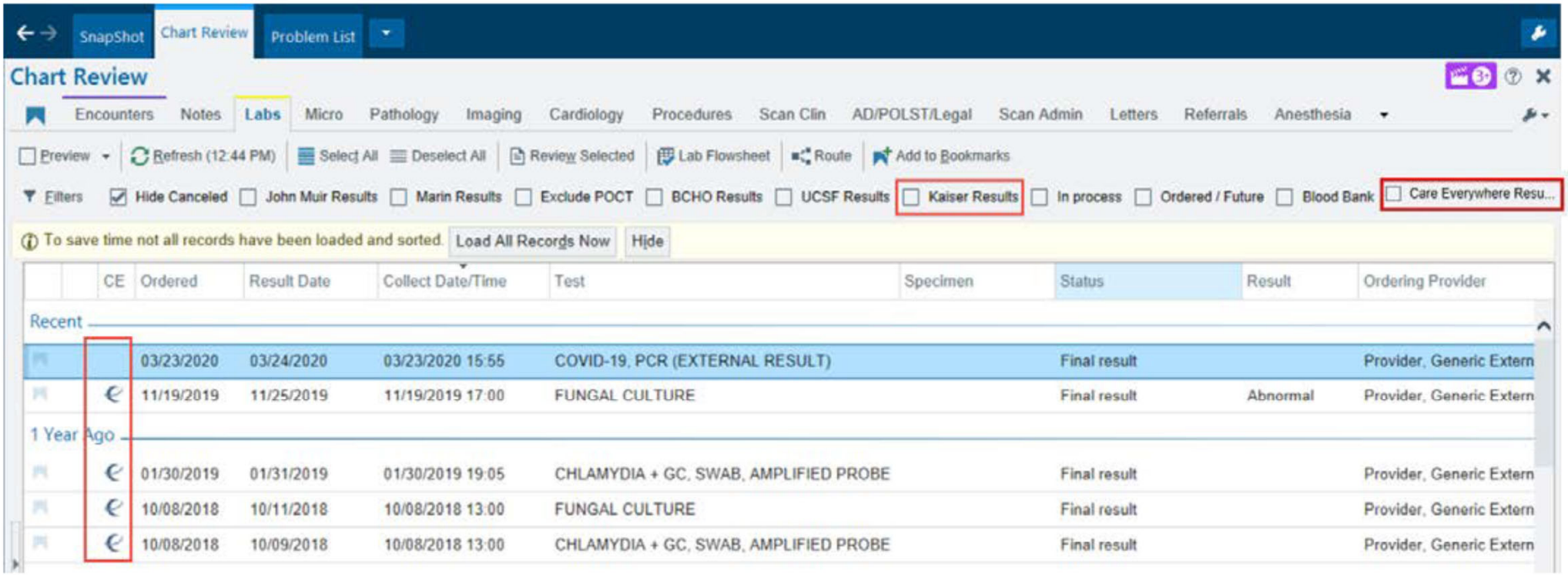



Almost all of which came via the "new" channel (16,600 per week; $p<0.001$)

No substitution of CR pathway for CE pathway; net gain

# And now on to studying lab result integration…

Went live 10/2019



# CLIIR Research "Pillars"

# Clinician EHR Use During COVID-19

## Evidence from National EHR Metadata

- The COVID-19 pandemic caused a sudden and dramatic shift in care delivery

- This includes clinician work and interactions with technology
  - Telemedicine
  - Volume

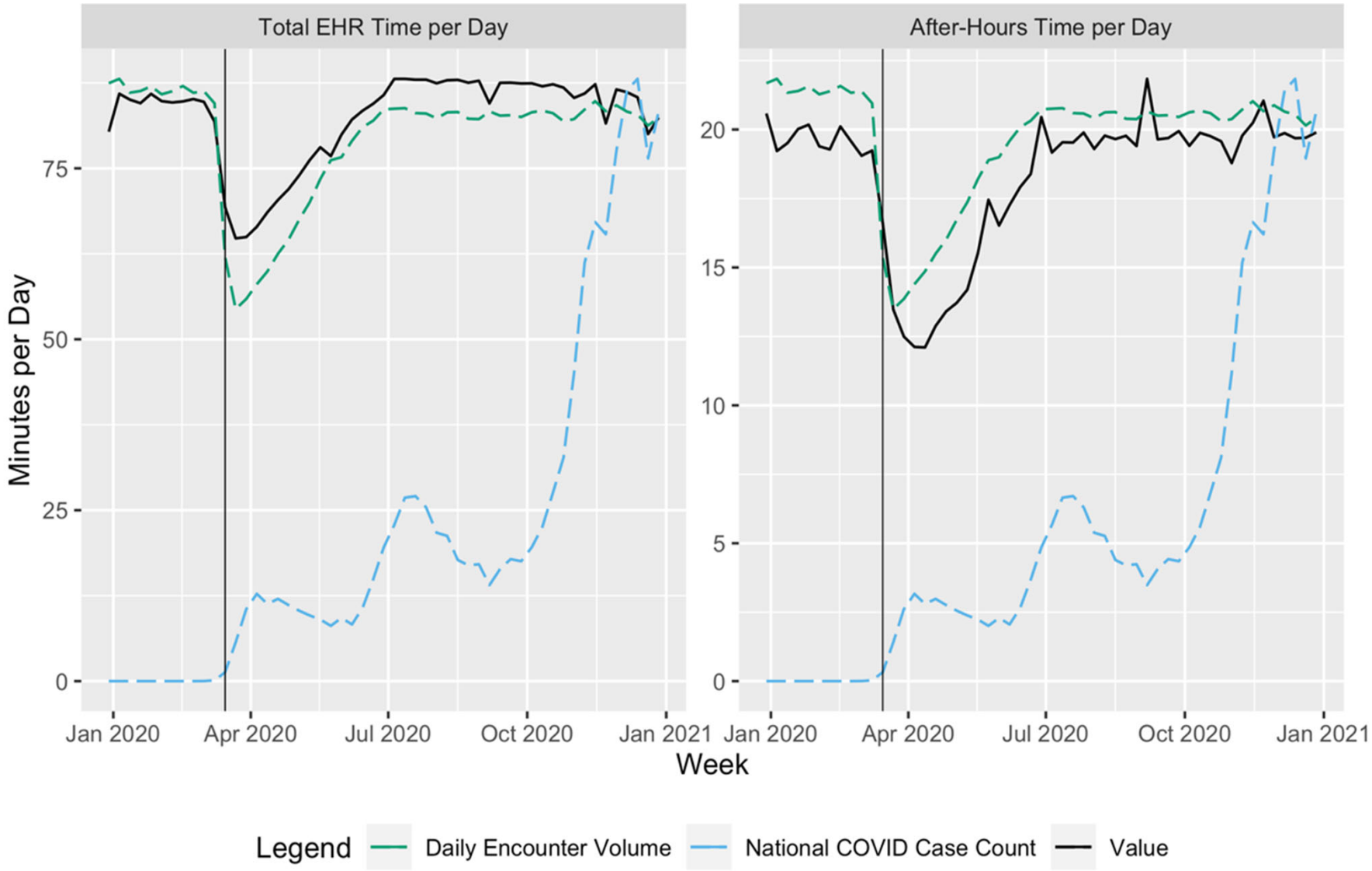
- How did EHR use change during the pandemic?

# Clinician EHR Use During COVID-19

## Evidence from National EHR Metadata

- National data from Epic Systems ambulatory care EHR
- 366 health systems from December 2019 – January 2021
- Physicians and APPs, aggregated to the health system level

# Clinician EHR Use During COVID-19



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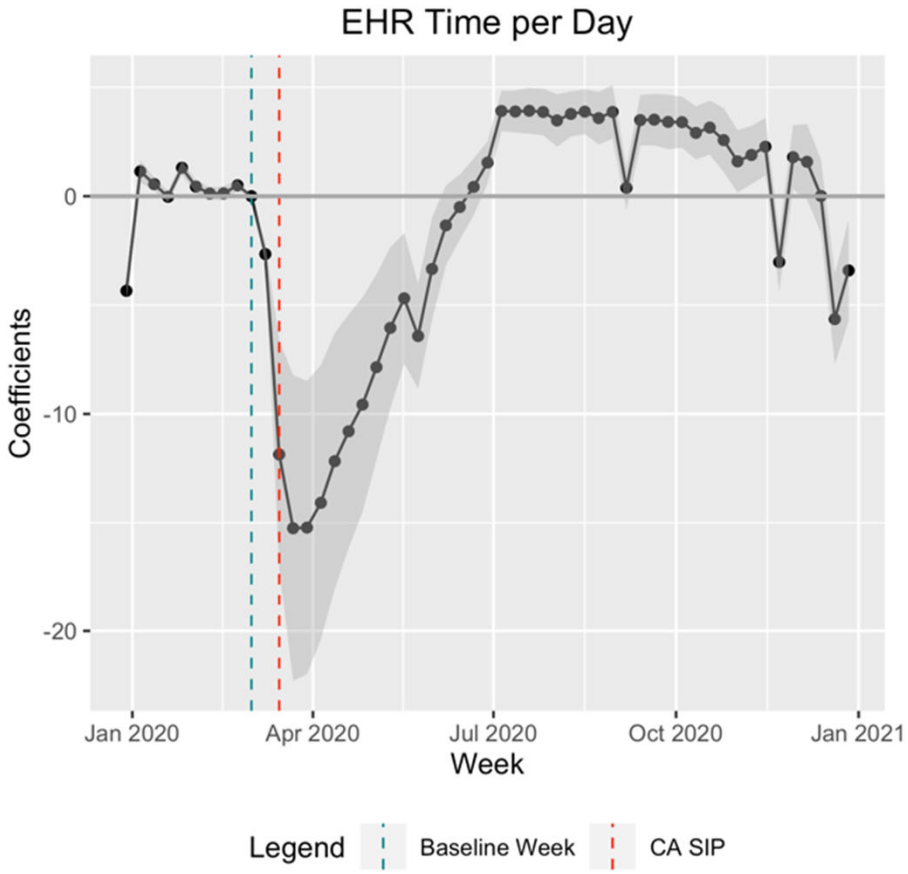


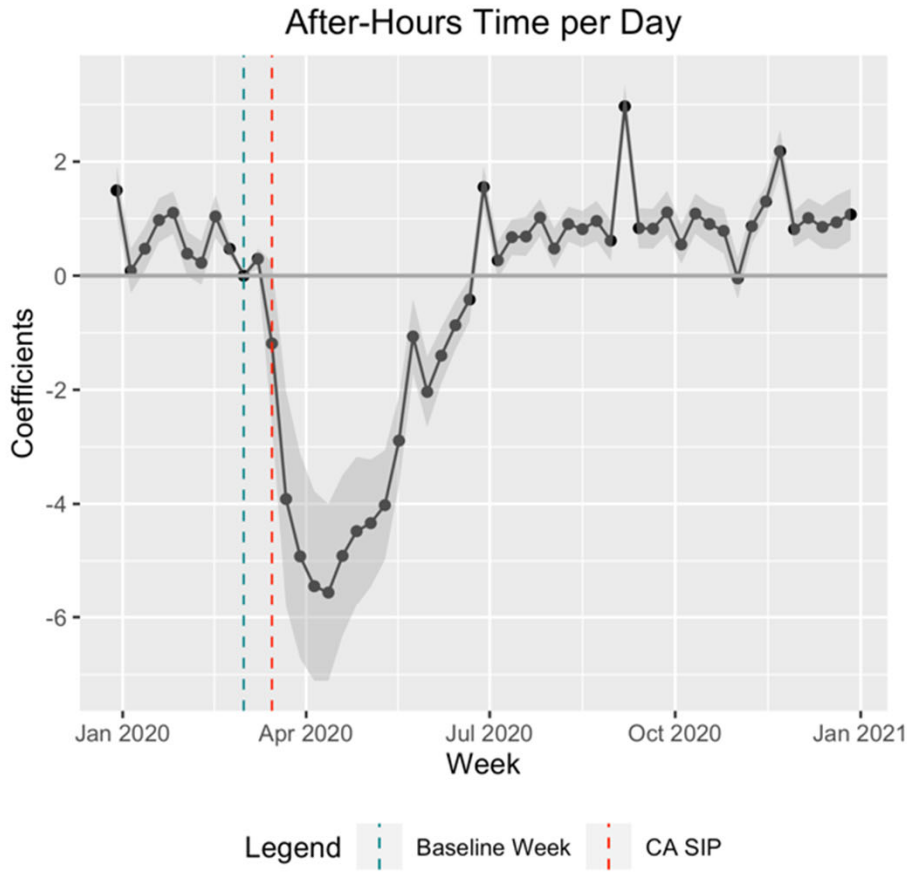


Notes: graphs are event study plots controlling for organization fixed effects and daily volume. All point estimates are relative to the week, 2-weeks prior to the first state-wide shelter in place (SIP) order in California, our proxy for the onset of the pandemic. Gray regions represents 95% confidence intervals with standard errors clustered at the organization level

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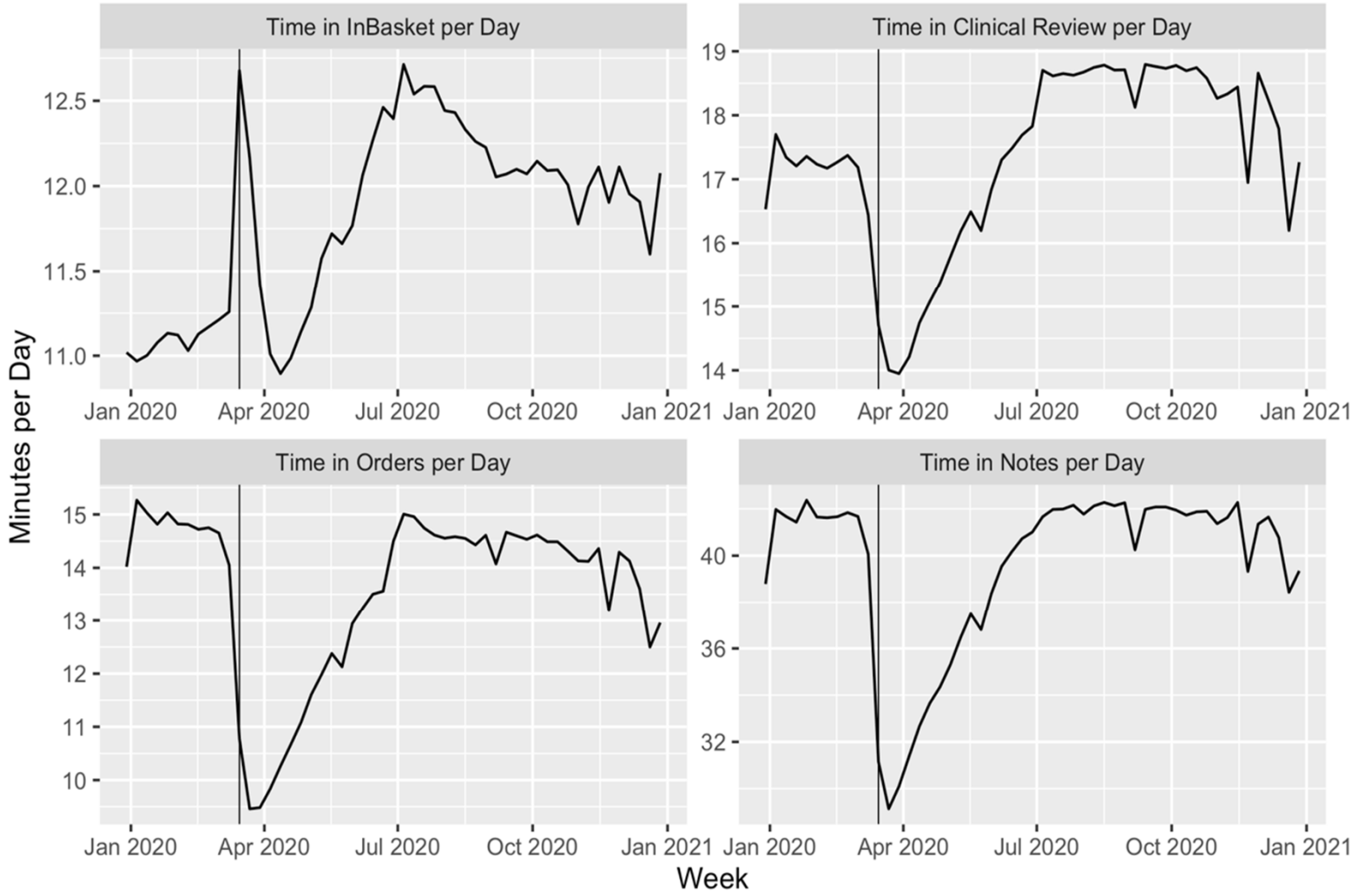

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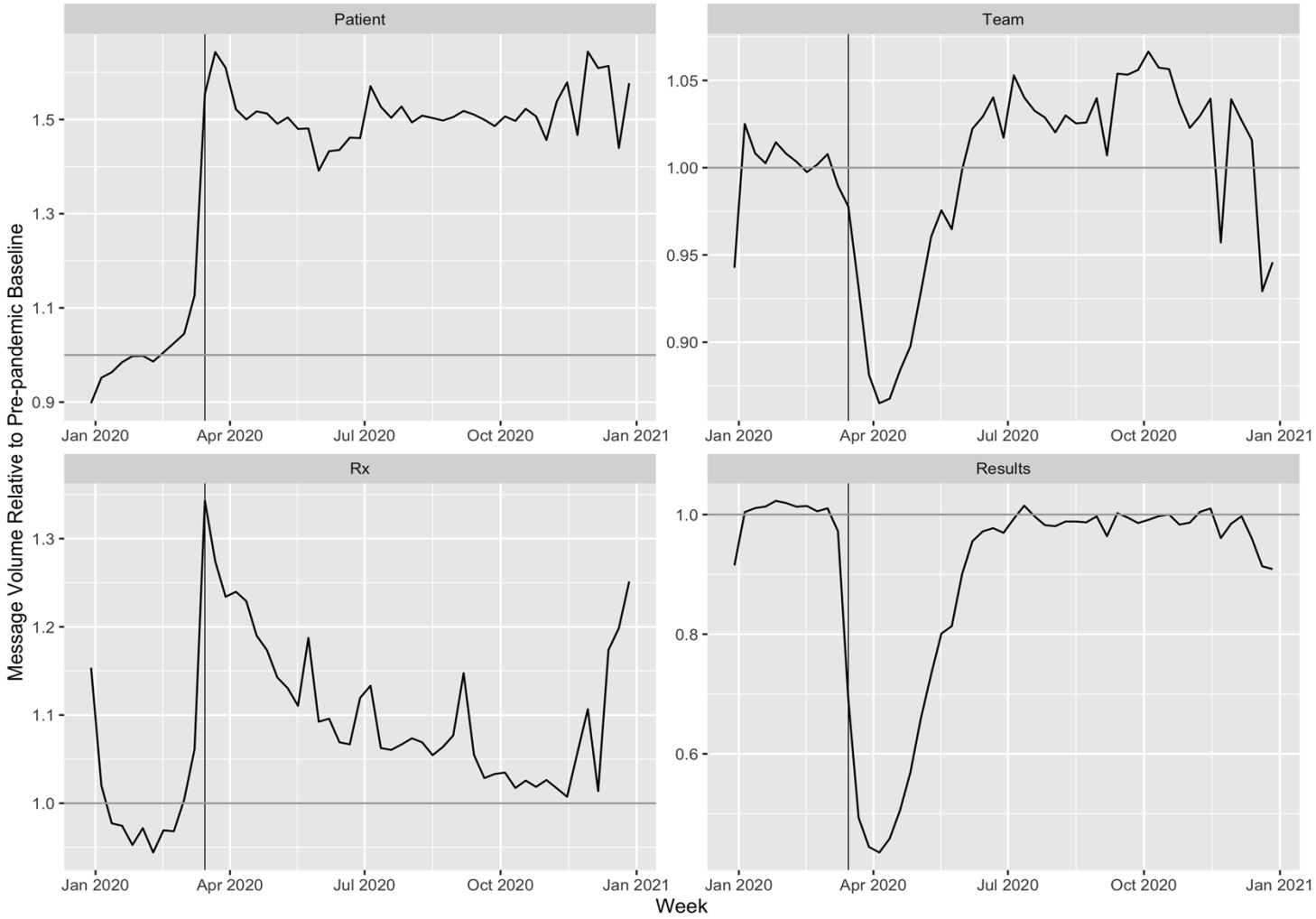


# Clinician EHR Use During COVID-19

| | *Dependent variable:* | | |
|---|---|---|---|
| | 'Time in In Basket per Day' | | |
| | (1) | (2) | (3) |
| MessageSystem | −0.040 | −0.001 | −0.001 |
| | (0.032) | (0.002) | (0.002) |
| MessageTeam | 0.401*** | 0.178* | 0.182** |
| | (0.073) | (0.095) | (0.089) |
| MessageResults | 0.081 | 0.238*** | 0.121* |
| | (0.088) | (0.040) | (0.065) |
| MessageRx | 0.651*** | −0.010 | 0.036 |
| | (0.135) | (0.123) | (0.105) |
| MessagePatient | 2.111*** | 2.321*** | 1.915*** |
| | (0.173) | (0.159) | (0.301) |
| MessageCustom | 2.683 | 0.071 | 0.073 |
| | (2.299) | (0.074) | (0.063) |
| MessageOther | 0.261 | 0.200* | 0.245* |
| | (0.186) | (0.118) | (0.137) |
| Constant | 5.239*** | | |
| | (0.432) | | |
| OrgID fixed effects | No | Yes | Yes |
| Week fixed effects | No | No | Yes |
| Observations | 18,347 | 18,347 | 18,347 |
| $R^2$ | 0.667 | 0.970 | 0.974 |
| Adjusted $R^2$ | 0.667 | 0.969 | 0.974 |
| Residual Std. Error | 2.424 (df = 18339) | 0.737 (df = 17976) | 0.682 (df = 17924) |
| *Note:* | | | *p<0.1; **p<0.05; ***p<0.01 |

# Clinician EHR Use During COVID-19

- Big disruptions in EHR work at the onset of the pandemic
- Slight increase in EHR time per day and after-hours time through the end of 2020, driven by InBasket and Clinical Review
- BIG increase in patient messages – which also demand the most clinician time

# Ongoing Policy Evaluations with EHR Audit Log Data

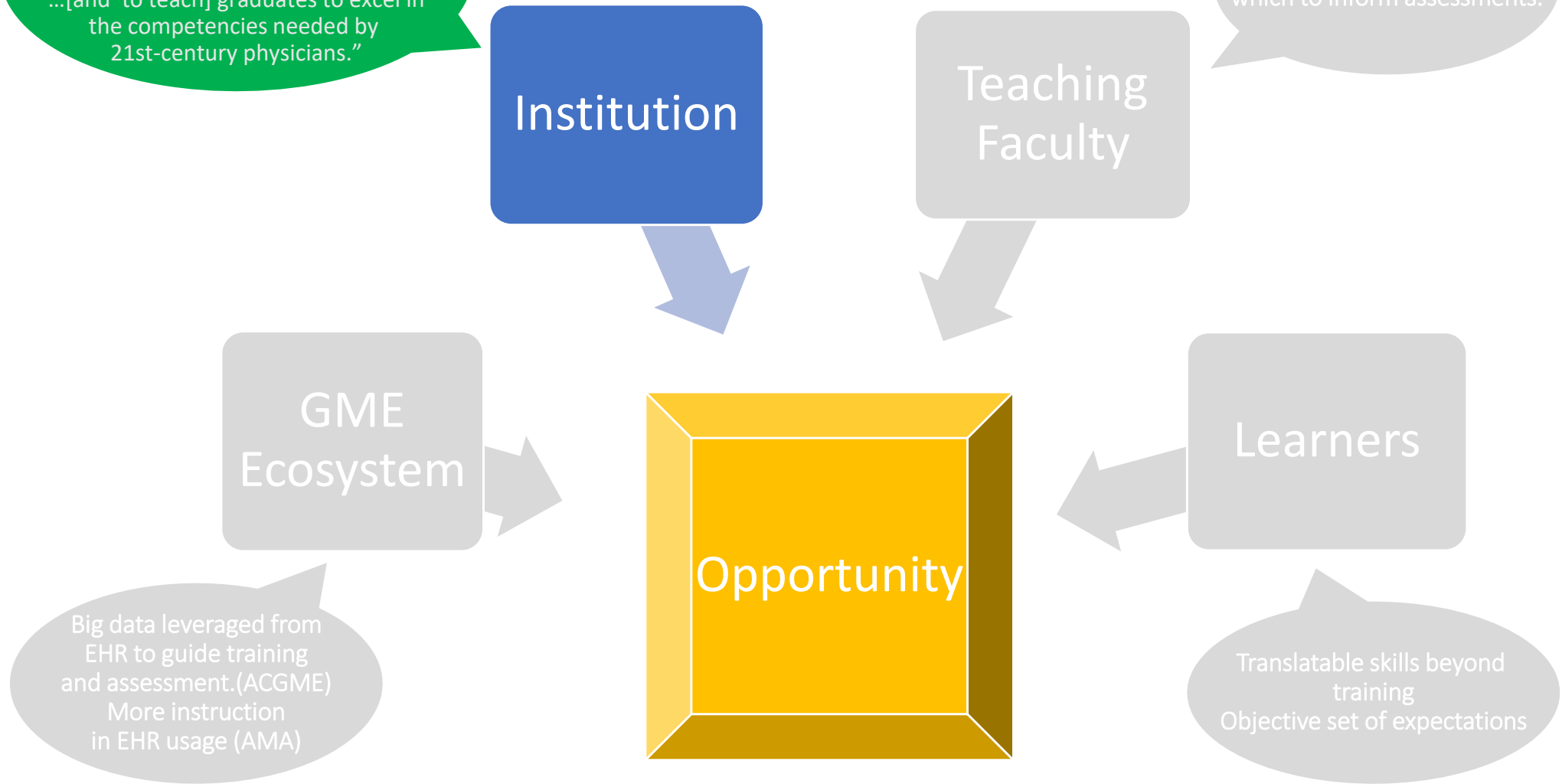
- Evaluation of 2021 E/M coding changes on physician work
- Impact of patient access to clinical notes on documentation patterns
- Telehealth and demands on physician time, decision-making
- Finding effective strategies to reduce documentation burden:
  - Identifying optimal use of EHR tools
  - Evaluating the use of documentation support staff to increase health system capacity

# The use of EHR Activity Logs for Assessing Trainee Growth and Maturation

# The Trainee Digital Growth Chart

# Motivation

**UCSF School of Medicine's Mission**:
"To educate learners who will improve the health of our communities …[and to teach] graduates to excel in the competencies needed by 21st-century physicians."





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4. https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/about-ama/councils/Council%20Reports/council-on-medical-education/a18-cme-4.pdf

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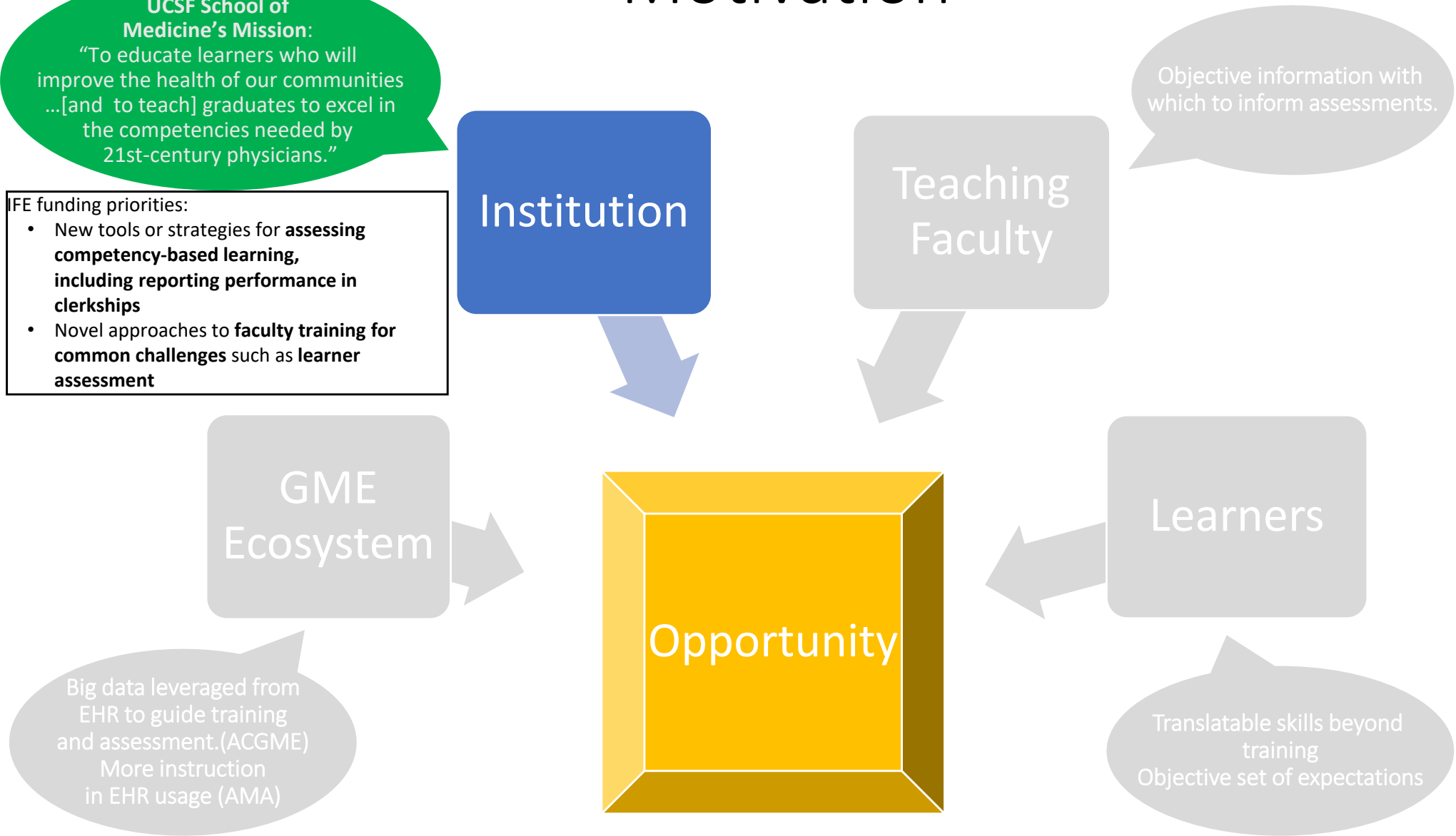
IFE funding priorities:

- New tools or strategies for **assessing competency-based learning, including reporting performance in clerkships**
- Novel approaches to **faculty training for common challenges** such as **learner assessment**





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Institution

Teaching Faculty

Objective information with which to inform assessments.

GME Ecosystem

Big data leveraged from EHR to guide training and assessment.(ACGME)
More instruction in EHR usage (AMA)

Opportunity

Learners

Translatable skills beyond training
Objective set of expectations


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ACGME

# Assessment Guidebook

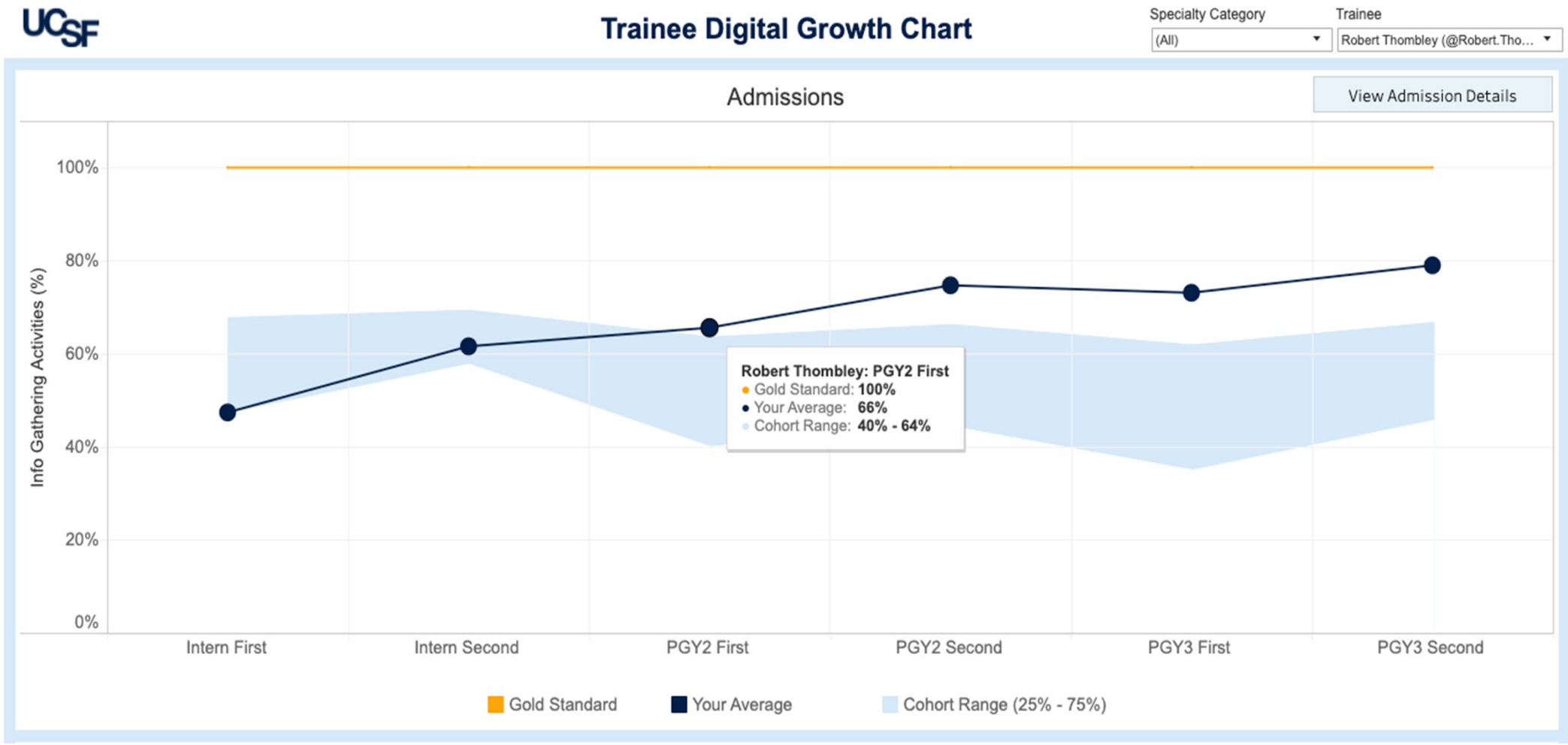
Eric S. Holmboe, MD
William F. Iobst, MD

**Components of Clinical Reasoning:**

1. Information gathering
2. Hypothesis generation
3. Problem representation
4. Differential diagnosis
5. Leading or working diagnosis
6. Diagnostic justification
7. Management

2020, www.acgme.org/Portals/0/PDFs/Milestones/Guidebooks/AssessmentGuidebook.pdf

# Trainee Digital Growth Chart



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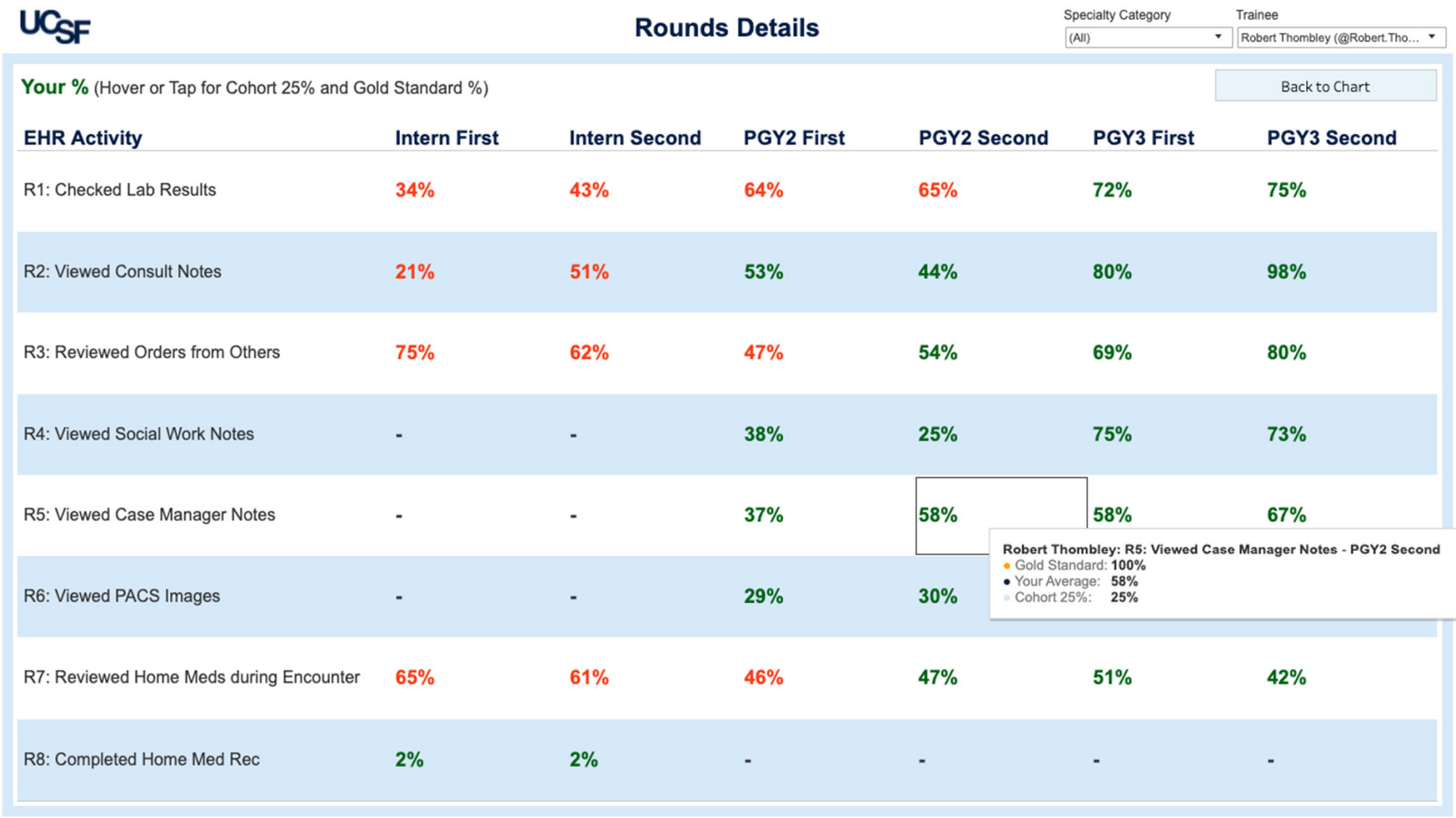

UCSF

**Rounds Details**

Specialty Category: (All)

Trainee: Robert Thombley (@Robert.Tho…

**Your %** (Hover or Tap for Cohort 25% and Gold Standard %)

Back to Chart

| EHR Activity | Intern First | Intern Second | PGY2 First | PGY2 Second | PGY3 First | PGY3 Second |
|---|---|---|---|---|---|---|
| R1: Checked Lab Results | 34% | 43% | 64% | 65% | 72% | 75% |
| R2: Viewed Consult Notes | 21% | 51% | 53% | 44% | 80% | 98% |
| R3: Reviewed Orders from Others | 75% | 62% | 47% | 54% | 69% | 80% |
| R4: Viewed Social Work Notes | - | - | 38% | 25% | 75% | 73% |
| R5: Viewed Case Manager Notes | - | - | 37% | 58% | 58% | 67% |
| R6: Viewed PACS Images | - | - | 29% | 30% | | |
| R7: Reviewed Home Meds during Encounter | 65% | 61% | 46% | 47% | 51% | 42% |
| R8: Completed Home Med Rec | 2% | 2% | - | - | - | - |

**Robert Thombley: R5: Viewed Case Manager Notes - PGY2 Second**
- Gold Standard: **100%**
- Your Average: **58%**
- Cohort 25%: **25%**

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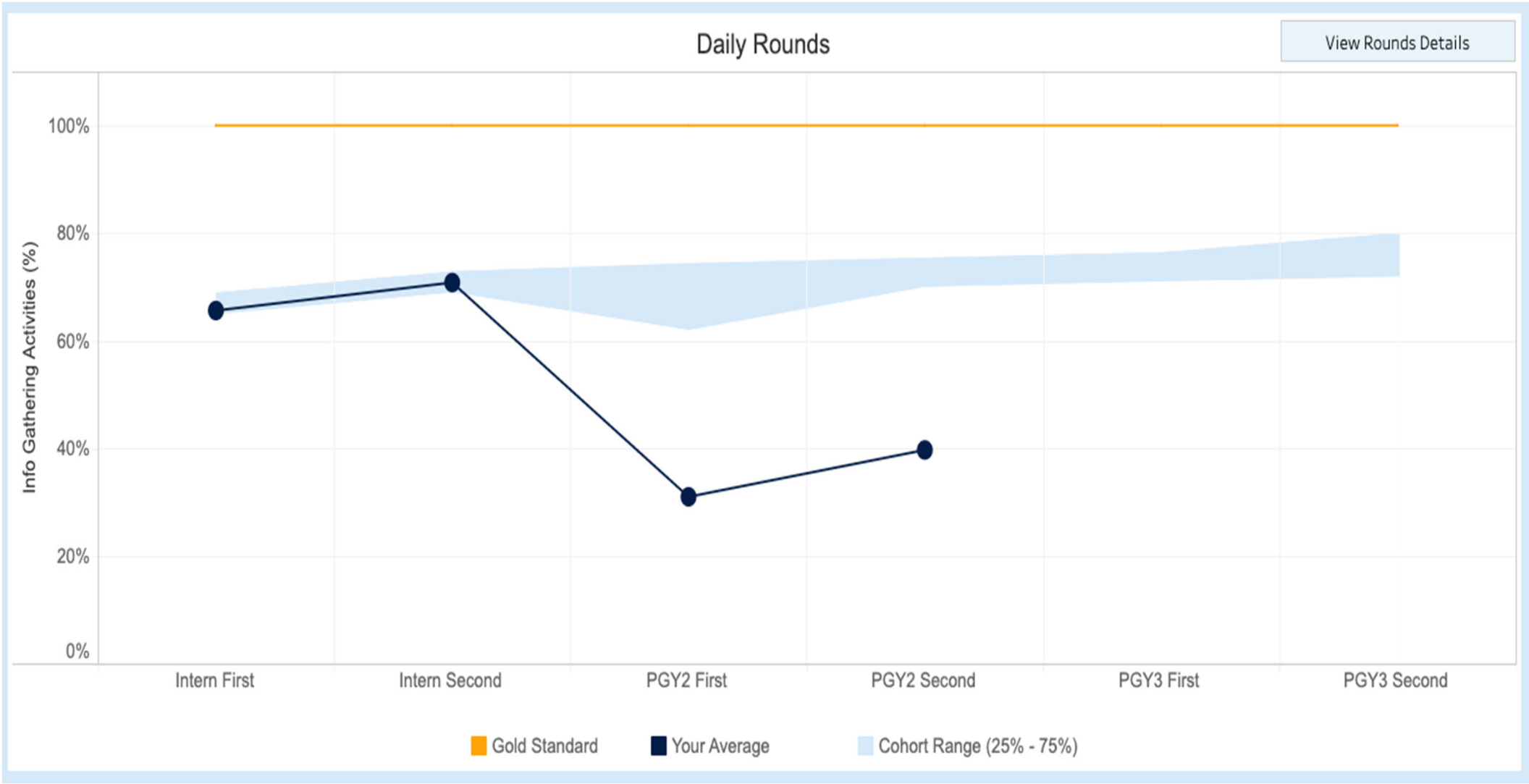


# Educational Policy Implications

Assessing learners during clinical rotations is subjective, time intensive, and not without bias, including inference, recall, and implicit gender bias.

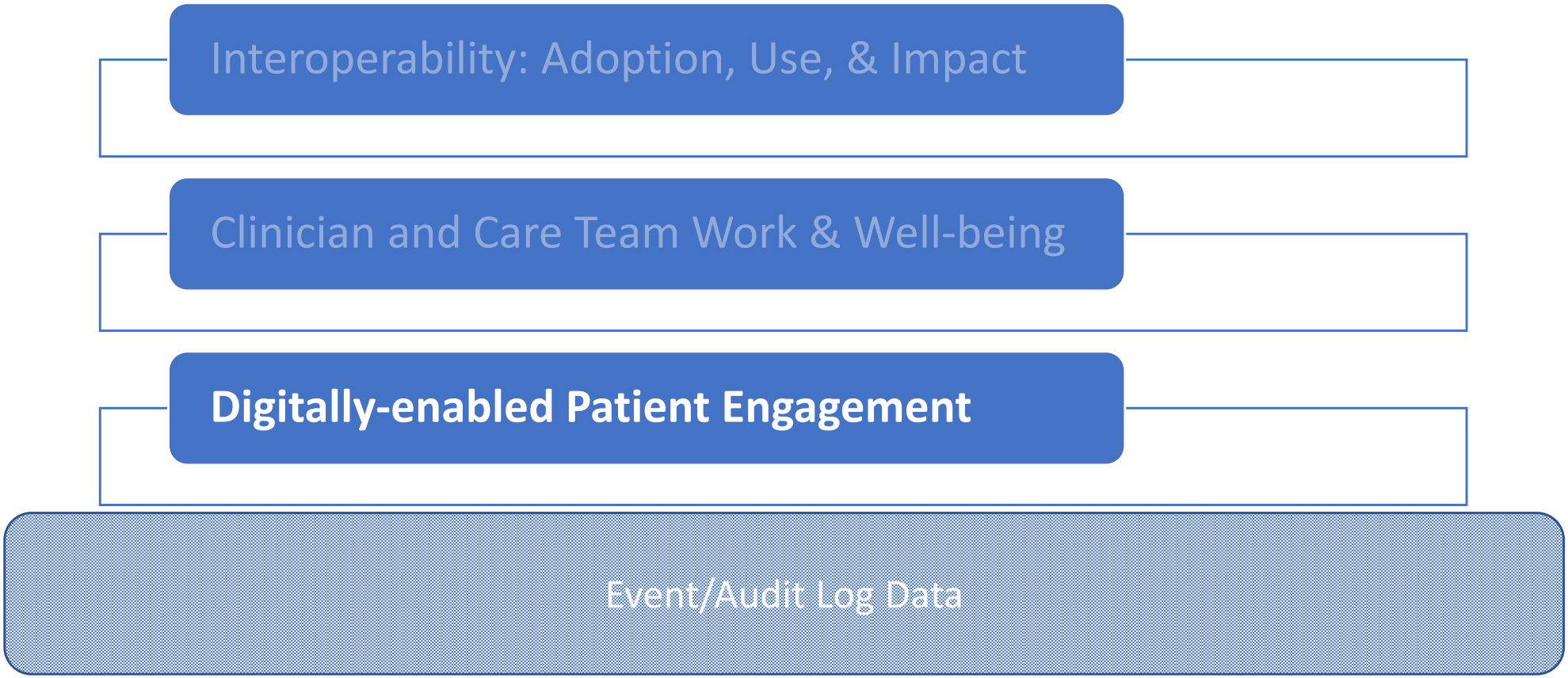
Organizations such as the ACGME, NASEM, and have called for novels assessment approaches that are:

- Automated
- Low burden
- Objective
- Realistic
- Can be derived from big data in the EHR

**Invited meeting: Next Era in Assessment Invitational Summit, May, 2022**

“A core group of medical education researchers and policy makers, who have an interest in the development and use of clinical performance measures, that will be the future of assessment in GME.”

# CLIIR Research "Pillars"



# PGHD Use and Adoption

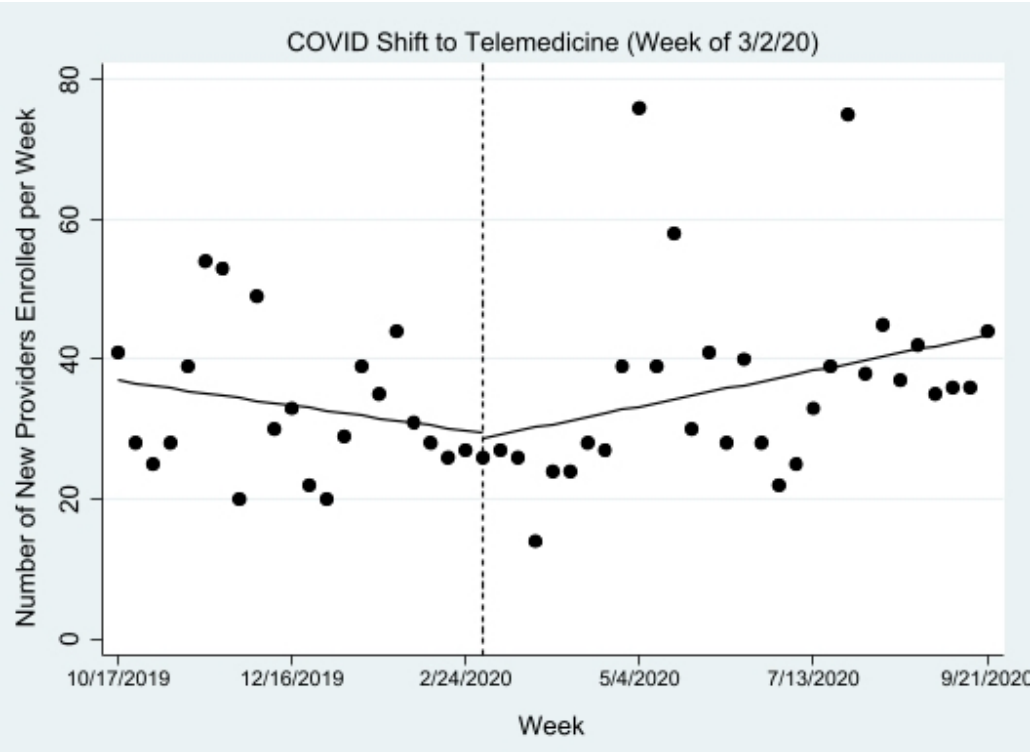
Patient generated health data (PGHD) have not achieved widespread clinical adoption. However, the COVID-induced shift to telemedicine may have created opportunities for PGHD as surrogates for vital signs collected in-person.

We conducted an interrupted time series analysis of physician enrollment in, and patient-initiated vital sign transmission of non-COVID associated PGHD through, a national PGHD platform (Validic).

Results
Eleven health systems, 4,735 physicians, and 51,341 patients were included.

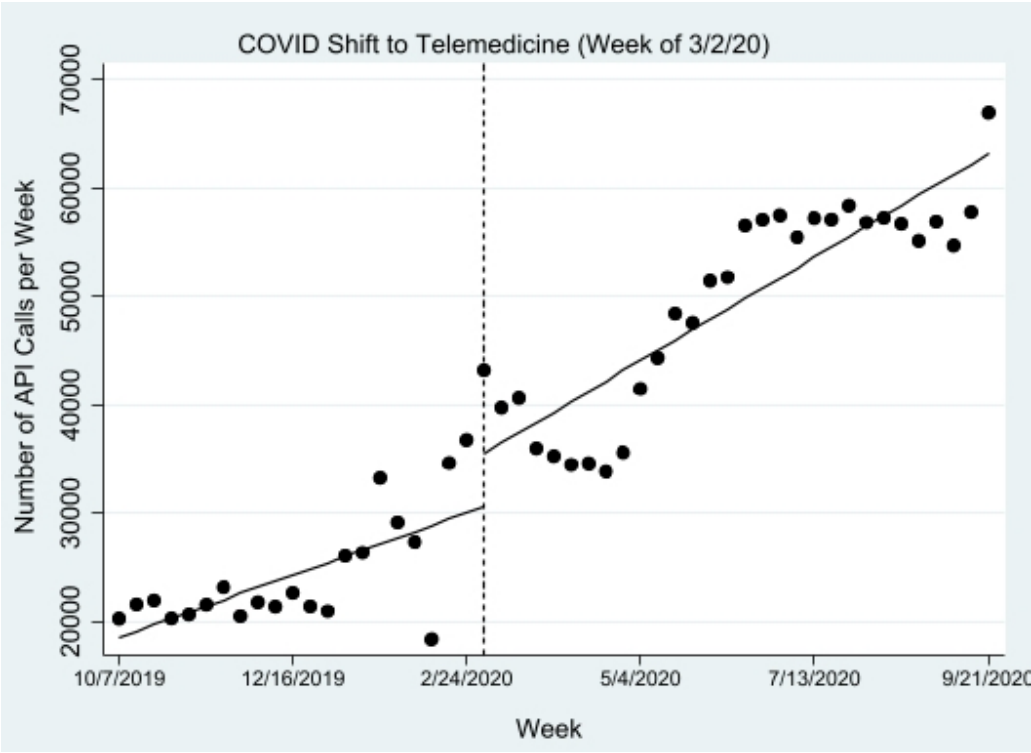
# National Trends in Peri-COVID PGHD Adoption

New Provider Enrollment




Significant increase in rate of new provider enrollment
(*P* =.02, CI=[0.14, 1.58])

API Call Volume




Rate of change of API call volume did not reach statistical significance, (*P*=.06, CI=[-22.8, 783.2]), but far outpaced a dramatic decrease in overall encounter rate.

# PGHD Policy

- Stage 3 Meaningful Use
- Limited and often Challenging Reimbursement

**Policy Actions**

- IA-BE-14 “Engage Patients and Families to Guide Improvement in the Systems of Care”
- Letter in response to White House Office of Science and Technology Policy, RFI on Strengthening Community Health Through Technology

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SANTA BARBARA • SANTA CRUZ

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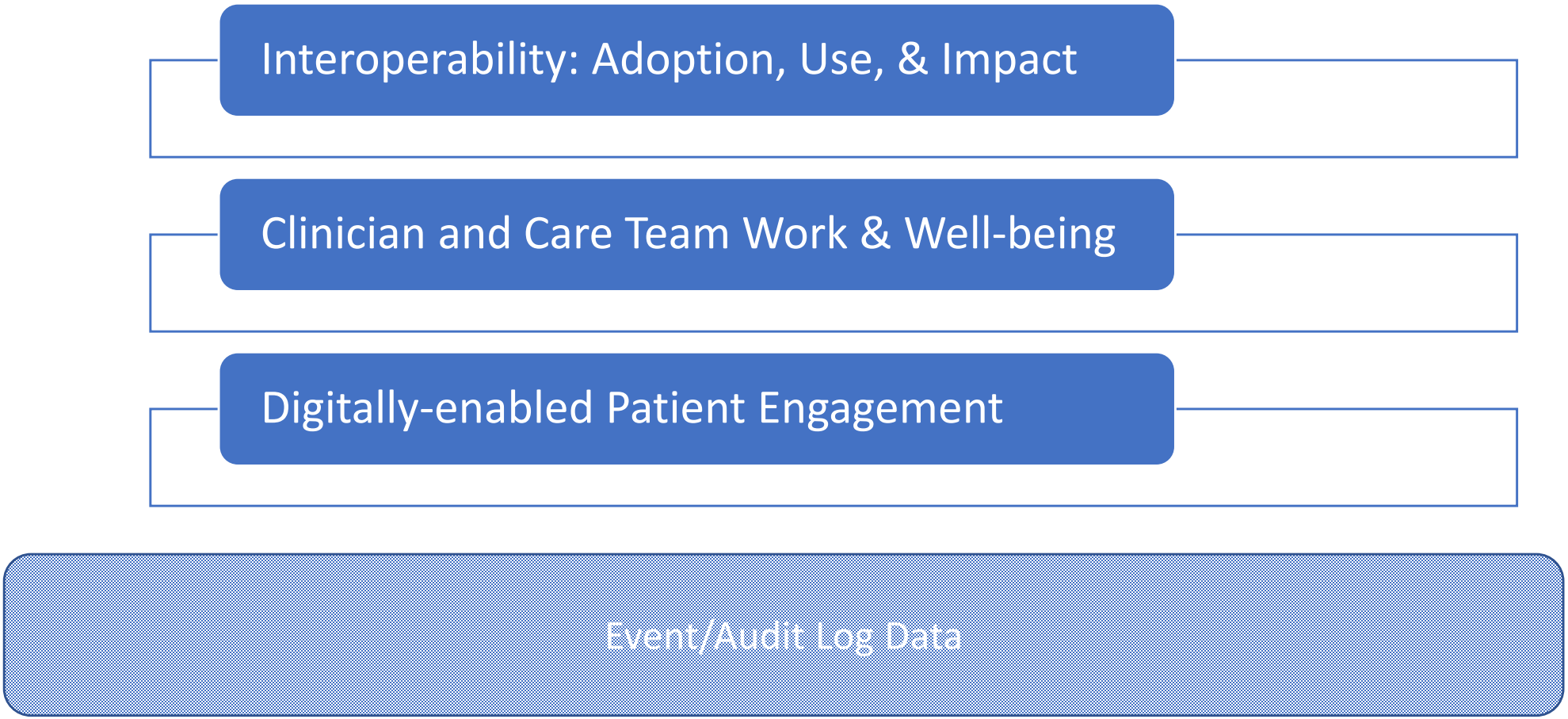
PHONE: (415) 502-1371
E-MAIL: Benjamin.rosner@ucsf.edu

February 28, 2022
To: Stacy Murphy, White House Office of Science and Technology Policy

Re: Request for Information on Strengthening Community Health Through Technology

Dear Ms. Murphy:

# Conclusion

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