AMDIS TED TALKS – 2019 EDITION - PART I

- SETTING EVIDENCE-BASED MEDICINE ON FHIR
  - BRIAN S. ALPER, MD, MSPH, FAAFP
- PREDICTIVE ANALYTICS - IMPACT ON PATIENT CARE & THROUGHPUT
  - RYAN BOUTIN, MD
- OPTIMIZATION STRATEGIES TO ENHANCE PHYSICIAN WELL-BEING AND ALLEVIATE EHR-RELATED BURNOUT
  - SHADI HIJJAWI, MD, FACP, MBA, CHCQ
- THE DISEASES OF CLINICAL INFORMATICS
  - JAKE LANCASTER, MD, MSHA, MSACI

Setting Evidence-Based Medicine on FHIR

EBMonFHIR

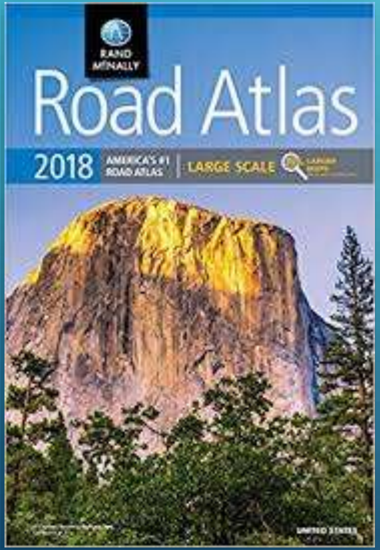
Interoperability for External Evidence

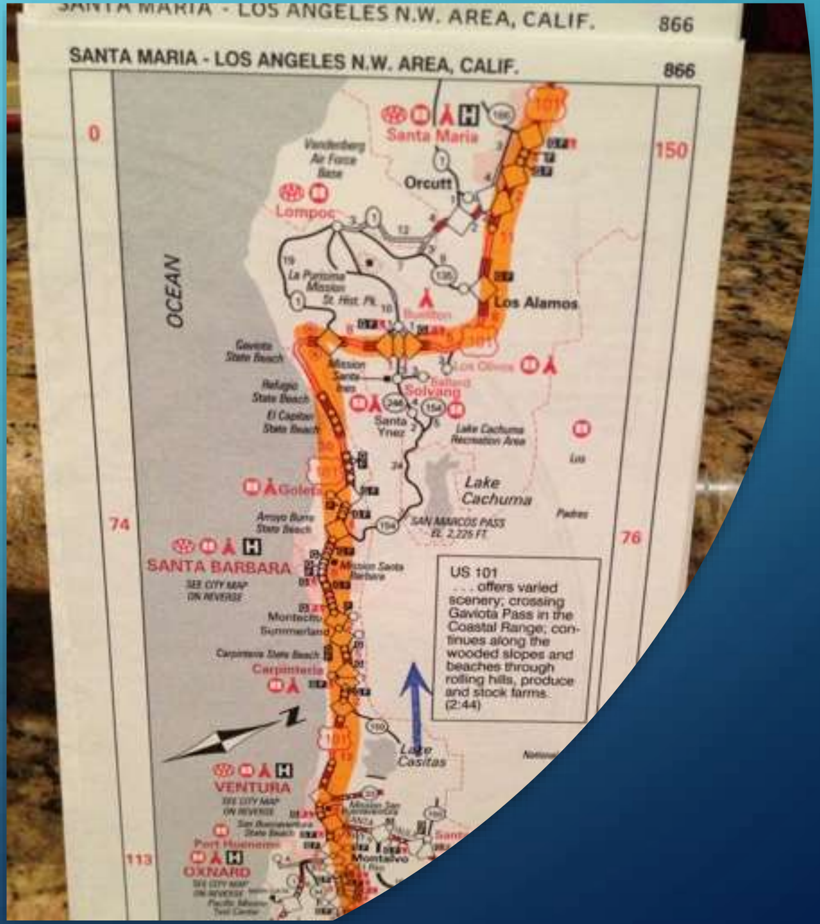
PRESENTER AND DISCLOSURES

- Brian S. Alper, MD, MSPH, FAAFP
- Board certifications: Family Medicine, Clinical Informatics
- Founder of DynaMed
- Vice President of Innovations and EBM Development, EBSCO Health
- Project Lead, EBMonFHIR
- Key Contributor – AHRQ ACTS, PC CDS Learning Network, MCBK
- Member – AAFP, ACP, AMDIS, AMIA, GRADE Working Group, G-I-N, HIMSS, HL7, ISDM, ISEHC

LOCATION KNOWLEDGE – SOCIETAL EVOLUTION

Print





LOCATION KNOWLEDGE – SOCIETAL EVOLUTION

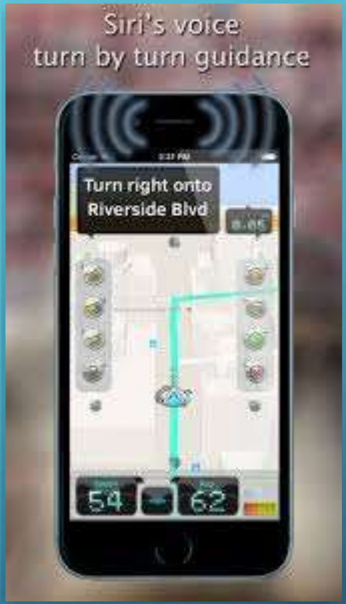
- Print
- Digital

LOCATION KNOWLEDGE – SOCIETAL EVOLUTION

- Print
- Digital
- Executable

LOCATION KNOWLEDGE – SOCIETAL EVOLUTION

- Print
- Digital
- Executable
- Computable



BIOMEDICAL EVIDENCE IS NOT COMPUTABLE LIKE FINANCIAL KNOWLEDGE OR LOCATION KNOWLEDGE, SO …

We can instantly know when to turn next to get to the restaurant and traffic is diverted, but we cannot instantly know what treatment to consider next for our health concerns –> major waste in time and resources; poor decisions and poor medical outcomes

WHY IS BIOMEDICAL EVIDENCE NOT COMPUTABLE?

NO

...standard for machine-interpretable expression

...interoperability (every group communicating it does it their own way)

...universal agreement about the right way to do it

...functional demonstration of how it can be done

FHIR SOLVES INTEROPERABILITY FOR PATIENT DATA

- Fast Healthcare Interoperability Resources (FHIR) is an HL7 standard
- Developed by US government (ONC, CDC, AHRQ, FDA, NIH, CMS), other governments, healthcare systems, payers (UHC, Aetna, etc), EHRs (Cerner, Epic, Allscripts, etc.), industry – all agreeing how to do it as a standard
- US likely to require by 2021 any person can get ALL their electronic health information in FHIR format – required for any EHR

EHR Vendors will not be controlling data access and business rules much longer

FHIR 'AS IS' DOES NOT HANDLE BIOMEDICAL RESEARCH EVIDENCE

No other standards are ready to handle research evidence

Large attempts include:

- Mobilizing Computable Biomedical Knowledge (MCBK) – NLM-associated consortium
- CDC "Adapting Clinical Guidelines for the Digital Age"
- "Evidence Ecosystem" attempts in Europe

None of these attempts have directly addressed standards for data exchange (i.e. the actual thing that would enable interoperability)

EBM-ON-FHIR - A BRIEF HISTORY

Sep → Jan → Feb → May → June

- GIN – Alper takes on GINTech (EBM technical group) role to start efforts to define interoperability standards
- HL7 – Alper learns enough about FHIR to understand how it works
- HIMSS – Alper informally proposes extending FHIR to meet EBM needs
- HL7 – Alper formally proposes HL7 project “FHIR Resources for Evidence-Based Medicine Knowledge Assets” (EBMonFHIR)
- HL7 - Approves EBMonFHIR project (5 work groups and management committees)

EBM-ON-FHIR – HISTORY CONT.

Sep → Jan → Feb → May → June → Sep

HL7, GIN – Alper and Shahin have first EBMonFHIR connectathon

- Evidence resource created to handle evidence about effects of interventions (focus on systematic reviews)
- Participating groups include Duodecim, MAGIC, HarmonIQ, ACC, EvidencePrime (GRADEpro) and more

EBM-ON-FHIR – HISTORY CONT.

Sep › Jan › Feb › May › June › Sep › Jan

HL7 – Alper and Shahin have second EBMonFHIR connectathon

- Evidence resource expanded to handle needs for research registries (associations of things, not just effects of interventions) – EBMonFHIR "absorbs" Clinical Profiles standard project
- CDC effort to adapt guidelines into recommendations (CDS artifacts) and HL7 CDS efforts combined to launch "Recommendations on FHIR" project (nicknamed CPGonFHIR and coordinated with EBMonFHIR)
- BRR group (FDA, NIH/NLM, CMS reps) suggest EBMonFHIR can become basis for required data formats for ClinicalTrials.gov, PubMed listing, journal publications
- Participating groups expand to include CDC, AHRQ, Johns Hopkins University, and more

EBM-ON-FHIR – HISTORY CONT.

Sep > Jan > Feb > May > June > Sep > Jan > Feb

Evidence resource codifies ‘statistic’ and ‘certainty’

- Despite statistic concepts being universally reported across biomedical publications and certainty concepts gathering “semi-standard” approach in healthcare (GRADE), there has been no well established method for reporting these things in machine-coded form

EBMonFHIR makes computable expression achievable for biomedical research evidence

PORTION OF STATISTIC RESOURCE

Each concept has explicit coding for unambiguous machine-interpretable expression

statisticType	0..1	CodeableConcept	The effect or risk estimate type StatisticStatisticType (Extensible)
quantity	0..1	Quantity	The statistic value
sampleSize	0..1	BackboneElement	Population sample size
description	0..1	string	Textual description of population sample size
note	0..*	Annotation	Footnote or explanatory note about the sample size
numberOfStudies	0..1	integer	Number of contributing studies
numberOfParticipants	0..1	integer	Cumulative number of participants
knownDataCount	0..1	integer	TBD
numeratorCount	0..1	integer	TBD
precisionEstimate	0..*	BackboneElement	An estimate of the precision of the statistic
description	0..1	string	Textual description of the estimate
note	0..*	Annotation	Footnote or explanatory note about the estimate
type	0..1	CodeableConcept	The estimate type StatisticPrecisionEstimateType (Extensible)
level	0..1	decimal	Level of confidence interval
from	0..1	decimal	Lower bound
to	0..1	decimal	Upper bound

certainty	0..*	BackboneElement	How certain is the effect
description	0..1	string	Textual description of the certainty
note	0..*	Annotation	Footnote or explanatory note about the statistic certainty
rating	0..*	CodeableConcept	Certainty rating StatisticCertaintyRating (Extensible)
certaintySubcomponent	0..*	BackboneElement	A component that contributes to the overall certainty
description	0..1	string	Textual description of the subcomponent
note	0..*	Annotation	Footnote or explanatory note about the statistic certainty subcomponent
type	0..*	CodeableConcept	Type of subcomponent of certainty rating StatisticCertaintySubcomponentType (Extensible)
rating	0..*	CodeableConcept	Subcomponent certainty rating StatisticCertaintySubcomponentRating (Extensible)

CERTAINTY ENCODED

QUALITATIVE CONCEPTS HAVE EXPLICIT CODING FOR UNAMBIGUOUS MACHINE-INTERPRETABLE EXPRESSION

GET INVOLVED

- Website confluence.hl7.org/display/CDS/EBMonFHIR
- GoogleGroups email groups.google.com/forum/#!forum/ebmonfhir
- Open meetings via WebEx
  - Tuesdays 4 pm Eastern
  - Thursdays 9 am Eastern
- Email balper@ebsco.com

Predictive Analytics - Impact on Patient Care & Throughput

Middlesex Health

Dr. Ryan Boutin
Assistant Chief, Hospital Medicine
Physician Informatacist / IT Physician Liaison

Middlesex Health includes a primary care network within Central and Southern CT as well as Urgent Care centers, 2 satellite EDs and Middlesex Hospital.

Middlesex Hospital is a 300 bed non-profit community hospital in Middletown, CT in central CT.

Early Warning Analysis

- Develop a real time **early warning analysis** at the point of care that physicians and care teams can utilize to monitor developing acute disease states, throughput measures, readmission risk and utilization review.

Why Develop An Early Warning Analysis

- A percentage of developing acute diseases can be **predicted** (and potentially prevented) by utilizing the data that is currently in the EMR. Potential to decrease M&M.
- The benefits of utilizing **Standardized protocols** to treat/prevent developing disease states is well documented.
- **Potential for reduced cost** by decreasing length of stay, decreasing readmission risk and improving utilization review

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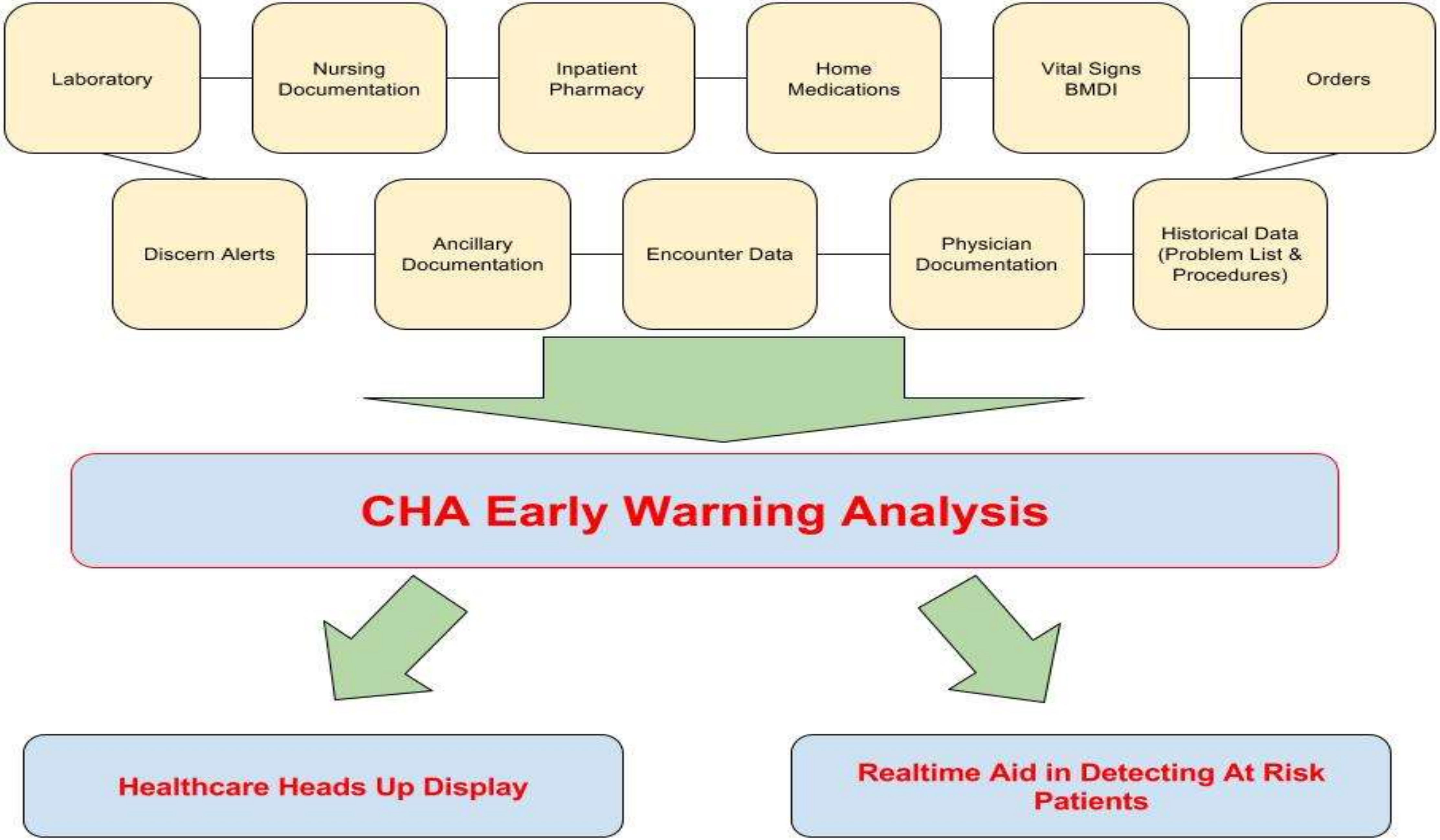
Clinical Healthcare Analytics Overview



Early Warning Analysis Development

- **Clinical Protocols:**
  - Acute Kidney Injury
  - Alcohol Withdrawal
  - Sepsis

- **Discharge / Throughput Protocols:**
  - Readmission Risk
  - Discharge Anticipation
  - Discharge Readiness
  - Level of Care Discrepancy

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Healthcare Heads Up Display - **HHUD**

- High Level Information
- Located Within Existing Physician Workflow
- Easy to Utilize, Minimal Training Needed
- Non-Interruptive
- Drill Down Capability
- Actionable
- Red / Yellow / Green Formatting (when applicable)

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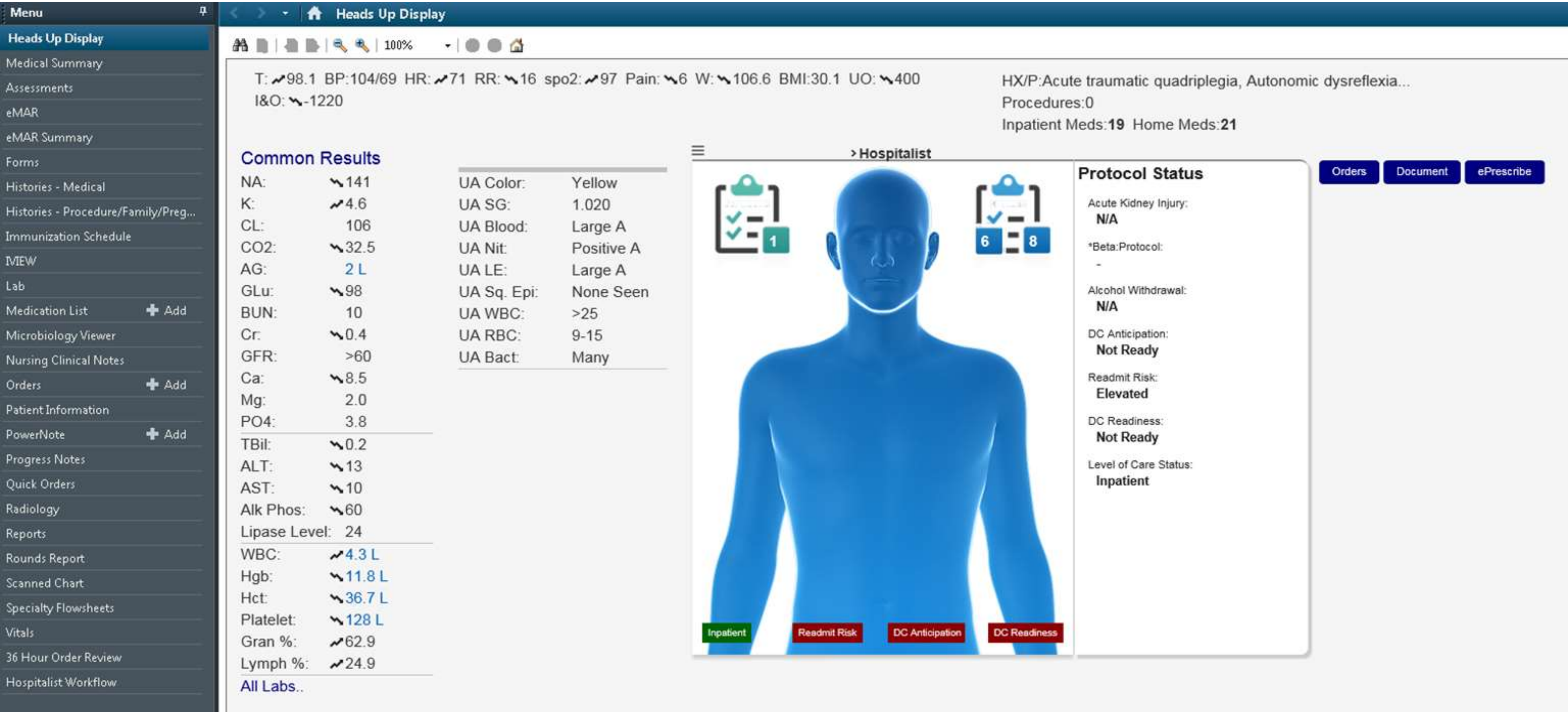
Easy to Use, High Level Information within Workflow



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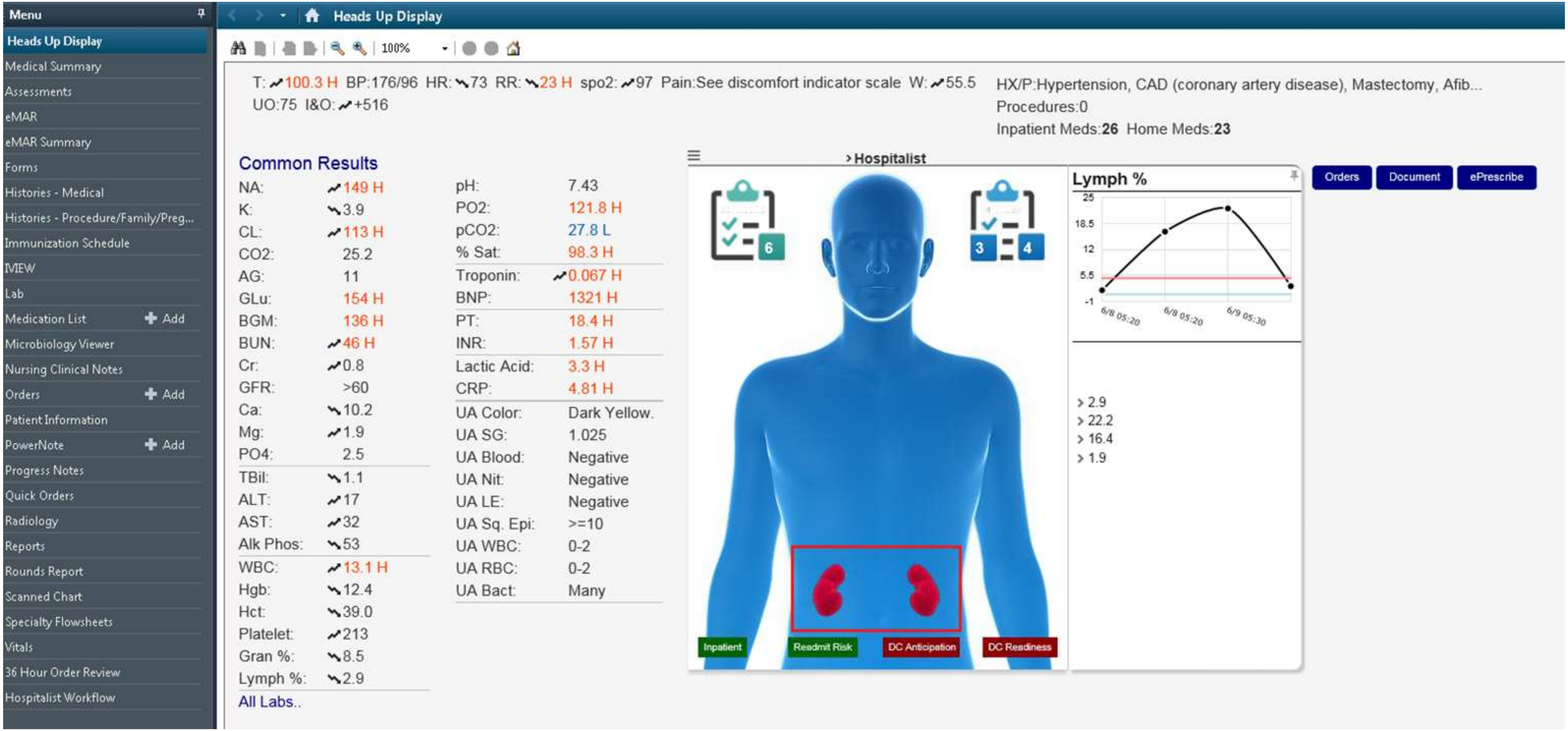
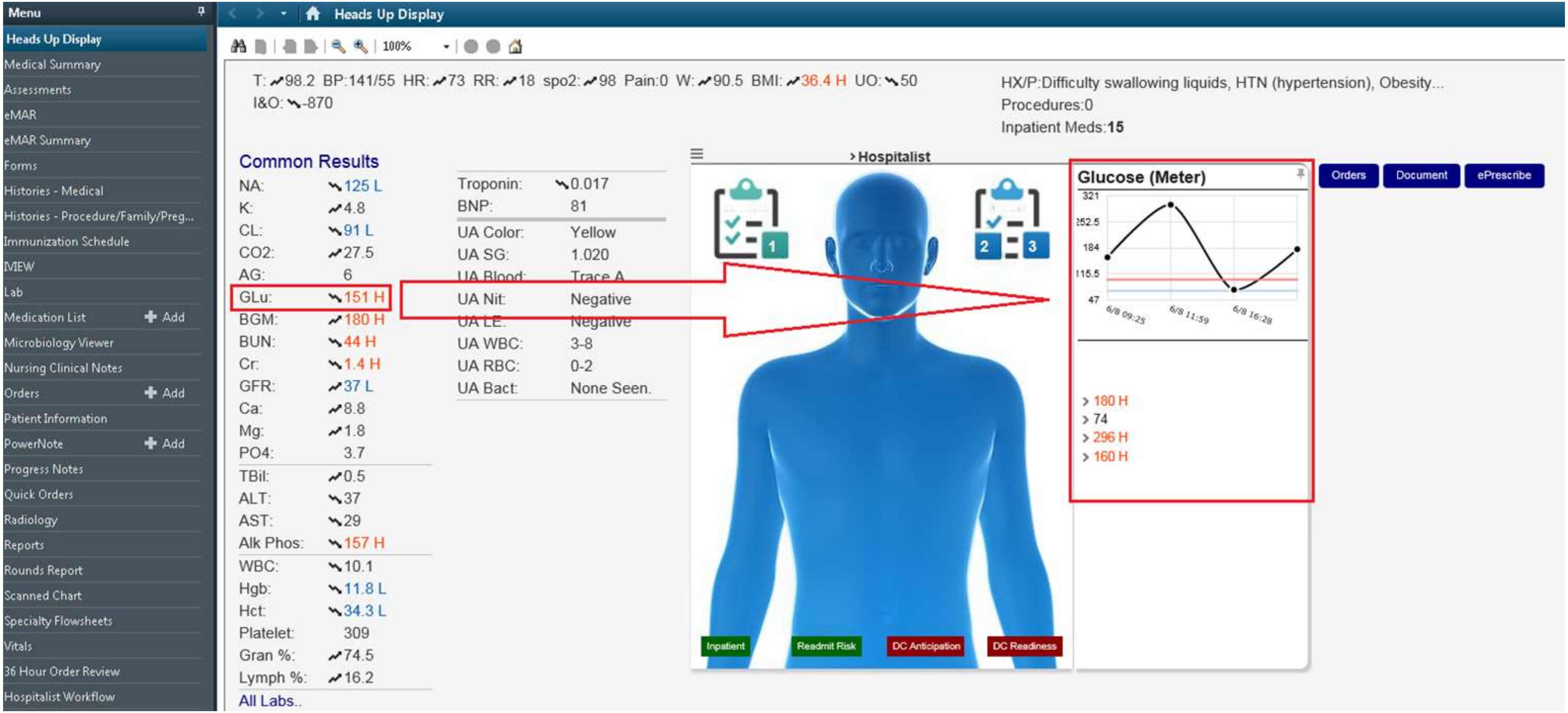
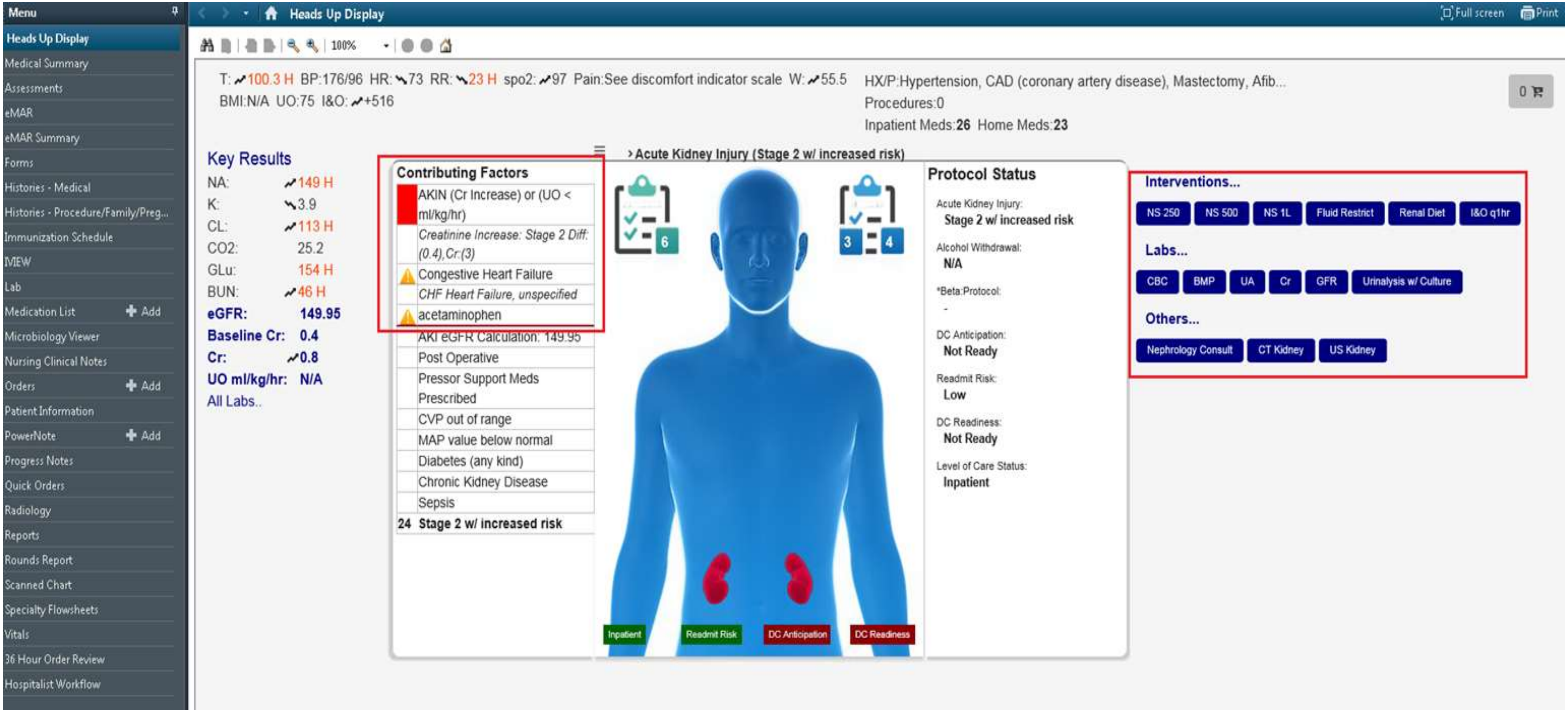
Non-Interruptive Early Warning System



Drill Down Capability

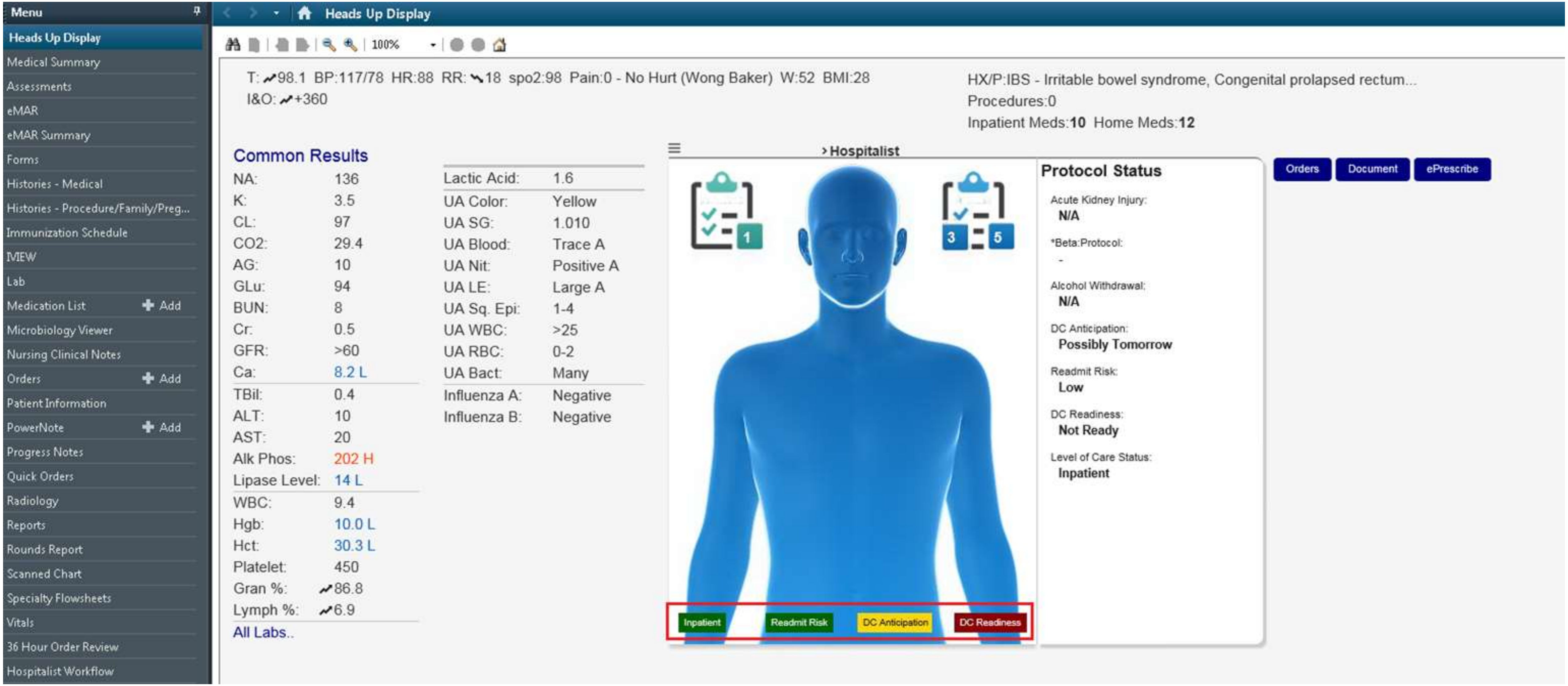


Actionable



Menu
Heads Up Display
Medical Summary
Assessments
eMAR
eMAR Summary
Forms
Histories - Medical
Histories - Procedure/Family/Preg...
Immunization Schedule
IVIEW
Lab
Medication List
Add
Microbiology Viewer
Nursing Clinical Notes
Orders
Add
Patient Information
PowerNote
Add
Progress Notes
Quick Orders
Radiology
Reports
Rounds Report
Scanned Chart
Specialty Flowsheets
Vitals
36 Hour Order Review
Hospitalist Workflow
Heads Up Display
Full screen
Print
100%
T: 100.3 H BP:176/96 HR: 73 RR: 23 H spo2: 97 Pain:See discomfort indicator scale W: 55.5
BMI:N/A UO:75 I&O: +516
HX/P:Hypertension, CAD (coronary artery disease), Mastectomy, Afib...
Procedures:0
Inpatient Meds:26 Home Meds:23
0
Key Results
NA: 149 H
K: 3.9
CL: 113 H
CO2: 25.2
GLu: 154 H
BUN: 46 H
eGFR: 149.95
Baseline Cr: 0.4
Cr: 0.8
UO ml/kg/hr: N/A
All Labs..
Contributing Factors
AKIN (Cr Increase) or (UO < ml/kg/hr)
Creatinine Increase: Stage 2 Diff:(0.4),Cr:(3)
Congestive Heart Failure
CHF Heart Failure, unspecified
acetaminophen
AKI eGFR Calculation: 149.95
Post Operative
Pressor Support Meds Prescribed
CVP out of range
MAP value below normal
Diabetes (any kind)
Chronic Kidney Disease
Sepsis
24 Stage 2 w/ increased risk
› Acute Kidney Injury (Stage 2 w/ increased risk)
6
3
4
Inpatient
Readmit Risk
DC Anticipation
DC Readiness
Protocol Status
Acute Kidney Injury:
Stage 2 w/ increased risk
Alcohol Withdrawal:
N/A
*Beta Protocol:
-
DC Anticipation:
Not Ready
Readmit Risk:
Low
DC Readiness:
Not Ready
Level of Care Status:
Inpatient
Interventions...
NS 250
NS 500
NS 1L
Fluid Restrict
Renal Diet
I&O q1hr
Labs...
CBC
BMP
UA
Cr
GFR
Urinalysis w/ Culture
Others...
Nephrology Consult
CT Kidney
US Kidney

Red / Yellow / Green Formatting



Realtime Aid in Detecting At Risk Patients
RADAR

- **Keys to success:**
  - High Level Information
  - Easy to Utilize
  - Drill Down Capability
  - Red / Yellow / Green Formatting
  - Actionable
  - Customizable by Role / User

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Easy to Use, High Level Information

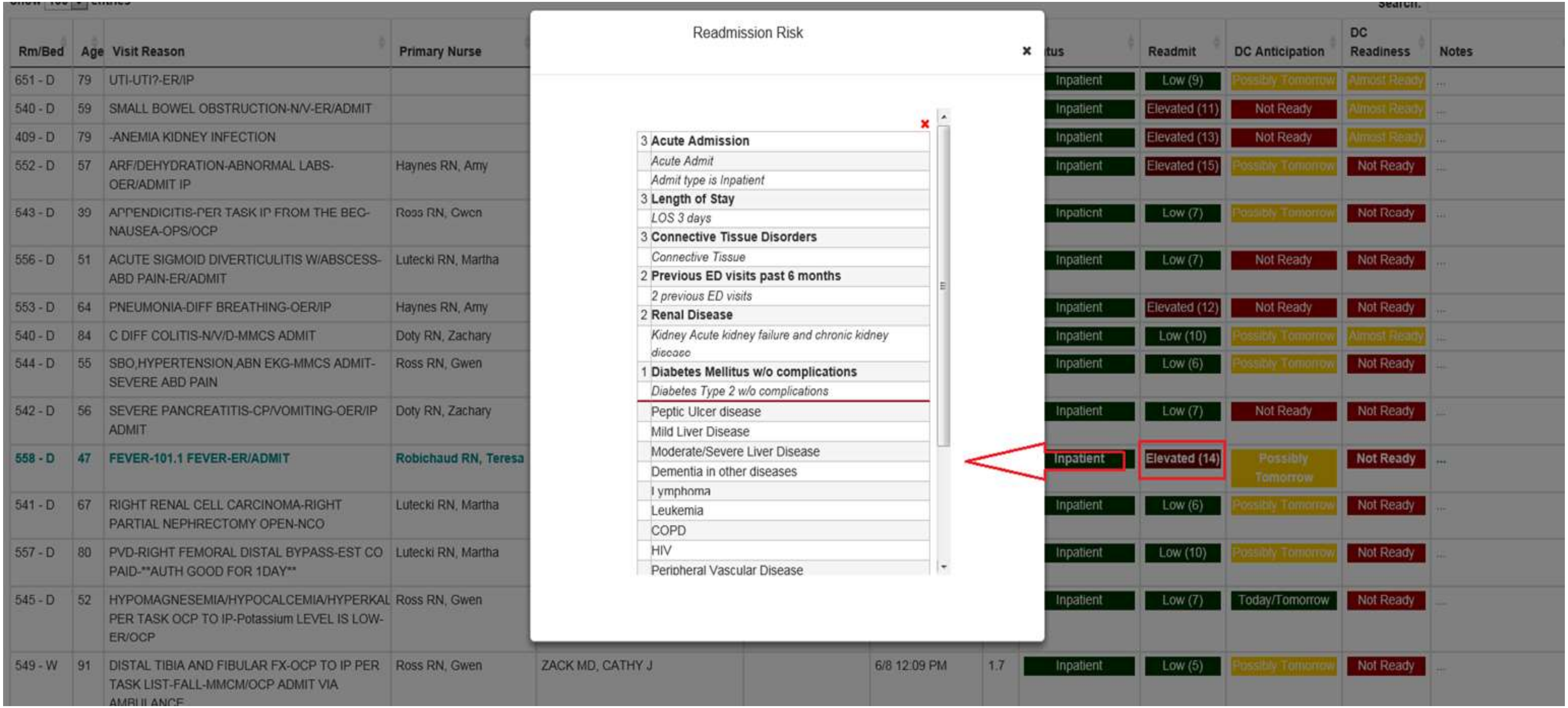
Patients for **NORTH FIVE**

Show 100 entries

Search:

Rm/Bed	Age	Visit Reason	Primary Nurse	Admitting Physician	Conditions	Last Report	LOS	Status	Readmit	DC Anticipation	DC Readiness	Notes
651 - D	79	UTI-UTI?-ER/IP				2/1 11:49 AM	131	Inpatient	Low (9)	Possibly Tomorrow	Almost Ready	...
540 - D	59	SMALL BOWEL OBSTRUCTION-N/V-ER/ADMIT				4/11 01:19 PM	127	Inpatient	Elevated (11)	Not Ready	Almost Ready	...
409 - D	79	-ANEMIA KIDNEY INFECTION				3/22 03:09 PM	91	Inpatient	Elevated (13)	Not Ready	Almost Ready	...
552 - D	57	ARF/DEHYDRATION-ABNORMAL LABS-OER/ADMIT IP	Haynes RN, Amy	ZACK MD, CATHY J	Acute Kidney Injury	6/6 02:59 PM	7.4	Inpatient	Elevated (15)	Possibly Tomorrow	Not Ready	...
543 - D	39	APPENDICITIS-PER TASK IP FROM THE BEG-NAUSEA-OPS/OCP	Ross RN, Gwen	PARKER MD, JAMES MICHAEL		6/5 09:20 AM	5.8	Inpatient	Low (7)	Possibly Tomorrow	Not Ready	...
556 - D	51	ACUTE SIGMOID DIVERTICULITIS W/ABSCESS-ABD PAIN-ER/ADMIT	Lutecki RN, Martha	ROSENER MD, STEPHANIE E	Acute Kidney Injury	6/8 12:37 PM	4.6	Inpatient	Low (7)	Not Ready	Not Ready	...
553 - D	64	PNEUMONIA-DIFF BREATHING-OER/IP	Haynes RN, Amy	OCHOLA-TINKER MD, LISA A		6/7 03:25 PM	4.3	Inpatient	Elevated (12)	Not Ready	Not Ready	...
540 - D	84	C DIFF COLITIS-N/V/D-MMCS ADMIT	Doty RN, Zachary	MACHADO DO, JOHN D		6/8 12:41 PM	3.7	Inpatient	Low (10)	Possibly Tomorrow	Almost Ready	...
544 - D	55	SBO,HYPERTENSION,ABN EKG-MMCS ADMIT-SEVERE ABD PAIN	Ross RN, Gwen	HARTMANN MD, KARL T		6/7 08:24 AM	3.4	Inpatient	Low (6)	Possibly Tomorrow	Not Ready	...
542 - D	56	SEVERE PANCREATITIS-CP/VOMITING-OER/IP ADMIT	Doty RN, Zachary	DOUGLASS MD, ALAN B		6/8 12:44 PM	3.2	Inpatient	Low (7)	Not Ready	Not Ready	...
558 - D	47	FEVER-101.1 FEVER-ER/ADMIT	Robichaud RN, Teresa	BALAZADEH MD, SETAREH L	Acute Kidney Injury	6/8 12:11 PM	2.6	Inpatient	Elevated (14)	Possibly Tomorrow	Not Ready	...
541 - D	67	RIGHT RENAL CELL CARCINOMA-RIGHT PARTIAL NEPHRECTOMY OPEN-NCO	Lutecki RN, Martha	MYER MD, EDWARD G		6/8 03:14 PM	2.1	Inpatient	Low (6)	Possibly Tomorrow	Not Ready	...
557 - D	80	PVD-RIGHT FEMORAL DISTAL BYPASS-EST CO PAID-**AUTH GOOD FOR 1DAY**	Lutecki RN, Martha	SAM MD, ALBERT D	*Beta:Protocol	6/8 02:07 PM	2.1	Inpatient	Low (10)	Possibly Tomorrow	Not Ready	...
545 - D	52	HYPOMAGNESEMIA/HYPOCALCEMIA/HYPERKAL PER TASK OCP TO IP-Potassium LEVEL IS LOW-ER/OCP	Ross RN, Gwen	ZACK MD, CATHY J		6/7 10:26 AM	1.8	Inpatient	Low (7)	Today/Tomorrow	Not Ready	...
549 - W	91	DISTAL TIBIA AND FIBULAR FX-OCP TO IP PER TASK LIST-FALL-MMCM/OCP ADMIT VIA AMBULANCE	Ross RN, Gwen	ZACK MD, CATHY J		6/8 12:09 PM	1.7	Inpatient	Low (5)	Possibly Tomorrow	Not Ready	...
550 - D	31	INTRACTABLE ABD PAIN-DIFF BREATHING-	Haynes RN, Amy	PARKER MD, JAMES MICHAEL			1.5	Observation!!	Low (2)	Possibly Tomorrow	Not Ready	...

Drill Down Capability



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Red / Yellow / Green Formatting

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Actionable

100%

NORTH FIVE | 15 minutes

P I O L

Patients for **NORTH FIVE**

Show 100 entries

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Benefits

- Early Warning Analysis, HHUD and RADAR are within the EMR
- Clinicians do not have to learn or utilize a separate system
- HHUD can be customized for each care group / facility
- Clinical Protocols developed specifically for acute disease states

Middlesex Health

Optimization Strategies to Enhance Physician Well-being and Alleviate EHR-related Burnout

Shadi Hijjawi, MD, FACP, MBA, CHCQM

Chief Medical Information Officer

CaroMont Health

Gastonia, NC

CaroMont Health

CaroMont Health

Non-profit Organization
435-Bed Tertiary Care Hospital
Level 3 Trauma Center
Free Standing ED/Urgent Care

50+ Physician Practices
500 + Physicians & ACPs
1,200 + Nurses

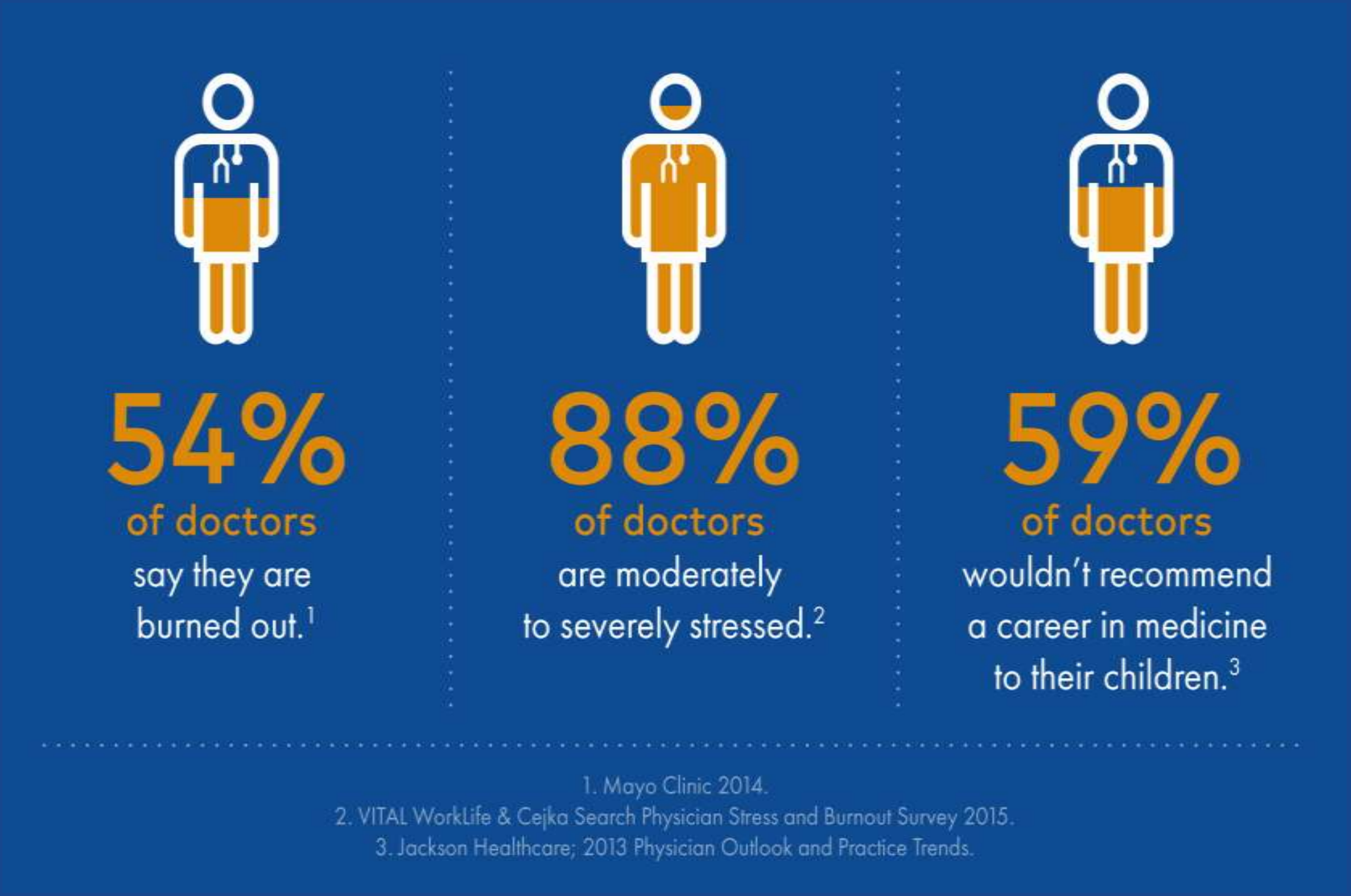
Annual Visits
Admissions: 20,000+
ED Visits: 108,000+
Ambulatory/ OP visits: 817,000+

LEAPFROG HOSPITAL SAFETY GRADE

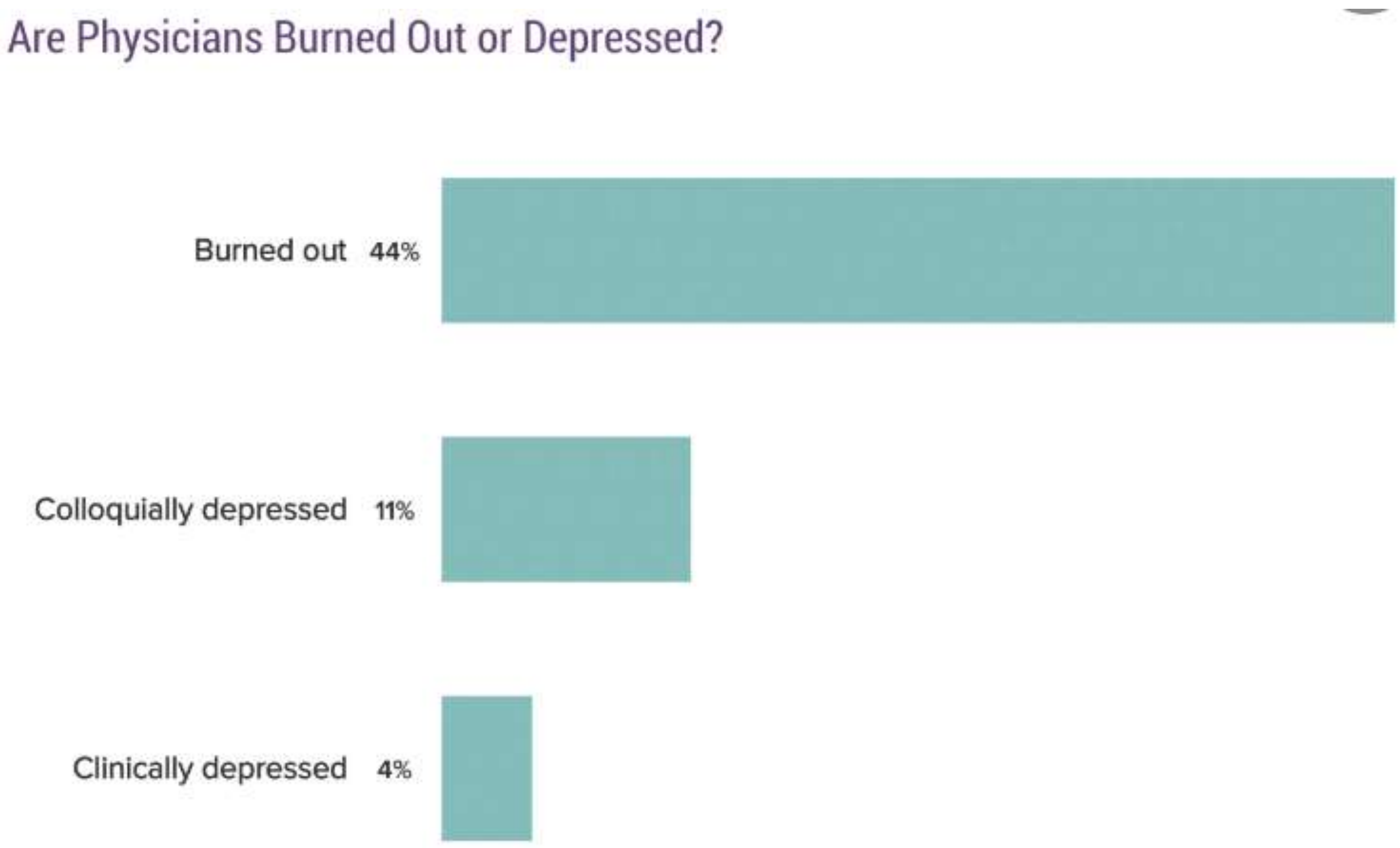
HIMSS Analytics STAGE 6

Watson Health 100 TOP HOSPITALS 2018

Physician Burnout



Medscape Survey 2019



How much does it cost USA?

1. $4.6 billion in costs related to physician turnover and reduced clinical hours is attributable to burnout each year in the United States.
2. At an organizational level, the annual economic cost associated with burnout related to turnover and reduced clinical hours is approximately $7600 per employed physician each year.

Ann Intern Med. 2019;170(11) :784-790.

How to Tackle this?

Optimization and Improvement Strategies

- Expert Help: Consultant Visit
- Leadership Planning
- Informatics Team Formation and Marketing
- Strategic Project: PEP
- Revamped training
- Outreach Programs

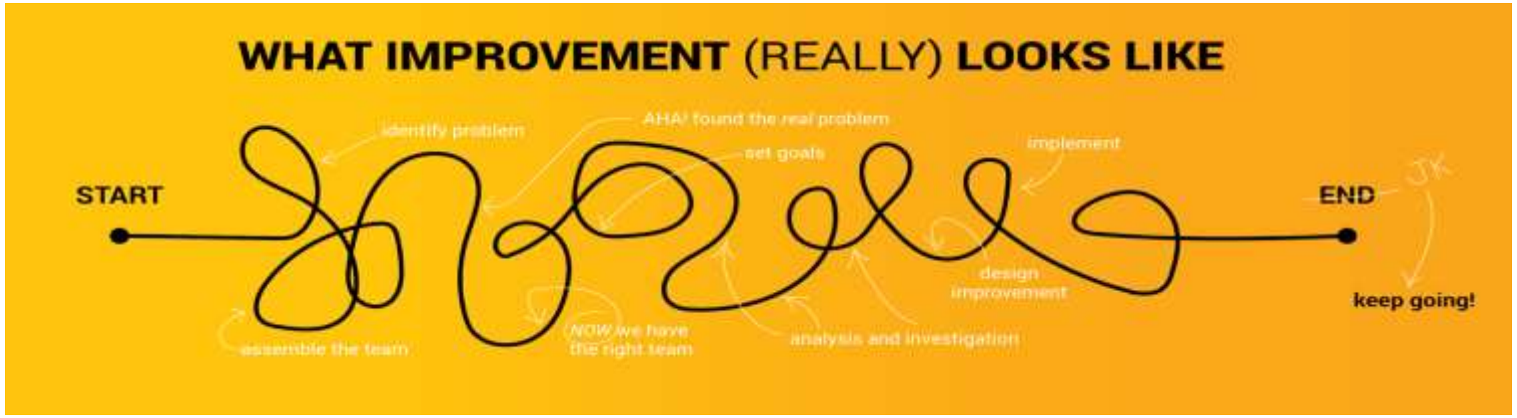


Photo Credit: Univ. of Utah Health

How to do that?

Let us show YOU how WE CARE!

Informatics Team

Mission: To Provide Exceptional Support to CaroMont Epic Users

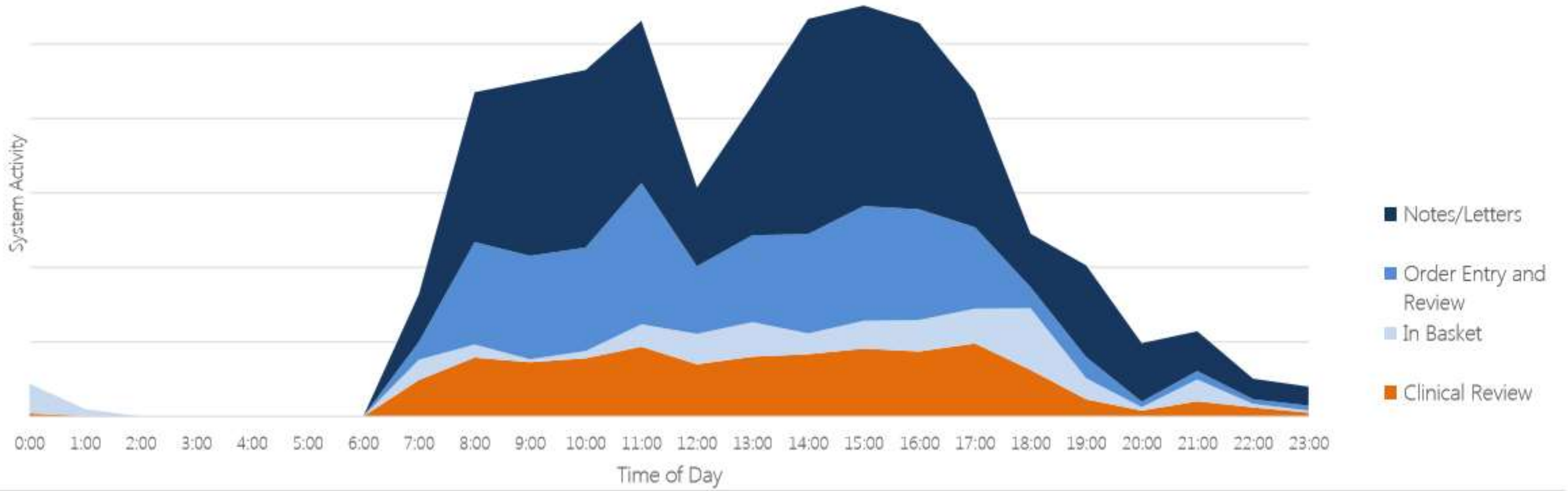
Vision: To be CaroMont's Trusted Champions for Epic Users

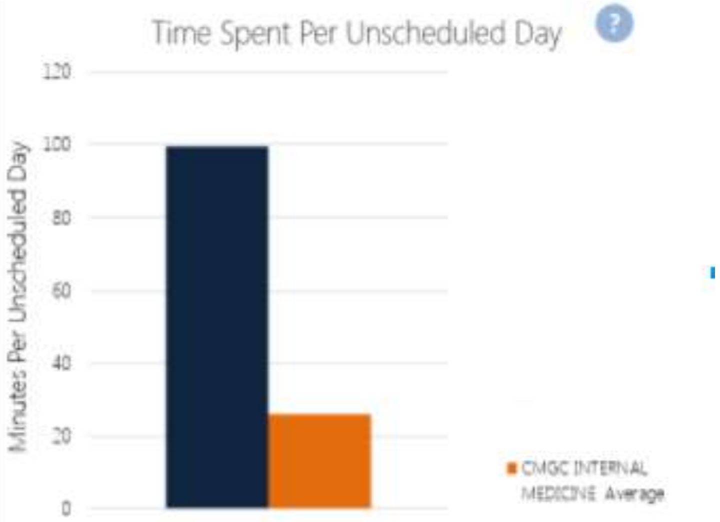
CaroMont's CARES Values

Compassion Accountability Reliability Excellence Safety

Utilize *Data*

Data Analytics: PEP and Signal of *Epic*



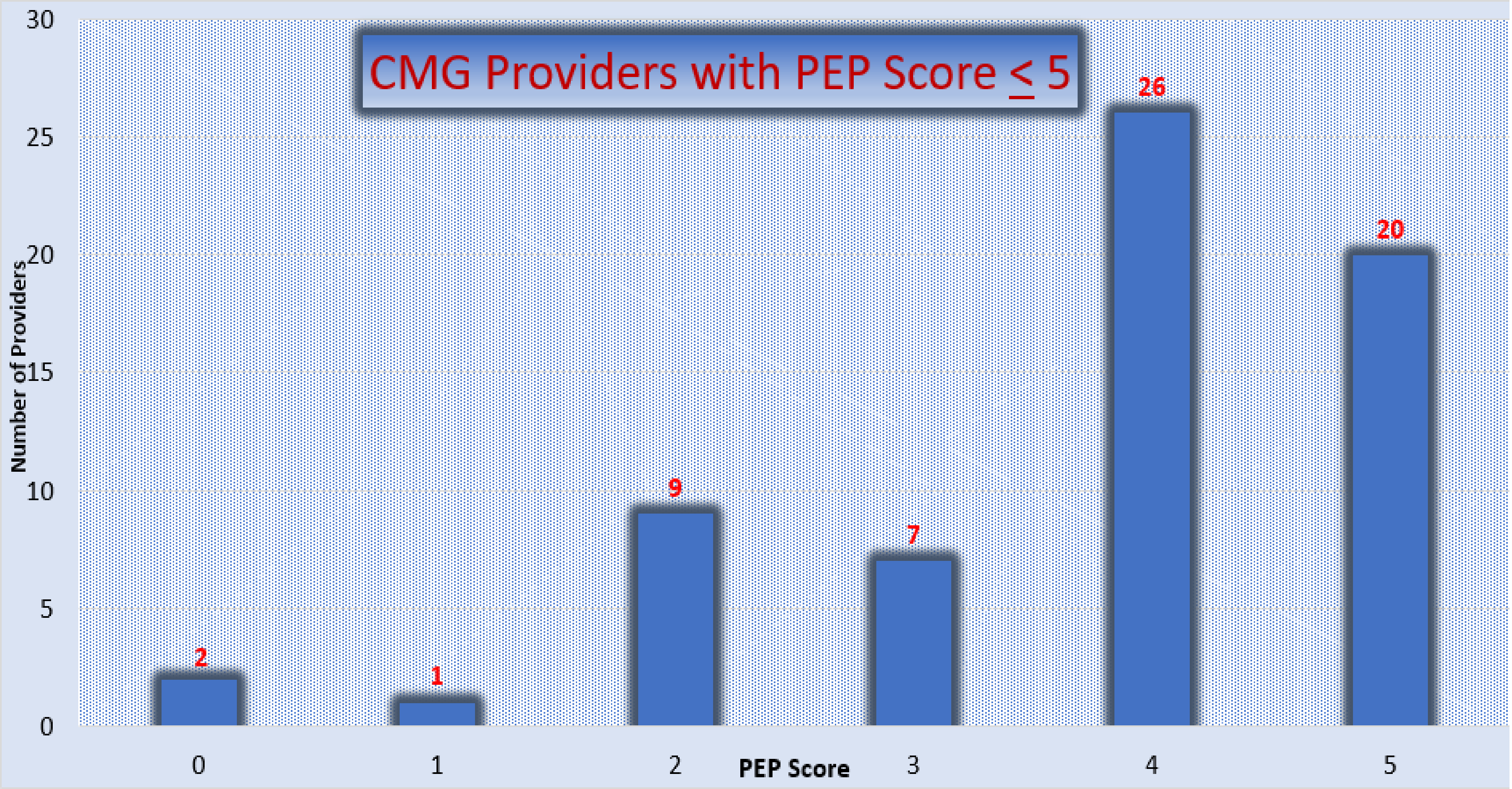


Data Collection

Optimization Project FY17/18

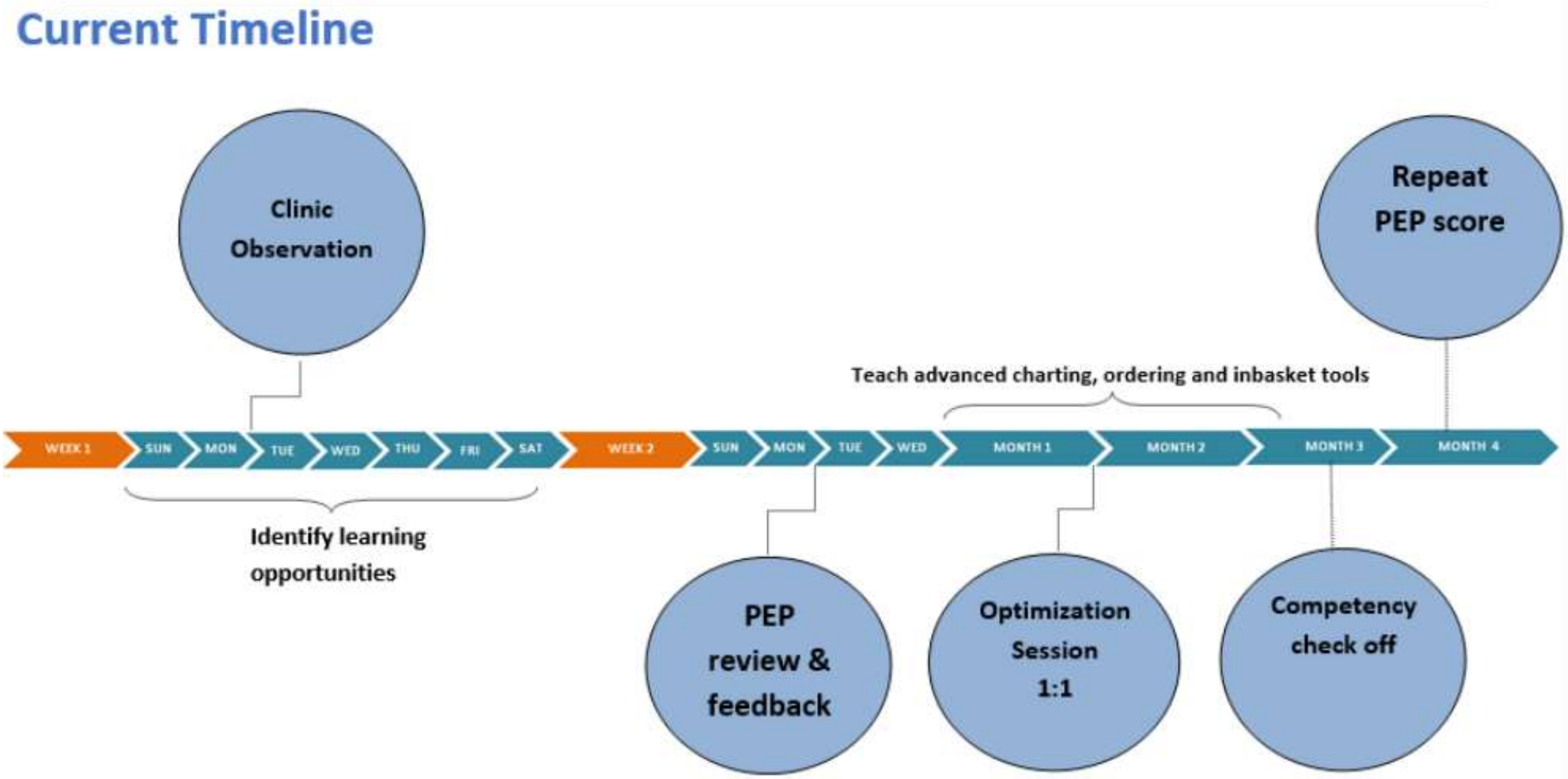
- Intervention designed for some *Ambulatory* providers
- Used PEP data
- A 16-week plan designed after feedback from providers
- Main Objective is to address Providers' Burnout

Enrollment: Providers with PEP < 5



Total 65

Intervention Plan



Results

- Finished > 350 1:1 sessions
- More than 500 hrs. of 1:1 training
- Filled PRE and POST training intervention Surveys
- Response Rate 74% on the PRE, and 65% on the POST
- Completed training 57 providers (19 ACPs, and 38 Physicians)

Subjective Data (Survey)

Burnout was reduced in > 70% after optimization

Outcomes After Undergoing Optimization (n=32) out of 57 (56%)	
Feeling MORE confident in proficiency to use Epic effectively	97%
Agreed for needing more optimization	84%
ALLEVIATED work-related burnout *	(See footnote)
Using epic functions more appropriate	97%
Signifcant improvement in effeicency in the following:	
Finding information and reviewing chart	84%
Office visit, consult & procedure note templates	88%
Documenting problem lists	72%
Ordering medications, labs, imaging, referrals	78%
Health Maintenance, Dashboard and Quality measures documentation	75%
InBasket workflows such as Results, MyChart, Refill requests	88%
** 34% had no burnout, > 71.4% of the remaining had alleviated burnout*	

Objective Outcomes

Follow up PEP data after intervention – 52 providers

	Increased > 1	**Overall Increase**
Efficiency (PEP)	25%	56%
Proficiency	44%	69%

Efficiency and Proficiency Average Scores

	Efficiency	**Proficiency**
Pre Optimization	3.7	6.0
Post Optimization	3.9	7.0
Change	**0.2* or 5.0% improvement**	**1.00* or 16.0% improvement**

- *p*-Value 0.13
- ***p*-Value 0.000022**

Minutes

Average minutes spent by each provider per patient / encounter in main chart sections

	Clinical Review	Ordering	Notes/Letters	Total
Pre Optimization	3.01	3.67	6.85	13.53
Post Optimization	2.75	3.56	5.96	12.27
Change per Encounter	0.26	0.11	0.89	**1.26 saved minutes per encounter***

*On average, if the provider sees 20 patients a day, he\she can save 25 minutes in the EMR per day.

→This is at least 84 hours less in the EMR per year per provider

→That is more than 2 weeks of less work per year per provider

Days of Working Late (after 5 pm)

	Avg. days of late activity per provider^
Pre Optimization	9.8 days
Post Optimization	5.2 days
Change per provider	4.6* days

^during monitoring period ~ 3 wks

- **p*- value =3.32E-08 (0.0000000332)
- On average, each provider reduced his\her days of working late by half after optimization !!

Provider Outreach Programs

- Clinic Rounding
- 1:1 sessions
- Epic Thursdays
- Workflow analysis

Coordinating with different Teams

- Analysts
- Coders
- Quality
- Leadership


EMR
BURNOUT
WELLBEING
PHYSICIANS
PLANNING
FEEDBACK
STRATEGY
TEAM
OUTREACH
OPTIMIZATIN
DELIVERY
SENIOR LEADERSHIP
PERSEVERANCE
CMIO
ENGAGEMENT
COMMUNICATION
LEADERSHIP
PERFORMANCE
IDEAS
VISION
IMPROVEMENTS
INFORMATICIST
COMMITTEES
MEETINGS

Are You Ready?

Thank you !

Shadi Hijjawi, MD, FACP, CHCQM, MBA
CMIO, CaroMont Health
Shadi.Hijjawi@CaroMontHealth.org

The Diseases of Clinical Informatics

PRESENTED BY:

JAKE LANCASTER, MD, MSHA, MSACI

CMIO WEST TENNESSEE HEALTHCARE

Problem Statement

- Clinical Informatics is a recognized clinical subspecialty of medicine but lacks many key features of other specialties including procedures, billing codes, diagnostic tests…
- Diseases

What is Clinical Informatics?

- The diagnosis and treatment of diseases related to information systems

CC: “I’m spending too much time in the chart”

- History: I’ve been using this thing for years but I am still can’t see as many patients as I did on paper. I spend my nights finishing notes
- Physical: Hunt and peck method of typing, no saved favorites, frequent jumping between screens
- Workup: EHR provider efficiency report shows doc spends 20 more minutes per patient than peers in same specialty. Bulk of time documenting and in orders

Diagnosis: Diabetes informatio

- Plan: Setup with auto text and order favorites. Setup with voice recognition transcription software.
- Check progress in 3 months.
- If no improvement consider Scribe

CC: “The notes don’t make sense anymore”

- History: Since going live with the new EHR, the notes have become progressively longer and you can no longer find any of the info you need.
- Physical: Audit of multiple notes from different providers shows overuse of copy forward as well as long autotext and other templates.
- Workup: Additional testing shows length of notes has doubled over past 8 years

Malignant documentation informationoma (Note Bloat)

- Plan:
  - Develop standards for what should and should not be included in notes by med staff and HIM
  - Educate about legal impact of having erroneous info in notes
  - Encourage movement to workflow pages (reduces note bloat)
  - Turn off copy forward

CC: I can’t get through an admission without 4-5 pop-up alerts

- History: Every time time admit orders are placed, multiple alerts display for lab duplicates, imaging duplicates, drug-drug interactions, and drug allergies
- Physical: Able to reproduce some of the alerts on a test patient including one for duplicate CBCs though ordered a day apart
- Workup: Report is run on alerts that are fired the most and have very high override rates.

Status Informaticus

- Plan:
  - Form best practices alerts group to review and streamline existing and incoming alerts
  - Explore new features for suppressing redundant alerts in an encounter
  - Offload some alerts to passive alerts
  - Change culture of solving every problem with an alert

CC: My computer is asking me to send it bitcoin

- History: Physician opened a link in an email from Jeff Bezos that asked if he wanted to be the new CMO of Amazon Health
- Physical: All files are frozen on his computer and pop-up box with count down timer has instructions for how to deposit the bitcoin
- Workup: Security assessment shows that threat is local to that machine only. All local files are either backed up or disposable

iBola Virus

- Plan:
  - Quarantine computer and remove from network
  - Restore and recover files
  - Continue to educate staff to not open emails from untrusted third parties
  - Yearly security assessments

CC: Everyone needs to switch from using notes to the workflow pages

- History: EHR vendor is recommending that clients move to using the workflow pages instead of the commonly used notes page. They will only be adding new features to the workflow pages and plan to retire the notes page.
- Physical: Most of current physicians on notes page. Some of the new workflows note optimized for the organization's current physicians. Mood of physicians not very receptive to the change
- Workup: Workflow pages may save a minute or two per patient. Numerous hurdles to overcome.

Informatiolithiasis

- Plan:
  - Optimize workflow page environment
  - Let transition occur as naturally as possible
  - If adoption halts or retirement date announced then bring on support for emergent conversion

Questions?

Jake.Lancaster@wth.org

AMDIS TED TALKS - 2019

- The Killing Paradox
  - Jason Schaffer, MD, MBI, FACEP
- Habits of Highly Effective Alerts
  - Emily C. Webber, MD FAAP FAMIA
- Beyond Secure Messaging
  - Jason Schaffer, MD, MBI, FACEP

The Killing Paradox

Electronic Health Records, Clinician Burnout, and the Paradox of Choice

Jason Schaffer, MD, MBI, FACEP

Indiana University Health

Success Metrics

- Documentation and total EHR time has fallen dramatically
- Governance time from request to decision has decreased by months
- Performance metrics have been improved from worst in the world to best-in-class
- Alerts and rules have been decreased by 80%
- Physician burnout has dropped by over 30% (measured by the Mayo Clinician Wellness Index)
- Patient quality and safety metricsf have all improved (as measured by Vizient)

HEALTH

Habits of Highly Effective Alerts

Emily C. Webber, MD FAAP FAMIA

AMDIS Physician Computer-Connection Symposium

June 2019

Indiana University Health

May 28, 2019, 08:00am | Views: 7,902

Electronic Health Records Are Broken

U.S. Department of Health and Human Services

AHRQ Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

Although there are few studies that quantify adverse events related to alert fatigue, this phenomenon has been implicated as a significant cause in several high-profile errors. A 2011 Boston Globe investigation identified more than 200 deaths over a 5-year period attributable to failure to appropriately heed alarms from physiologic monitoring systems. A recent book by a prominent patient safety leader details how a hospitalized teenager received a 38-fold overdose of an antibiotic, in large part because the ordering physician had been advised by colleagues to "just ignore the alerts."

ANNALS OF MEDICINE

WHY DOCTORS HATE THEIR COMPUTERS

Digitization promises to make medical care easier and more efficient. But are screens coming between doctors and patients?

By Atul Gawande November 5, 2018

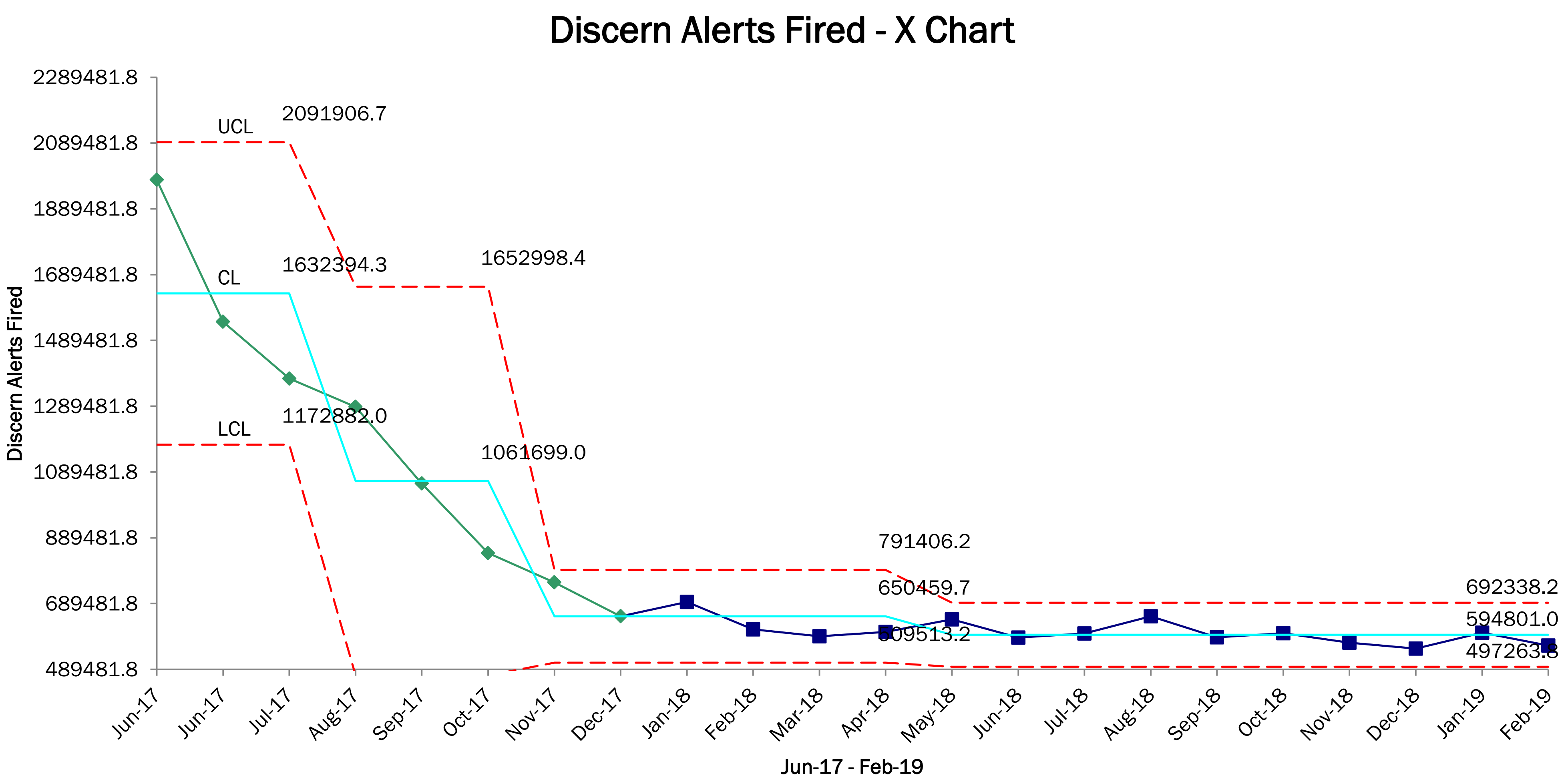
Study Published December 2013

Are we heeding the warning signs? Examining providers' overrides of computerized drug–drug interaction alerts in primary care.

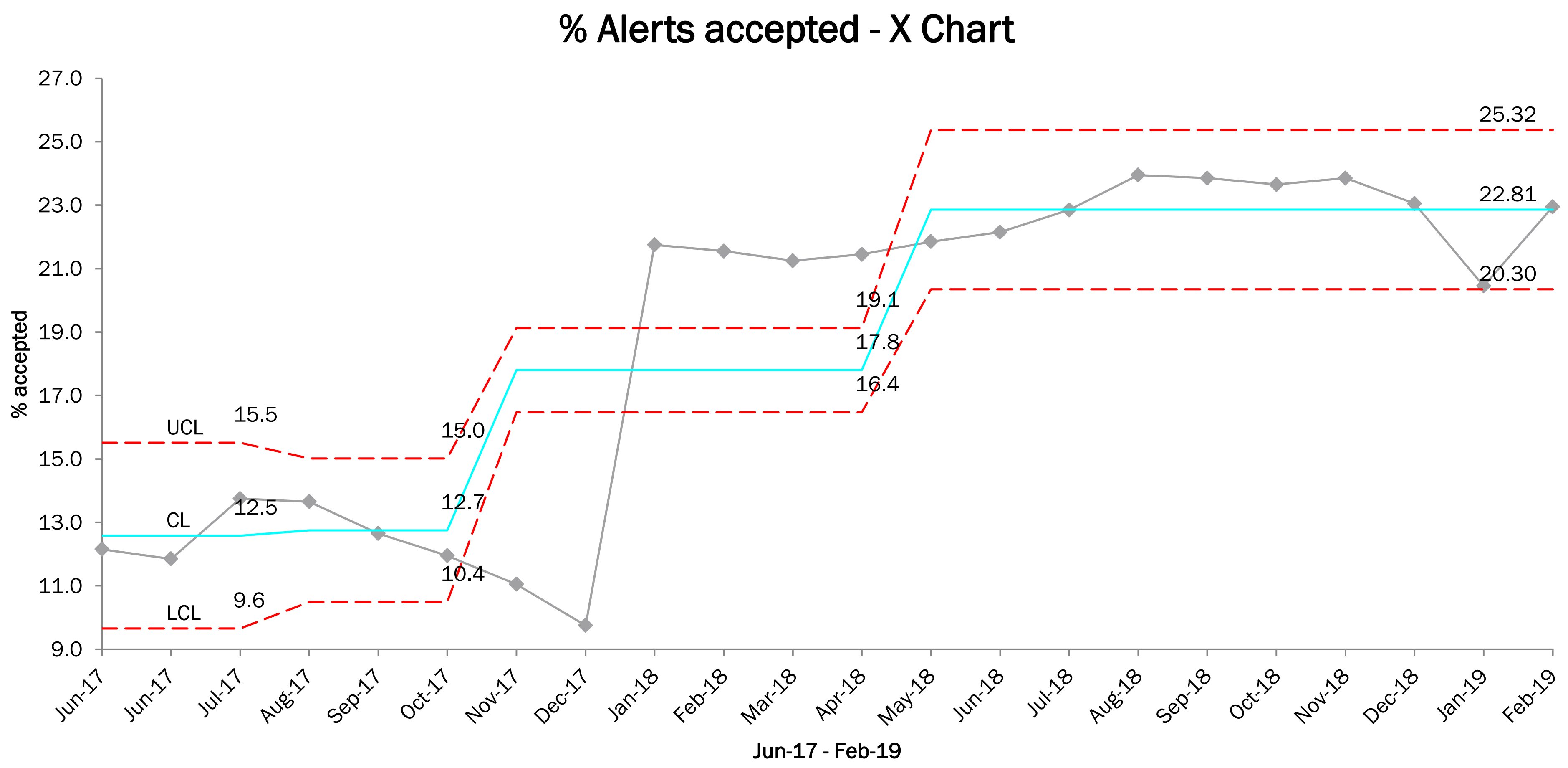
“Exnovation” and “The Purge”

- Exnovation
  - An opposite of innovation
  - Occurs when products and processes that have been tested and confirmed to be best-in-class are standardized to ensure that they are not innovated further

- Does this work?
- Do you need a new solution?
- Did you sunset the thing you replaced?

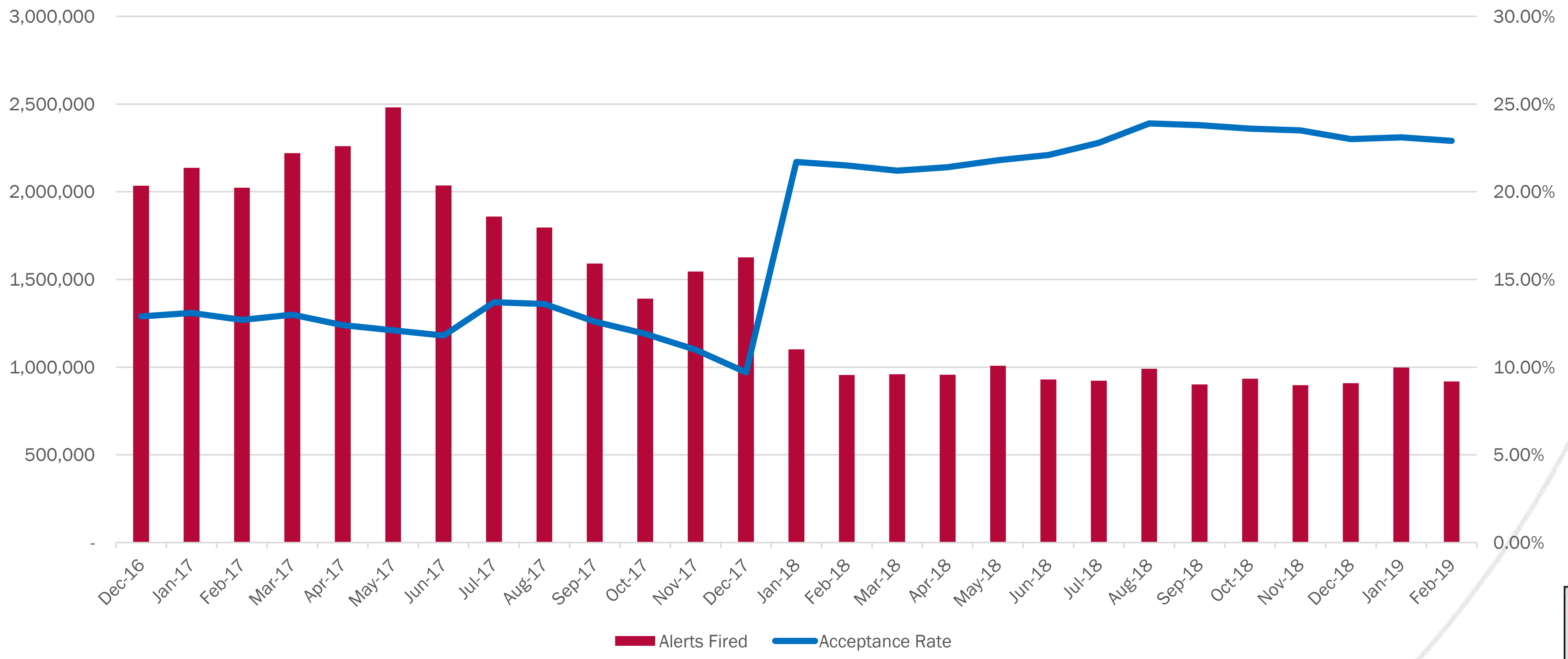


Discern Alerts Fired - X Chart
Discern Alerts Fired
2289481.8
2089481.8
1889481.8
1689481.8
1489481.8
1289481.8
1089481.8
889481.8
689481.8
489481.8
UCL
CL
LCL
2091906.7
1632394.3
1652998.4
1172882.0
1061699.0
791406.2
650459.7
509513.2
692338.2
594801.0
497263.8
Jun-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Jun-17 - Feb-19

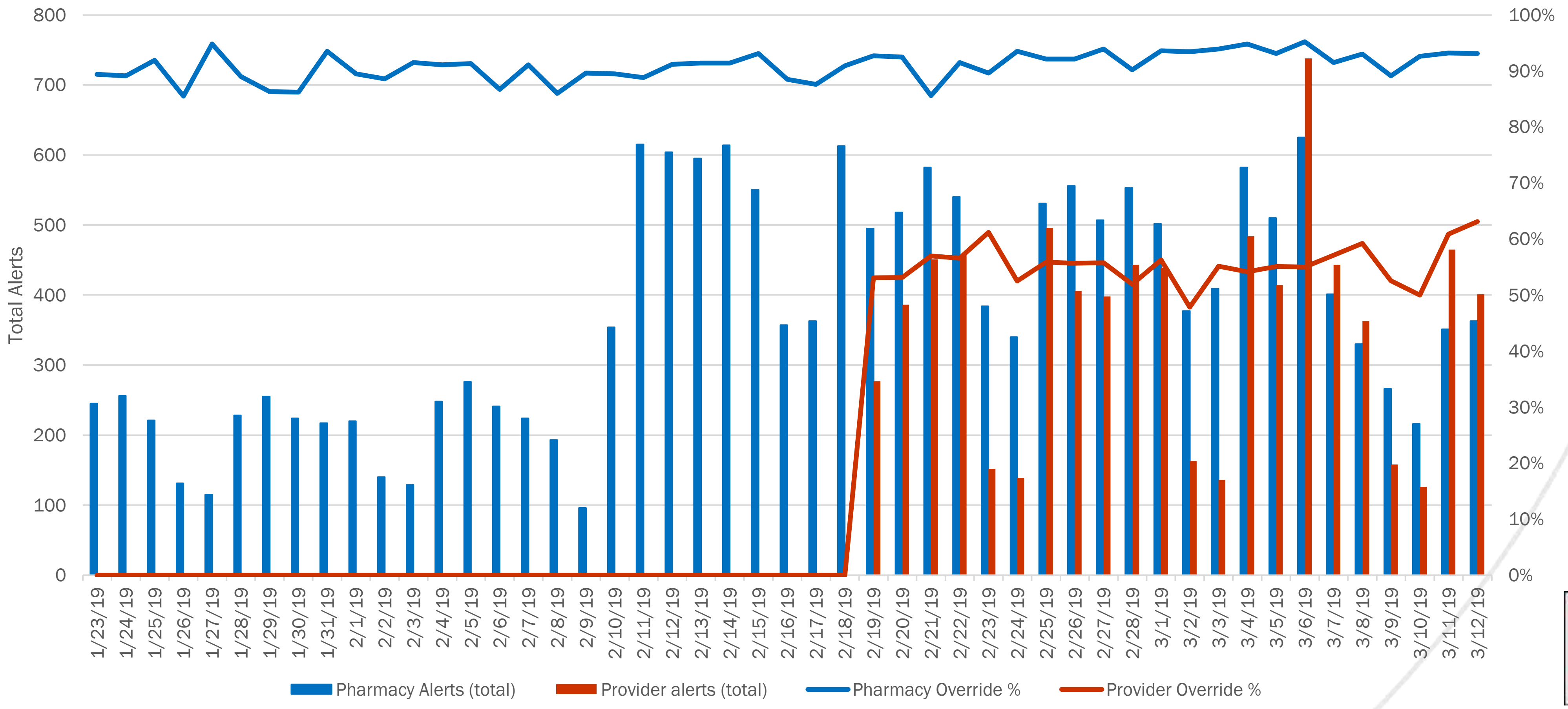


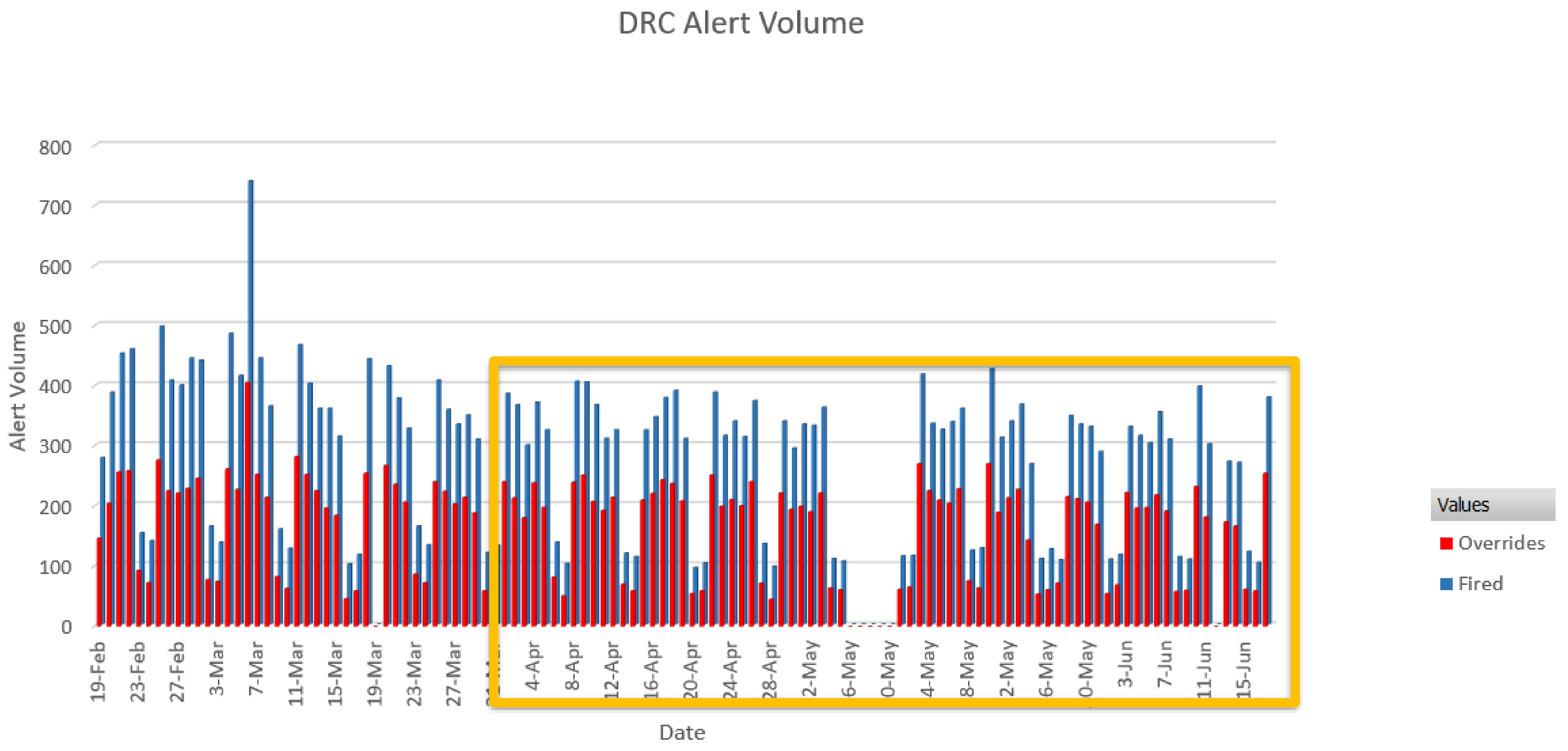
% Alerts accepted - X Chart
% accepted
Jun-17 - Feb-19
UCL
CL
LCL
15.5
12.5
9.6
15.0
12.7
10.4
19.1
17.8
16.4
25.32
22.81
20.30
27.0
25.0
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
Jun-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19

Alert acceptance



Pharmacy and provider acceptance of DRC




DRC Alert Volume
Alert Volume
800
700
600
500
400
300
200
100
0
19-Feb
23-Feb
27-Feb
3-Mar
7-Mar
11-Mar
15-Mar
19-Mar
23-Mar
27-Mar
4-Apr
8-Apr
12-Apr
16-Apr
20-Apr
24-Apr
28-Apr
2-May
6-May
4-May
8-May
2-May
6-May
3-Jun
7-Jun
11-Jun
15-Jun
Date
Values
Overrides
Fired

Key Drivers of Success

- Disciplined approach to intent
- Clinical entrenchment

- Agile removal and curation
  - Alert SWAT team: average 72 business hours



References

1. Saiyed SM et al. Optimizing drug-dose alerts using commercial software throughout an integrated health care system. J Am Med Inform Assoc. 2017 Nov 1;24(6):1149-1154. doi: 10.1093/jamia/ocx031.
2. Institute for Safe Medication Practices (ISMP). High alert medication assessment. https://www.ismp.org/assessments/high-alert-medications
3. Sirajuddin AM et al, *Implementation pearls from a new guidebook on improving medication use and outcomes with clinical decision support. Effective CDS is essential for addressing healthcare performance improvement imperatives*. J Healthc Inf Manag. 2009 Fall;23(4):38-45.j

Beyond Secure Messaging

Health Care Communication for a new Age

Jason Schaffer, MD, MBI, FACEP

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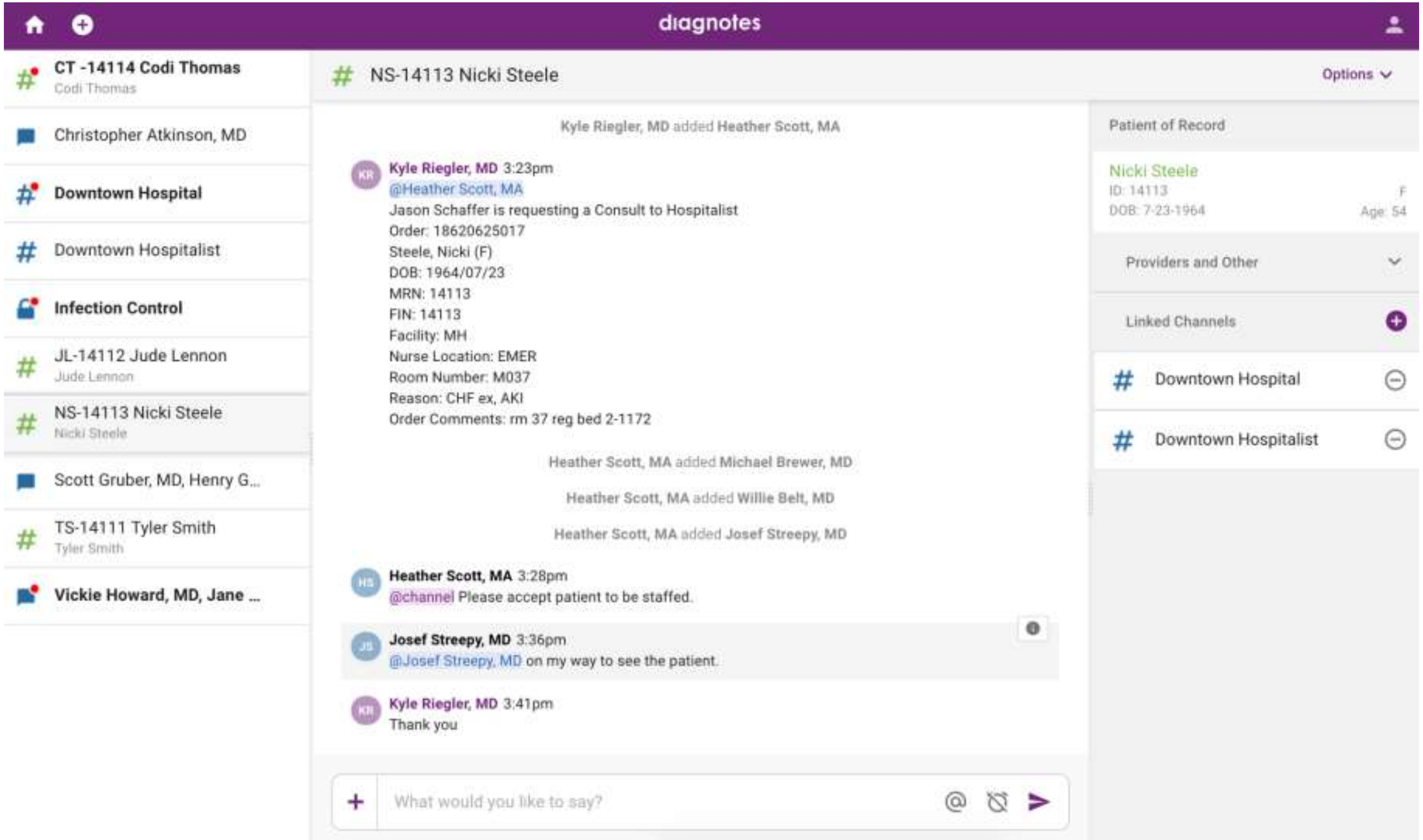

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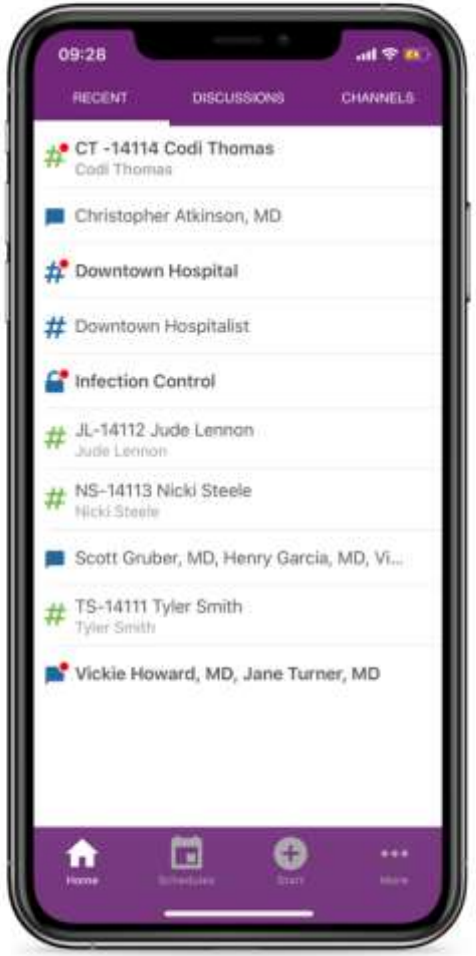

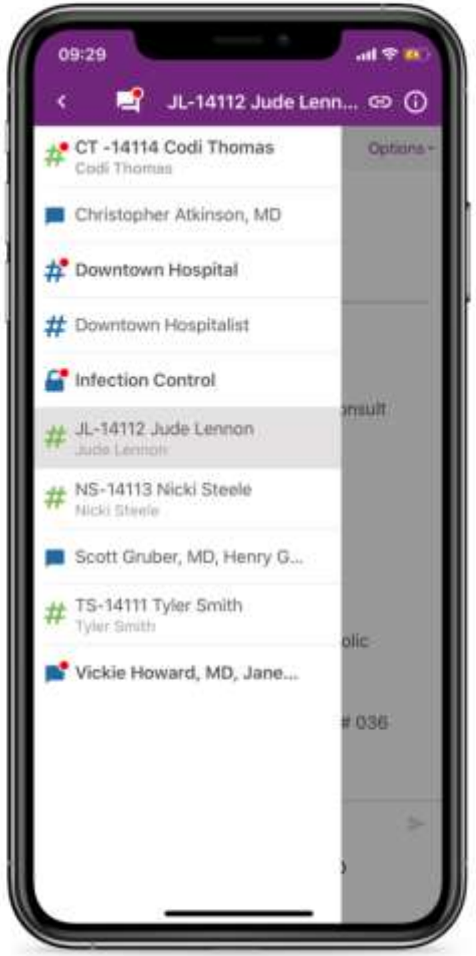

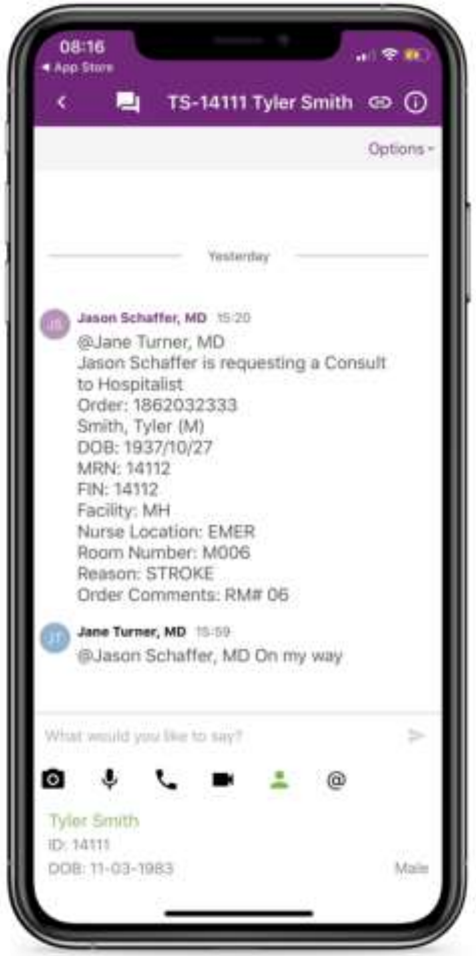

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HEALTH Indiana University Health

AMDIS TED TALKS – 2019 CLINICAL FELLOWS EDITION

- CMIO 3.0
  - Monique Diaz M.D.
- Digital Phenotyping
  - John Zulueta, MD

CMIO 3.0

MONIQUE DIAZ M.D.

UNIVERSITY OF ILLINOIS HOSPITAL AND HEALTH SCIENCES SYSTEM

CHICAGO, IL

HCI HEALTHCARE INFORMATICS

The Rise of the Second-Generation CMIO

Physician leaders shift to more strategic uses of data

December 1, 2014 by David Raths

In arranging interviews with health IT leaders this year, I have noticed a profusion of new titles, such as chief health information officer, medical director of informatics, and chief innovation officer. Hillary Ross, a consultant for the executive search firm Witt/Kieffer, who specializes in recruiting chief medical information officers and other senior-level IT executives, believes these new titles are part of a wave she calls "second-generation CMIOs."

Hillary Ross, Witt/Kieffer

"The first-generation CMIO was a change agent, an implementer," she said. That person did the operational heavy lifting with creating order sets, engaging physicians in new systems, and overseeing training and education. "This next generation is more strategic and visionary," she said. They are searching for the type of initiatives to leverage the healthcare system's investment in EHRs, focused on population health, improving patient safety and care and lowering costs.

Some first-generation CMIOs will make the transition to the second generation, while others

And although health systems such as UPMC focus energy on commercializing innovations developed internally, Ross said often the innovation focus in a job title refers to physicians bringing new technologies, such as telemedicine, smartphones, and smart pump technology, to the organization and integrating them with existing technologies.

One change she has noted is in reporting structures. When EHRs were first being implemented, the CMIO typically reported to the CIO, Ross said. "Now that the lion's share of initial EHR implementation work is done, and the focus is on optimizing their use, we are seeing a definite shift in their reporting to the chief medical officer."

CMIOs with the skills to focus on data and analytics are very much in demand, she said. "It is critical that you have the skill set but also the personal skills. You can be the most educated person in the world, but if you don't have a personal style that is a good fit with the organization you won't be successful." Personal style was important for first-generation CMIOs, she said, and

CMIO 3.0: THE GIST

CMIO 1st Generation + CMIO 2nd Generation

SURE

CMIO 3.0: THE GIST

CMIO 3.0 TRUE

WHERE IQ = EQ

CMIO 3.0 CHARACTERISTICS

A Team-builder and

(Interdisciplinary) Team Player

HBR.ORG

Harvard Business Review

OCTOBER 2013
REPRINT R1310B

THE BIG IDEA

The Strategy That Will Fix Health Care

Providers must lead the way in making value the overarching goal *by Michael E. Porter and Thomas H. Lee*

Longitudinal Look-Stroke Dashboard

	Precipitating Event	ER	Acute Hospital Admit (OT Eval.)	Acute Rehab Admit	Home After 90 Days	Home After 6 months
Prompt		5B Right arm motor drift	Not applicable			
Response		+3 No effort against gravity	2. 'A lot' (patient requires maximum moderate assistance			
Scoring System		NIHSS	JHU AM-PAC			

INTERDISCIPLINARY TEAM MEMBERS & CONTRIBUTORS

Neurology & Rehab Residents	Neurology & Rehab Attendings	Nurses
Researchers	Data Scientists	Medical Librarians
Bio-visual designers	Stroke Survivors	Family Members

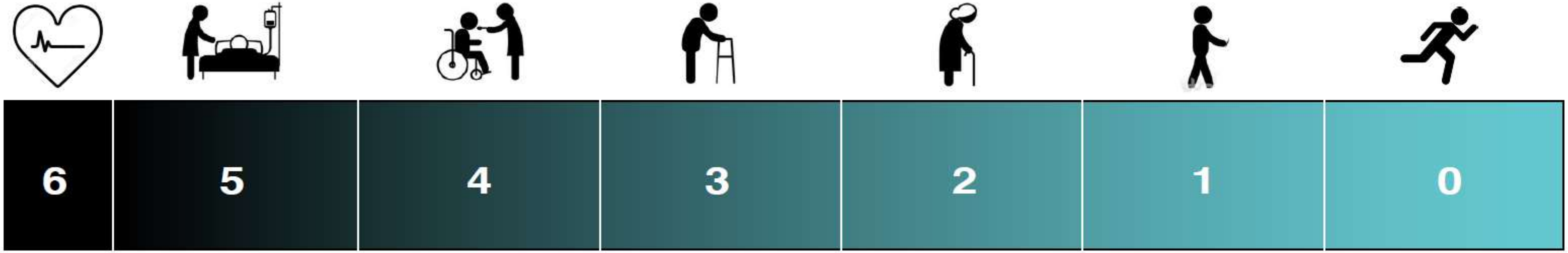
CMIO 3.0 CHARACTERISTICS

Designer

(kinda)

90 Day Post-Stroke mRankin Score (Q2)

Average disability score: 2.3 **Total cases: 64**



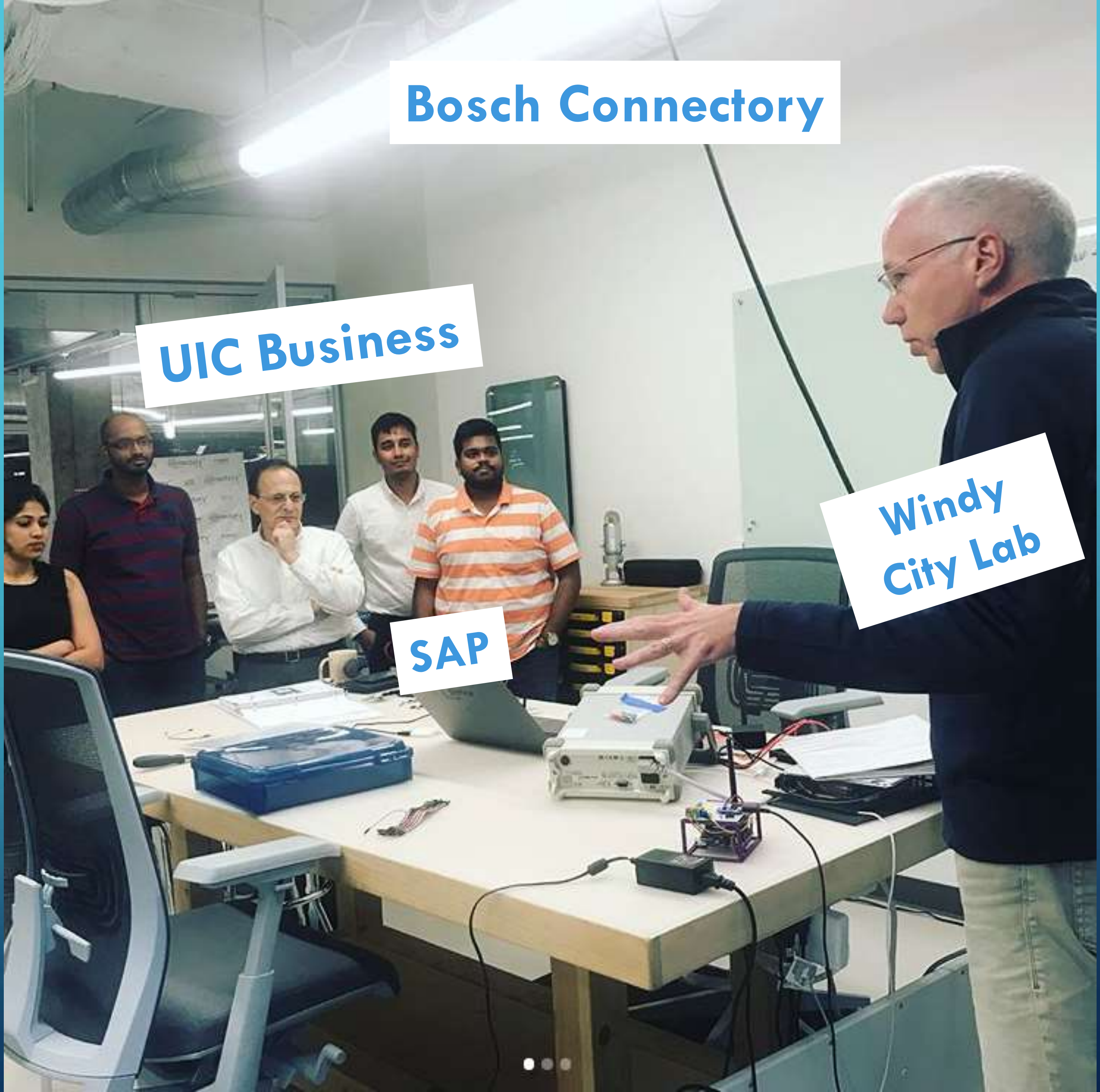
Total patients per score	2	7	8	6	14	21	6

CMIO 3.0 CHARACTERISTICS

Strategic Partner

MARC HARRISON PRESIDENT AND CEO AT INTERMOUNTAIN HEALTHCARE
BECKER'S HOSPITAL REVIEW MEETING APRIL 2ND 2019

"The answer will not be mergers, it will be creative and strategic partnerships. Partnerships you would have never imagined just a few years ago."


Bosch Connectory
UIC Business
Windy City Lab
SAP

CMIO 3.0 CHARACTERISTICS

Culturally Competent

PATIENT TYPE

Stroke Type
PGD
Family History
PMH
Insurance
Demographics
Social History

INITIAL PRESENTATION

PE Findings
Labs
Imaging
Time Points
Stroke Types
Vitals
Medications
Scales & Scores
Patient Medical History
Family History
Insurance
Social History
Demographics

HOSPITAL COURSE

Interventions
Complications
Medications
Rehab Specifics
Time Points
Scales & Scores

DISCHARGE PRESENTATION

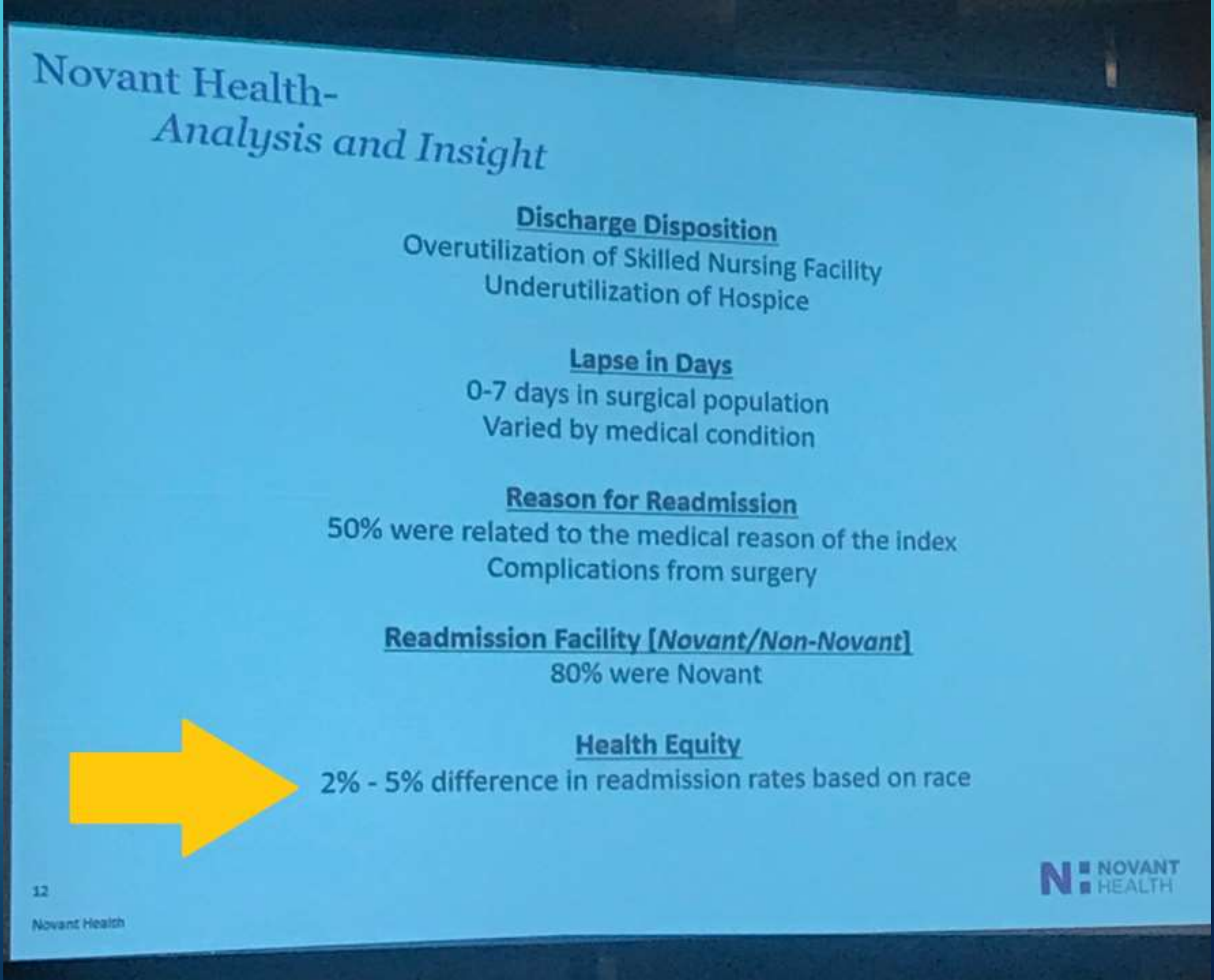
PE Findings
Labs
Imaging
Time Points
Stroke Types
Vitals
Medications
Scales & Scores
Insurance

RESULTS

Genetics
Labs
Pathology
Imaging
Vitals

FOLLOW UP

Scales & Scores
PRO
PE Findings
Rehabilitation-Specific
Labs
Imaging
Vitals



Novant Health-
Analysis and Insight

Discharge Disposition
Overutilization of Skilled Nursing Facility
Underutilization of Hospice

Lapse in Days
0-7 days in surgical population
Varied by medical condition

Reason for Readmission
50% were related to the medical reason of the index
Complications from surgery

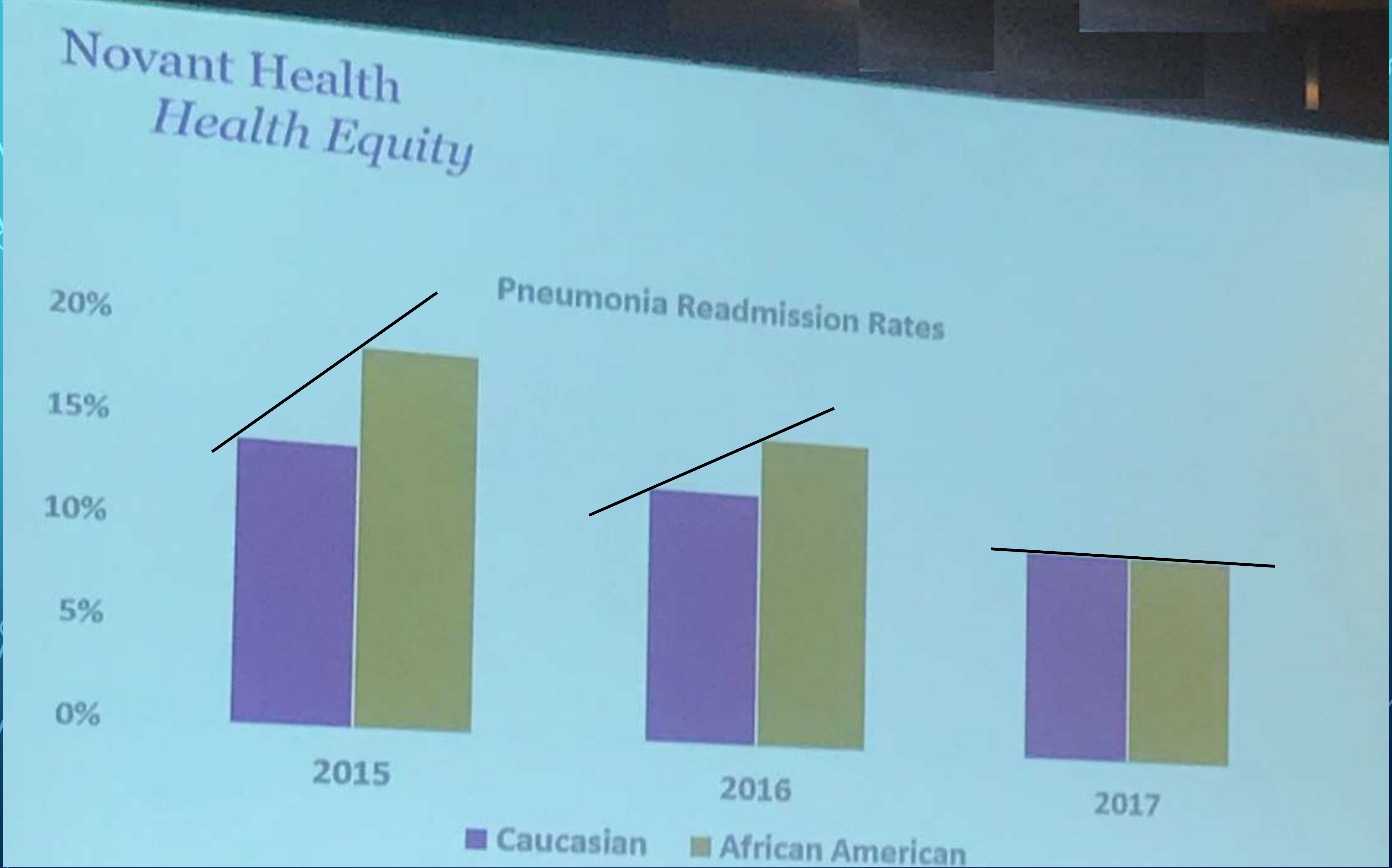
Readmission Facility [*Novant/Non-Novant*]
80% were Novant

Health Equity
2% - 5% difference in readmission rates based on race

NOVANT HEALTH

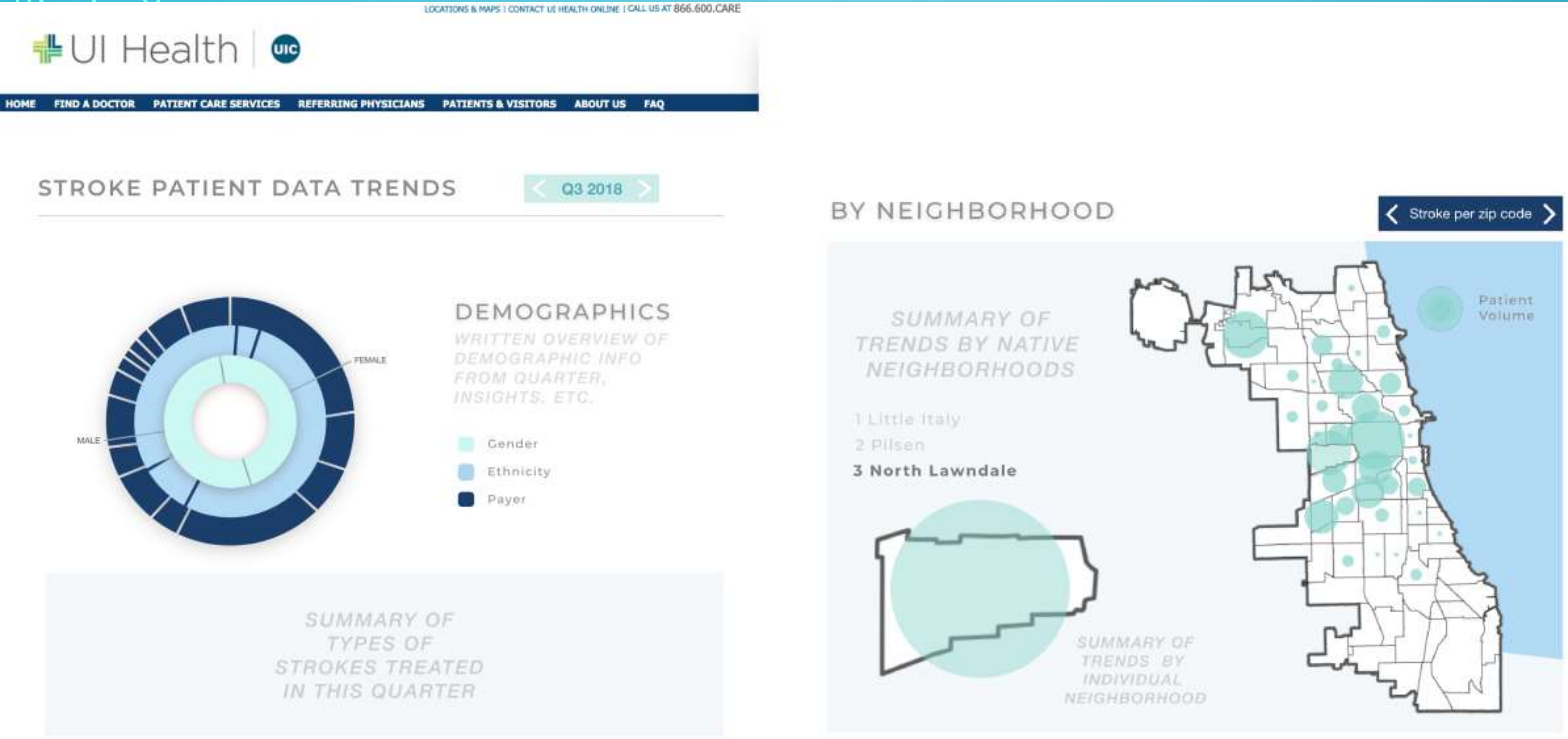
Health Equity

2% - 5% difference in readmission rates based on race


Novant Health
Health Equity
Pneumonia Readmission Rates
20%
15%
10%
5%
0%
2015
2016
2017
Caucasian
African American

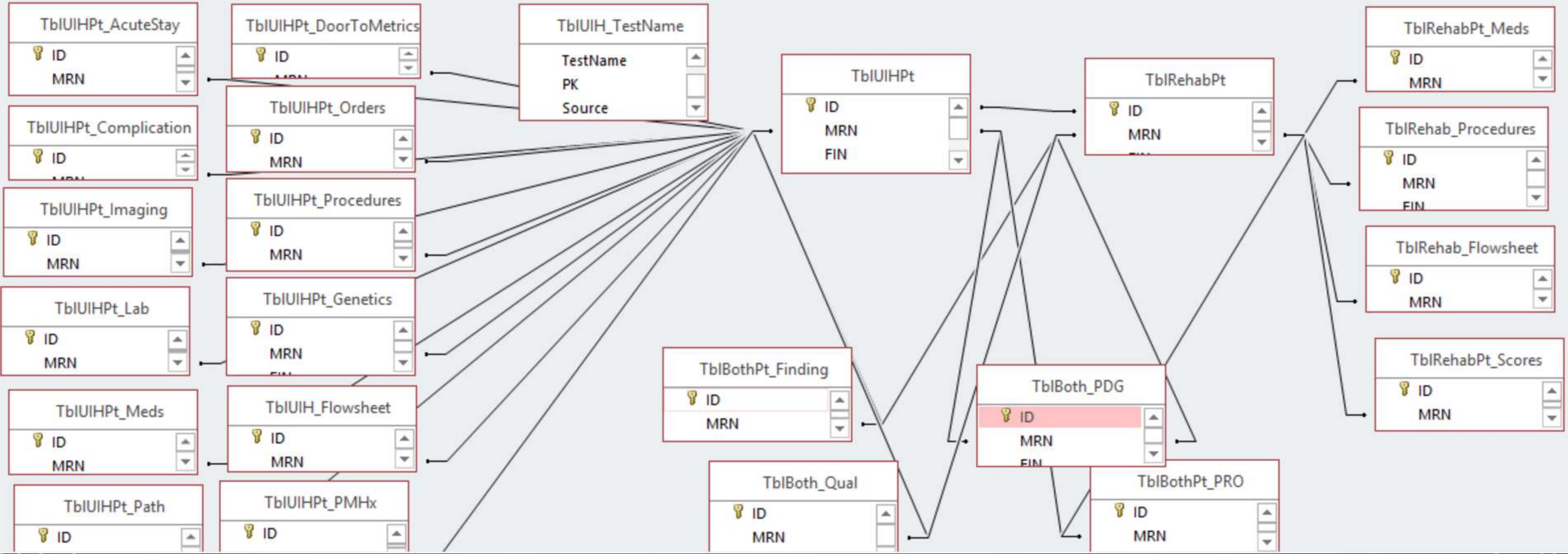
CMIO 3.0 CHARACTERISTICS

Programmer ?


LOCATIONS & MAPS | CONTACT UI HEALTH ONLINE | CALL US AT 866.600.CARE
UI Health
UIC
HOME
FIND A DOCTOR
PATIENT CARE SERVICES
REFERRING PHYSICIANS
PATIENTS & VISITORS
ABOUT US
FAQ
STROKE PATIENT DATA TRENDS
Q3 2018
FEMALE
MALE
DEMOGRAPHICS
WRITTEN OVERVIEW OF DEMOGRAPHIC INFO FROM QUARTER, INSIGHTS, ETC.
Gender
Ethnicity
Payer
SUMMARY OF TYPES OF STROKES TREATED IN THIS QUARTER
BY NEIGHBORHOOD
Stroke per zip code
SUMMARY OF TRENDS BY NATIVE NEIGHBORHOODS
1 Little Italy
2 Pilsen
3 North Lawndale
Patient Volume
SUMMARY OF TRENDS BY INDIVIDUAL NEIGHBORHOOD

CMIO 3.0 CHARACTERISTICS

Data Curator


TblUIHPt_AcuteStay
ID
MRN
TblUIHPt_DoorToMetrics
ID
TblUIH_TestName
TestName
PK
Source
TblRehabPt_Meds
ID
MRN
TblUIHPt
ID
MRN
FIN
TblRehabPt
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FUNCTIONAL INDEPENDENCE MEASURE (FIM) SCORES ARE A BETTER PREDICTOR OF 30-DAY READMISSION COMPARED TO COMORBIDITIES ALONE

Sources:

- Shih SL, Zafonte R, Bates DW, et al. Functional status outperforms comorbidities as a predictor of 30-day acute care readmissions in the inpatient rehabilitation population. J Am Med Dir Assoc. 2016;17(10):921-926.
- Fisher SR, Graham JE, Krishnan S, Ottenbacher KJ. Predictors of 30-day readmission following inpatient rehabilitation for patients at high risk for hospital readmission. Phys Ther. 2016;96(1):62-70.]

DATA CURATOR

Physician Determined Data

(What weekly/monthly reports do clinicians want to see?)

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BOTCHED OPERATION

Death By 1,000 Clicks: Where Electronic Health Records Went Wrong

The U.S. government claimed that turning American medical charts into electronic re make health care better, safer and cheaper. Ten years and $36 billion later, the system mess. Inside a digital revolution that took a bad turn.

By **Fred Schulte** and **Erika Fry, Fortune** • MARCH 18, 2019

Opinion

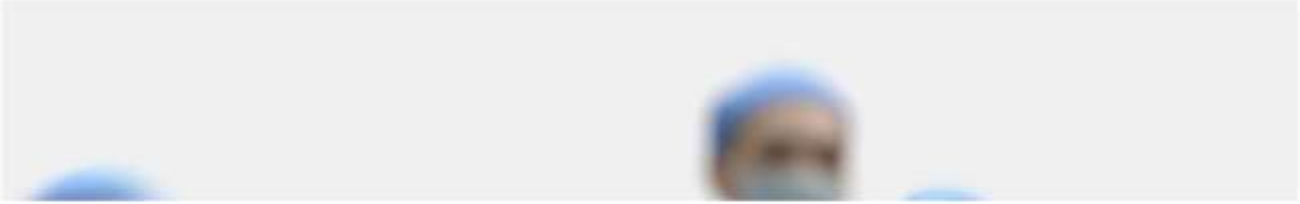
The Business of Health Care Depends on Exploiting Doctors and Nurses

One resource seems infinite and free: the professionalism of caregivers.

By Danielle Ofri

Dr. Ofri practices at Bellevue Hospital in New York.

June 8, 2019



Digital Phenotyping

John Zulueta – Clinical Informatics Fellow, UIC
jzulueta@uic.edu

UI Health | UIC

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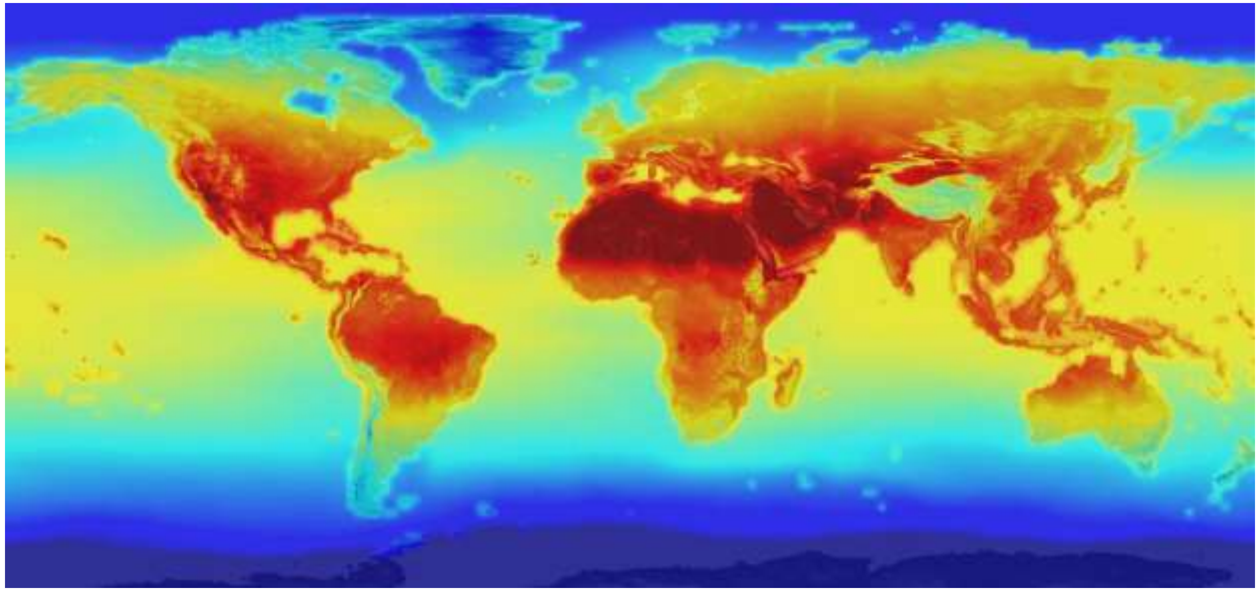

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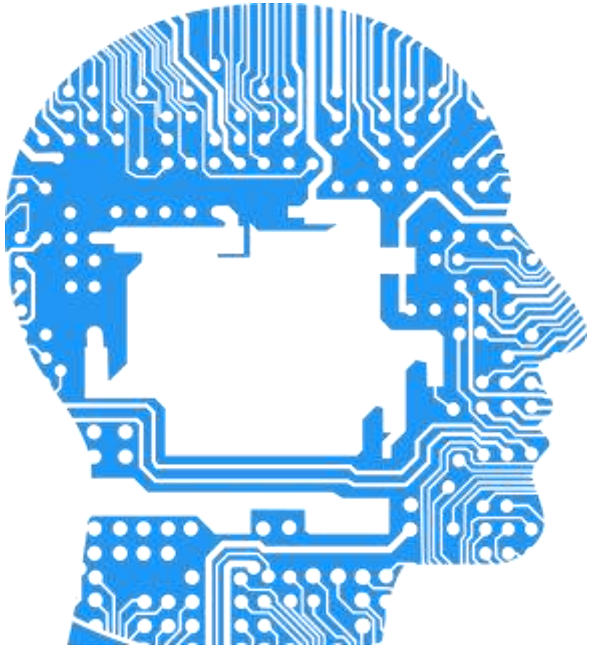

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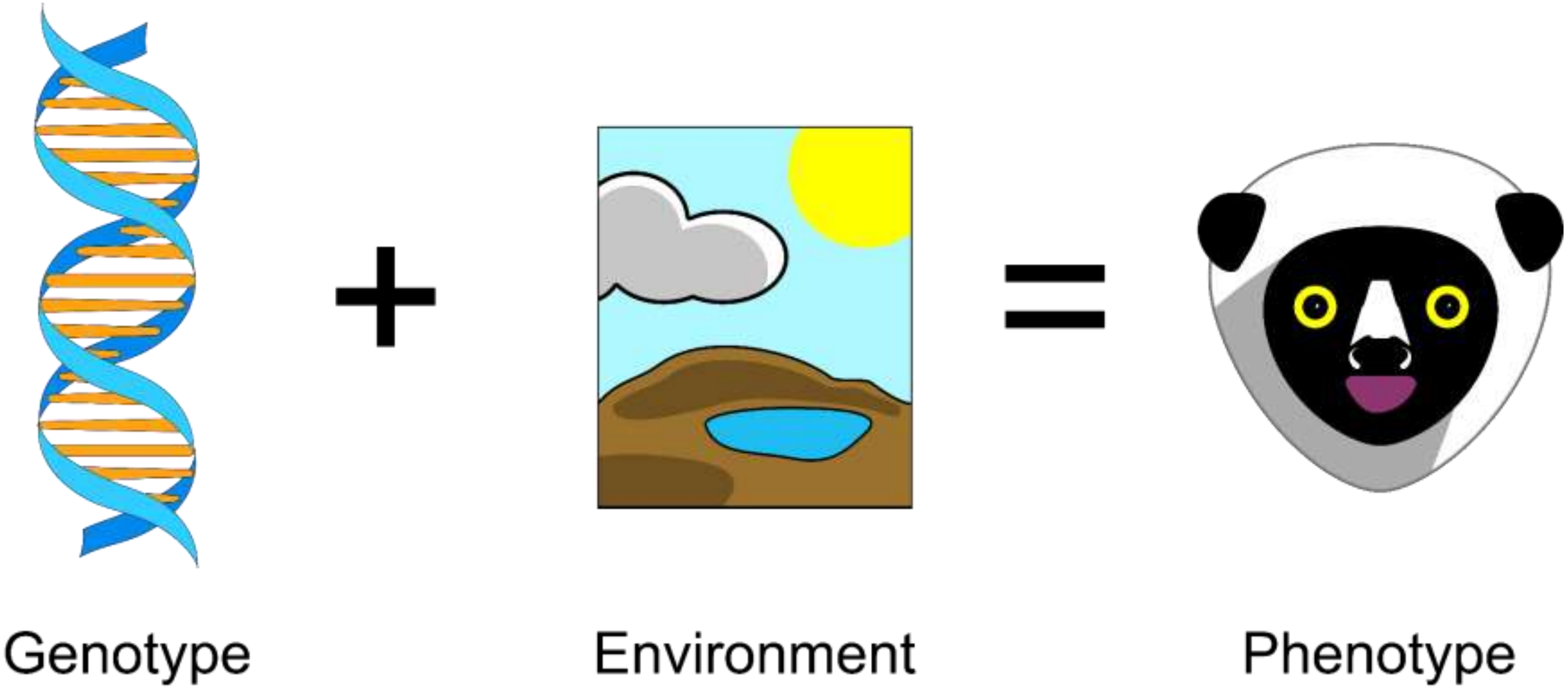
PHENOTYPE



HOW DO YOU CREATE A DIGITAL PHENOTYPE?

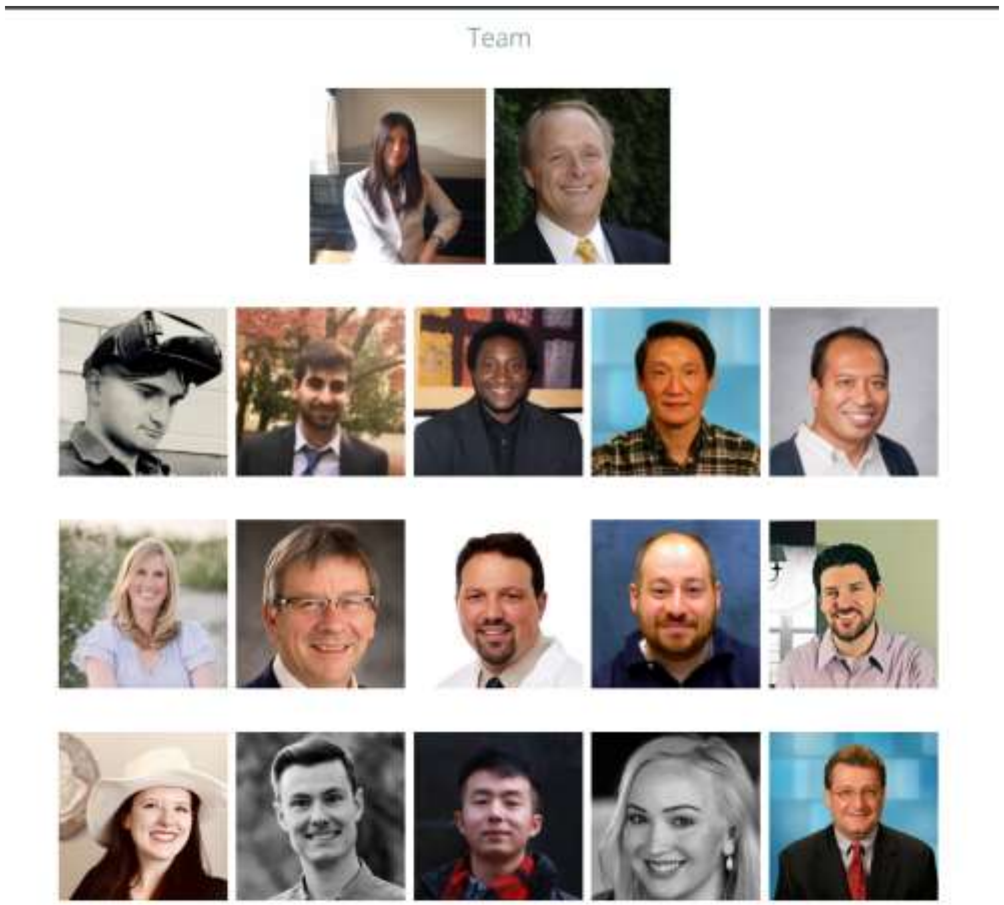
Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology*, *4*(1), 1–32. https://doi.org/10.1146/annurev.clinpsy.3.022806.091415

What is Data Exhaust? - Definition from Techopedia. (n.d.). Retrieved April 15, 2019, from https://www.techopedia.com/definition/30319/data-exhaust

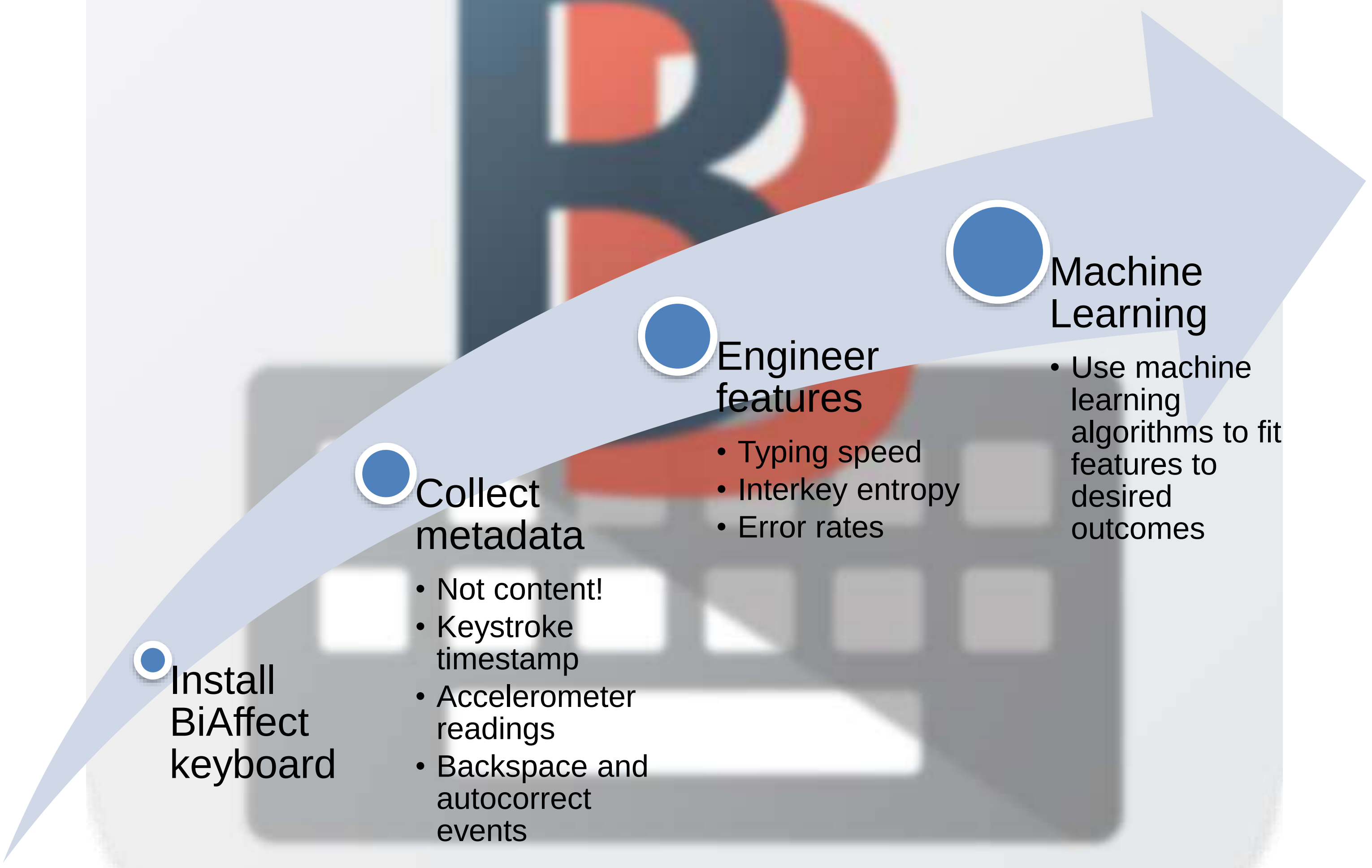
Jain, S. H., Powers, B. W., Hawkins, J. B., & Brownstein, J. S. (2015). The digital phenotype. *Nature Biotechnology*, *33*(5), 462–463. https://doi.org/10.1038/nbt.3223

CAN WE USE THE DIGITAL EXHAUST FROM MOBILE PHONES TO CREATE PHENOTYPES OF PSYCHIATRIC DISEASES?

INTRODUCING BiAffect



BiAffect Implementation



PILOT RESULTS

- Completed a pilot study using an early version of BiAffect in 2017 with 40 subjects

Original Paper

Predicting Mood Disturbance Severity with Mobile Phone Keystroke Metadata: A BiAffect Digital Phenotyping Study

Abstract

CURIOSITY

WILEY

Let your fingers do the talking: Passive typing instability predicts future mood outcomes

Jonathan P. Stange | John Zulueta | Scott A. Langenecker | Kelly A. Ryan | Andrea Piscitello | Jenna Duffecy | Melvin G. McInnis | Pete Nelson | Olusola Ajilore | Alex Leow

1 | INTRODUCTION

2 | CASE PRESENTATION

DeepMood: Modeling Mobile Phone Typing Dynamics for Mood Detection

Bokai Cao, Lei Zheng, Chenwei Zhang, Philip S. Yu, Andrea Piscitello, John Zulueta, Olu Ajilore, Kelly Ryan, and Alex D. Leow

ABSTRACT

KEYWORDS

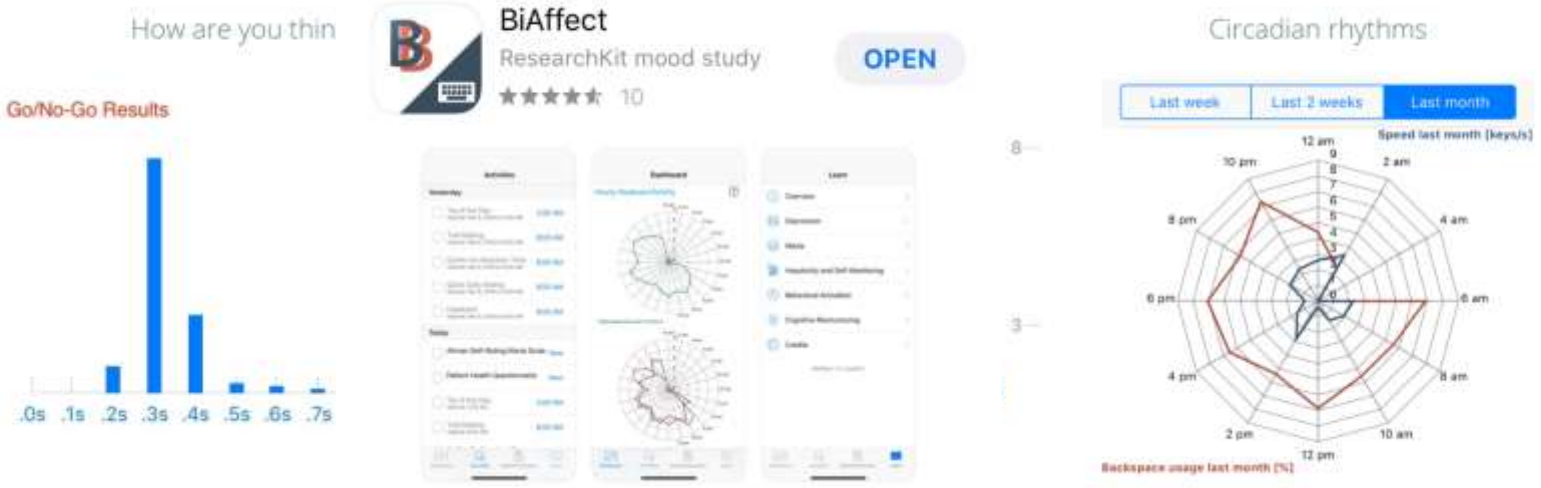
1 INTRODUCTION

KEY FINDINGS

- 63% of the variance in depressive symptoms and 34% of the variance in mania symptoms is explained by our models
- Using deep learning methods subjects can be classified as depressed or not depressed with 90% accuracy
- Instability of daily typing metrics is 70% correlated with future depressive symptoms

CURRENT STEPS

- Study currently underway via Apple’s Research Kit platform open to adults in the U.S.
- Includes self-reported measures and tests of cognitive function

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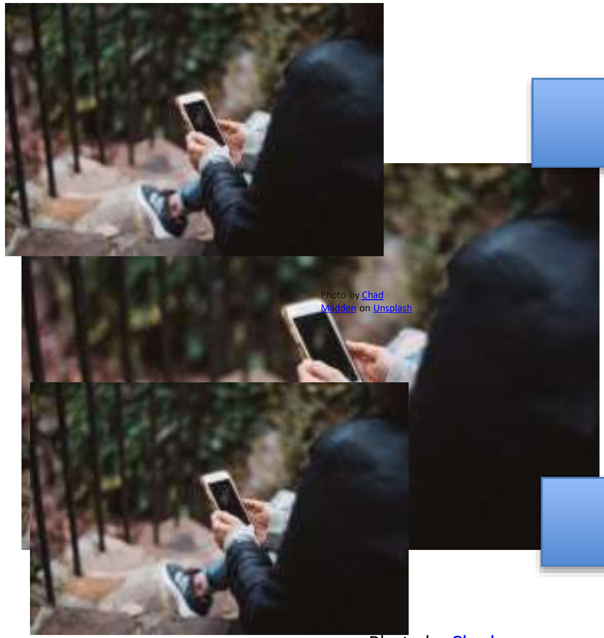

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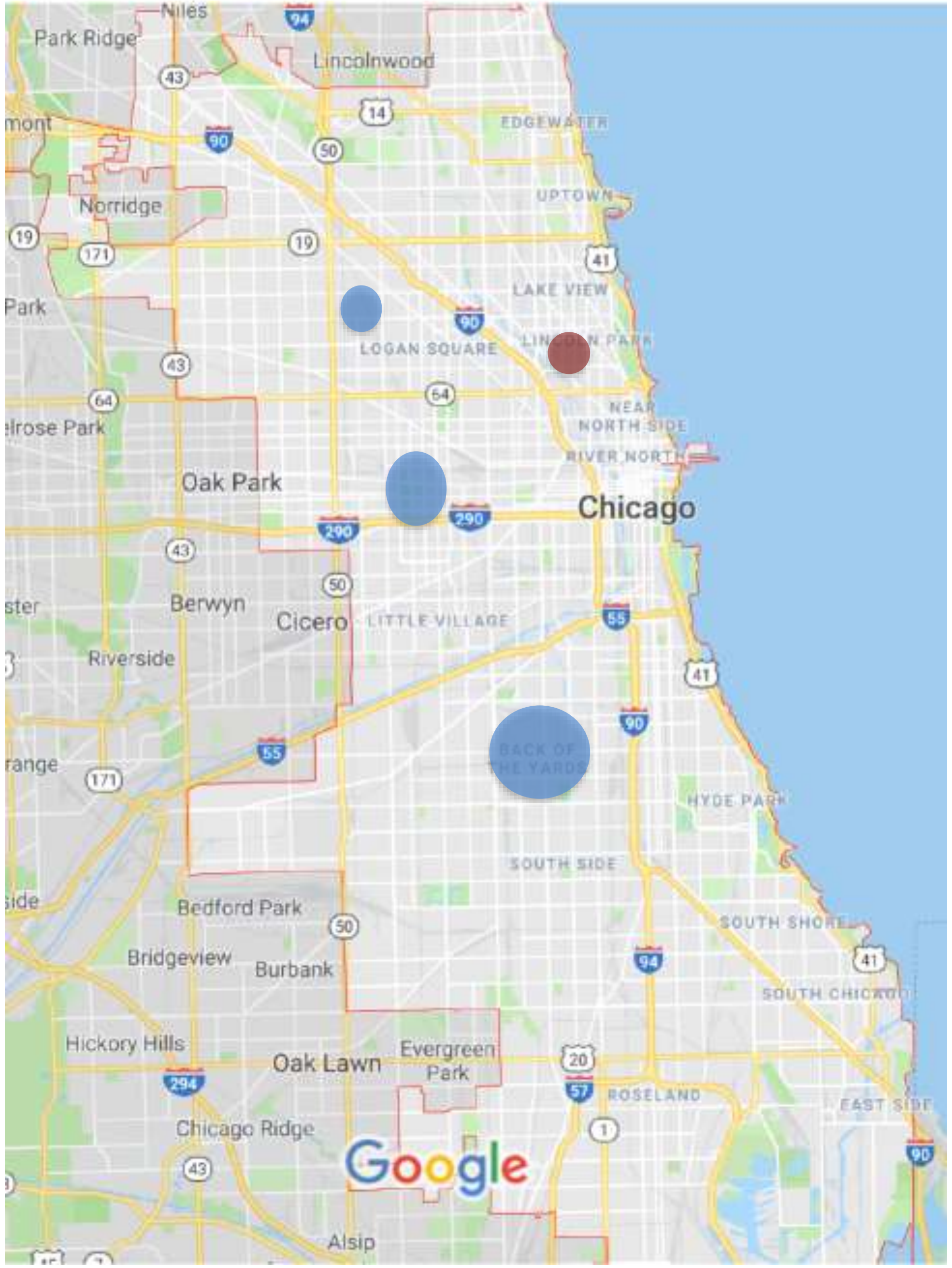

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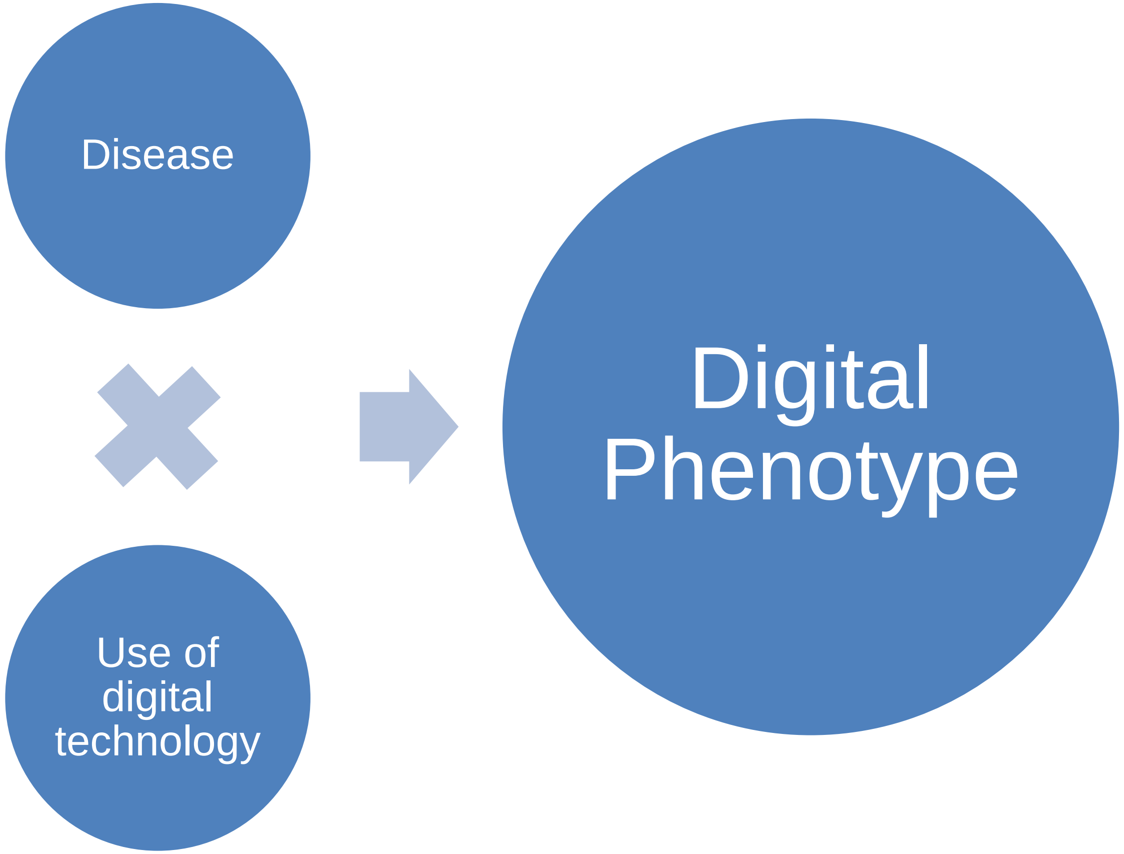
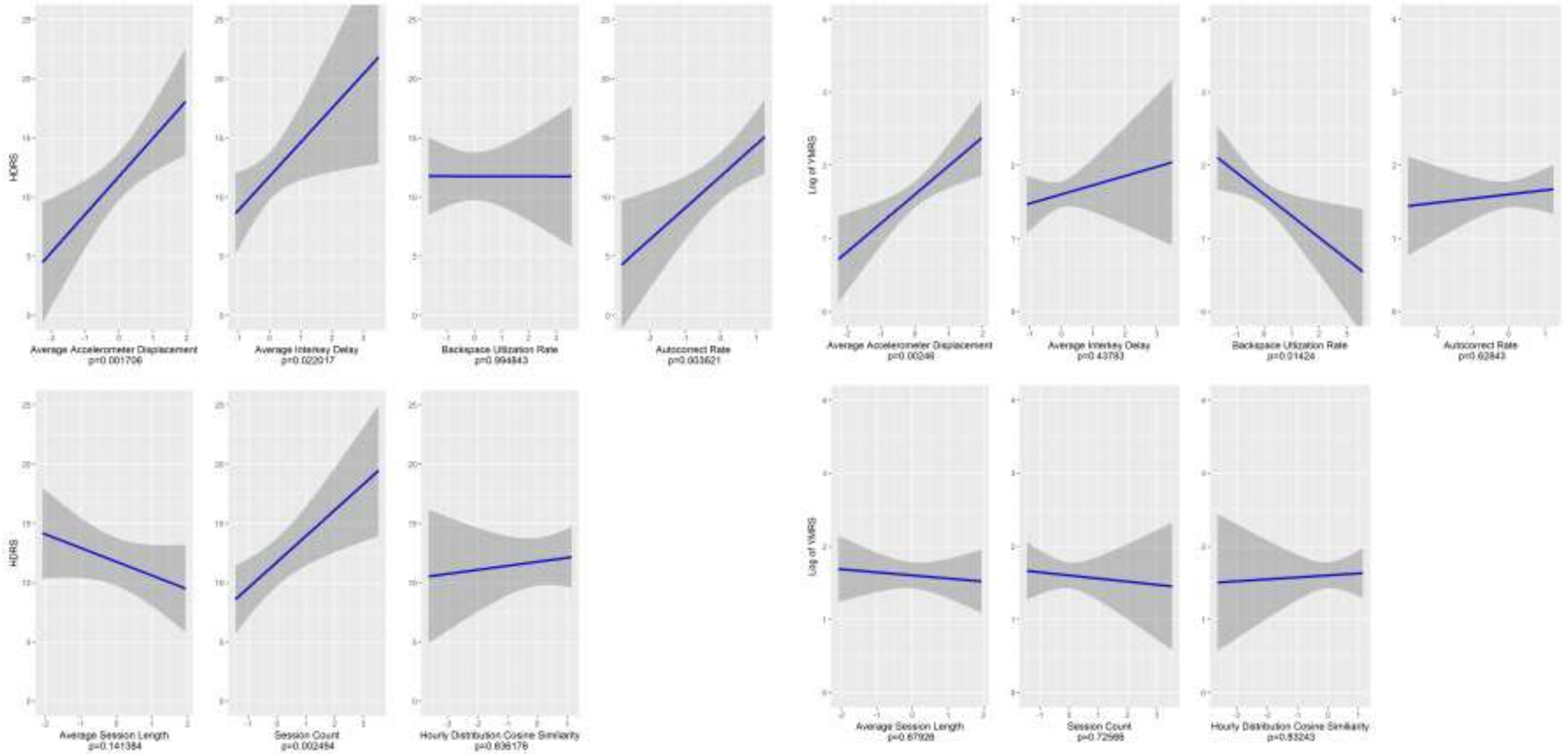
DIGITAL PHENOTYPE



Jain, S. H., Powers, B. W., Hawkins, J. B., & Brownstein, J. S. (2015). The digital phenotype. *Nature Biotechnology*, *33*(5), 462–463. https://doi.org/10.1038/nbt.3223

63% of the variance in depressive symptoms and 34% of the variance in mania symptoms is explained by our models



Zulueta, J., Piscitello, A., Rasic, M., Easter, R., Babu, P., Langenecker, S. A., … Leow, A. (2018). Predicting Mood Disturbance Severity with Mobile Phone Keystroke Metadata: A BiAffect Digital Phenotyping Study. *Journal of Medical Internet Research*, *20*(7), e241. https://doi.org/10.2196/jmir.9775

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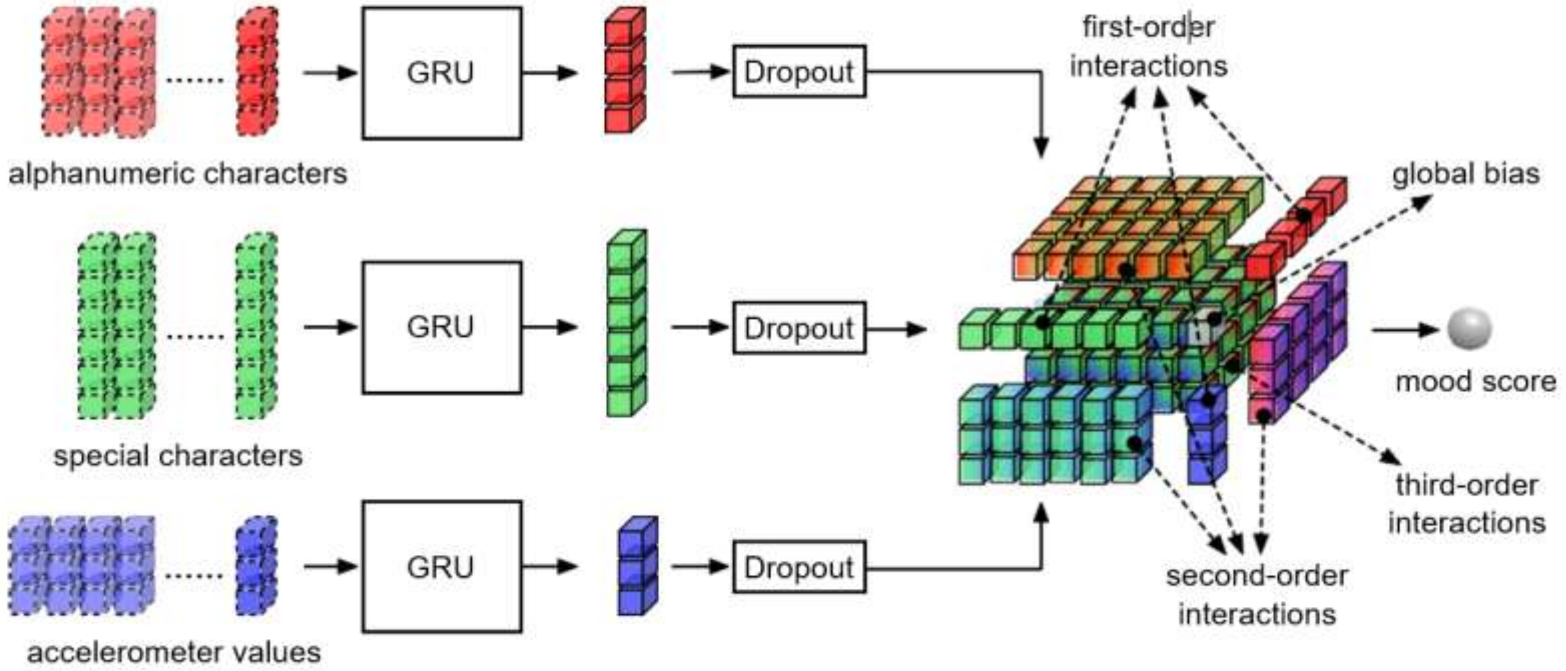
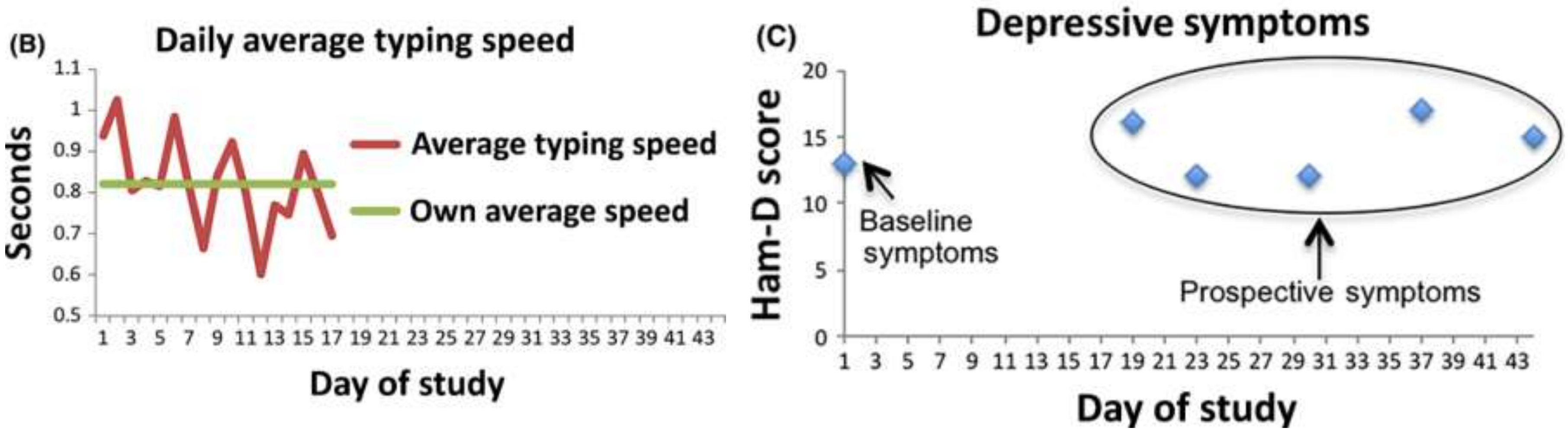


Cao B, Zheng L, Zhang C, Yu PS, Piscitello A, Zulueta J, Ajilore O, Ryan K, Leow AD. DeepMood: Modeling Mobile Phone Typing Dynamics for Mood Detection. Proc 23rd ACM SIGKDD Int Conf Knowl Discov Data Min - KDD ’17 [Internet]. 2017;(August):747–755.

Instability of daily typing metrics is 70% correlated with future depressive symptoms



Stange, J. P., Zulueta, J., Langenecker, S. A., Ryan, K. A., Piscitello, A., Duffecy, J., … Leow, A. (2018). Let your fingers do the talking: Passive typing instability predicts future mood outcomes. *Bipolar Disorders*. https://doi.org/10.1111/bdi.12637

LAST TALK

HIJJAWI

ALPER