2022

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Sept. 19–21, 2022

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MU Health Care

HEART
Stanford Healthcare AI Applied Research Team

Assessing and Implementing AI and Machine Learning to Optimize Care

Panelists

Kory Anderson, MD, CHCQM-PHYADV, FACP
Medical Director, Physician Advisor Services, CDI & Quality, Intermountain Healthcare, South Weber, UT
Kearstin Jorgenson, MSM, CPC, COC
Operations Director, Intermountain Physician Advisor Service and CDI, Intermountain Healthcare, Bountiful, UT
Sathya Vijayakumar, MS, MBA
Sr. Clinical Operations Manager, Intermountain Healthcare, Salt Lake City, UT

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Olubusayo Famutimi, MBBS, MPH
Sr. Healthcare Analytics Consultant, University of Missouri Healthcare, Columbia, MO

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Margaret Smith, MBA
Director of Operations, Stanford Healthcare AI Applied Research Team, Stanford Health Care
Amelia Sattler, MD
Physician and Associate Medical Director of Stanford Healthcare AI Applied Research Team
Stanford Family Medicine-Hoover, Palo Alto, CA

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Learning Objectives

- Discuss the use of AI-based tools to sustain expected mortality and patient safety indicator improvement efforts.
- Compare and contrast approaches using traditional research versus quality improvement methodology for the co-development and translation of AI/ML technologies in health care.
- Identify how AI can be leveraged for risk stratification of hospitalized COVID-19 patients.

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Transforming Ideas into Innovations: Bringing Health AI from Code to Bedside

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Stanford Healthcare AI Applied Research Team

Mission

To bring leading edge AI technologies from “code to bedside” in support of the Quintuple Aim

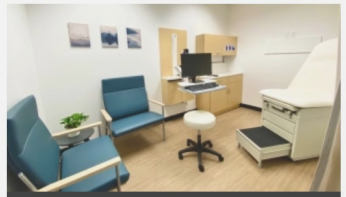
Vision

To be a national leader in the study and implementation of AI technologies to solve specific, practical problems in healthcare

Website

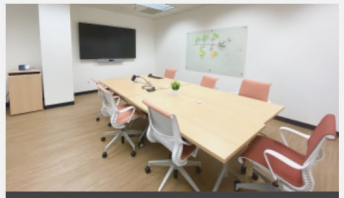
Scan Me
To visit our website

Simulation Lab in Redwood City


Mock clinic exam room

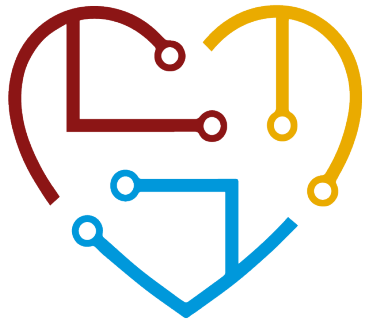

Open collaboration space


Open lounge area


Simulation debrief room

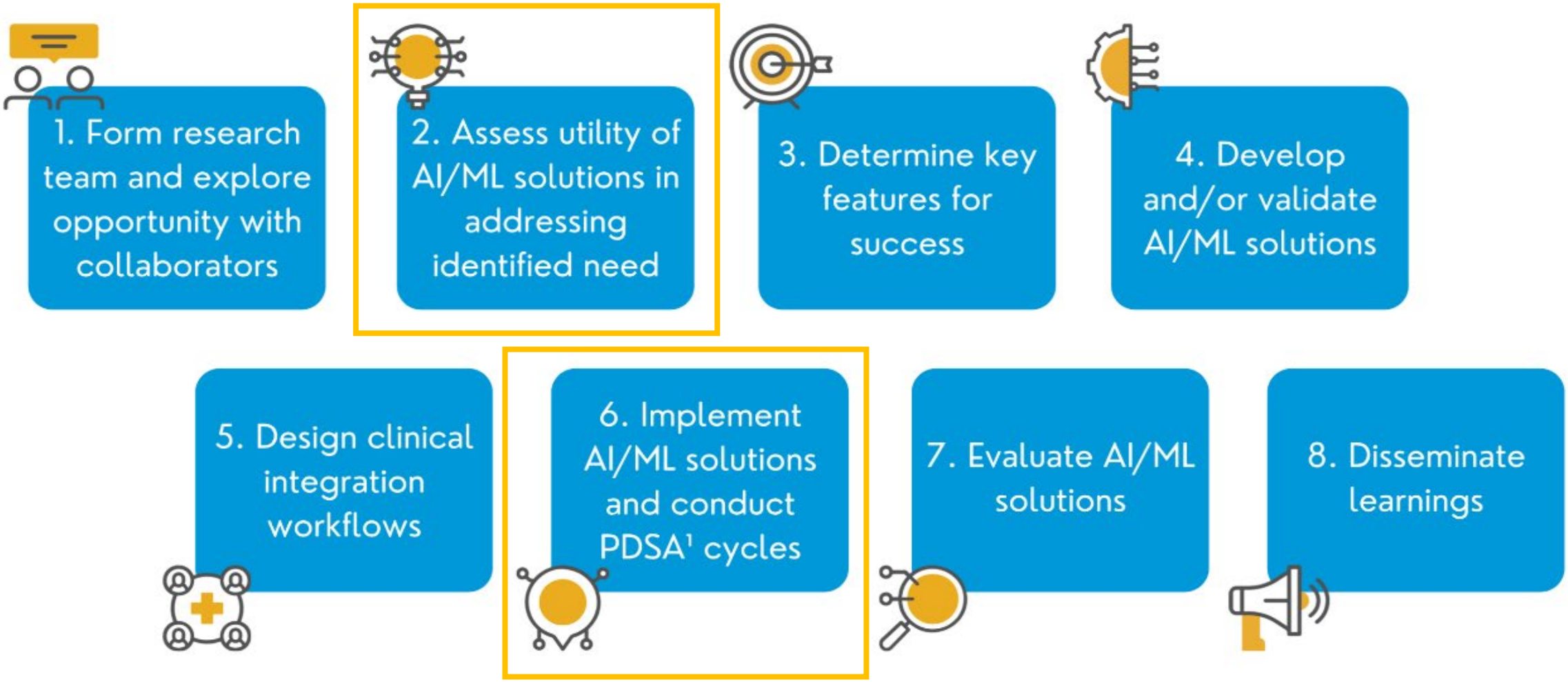
Our Team

Our Projects



Improving Clinical Diagnosis	AI-enabled Dermatology in Primary Care	Early Detection of Autoimmune Disease	Behavioral Health Screening with Computer Vision		
Improving Population Health	AI-enabled Remote Patient Monitoring	At Home Devices for Hypertension & Heart Failure	AI-enabled Stress Sensing		
Optimizing Outpatient Care	Predicting ED Visits and Hospitalizations	Digital Care Assistants	Automating In-Basket Management for Providers		
Optimizing Inpatient Care	Predicting Clinical Deterioration in the Inpatient Setting	Risk of Mortality as a Proxy for Advance Care Planning			
Voice Enabled Applications	Automating Clinical Documentation	Patient Facing Voice Assistants	AI-enabled Patient Interviewing		
Health Policy, Education and Equity	National Academy of Medicine	American Academy of Family Physicians	American Board of Family Medicine	Society of Teachers of Family Medicine	American Board of Artificial Intelligence in Medicine

Lessons Learned: The HEA$_3$RT Method



[1] Plan-Do-Study-Act

Merging QI and Research Methods: Project Example

1. Form research team and explore opportunity with collaborators
2. Assess utility of AI/ML solutions in addressing identified need
3. Determine key features for success
4. Develop and/or validate AI/ML solutions

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5. Design clinical integration workflows
6. Implement AI/ML solutions and conduct PDSA[1] cycles
7. Evaluate AI/ML solutions
8. Disseminate learnings

AI-Enabled
Advance Care Planning

[1] Plan-Do-Study-Act

Key Takeaways

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- Collaborate with stakeholders to gain a comprehensive understanding of the problem and workflow BEFORE investing in solutions
- Clearly establish the utility and feasibility of AI/ML solutions to solve the problem
- Engage relevant care team members in designing clinical workflows and conducting PDSA cycles to refine implementation

Questions?

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Health Care

An Artificial Intelligence Model to Predict Risk of Mortality in Patients Hospitalized with COVID-19

Olubusayo Daniel Famutimi MBBS, MPH

Sr. Healthcare Analytics Consultant

University of Missouri Healthcare, Columbia, MO

Rationale

- The COVID-19 pandemic has put critical care capacity under the spotlight like never before, hospitals around the world have long faced challenges with bed and staffing shortages to meet demand for acute care.
- It's a highly complex and dynamic orchestration challenge, with many moving parts. Which patient waiting in the ED should get the next ICU bed? Which patient in the ICU can I safely move to a step-down unit to free up a bed?
- The real challenge is often one of patient flow: anticipating and knowing when to transition a patient from one care setting to the next.
- Existing risk scores (NEWS, mSOFA, APACHE) are not built for COVID-19, they exist as track-and-trigger alert systems for impending clinical decline.

NEWS – National Early Warning Score
APACHE – Acute Physiology and Chronic Health Evaluation
mSOFA – modified Sequential Organ Failure Assessment

Intervention

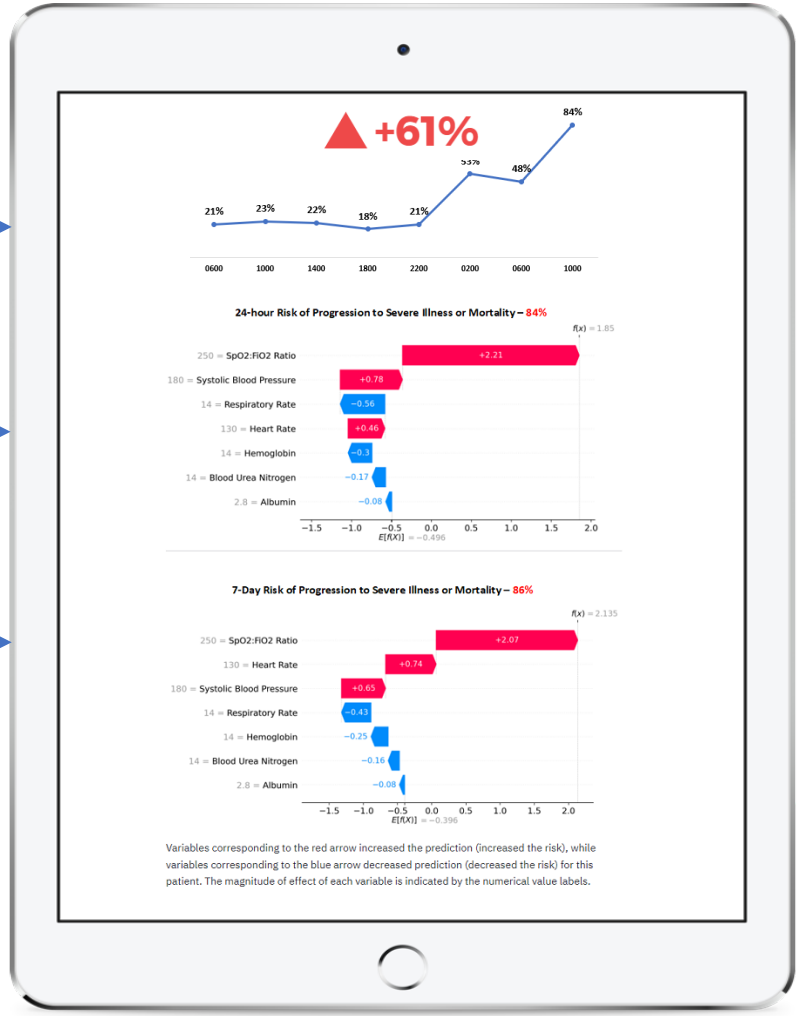
- We designed and developed a named model; COVID-19 Personalized Risk Intelligence System for Mortality (**COVID-PRISM**) available as a web application at https://covidprism.com/model/
- Explainable, interpretable and adaptive artificial intelligence-based prognostic model
- Predict 24-hour and 7-day risk of progression to severe disease or mortality in patients hospitalized with COVID-19.
- Variables: Time-varying Vital sign and laboratory variables obtained from electronic health records
- AUROC - 0.974, Sensitivity – 90%, Specificity – 93%

Leveraging AI for Risk estimation

Risk Trend Line
Risk trend line shows how risk has changed over time.

Risk estimation
Shows probability risk estimates

Explainable
Shows the relative impact of each variable on prediction



Impact/Lessons Learned

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- Improved ICU capacity planning
- Efficient Resource Allocation
- Improved Patient Flow
- Support Clinical Decision (Clinician-Directed Nudges vs. Alerts)

Key Takeaways

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- The COVID-19 crisis has exposed and exacerbated many unforeseen bottlenecks in healthcare.
- It has also given rise to smart ways of tackling them.
- Using the power of AI and predictive modelling, we can extract relevant patterns and insights in the vast amount of readily available clinical data in EHR to predict clinical events and optimize patient care

Questions?

Health Care

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Alphabet Soup: AI to improve Mortality and PSI O:E

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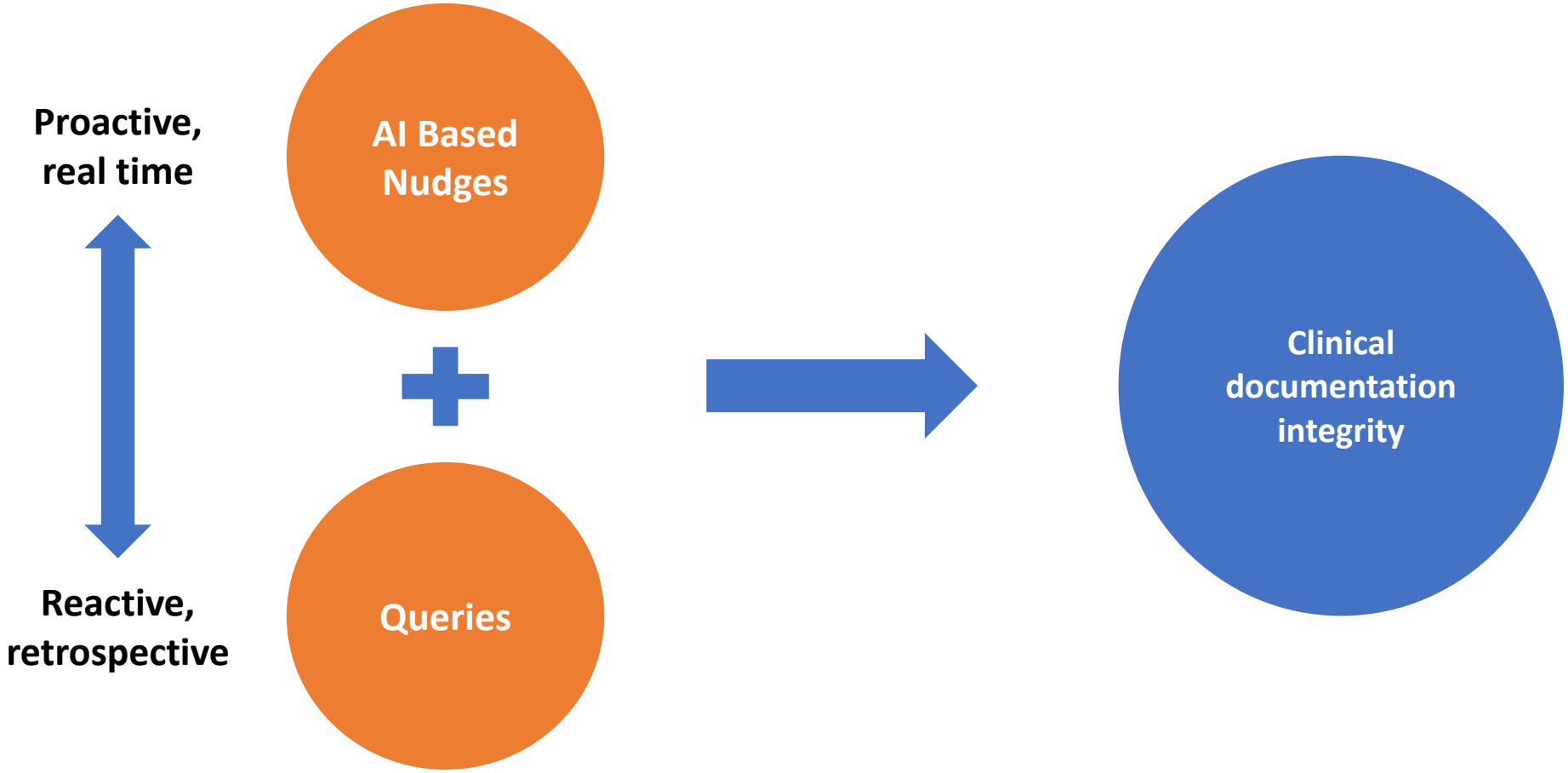
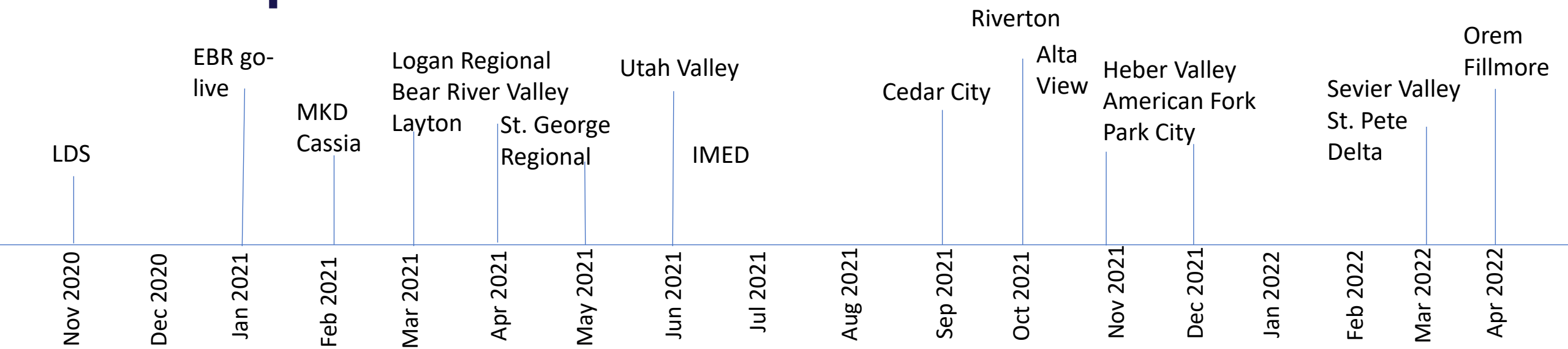
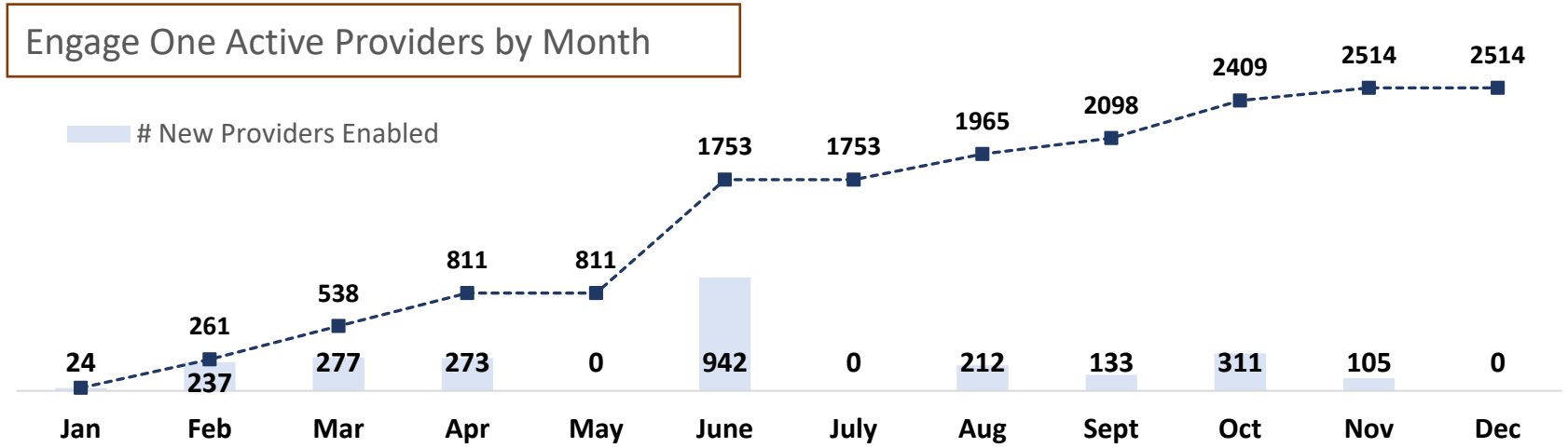
Office of Patient Experience, Intermountain Healthcare

Introduction – Wholistic Approach to CDI



Our Implementation Timeline





Results (July 2021 – Feb 2022)

Nudge Concept	Clinical Documentation	Specified Final Code	Final Code Set Impact			Quality	
	Total Resolved Nudges	Nudges with Specified Codes	Resolved Nudges Impact: MS DRG, APR DRG, or Both	DRG Impact [PDx, CC, and/or MCC]	APR Impact [+SOI and/or ROM]	Potential HCC Impact	+ Elixhauser Impact
Heart Failure	1291	1222	247	163	100		9
Diabetes Mellitus	1273	1136	12	8	6		39
Atrial Fibrillation	831	719	25	11	16	2	
Encephalopathy	626	455	70	69	2	3	
Respiratory Failure	477	361	1		1		
Low BP and Pressor	456	360	31	11	22	159	1
Acute Kidney Disease - Cause	450	235	3	3	1	1	
Kidney Disease	391	342	11	7	5	297	20
Malnutrition - Severity	383	298	54	46	11		4
Metastatic Disease	186	141					18
Staph. Infection	53	27					
Heart Failure - Etiology	50	41	9	8	1		
COPD	35	16					
Debridement - Depth/Level	27	7					
Leak	8						
Brain Hemorrhage	6	3					
Low Potassium	2	1					
Low Sodium	2	2					
Shock	1	1	1		1		
Diabetes - Neuropathic Agents	1						
Grand Total	6549	5367	464	326	166	462	91

Lessons Learned

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- Set up a test group of physicians who are willing to try your decision support tool early on
- It helps to phase out your implementation - so you can improve on the algorithm as you learn from early experience
- Get leadership buy-in for the program to succeed
- Standardize your trainings and rollout methodology to make it easy to scale and track

Key Takeaways

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- Align strategic direction
- Get leadership support
- Determine division specific conditions
- Standard rollout process across all facilities

Questions?

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Panel Discussion

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