EMERGENCY CARE REDESIGN: THE DIGITAL NEXT STEP

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Gníomhaireacht Bainistíochta an Chisteáin Náisiúnta
National Treasury Management Agency

National Quality, Clinical Risk and Safety Conference
September 29, 2017

uchealth

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Conflicts and Disclosures

- My opinions are my own and do not represent the University of Colorado, the Board of Regents of the University of Colorado or the State of Colorado
- Department and System Equity and Revenue Positions
  - Burst IQ
  - Scribe America
  - RxRevue
  - AgileMD
  - LeanTaas
  - Knowledge Factor

The Digital Next Step

- An abbreviated case study
- Using data to inform process and improve quality
- digital solutions for 3 problems

UCH ED Case Study

University of Colorado Hospital

- Only academic medical center in the region
- 639 beds
- 48,909 annual admissions
- 1,000,522 outpatient encounters
- 101,374 ED visits annually

- Over 6,000 staff and faculty
- Magnet status for 10 years
- 2011 and 2012 UHC Quality Award winner
- #1 hospital in Denver – *US News & World Report*
- *#15 – US News & World Report*

University of Colorado Health

- $3.2 billion in revenue
- 10 hospitals
- 2,220 hospital beds
- 21 freestanding ED
  - 31 total
- 9 Urgent Care Centers
- 113,315 admissions and OBS visits
- 11,512 babies delivered
- 66,111 surgeries
- 550,000 emergency visits
- 1.6 million unique patient lives

Go Back to 2013

- Capacity constraints
- Patient and provider dissatisfaction
- Damaged relations with EMS & provider community
- Move to new facility

….in 8 months

KOTTER'S EIGHT STEP MODEL

Approaches to Managing Organizational Change

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Guiding Principles

- Patient Centered
- Data Driven
- Central Discipline
- Local Control

SOUTHWEST AIRLINES

“We have a strategic plan.
It’s called doing things.”

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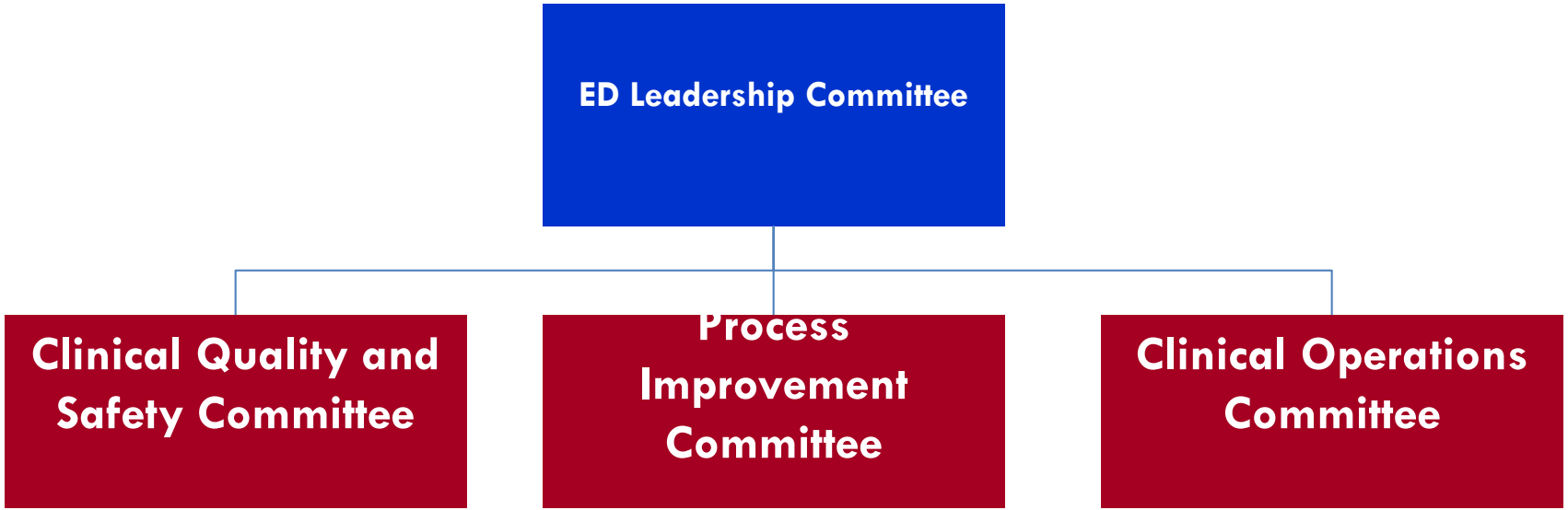
Setting the Vision

- Focus on the wildly important
- ***Challenge everything*** … *But f*ocus on the wildly important
- Speak with 1 voice

ED Clinical Leadership Overview



INCREASING

Quality
Patient Satisfaction
Staff/Faculty Satisfaction
Patient Throughput/Flow
Hours per Patient Visit
Efficiency & Productivity

WHILE…

TO REMAIN

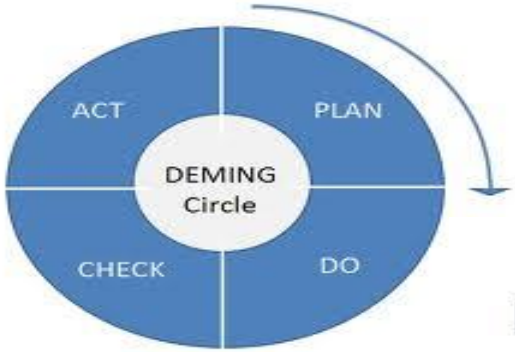
Budget Neutral

DECREASING

Staff Cost
Waste – Non Value Add
Variability & Errors
Sentinel Events
Patient Wait Time
Hunting & Gathering
Door to Provider Time

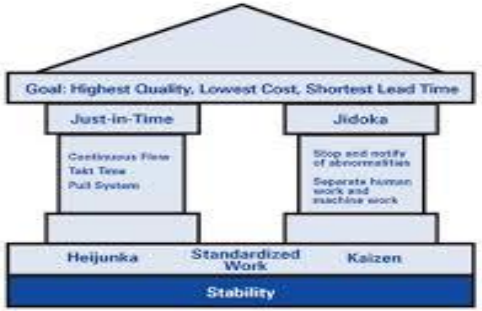
Process Improvement Methodologies

Six Sigma



LEAN SIX-SIGMA

TQM
Total Quality Management



Toyota Production System "House."

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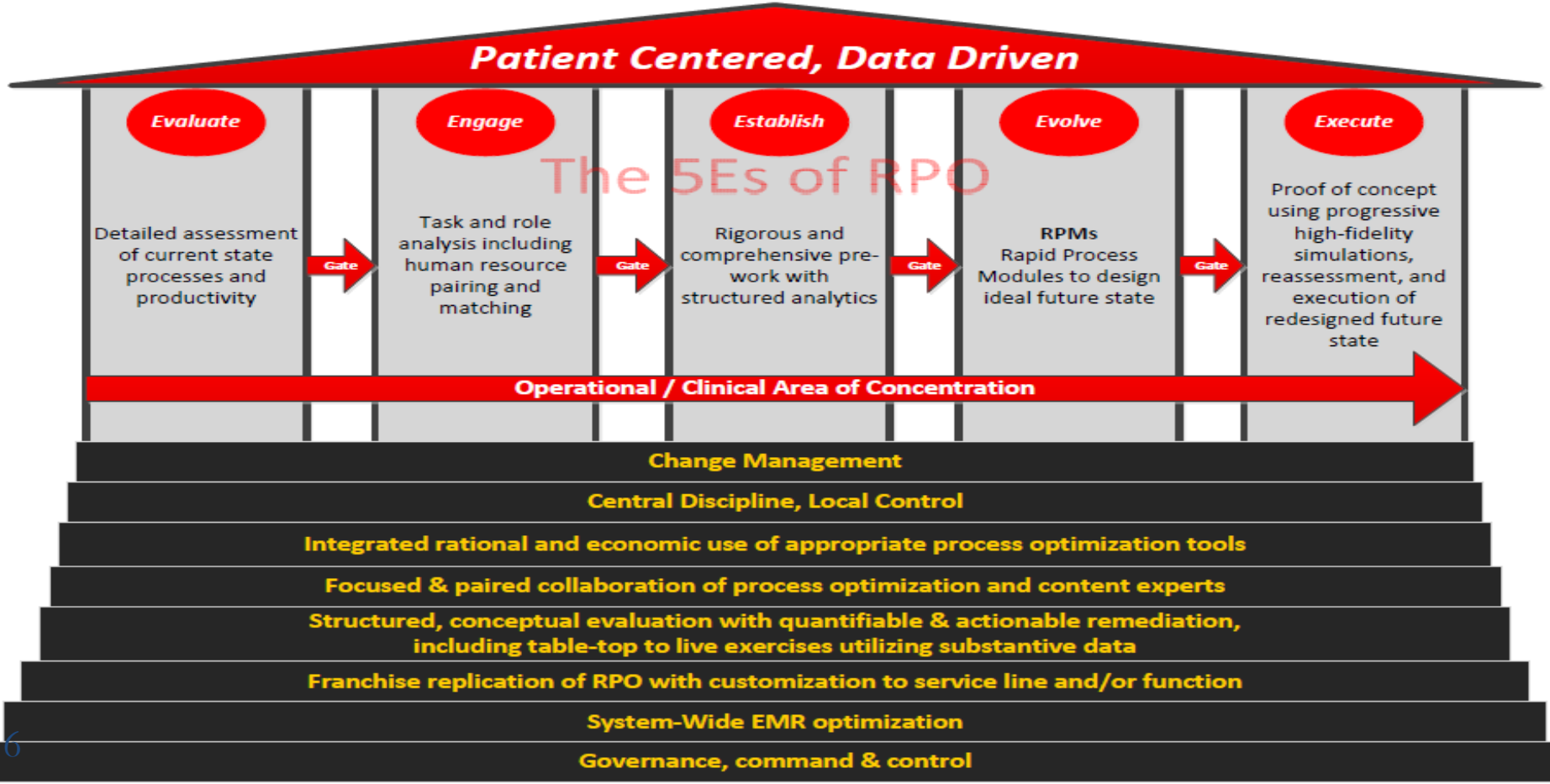
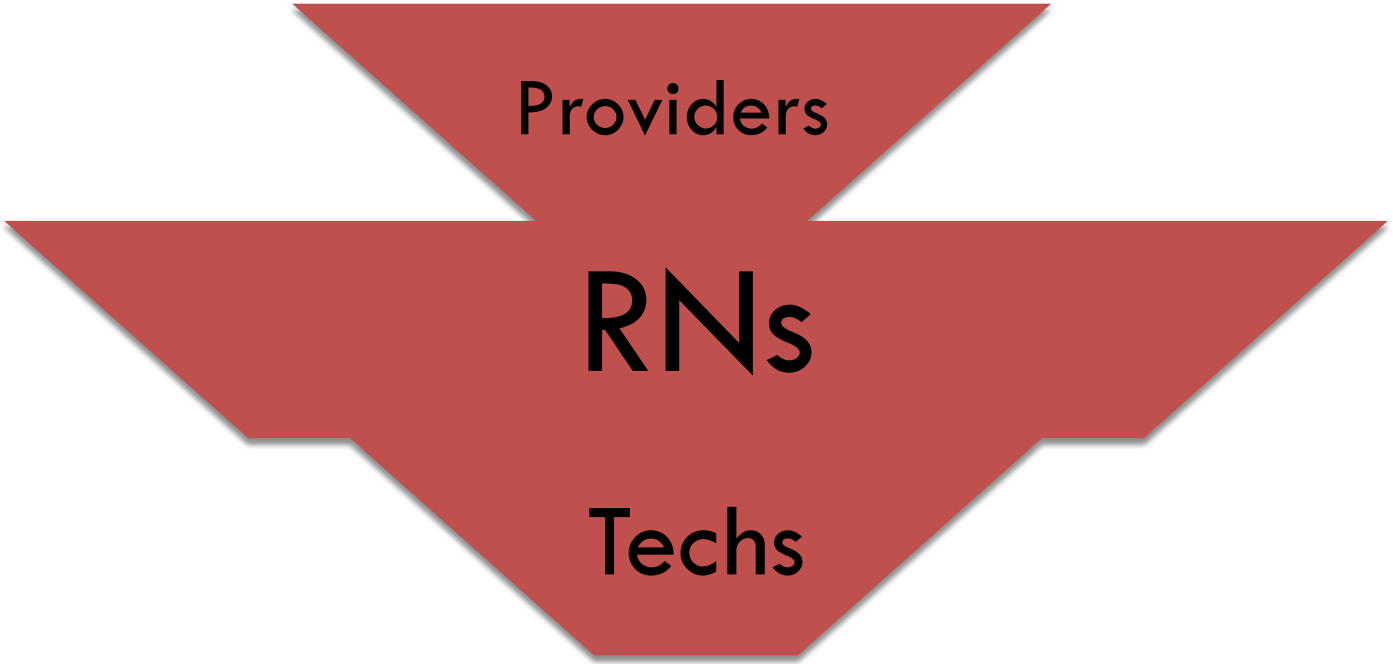
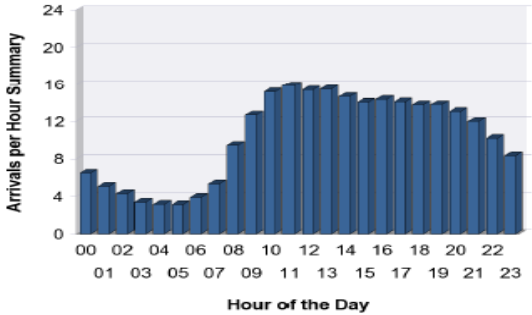
Rapid Process Optimization (RPO) Methodology



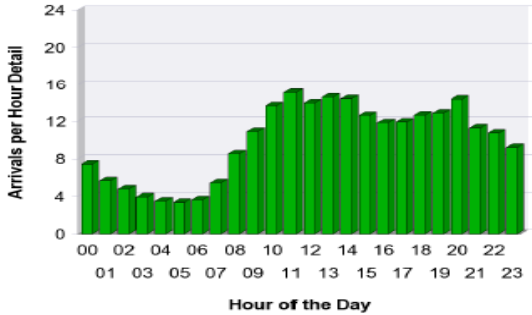
Current State – Employee Mix



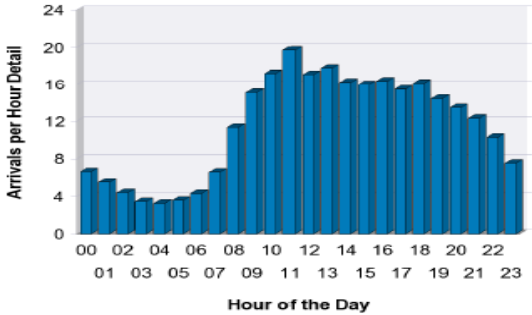
Arrivals by Hour between 4/7/13 and 9/30/13



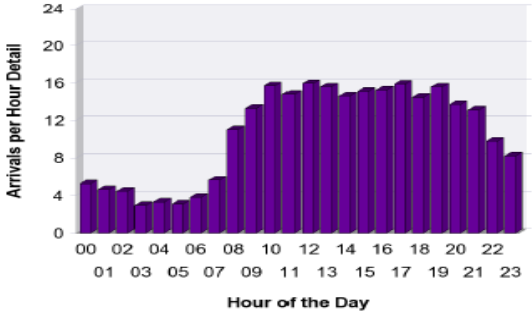
Arrivals by Hour between 4/7/13 and 9/30/13 - Sundays Only



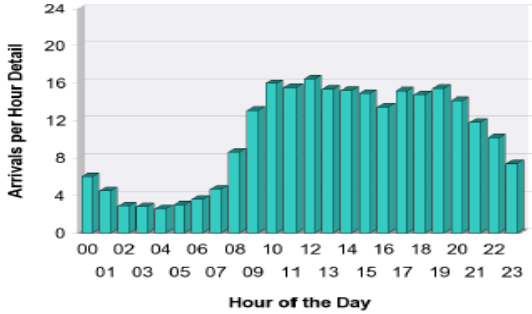
Arrivals by Hour between 4/7/13 and 9/30/13 - Mondays Only



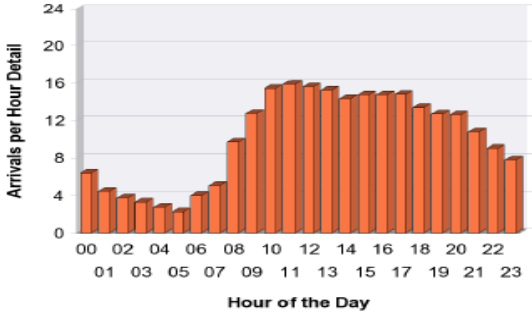
Arrivals by Hour between 4/7/13 and 9/30/13 - Tuesdays Only



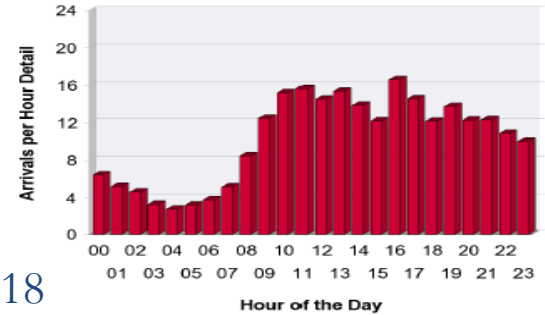
Arrivals by Hour between 4/7/13 and 9/30/13 - Wednesdays Only



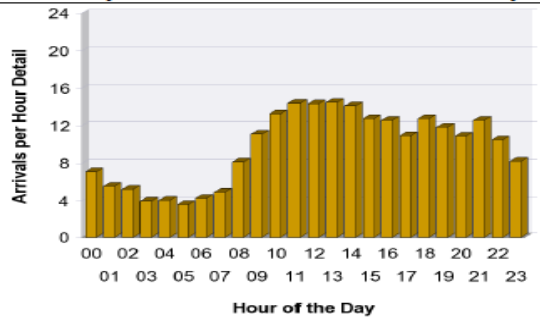
Arrivals by Hour between 4/7/13 and 9/30/13 - Thursdays Only



Arrivals by Hour between 4/7/13 and 9/30/13 - Fridays Only



Arrivals by Hour between 4/7/13 and 9/30/13 - Saturdays Only



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Current vs. Future: Standards of Work

ROLE	ACTIVITY	Future % of Role	
MD	Patient Care	up	
	Waiting time (lab)	down	POCT
	Waiting time (pt not ready)	down	Transfer to tech
	Looking for unstocked items	down	Transfer to CS
	Waste Time	unchanged	
	Charting	unchanged	
RN	Patient Care	**up**	
	Drawing blood/starting IV	down	Transfer to tech
	Stocking	down	Transfer to CS
	Transport	down	Transfer to Transport
	Cleaning Room	down	Transfer to EVS
	Waste Time	unchanged	
	Charting	unchanged	
Pod Tech	Patient Care	**up**	
	Stocking	down	Transfer to CS
	Transport	down	Transfer to Transport
	Cleaning Room	down	Transfer to EVS
	Waste Time	unchanged	

Evidence Based Approach

THE PRACTICE OF EMERGENCY MEDICINE/CONCEPTS

Optimizing Emergency Department Front-End Operations

Jennifer L. Wiler, MD, MBA
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Alan Heins, MD
Abhi Mehrotra, MD
Michael G. Mikhail, MD
Diana Fite, MD

From the Division of Emergency Medicine, Washington University in St. Louis School of Medicine, St Louis, MO (Wiler); the Department of Emergency Medicine, Christiana Care Health Services, Newark, DE (Gentle); Forrest Hills Hospital, Forrest Hills, NY (Halfpenny); the Department of Emergency Medicine, University of South Alabama College of Medicine and Medical Center, Mobile, AL (Heins); the Department of Emergency Medicine, University of North Carolina, Chapel Hill, NC (Mehrotra); the Department of Emergency Medicine, St. Joseph Mercy Hospital, Ann Arbor, MI (Mikhail); and the Department of Emergency Medicine, University of Texas Medical School at Houston, Houston, TX (Fite).

As administrators evaluate potential approaches to improve cost, quality, and throughput efficiencies in the emergency department (ED), "front-end" operations become an important area of focus. Interventions such as immediate bedding, bedside registration, advanced triage (triage-based care) protocols, physician/practitioner at triage, dedicated "fast track" service line, tracking systems and whiteboards, wireless communication devices, kiosk self check-in, and personal health record technology ("smart cards") have been offered as potential solutions to streamline the front-end processing of ED patients, which becomes crucial during periods of full capacity, crowding, and surges. Although each of these operational improvement strategies has been described in the lay literature, various reports exist in the academic literature about their effect on front-end operations. In this report, we present a review of the current body of academic literature, with the goal of identifying select high-impact front-end operational improvement solutions. [Ann Emerg Med. 2010;55:142-160.]

0196-0644/$-see front matter
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doi:10.1016/j.annemergmed.2009.05.021

INTRODUCTION

Emergency Department Crowding and the Need for Operational Improvement Strategies

For nearly 2 decades, emergency department (ED) crowding has been recognized as a growing problem. From 1995 through

has emphasized the need for smoothing ED patient flow and, in January 2005, implemented a new leadership standard, managing patient flow, which mandates that hospitals ". . .develop and implement plans to identify and mitigate impediments to efficient patient flow throughout the

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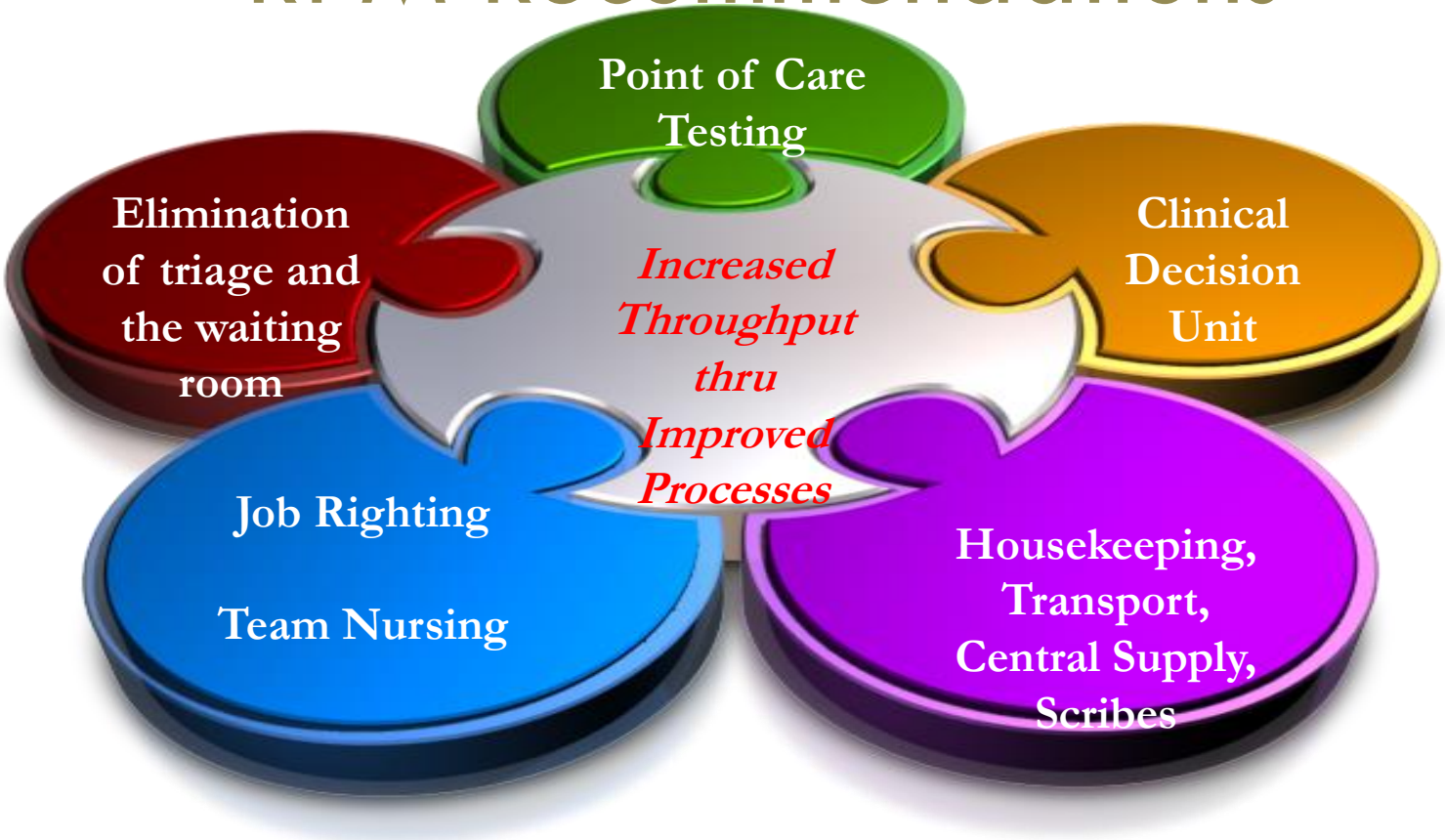
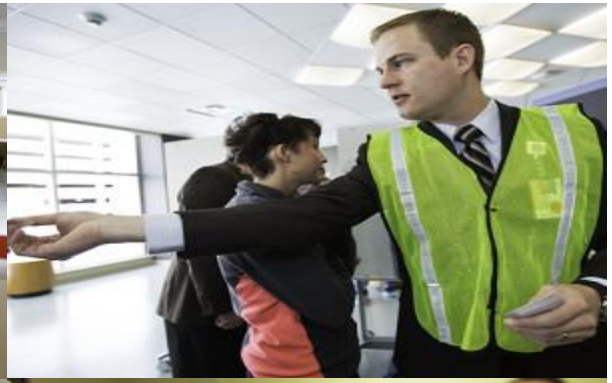
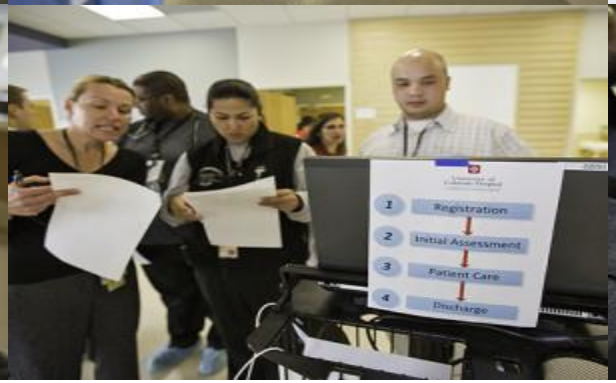
RPM Recommendations



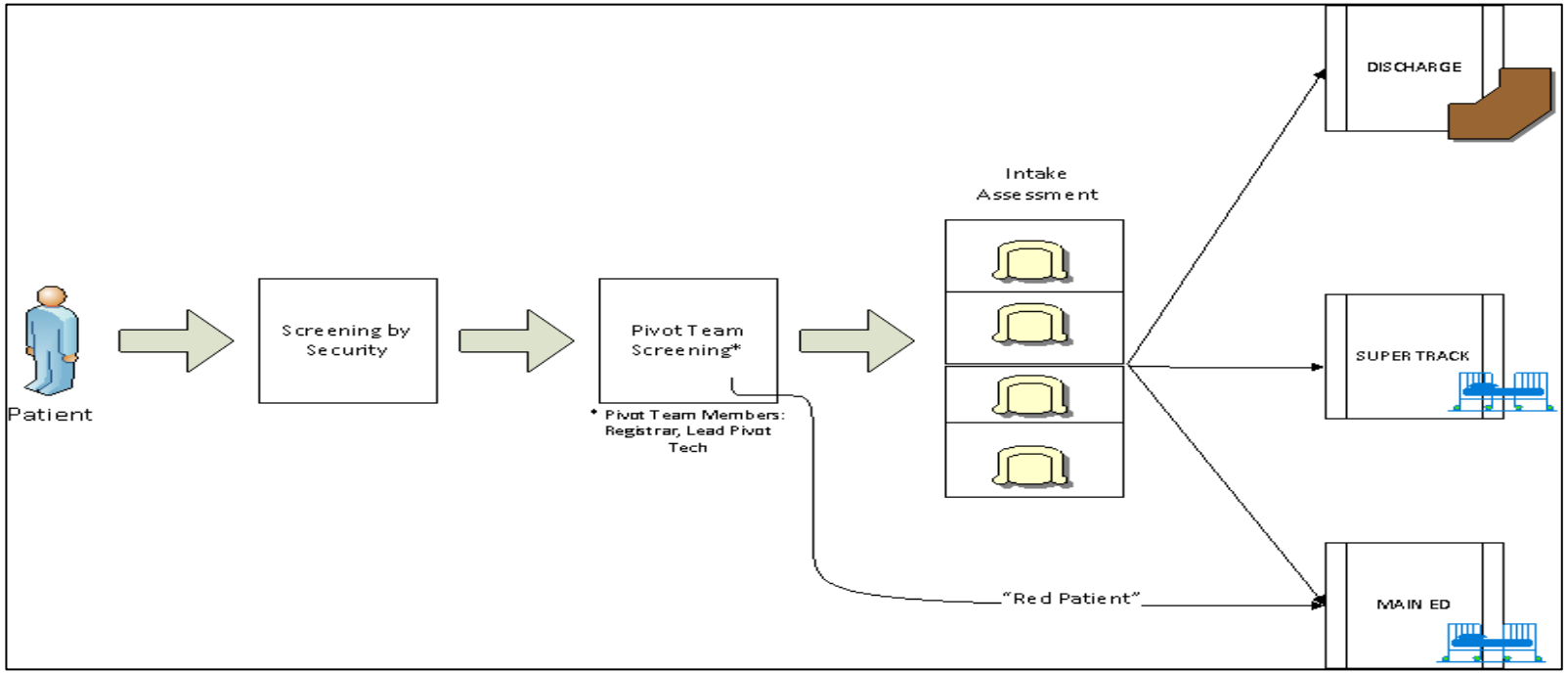
High Fidelity Testing





Implement

ED Patient Flow



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Standard Work: Pivot Lead Tech

Owners	Approved By:	Revision Date
ED Charge Nurses ED Techs	April Koehler, RN Rob Leeret, RN Kelly Bookman	10/4/13

Purpose	Define the role of a Pivot Lead Tech Goals: Decrease LOS, decrease door to provider, no WR, direct rooming of high acuity patients.	
Scope	Presentation to front entrance of the Emergency Department through placement in patient exam room or Intake room	
Definitions	Open bed	Any staffed bed in department
	Pivot Lead Tech	Minimum requirement: ED Tech with minimum 3 months experience in ED setting combined with completion of Pivot Lead Training Class
	Front End Tech	See requirements for an ED Tech; Roles divided into Vitals Tech and Runner Tech. Responsible for placing patient in Intake Room and/or transporting patient to exam room in Main ED
	Pivot CTA	See requirements for CTA
	Intake Room	Chief complaint and assessment done by Intake MD. Initial vital signs done by front end vitals tech
	Red Patient	High acuity patient…..

Intake/Front End Best Practices

- Male exposure to STD
- URI symptoms
- Rash
- Extremity pain after minor trauma
- Back pain w/o neuro deficits
- Dental pain
- Medication refills without symptoms
- Chronic pain
- Low mechanism MVC
- Conjunctivitis with no concern for corneal abrasion
- Classic UTI symptoms in otherwise healthy young female
- Mild cellulitis
- Insect bite
- Mild allergic reaction
- Wound check
- Suture removal
- Mild anxiety
- Numbness/tingling with normal neuro exam
- Neck pain
- Epigastric pain classic for gastritis

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Abdominal CT Pathway

What is the likely diagnosis or presentation?

Appendicitis

Alvarado Score

Symptoms	
Migratory right iliac fossa pain	1
Nausea / Vomiting	1
Anorexia	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory Findings	
Leukocytosis	2
Shift to the left of neutrophils	1

5-6	Possible
7-8	Probable
>/=9	Very probable

Reference: Am J Emerg Med. 2007 Jun;25(5):489-93

Alvarado Score >/= 7 and patient male with BMI <35?

- NO → Is patient a NON PREGNANT female with pelvic pain > abdominal pain?
  - NO → Obtain Abd/Pelvic CT with IV contrast only
  - YES → Perform pelvic exam and obtain pelvic US
    - Does pelvic US explain symptoms?
      - NO → Obtain Abd/Pelvic CT with IV contrast only
- YES → Consult General Surgery to evaluate **prior** to CT

Renal Stone

Patient with NO prior history of stone or new concern for high grade obstruction or abscess (consider renal US to look for hydronephrosis first)

Obtain CT KUB
(No IV or PO contrast)

Small Bowel Obstruction

High likelihood of Small Bowel Obstruction?

- YES → Obtain 3-way abd X-ray
  - (+) Small Bowel Obstruction?
    - NO → Obtain Abd/Pelvic CT with PO and IV contrast
      - 2 hour oral contrast prep
    - YES → (+) Small Bowel Obstruction?
      - YES → Consider NGT; Admit to General Surgery; Obtain Abd/Pelvic CT with PO and IV contrast as inpatient
- NO → Obtain Abd/Pelvic CT with PO and IV contrast
  - 2 hour oral contrast prep

Intractable Nausea / Vomiting

(Meds already maximized)
Example:

- Pancreatitis: Lipase <1000 (if Lipase >1000 admit, CT as inpatient)
- Other pathology

Consider NGT to decompress bowel and administer PO contrast

Obtain Abd/Pelvic CT with PO and IV contrast

- 1 hour oral contrast prep

Dispo per diagnosis on CT

History or Concern for Complex Abdominal Pathology

Examples:

- Recent surgery
- History of abscess, drains
- Fistula
- Diverticulitis (if imaging required)
- Crohn's (f imaging required)

Obtain Abd/Pelvic CT with PO and IV contrast

- 2 hour oral contrast prep

Consult Radiology to determine optimal imaging protocol

General Surgery Approved R McIntyre MD, 1/2013
Radiology Approved ED Radiology Committee 1/2013
EDCQI Committee Approved 1/22/2013

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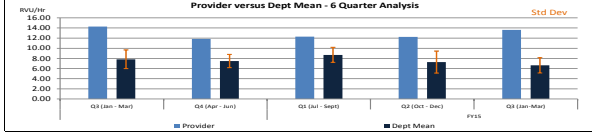
DR. RICHARD D ZANE

Provider Dashboard, Updated Through December 2015

RVU per Hour Worked

Provider versus Dept Mean - 6 Quarter Analysis

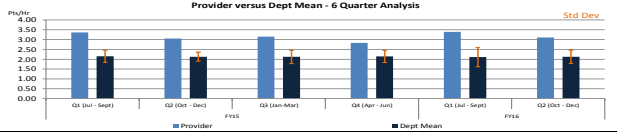


	Provider	Dept Mean	Standard Deviation vs. Department Mean
FY16 Q1+Q2	13.00	7.01	*
FY15 Q3+Q4	12.09	7.82	3.52

* no previous data

Patients per Hour Worked - Main Department

Provider versus Dept Mean - 6 Quarter Analysis

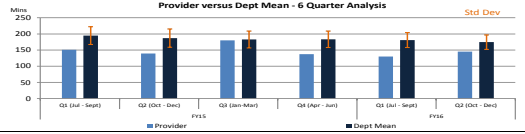


	Provider	Dept Mean	Standard Deviation vs. Department Mean
FY16 Q1+Q2	3.25	2.11	4.29
FY15 Q3+Q4	3.02	2.13	3.03

* no previous data

Overall Length of Stay - Main Department

Provider versus Dept Mean - 6 Quarter Analysis

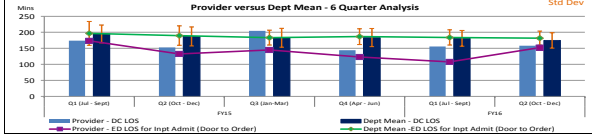


	Provider	Dept Mean	Standard Deviation vs. Department Mean
FY16 Q1+Q2	137	181	2.29
FY15 Q3+Q4	164	183	1.19

* no previous data

Discharge Length of Stay and ED LOS for Inpt Admit (Door to Order) Main Department

Provider versus Dept Mean - 6 Quarter Analysis

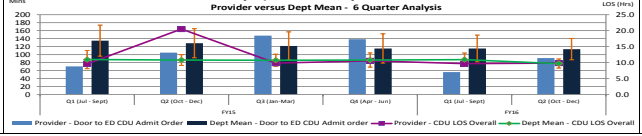


	Provider	Dept Mean	Standard Deviation vs. Department Mean
FY16 Q1+Q2 ED LOS - Discharge Pts	157	195	1.74
FY15 Q3+Q4 ED LOS - Discharge Pts	183	200	0.88
FY16 Q1+Q2 ED LOS for Inpt Admit (Door to Order)	129	183	2.84
FY15 Q3+Q4 ED LOS for Inpt Admit (Door to Order)	137	185	4.42

* no previous data

Door to ED CDU Admit Order and CDU LOS Overall (Admit Order to DC, IP, TF Dispo) - Main Department

Provider versus Dept Mean - 6 Quarter Analysis



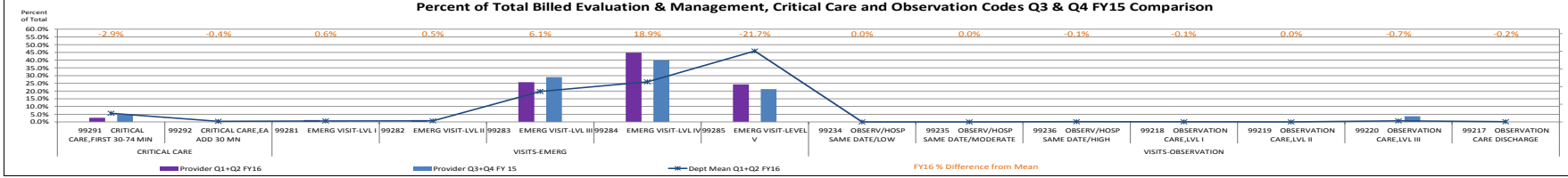
	Provider	Dept Mean	Standard Deviation vs. Department Mean
FY16 Q1+Q2 ED LOS - Door to ED CDU Admit Order	74	114	1.74
FY15 Q3+Q4 ED LOS - Door to ED CDU Admit Order	143	118	-0.69
CDU Admit Decision to Depart - Not Included in Overall ED Length of Stay			
FY16 Q1+Q2 CDU LOS Overall (Admit Order to DC, IP, TF Dispo) (hrs)	9.8	10.5	0.37
FY15 Q3+Q4 CDU LOS Overall (Admit Order to DC, IP, TF Dispo) (hrs)	10.1	10.7	0.26

* no previous data

Intake Metrics

	Provider	Dept Mean	Standard Deviation vs. Department Mean
CY15 DC from Intake	33.7%	17.5%	2.48
CY15 Sent to Supertrack	23.8%	25.5%	-0.52

Percent of Total Billed Evaluation & Management, Critical Care and Observation Codes Q3 & Q4 FY15 Comparison



Based on UPI Billing Data			Provider Q3+Q4 FY15	Dept Mean Q3+Q4 FY15	Provider Q1 & Q2 FY16	Dept Mean Q1 & Q2 FY16
CRITICAL CARE	99291	CRITICAL CARE,FIRST 30-74 MIN	4.6%	4.0%	2.7%	5.6%
	99292	CRITICAL CARE,EA ADD 30 MN	0.0%	0.0%	0.0%	0.4%
EMERG	99281	EMERG VISIT-LVL I	0.3%	1.0%	1.2%	0.6%
	99282	EMERG VISIT-LVL II	0.0%	1.0%	1.2%	0.7%
	99283	EMERG VISIT-LVL III	29.0%	23.0%	25.8%	19.7%
	99284	EMERG VISIT-LVL IV	39.9%	28.0%	44.8%	26.0%
	99285	EMERG VISIT-LEVEL V	21.3%	28.0%	24.2%	45.9%
OBSERVATION	99234	OBSERV/HOSP SAME DATE/LOW	0.0%	0.0%	0.0%	0.0%
	99235	OBSERV/HOSP SAME DATE/MODERATE	0.0%	0.0%	0.0%	0.0%
	99236	OBSERV/HOSP SAME DATE/HIGH	0.6%	1.0%	0.0%	0.1%
	99218	OBSERVATION CARE,LVL I	0.3%	2.0%	0.0%	0.1%
	99219	OBSERVATION CARE,LVL II	0.3%	1.0%	0.0%	0.0%
	99220	OBSERVATION CARE,LVL III	3.7%	7.0%	0.0%	0.7%
	99217	OBSERVATION CARE DISCHARGE	0.0%	4.0%	0.0%	0.2%

Total FY16 Outside CME Hours Earned
1.50

ECG Performed for Presenting Complaint of Chest Pain (PQRS#54) or Syncope (PQRS#55)	
Provider	Department Mean
100%	98.50%

Date Range

7/1/2015-8/7/2017

Date Slicer

Fiscal Year/Quarter/Month

- 2016
- 2017
  - 1
    - July, 2016
    - August, 2016

Provider

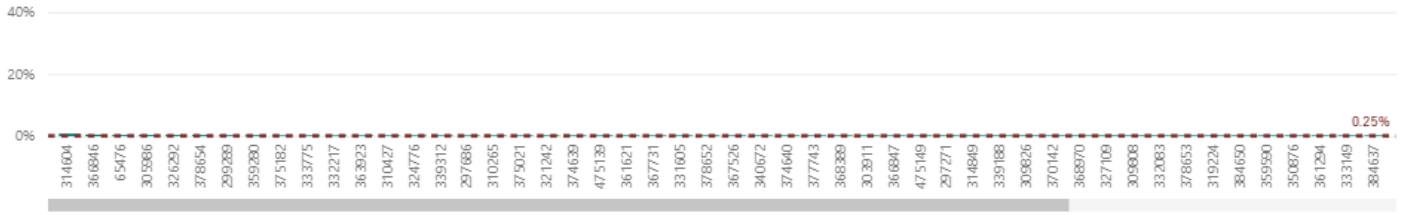
- Select All
- 65476
- 67071

Provider with Incentive

- Select All
- N
- Y

uchealth

Provider Variation: Deaths within 24 Hours For Patients Seen In Main- Line Represents Median



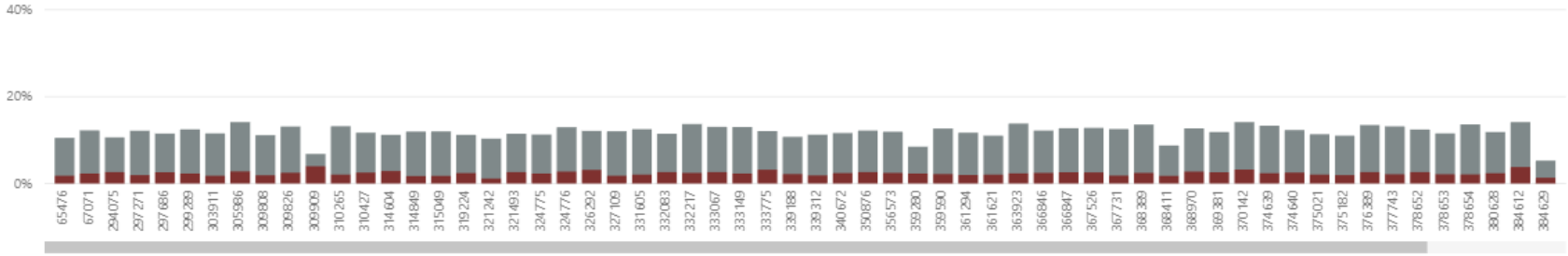
Provider Variation: Upgrades to ICU within 24 Hours For Patients Seen In Main- Line Represents Median

Provider Variation: Return Visits For Patients Seen In Main

● Return Visit Within 9 Days & Admitted ● Return Visit Within 9 Days & Not Admitted

9.78 %
Return Visit Within 9 Days & Not Admitt...

2.30 %
Return Visit Within 9 Days & Admitted



Final Provider Dashboard Deldentified

INCENTIVE METRICS I

Date Range

7/1/2015-8/7/2017

Date Slicer

Fiscal Year/Quarter/Month

- 2016
- 2017
  - 1
    - July, 2016
    - August, 2016

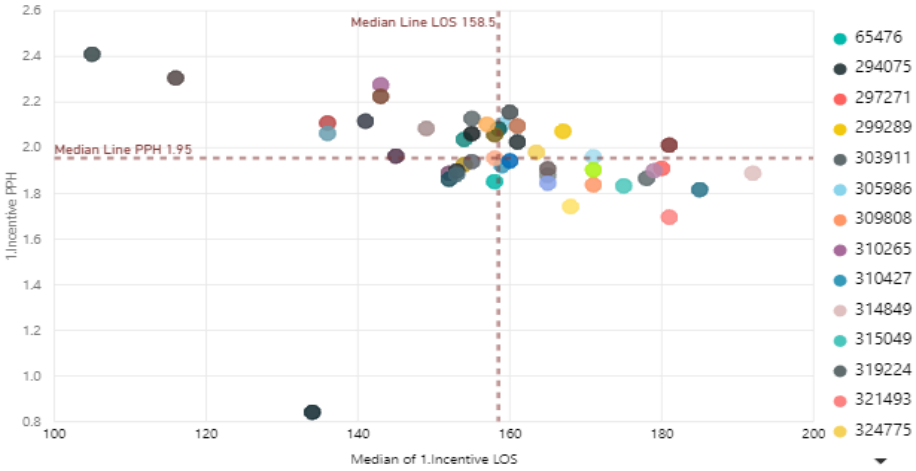
Provider

- Select All
- 65476
- 294075

Provider with Incentive

- Select All
- N
- Y

Median ED Length of Stay and Average Patients Per Hour



uchealth

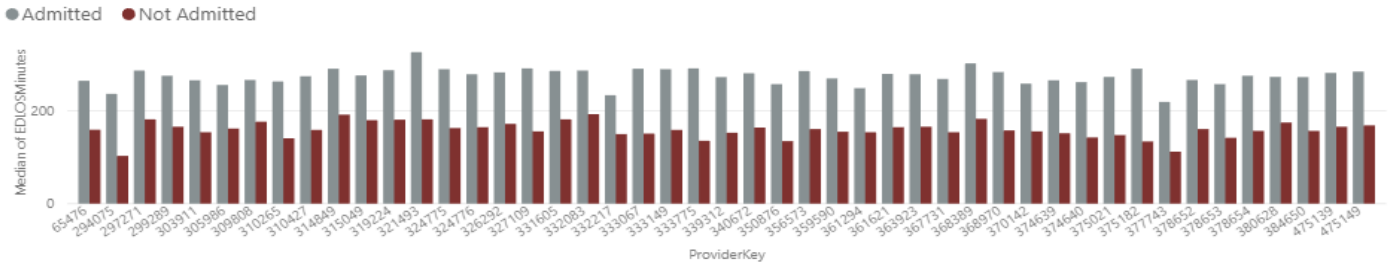
1.96
1.Incentive PPH

160.0
Median of 1.Incentive LOS

Ranked Data

ProviderKey	1.Incentive PPH	1.Rank PPH	Median of 1.Incentive LOS
65476	1.85	1	158.0
294075	2.41	1	105.0
297271	1.91	1	180.0
299289	2.07	1	167.0
303911	2.13	1	155.0
305986	2.10	1	159.0
309808	1.84	1	171.0
310265	2.28	1	143.0
310427	1.92	1	159.0
314849	1.89	1	192.0
315049	1.83	1	175.0
319224	1.87	1	178.0
321493	1.70	1	181.0
324775	1.98	1	163.5
324776	1.88	1	165.0
326292	1.96	1	171.0
327109	1.95	1	158.0

Median ED Length of Stay (Arrival Time to ED Depart)



Admitted

273

Median of EDLOSMinutes

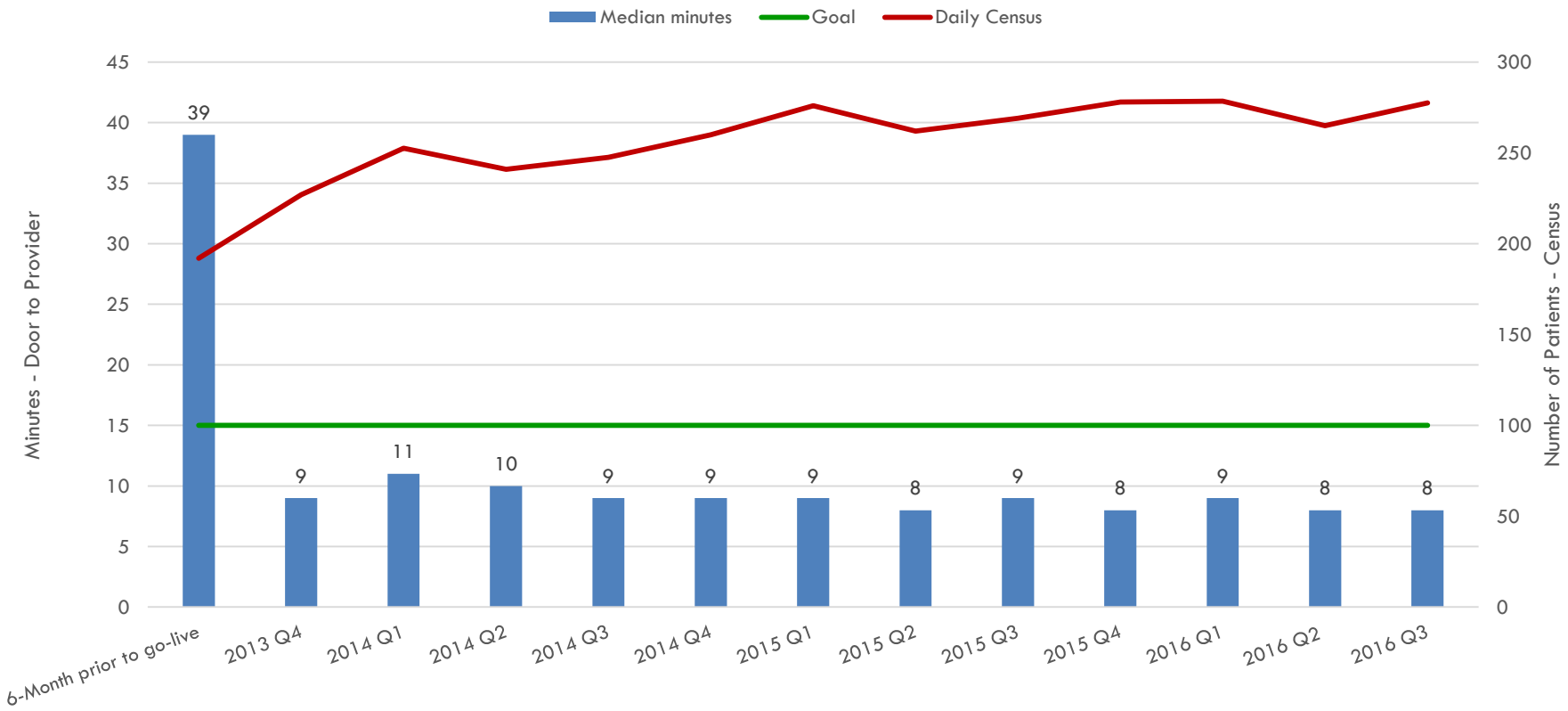
Not Admitted

160

Median of EDLOSMinutes

Results

Door to Provider



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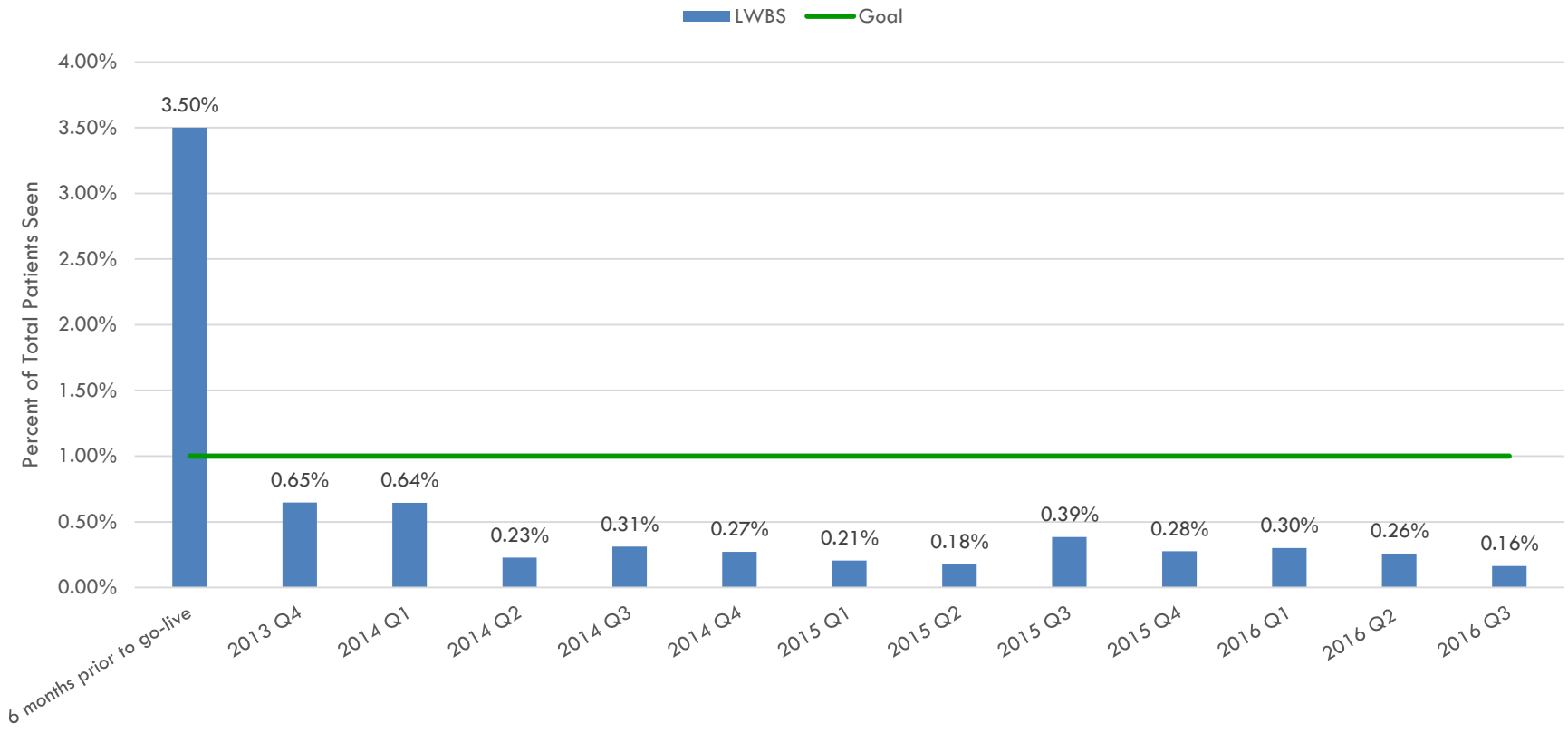
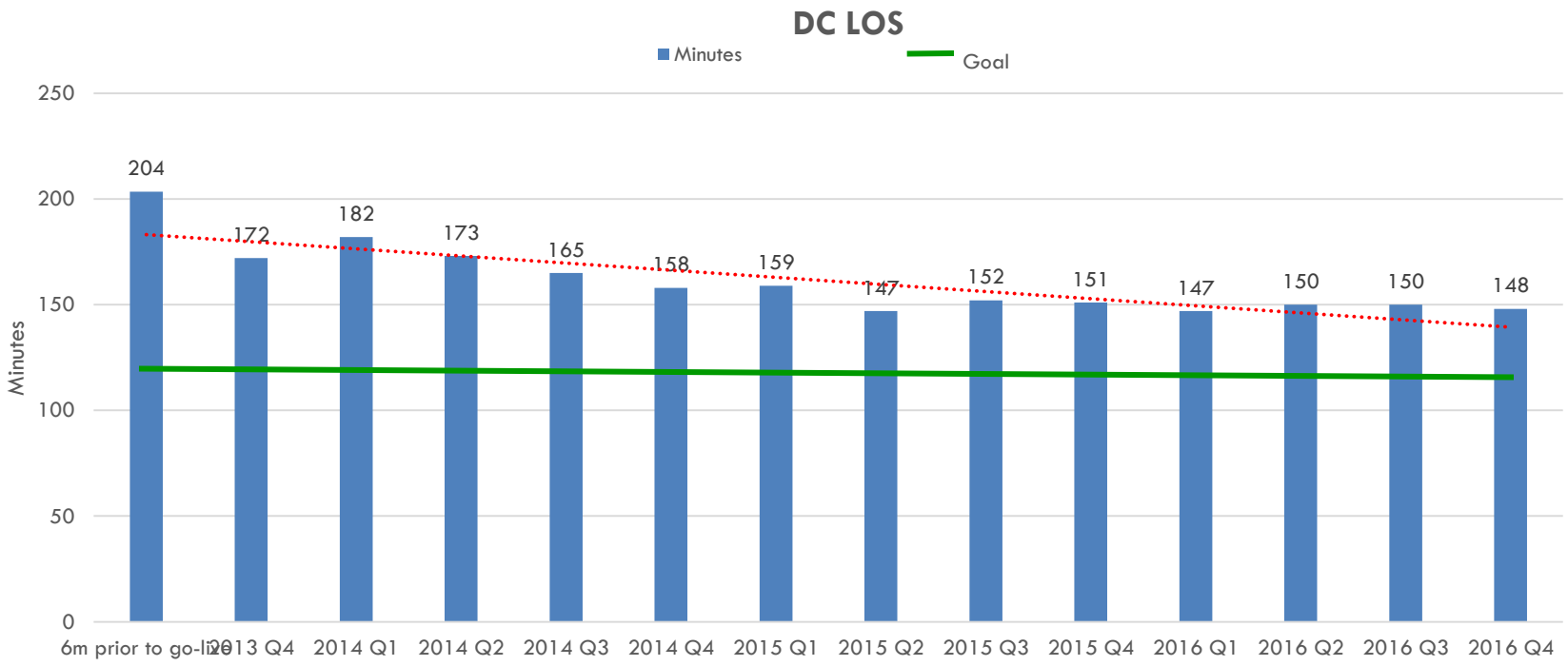
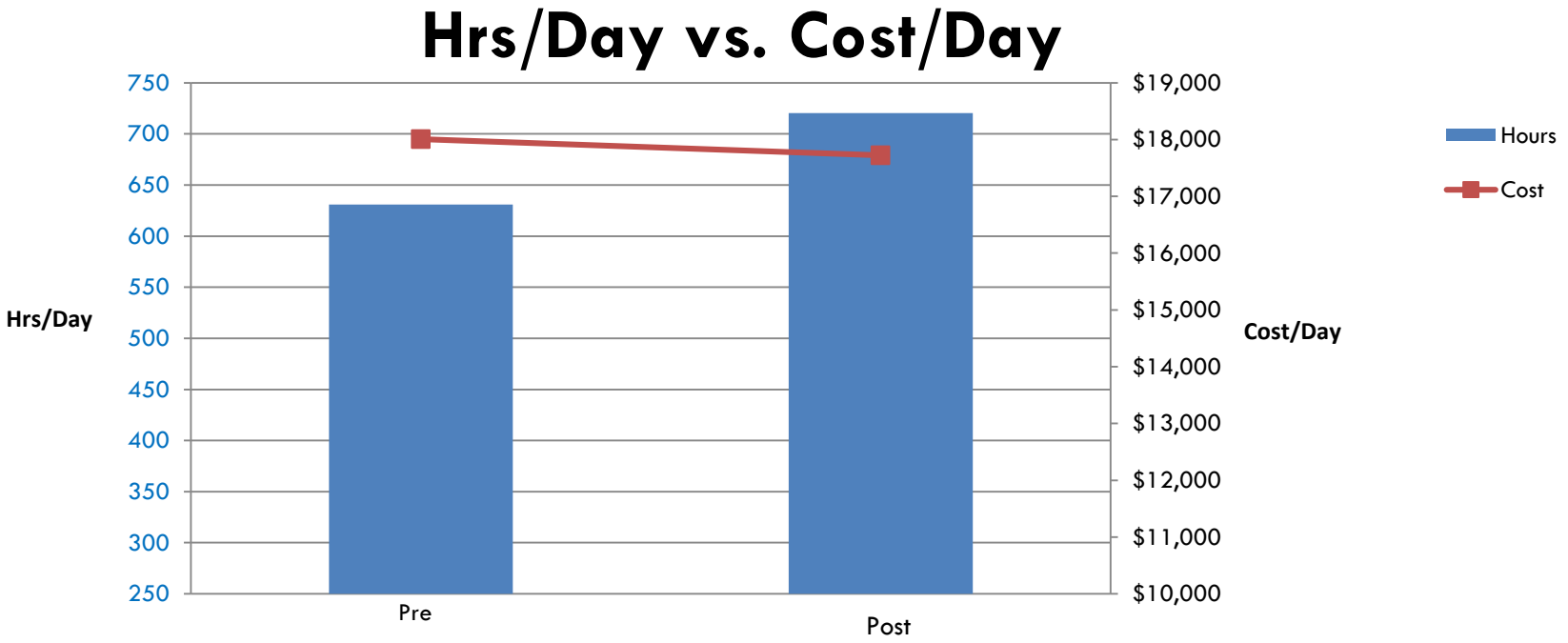
LWBS




DC LOS
Minutes
Goal
250
200
150
100
50
0
Minutes
204
172
182
173
165
158
159
147
152
151
147
150
150
148
6m prior to go-live
2013 Q4
2014 Q1
2014 Q2
2014 Q3
2014 Q4
2015 Q1
2015 Q2
2015 Q3
2015 Q4
2016 Q1
2016 Q2
2016 Q3
2016 Q4

ED Staff Cost



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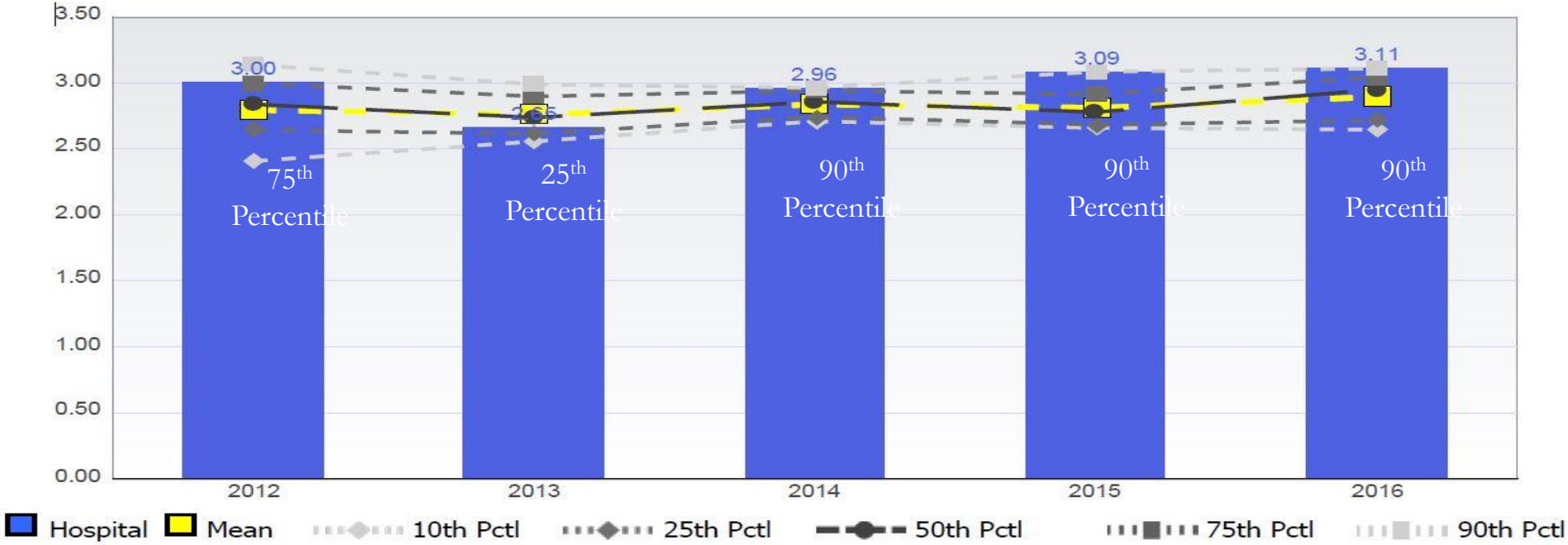
National Database for Nursing Quality Indicators

Mean Practice Environment Scale



Comparison to Benchmarks

	6-mths pre new ED	FY 15	AAAEM Median FY 14
Census	70,774	101,492	64,421
LWBS Rate	3.57%	0.26%	2.9%
Average Monthly Census	5,898	8,046	5,368
Average Conversion Rate	17.31%	25.5% CDU- 12.3% IP Admits- 13.2%	24.4%
Door to provider (hours)	1.12	0.22	0.6
Total LOS (hrs)	5.42	3.0	4.5
Patients Per Hour	2.05	2.5	2.5

Article

American Journal of Medical Quality
1–6
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DOI: 10.1177/1062860616637683
ajmq.sagepub.com
SAGE

Rapid Process Optimization: A Novel Process Improvement Methodology to Innovate Health Care Delivery

Jennifer L. Wiler, MD, MBA[1], Kelly Bookman, MD[1], Derek B. Birznieks, MBA[2], Robert Leeret, RN[2], April Koehler, RN[2], Shauna Plank, MSEng[2], and Richard Zane, MD[1]

Abstract

Health care systems have utilized various process redesign methodologies to improve care delivery. This article describes the creation of a novel process improvement methodology, Rapid Process Optimization (RPO). This system was used to redesign emergency care delivery within a large academic health care system, which resulted in a decrease: (1) door-to-physician time (Department A: 54 minutes pre vs 12 minutes 1 year post; Department B: 20 minutes pre vs 8 minutes 3 months post), (2) overall length of stay (Department A: 228 vs 184; Department B: 202 vs 192), (3) discharge length of stay (Department A: 216 vs 140; Department B: 179 vs 169), and (4) left without being seen rates (Department A: 5.5% vs 0.0%; Department B: 4.1% vs 0.5%) despite a 47% increased census at Department A (34 391 vs 50 691) and a 4% increase at Department B (8404 vs 8753). The novel RPO process improvement methodology

Harvard Business Review

LEADERSHIP

How We Transformed Emergency Care at Our Hospital

by Richard Zane, MD

DECEMBER 17, 2015

SAVE | SHARE | COMMENT 6 | TEXT SIZE | PRINT

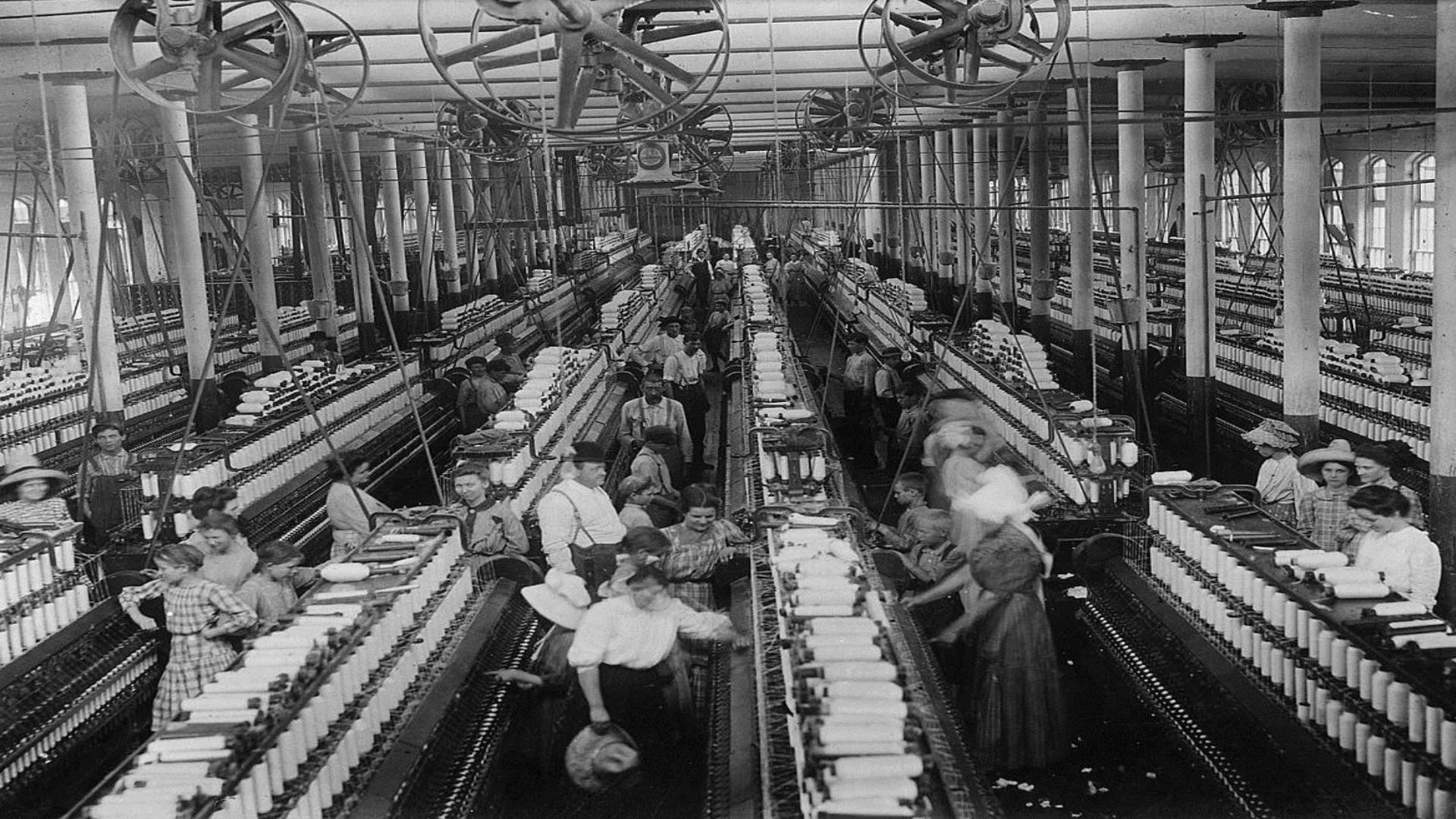
The emergency department (ED) is no longer just the hospital's often-overcrowded front door for medical

Process and Quality Redesign Site Visitors (2013-Present)

But.....

- Variability
- Dissemination
- Pace of Change

Can technology really be deployed in healthcare without increasing cost and decreasing efficiency?



UNIVAC

.com

14:59 PM
134
81
76

What about healthcare?

Epic

eHealth Ireland

pharyngitis

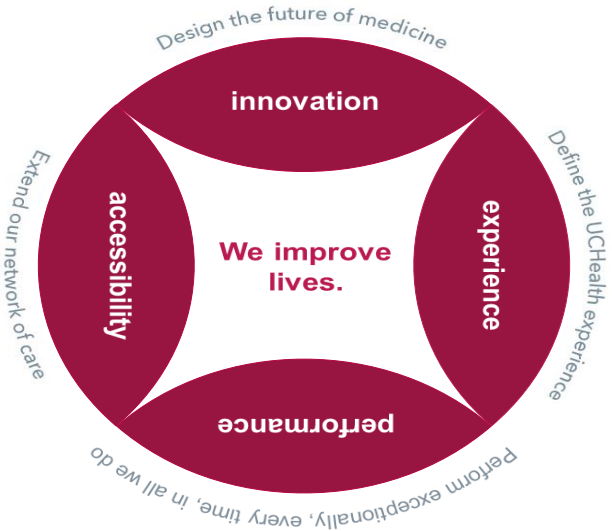
470,000

PubMed

3,320

How do we do this?

- Embrace Innovation
- Embrace Industry
- Don’t reinvent the wheel
- Take advantage of Colorado
- CARE Innovation Center

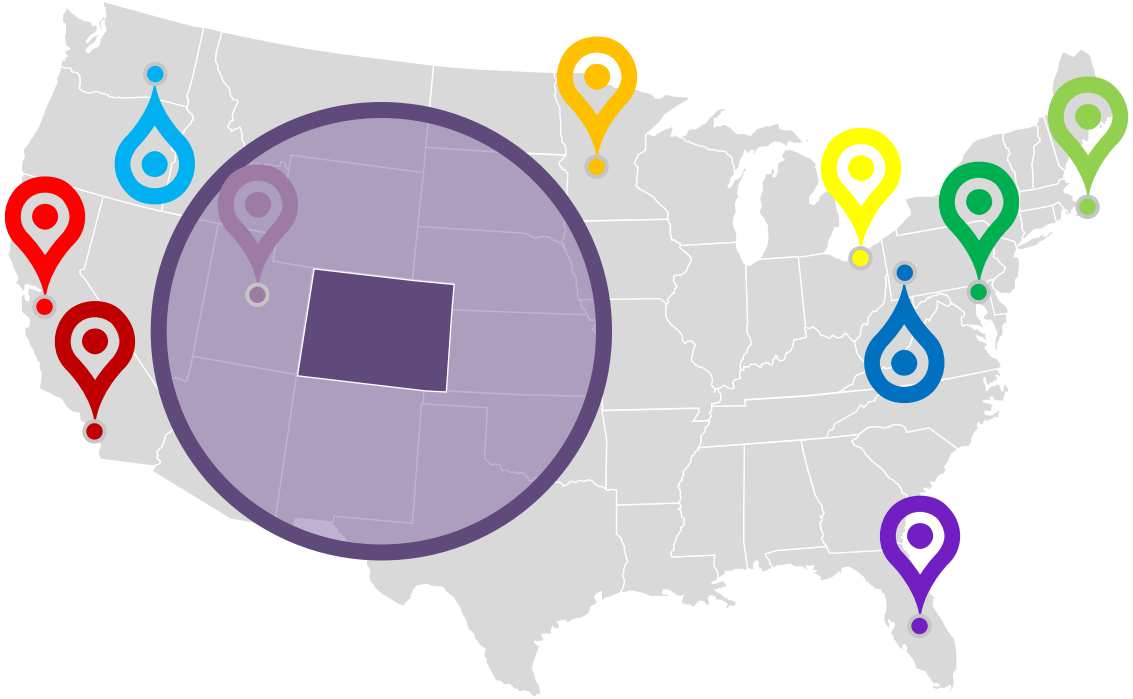


Colorado Digital Health Ecosystem

Innovation Space Competition

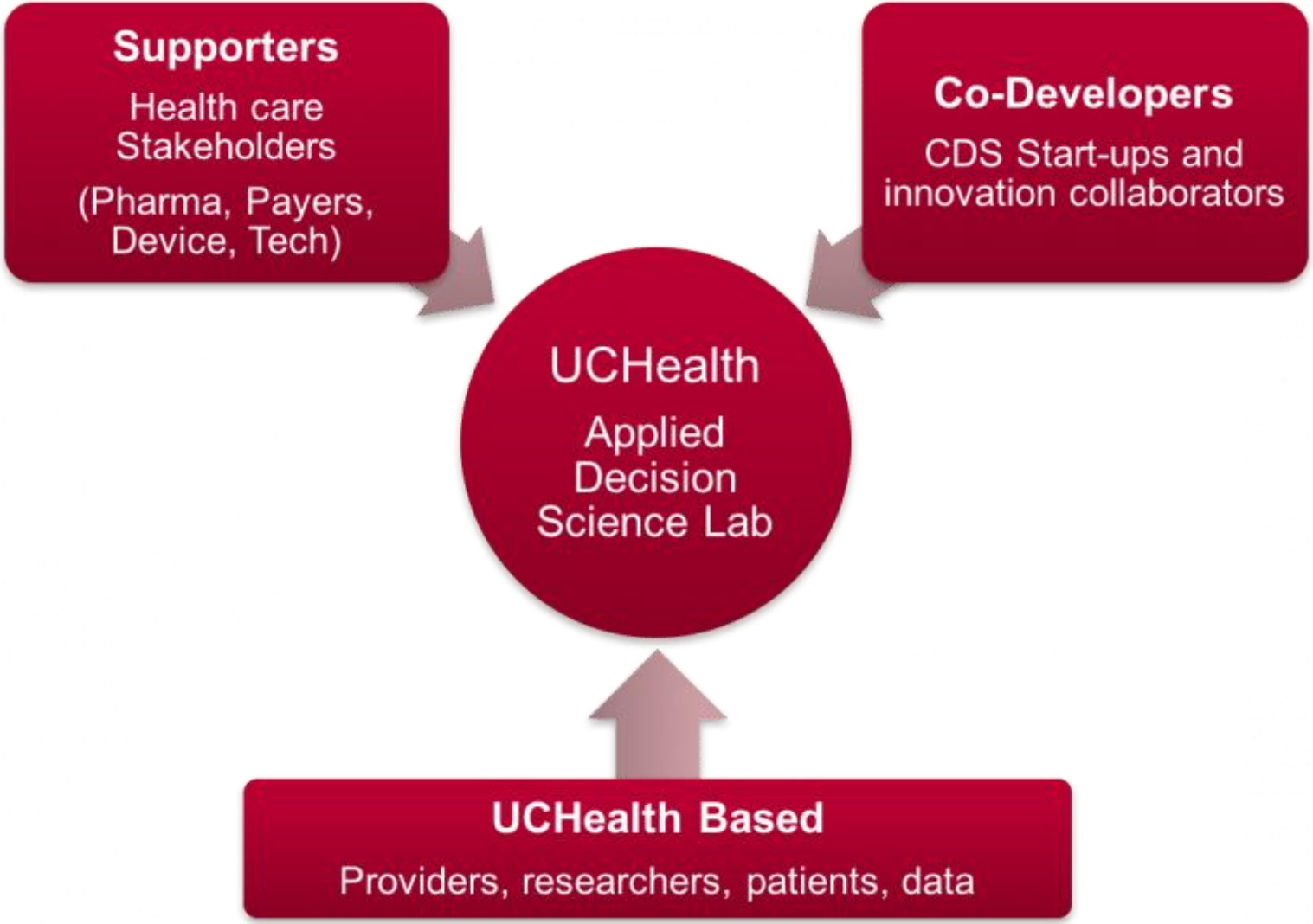
Integrated Academic Health Systems

- Cedars Sinai
- Stanford
- Mayo Clinic
- Cleveland Clinic
- Partners Health
- Johns Hopkins
- Providence
- UPMC
- Intermountain
- Florida



Applied Decision Science Lab

- Team
  - Clinician Subject Matter Experts
  - Physician Informaticists
  - Physician programmers
  - Implementation Scientist
  - Economist
  - Data architects
  - Data scientist
  - Data analyst
  - Venture analyst
- One robust instance of an Electronic
  - Horizontally and vertically integrated healthcare system as lab


Supporters
Health care Stakeholders
(Pharma, Payers, Device, Tech)
Co-Developers
CDS Start-ups and innovation collaborators
UCHealth
Applied Decision Science Lab
UCHealth Based
Providers, researchers, patients, data

Solve problems

- Would we want to be a customer
  - If we do, you likely will
- Is there a revenue opportunity
- Is there an equity opportunity
- Does the partner have a team
- Have they had success
- Are they well funded

Three problems (maybe yours?)

- Nobody follows guidelines and Clinical Decision Support is too hard
  - Hard stops
  - Too many clicks
  - Nobody follows paper guidelines or leaves their work-flow
- Over prescribing
  - Opioids are killing people
  - Can't remember every medicine
- Knowledge dissemination
  - Emailing a presentation and quiz is not dissemination

Can an EMR help providers make informed decisions?

- 85%
- 5-75%
- 1/5
- Alert/warning fatigue
- 24/7/365 50%
- Clicked into submission

Kung, J, et al, Failure of Clinical Practice Guidelines to Meet Institute of Medicine Standards
JAMA, 2012;172(21):1628-1633

University of Colorado
Anschutz Medical Campus
SCHOOL OF MEDICINE
DEPARTMENT OF EMERGENCY MEDICINE

University of
Colorado Hospital
UNIVERSITY OF COLORADO HEALTH
EMERGENCY DEPARTMENT

Abdominal CT Pathway

What is the likely diagnosis or presentation?

Appendicitis

Alvarado Score

Symptoms	
Migratory right iliac fossa pain	1
Nausea / Vomiting	1
Anorexia	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory Findings	
Leukocytosis	2
Shift to the left of neutrophils	1

5-6	Possible
7-8	Probable
>/=9	Very probable

Reference: Am J Emerg Med. 2007 Jun;25(5):489-93

Alvarado Score >/= 7 and patient male with BMI <35?

- NO → Is patient a NON PREGNANT female with pelvic pain > abdominal pain?
  - NO → Obtain Abd/Pelvic CT with IV contrast only
  - YES → Perform pelvic exam and obtain pelvic US
    - Does pelvic US explain symptoms?
      - NO → Obtain Abd/Pelvic CT with IV contrast only
- YES → Consult General Surgery to evaluate **prior** to CT

Renal Stone

Patient with NO prior history of stone or new concern for high grade obstruction or abscess (consider renal US to look for hydronephrosis first)

Obtain CT KUB
(No IV or PO contrast)

Small Bowel Obstruction

High likelihood of Small Bowel Obstruction?

- YES → Obtain 3-way abd X-ray
- NO → Obtain Abd/Pelvic CT with PO and IV contrast
  - 2 hour oral contrast prep

(+) Small Bowel Obstruction?

- NO → Obtain Abd/Pelvic CT with PO and IV contrast
  - 2 hour oral contrast prep
- YES →
  - Consider NGT
  - Admit to General Surgery
  - Obtain Abd/Pelvic CT with PO and IV contrast as inpatient

Intractable Nausea / Vomiting

(Meds already maximized)
Example:

- Pancreatitis: Lipase <1000 (if Lipase >1000 admit, CT as inpatient)
- Other pathology

Consider NGT to decompress bowel and administer PO contrast

Obtain Abd/Pelvic CT with PO and IV contrast

- 1 hour oral contrast prep

Dispo per diagnosis on CT

History or Concern for Complex Abdominal Pathology

Examples:

- Recent surgery
- History of abscess, drains
- Fistula
- Diverticulitis (if imaging required)
- Crohn's (f imaging required)

Obtain Abd/Pelvic CT with PO and IV contrast

- 2 hour oral contrast prep

Consult Radiology to determine optimal imaging protocol

General Surgery Approved R McIntyre MD, 1/2013
Radiology Approved ED Radiology Committee 1/2013
EDCQI Committee Approved 1/22/2013

"This quality improvement document is to be maintained solely within the institution and may not be released to any third party without written permission from the department, hospital, and university legal counsel."

Can CDS be better?

- Integrated into workflow
- No hard stops
- No alerts
- Fewer clicks

Goal: To integrate evidence based CDS into the EHR workflow

Background

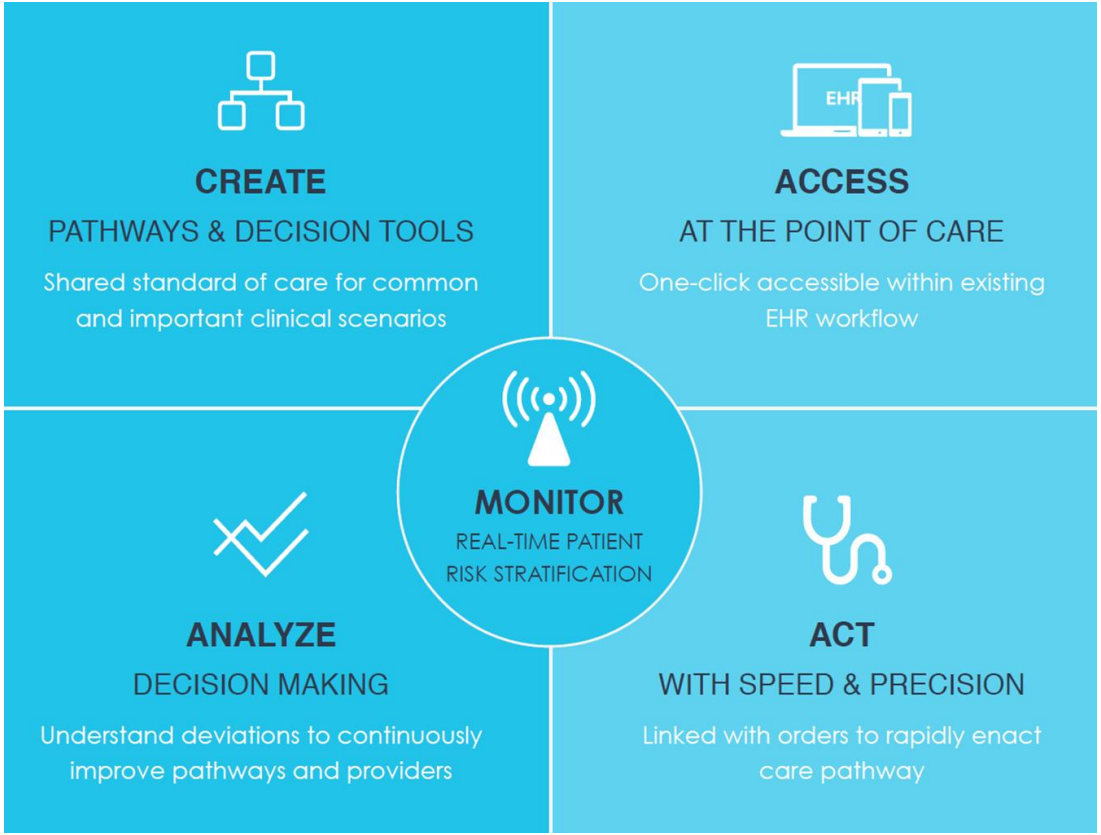
2013
The White Binder

2014
ED Physician Dashboard

Approach

Integrated into Epic clinical workflow!!!

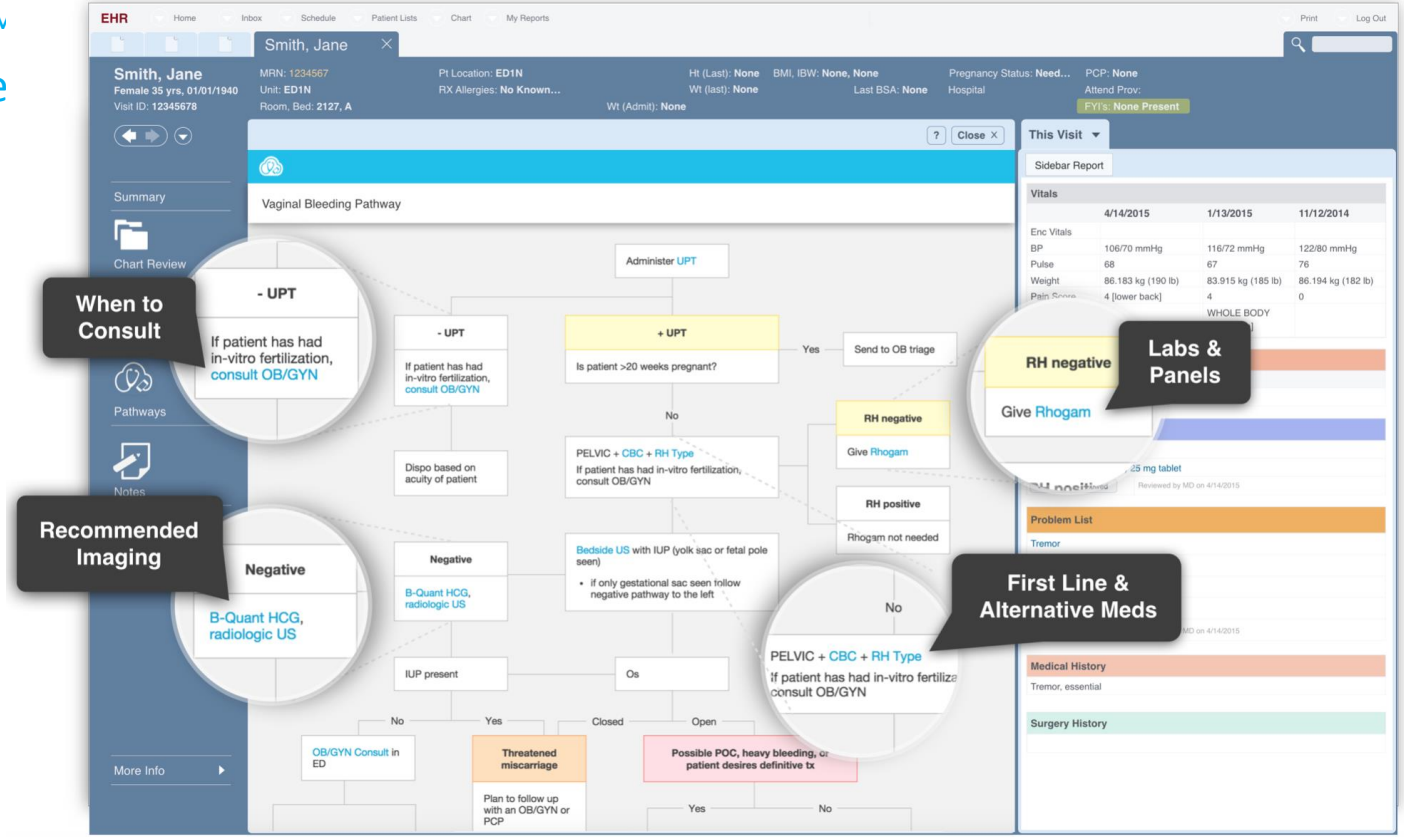
AgileMD


CREATE
PATHWAYS & DECISION TOOLS
Shared standard of care for common and important clinical scenarios
EHR
ACCESS
AT THE POINT OF CARE
One-click accessible within existing EHR workflow
MONITOR
REAL-TIME PATIENT RISK STRATIFICATION
ANALYZE
DECISION MAKING
Understand deviations to continuously improve pathways and providers
ACT
WITH SPEED & PRECISION
Linked with orders to rapidly enact care pathway

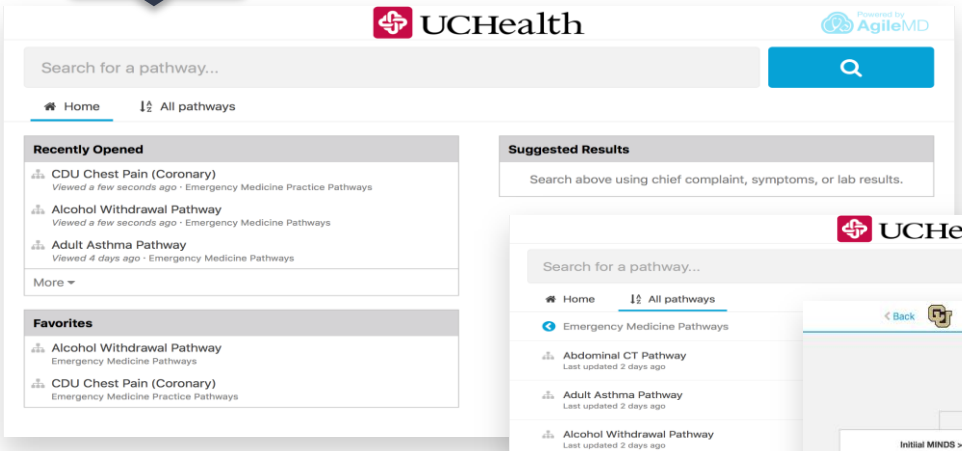
AgileMD

“SMART Pathways™ For Emergency Care

AgileMD is a software platform that streamlines clinical workflow and supercharges clinical decision support within a health system’s electronic medical record system.

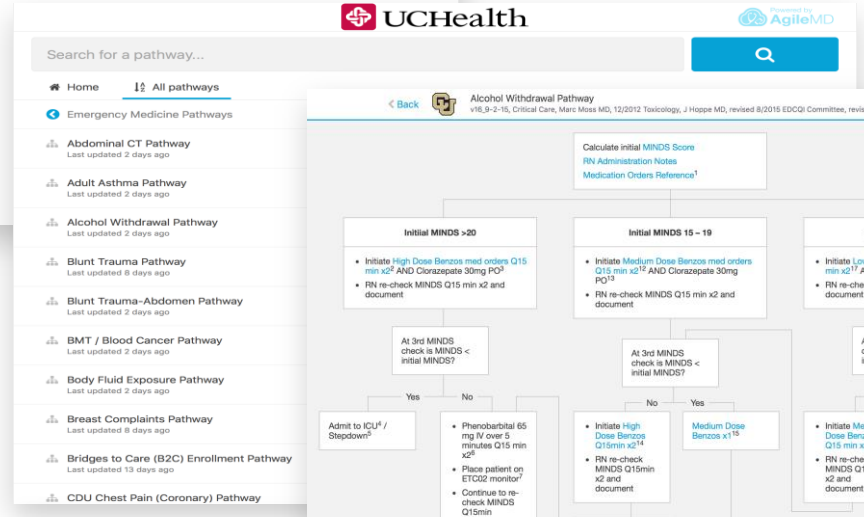


HOME

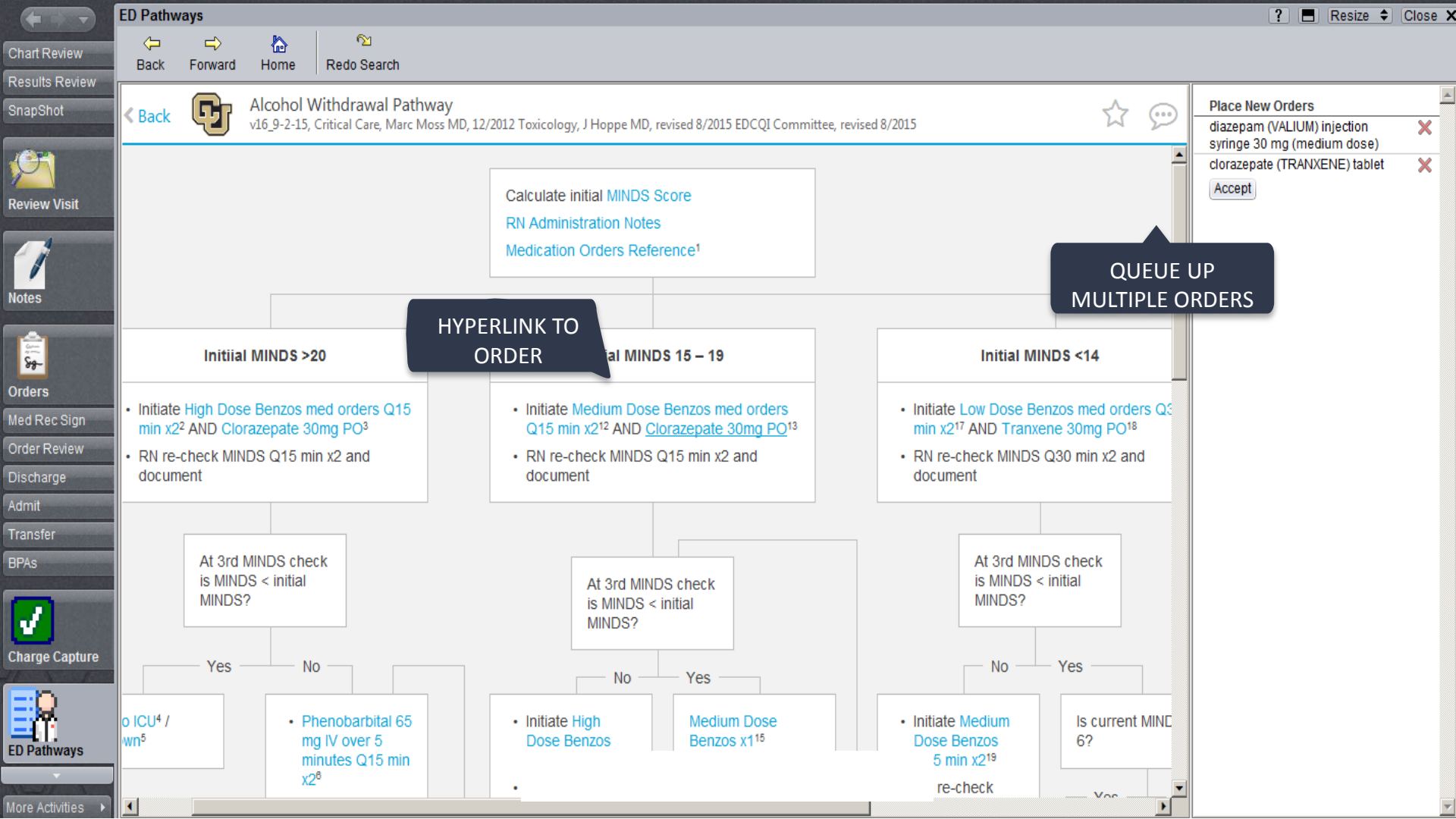


AgileMD

ALL PATHWAYS

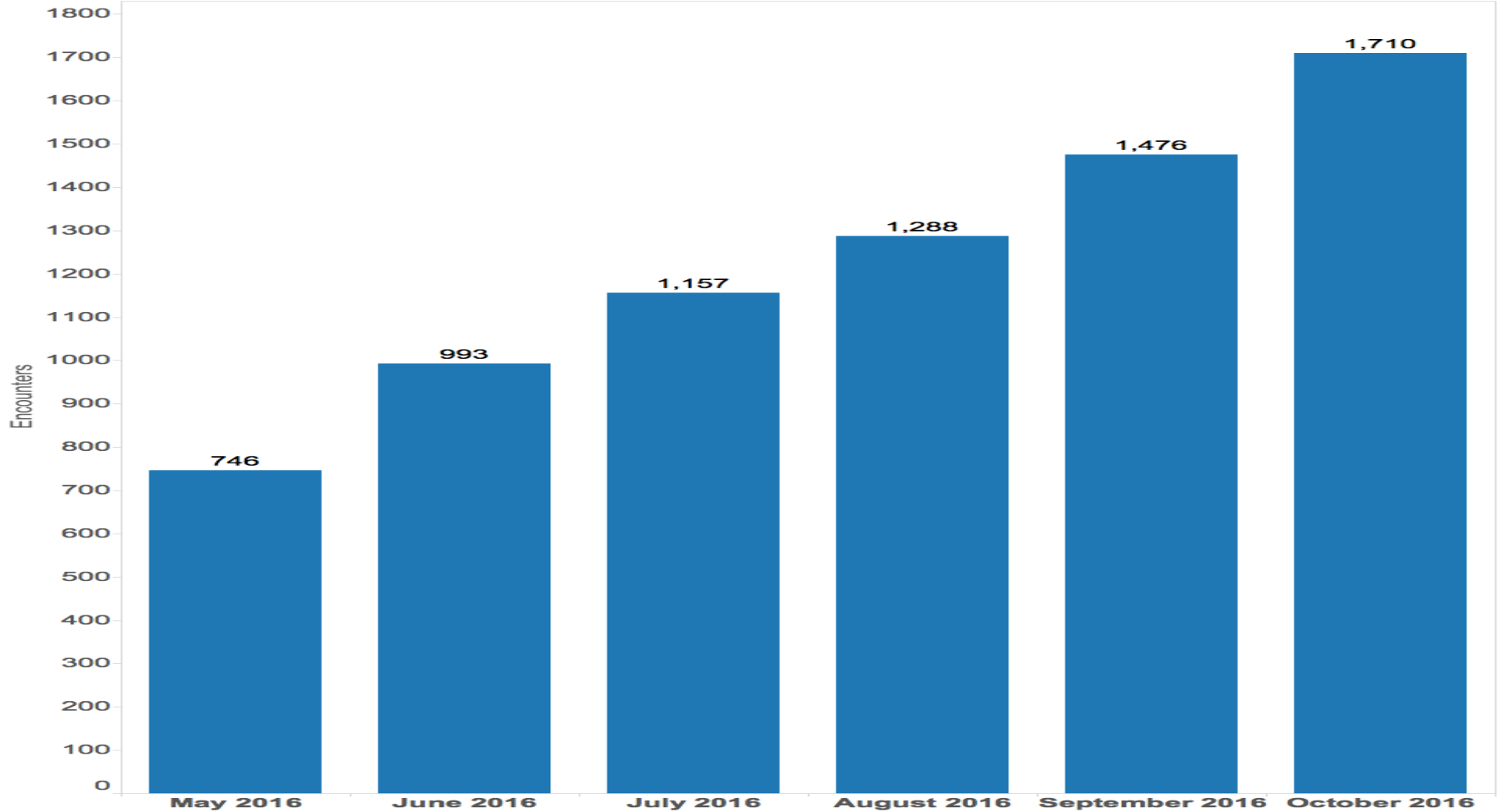


ORDER-INTEGRATED

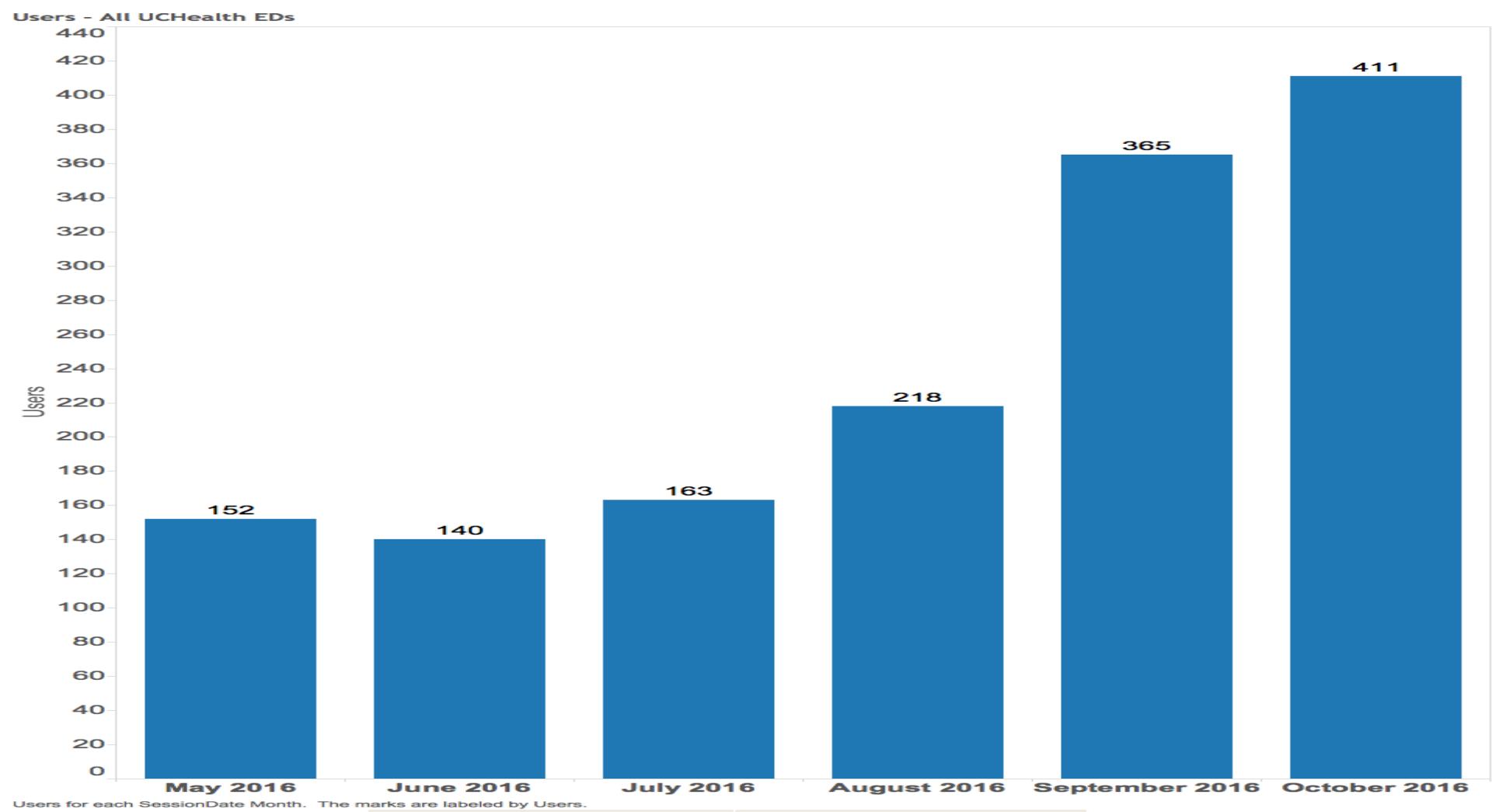

ED Pathways
Resize
Close
Back
Forward
Home
Redo Search
Chart Review
Results Review
SnapShot
Review Visit
Notes
Orders
Med Rec Sign
Order Review
Discharge
Admit
Transfer
BPAs
Charge Capture
ED Pathways
More Activities
Back
Alcohol Withdrawal Pathway
v16_9-2-15, Critical Care, Marc Moss MD, 12/2012 Toxicology, J Hoppe MD, revised 8/2015 EDCQI Committee, revised 8/2015
Calculate initial MINDS Score
RN Administration Notes
Medication Orders Reference[1]
HYPERLINK TO ORDER
QUEUE UP MULTIPLE ORDERS
Initiial MINDS >20
• Initiate High Dose Benzos med orders Q15 min x2[2] AND Clorazepate 30mg PO[3]
• RN re-check MINDS Q15 min x2 and document
al MINDS 15 – 19
• Initiate Medium Dose Benzos med orders Q15 min x2[12] AND Clorazepate 30mg PO[13]
• RN re-check MINDS Q15 min x2 and document
Initial MINDS <14
• Initiate Low Dose Benzos med orders Q3 min x2[17] AND Tranxene 30mg PO[18]
• RN re-check MINDS Q30 min x2 and document
At 3rd MINDS check is MINDS < initial MINDS?
Yes
No
o ICU[4] / wn[5]
• Phenobarbital 65 mg IV over 5 minutes Q15 min x2[6]
At 3rd MINDS check is MINDS < initial MINDS?
No
Yes
• Initiate High Dose Benzos
Medium Dose Benzos x1[15]
re-check
At 3rd MINDS check is MINDS < initial MINDS?
No
Yes
• Initiate Medium Dose Benzos 5 min x2[19]
Is current MIND 6?
Place New Orders
diazepam (VALIUM) injection syringe 30 mg (medium dose)
clorazepate (TRANXENE) tablet
Accept

In a year

Encounters - All UCHealth EDs



Encounters for each SessionDate Month. The marks are labeled by Encounters.


Users - All UCHealth EDs
Users
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
152
140
163
218
365
411
May 2016
June 2016
July 2016
August 2016
September 2016
October 2016
Users for each SessionDate Month. The marks are labeled by Users.

Decreasing Length of Stay

Chest Pain

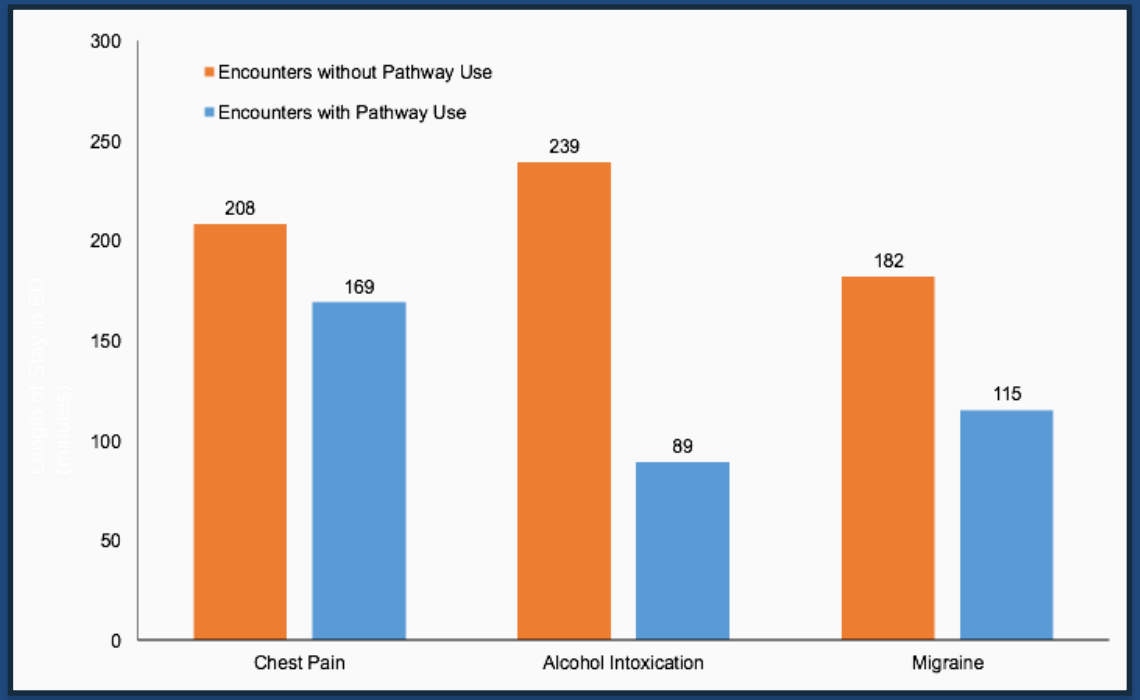
↓ 39 mins (18%)

Etoh

↓ 150 mins (62%)

Migraine

↓ 67 mins (36%)



Decreasing Variance in Length of Stay

Patient Chief Complaint	Standard Deviation in Length of Stay: Encounters with Pathway Use [A]	Standard Deviation in Length of Stay: Encounters without Pathway Use [B]	Difference [C] = [A] - [B]	Difference (%) [D] = [C] / [B]	Statistically Significant at 99% level [E]
1. Chest Pain	131	137	-5	-4%	**
2. Alcohol Intoxication	84	244	-160	-66%	**
3. Migraine	57	125	-67	-54%	**

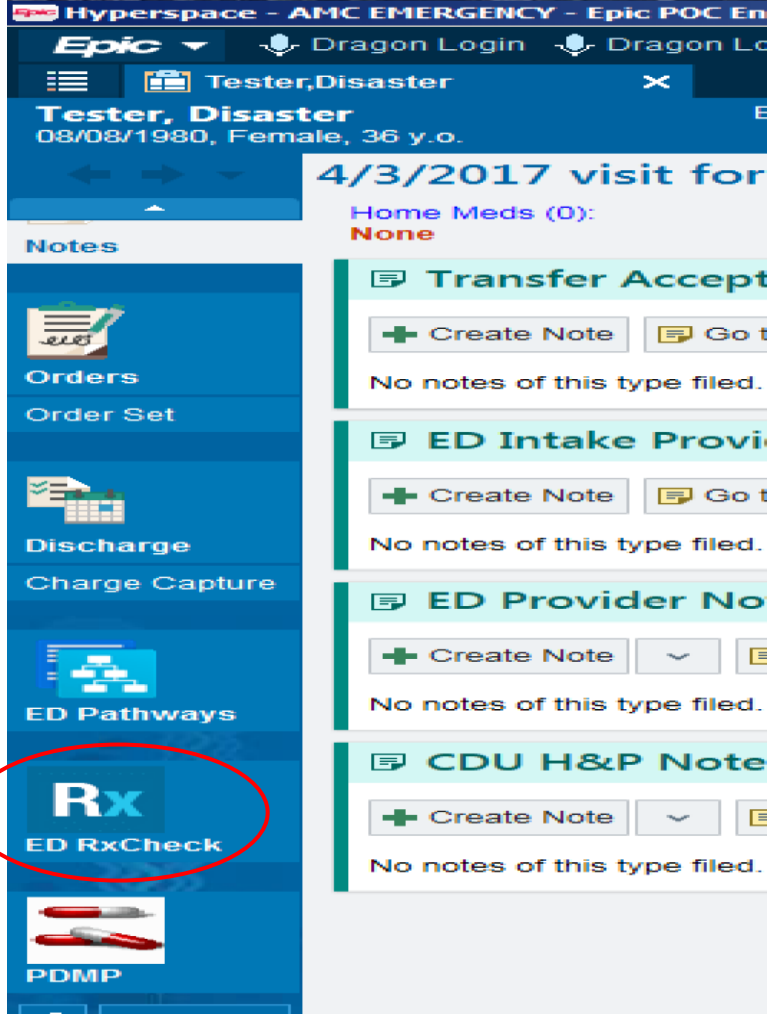
Next

- Nursing
- Oncology
- Thoracic Surgery
- Primary Care

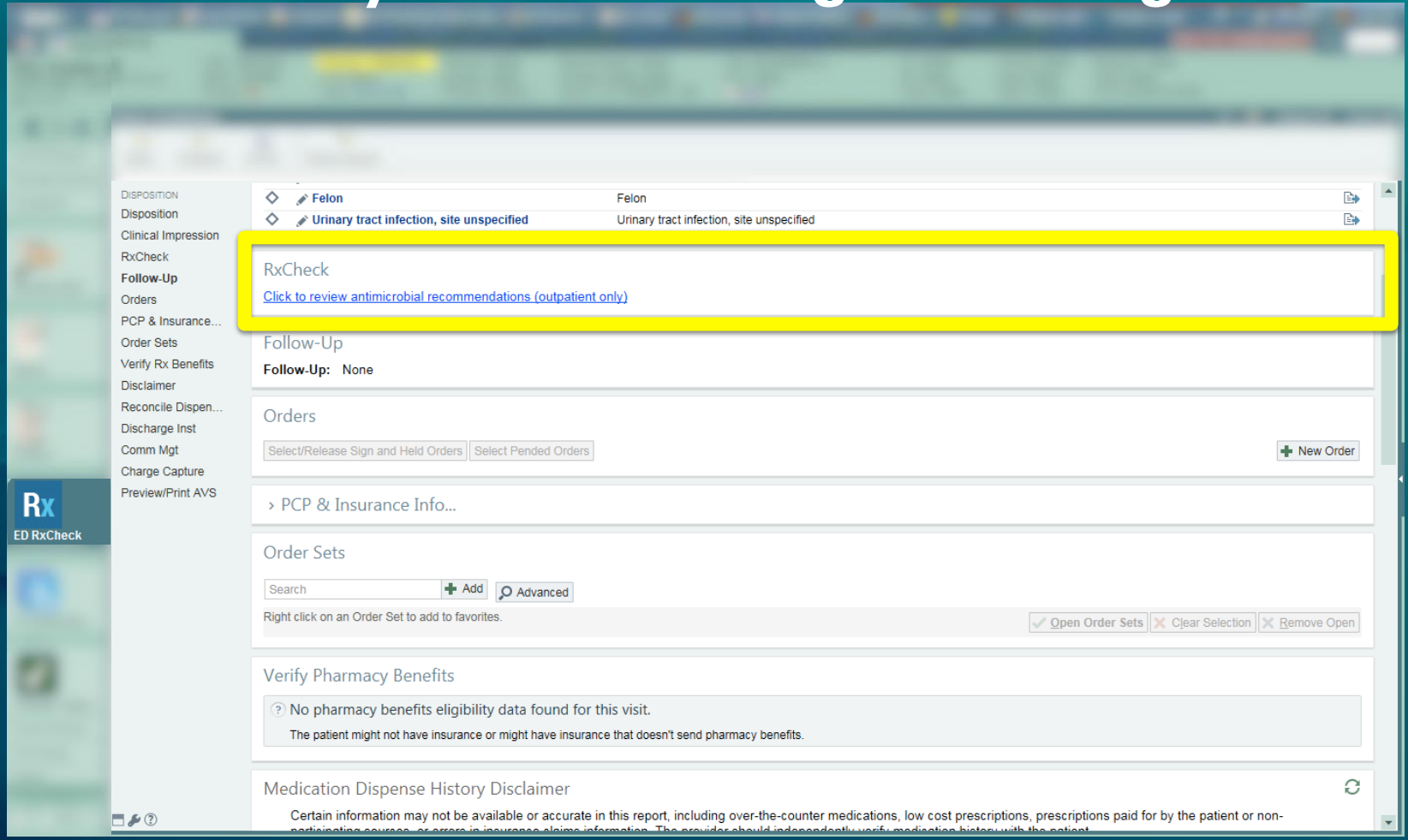
The Prescribing Problem

- Indications change day to day
- Antibiotics are incorrectly and overprescribed
- Patients have skin in the game
- Opioids are a scourge
- Biologics and immunotherapy

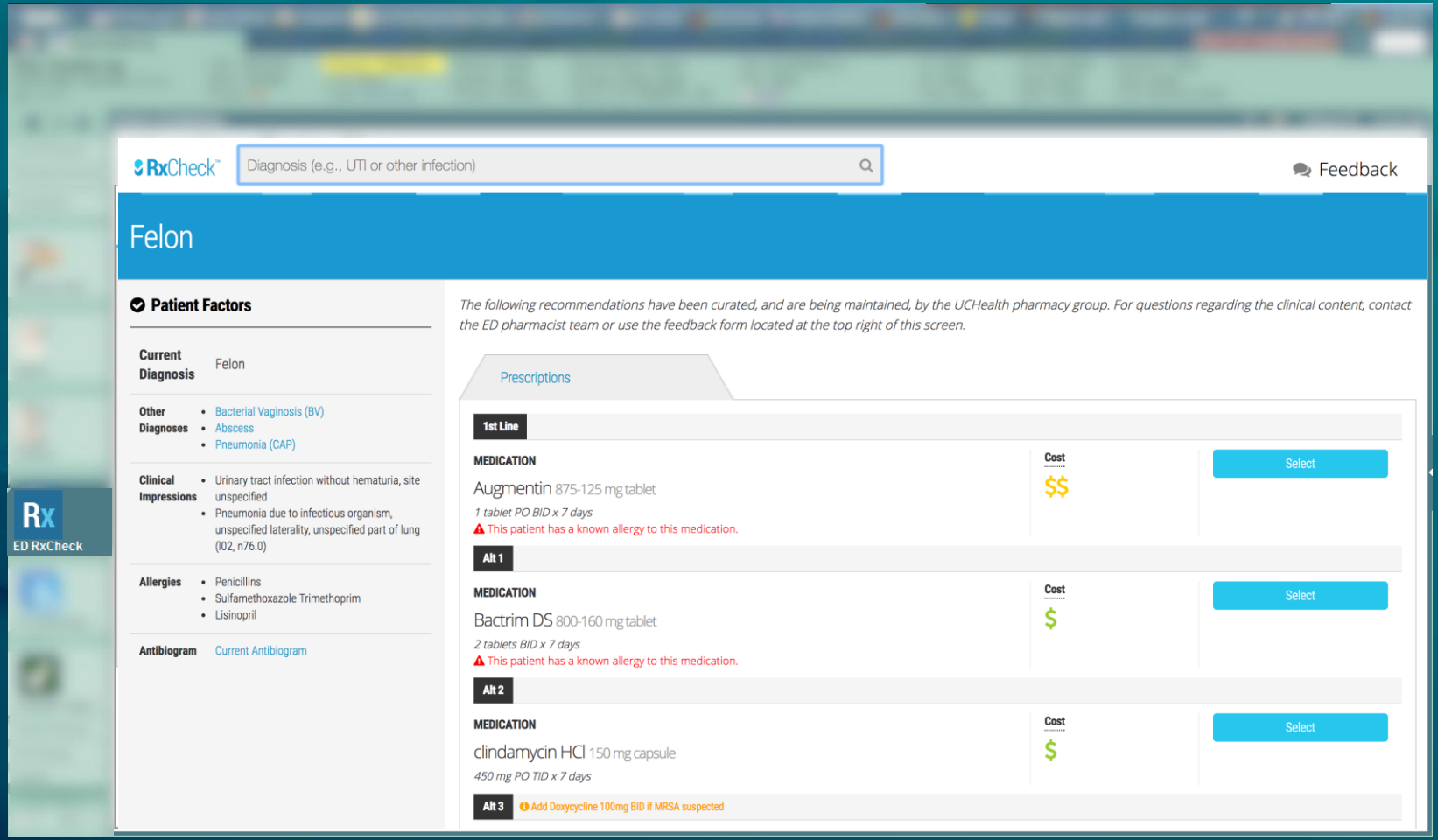
RxRevu


Hyperspace - AMC EMERGENCY - Epic POC En
Epic
Dragon Login
Dragon Lo
Tester,Disaster
Tester, Disaster
08/08/1980, Female, 36 y.o.
4/3/2017 visit for
Home Meds (0):
None
Notes
Orders
Order Set
Discharge
Charge Capture
ED Pathways
Rx
ED RxCheck
PDMP
Transfer Accept
Create Note
No notes of this type filed.
ED Intake Provi
Create Note
No notes of this type filed.
ED Provider No
Create Note
No notes of this type filed.
CDU H&P Note
Create Note
No notes of this type filed.

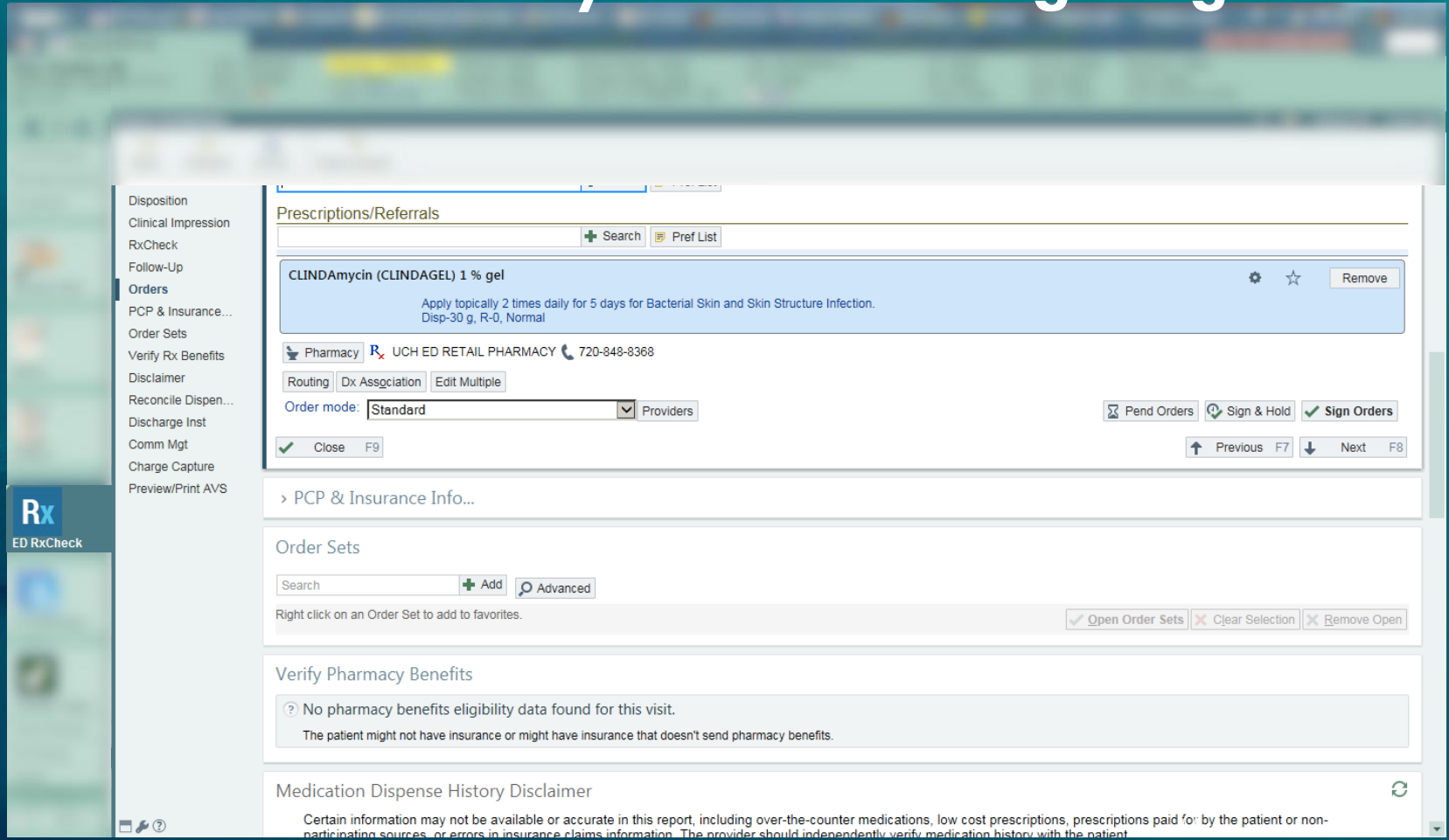
The New Way Of Prescribing - Discharge Guidance



Select Medication



The New Way Of Prescribing - Sign Order



UCHealth Development Partnership Results

- Launched October 2016
- Currently used by 182 prescribers in UCHealth's largest ED
- Has been used for more than 2,000 prescription decisions since launch
- Prescribers are selecting an RxCheck recommendation 55% of the time
- Selection of RxCheck recommendations has grown 28% since launch
- UCHealth has identified 10 minutes of time savings, per prescriber during each shift

Outcomes Data

	UTI (n=548)		Pneumonia (n=307)		Tonsillitis (n=348)	
Guidelines	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
Recommended (First line)	33.1%	**85.5%**	12.0%	**87.5%**	26.1%	20.0%
Recommended Alternative	52.1%	0.0%	76.1%	0.0%	39.3%	**53.3%**
Not Recommended	14.8%	16.1%	12.0%	12.5%	34.7%	24.4%

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Next

- Expand to all 30 ED's
- Include >75% of all medications
- Pilot with primary care
- Pilot with Heart Failure
- Partnership with Novartis
- Partnership with Anthem

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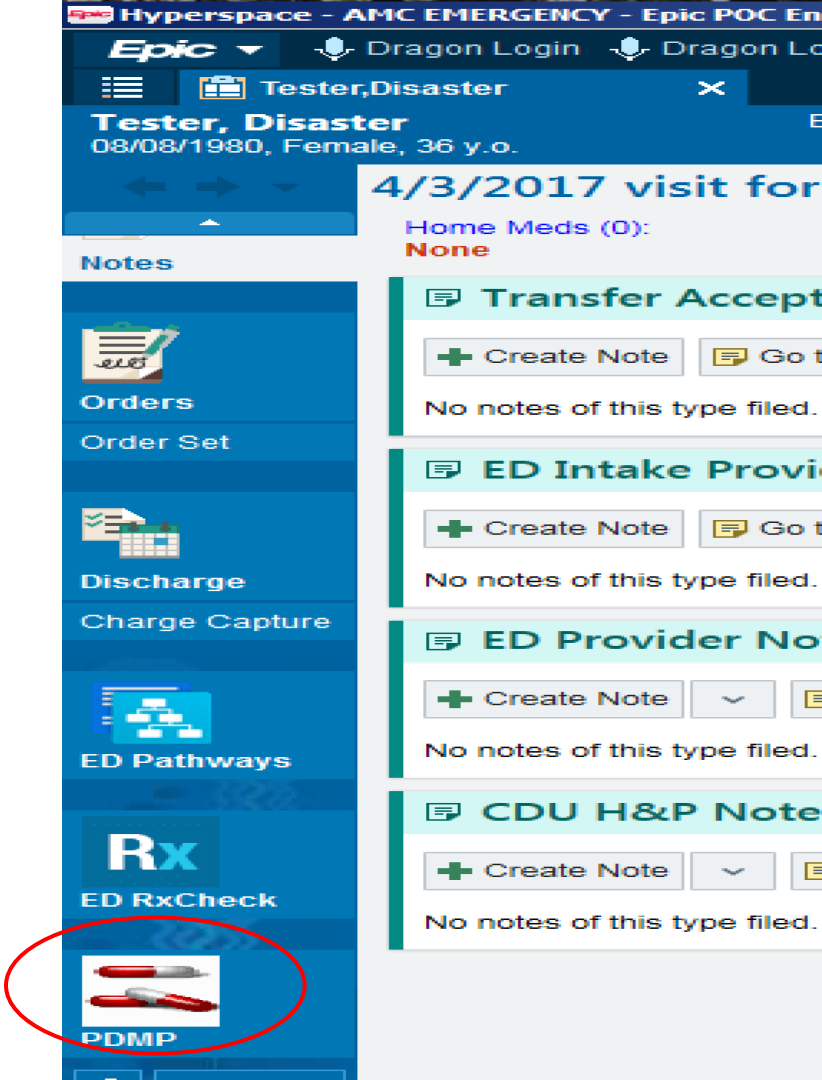
Opioids

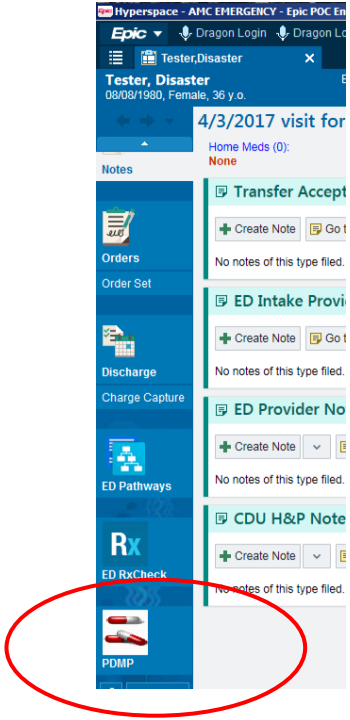
- Epidemic
- Regulation
- Prescription Drug Monitoring Program (PDMP) is next to useless

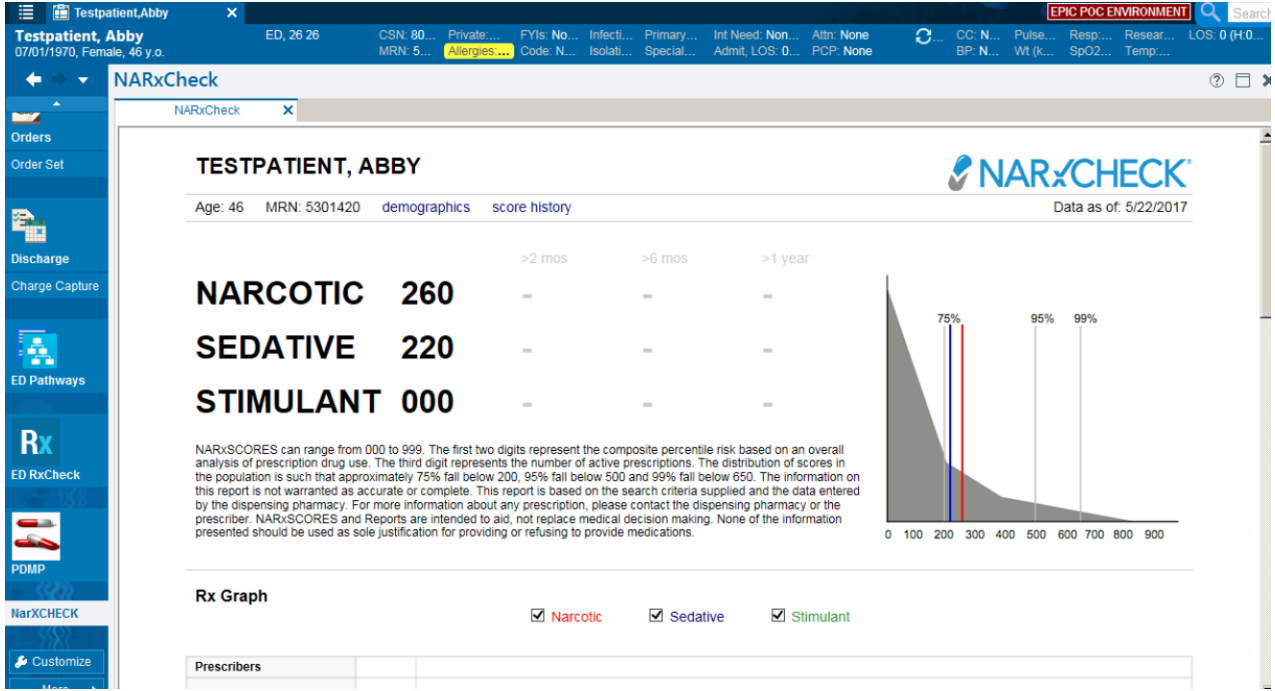
uchealth

PDMP and Appriss

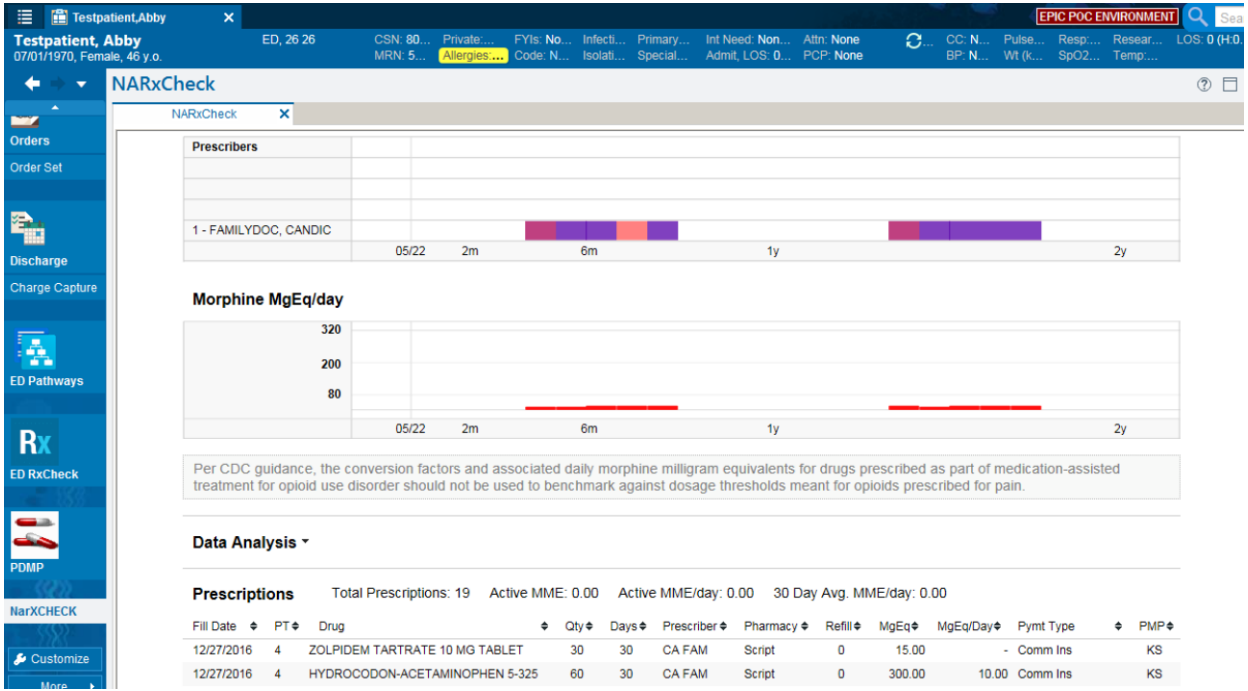


Appriss/PDMP platform





Appriss/PDMP platform



Results

- Significant decrease in New prescriptions
- Significant decrease in pills prescribed
- Significant decrease in provider variability
- PDMP utilization increased from 9% to 75%

Knowledge Dissemination

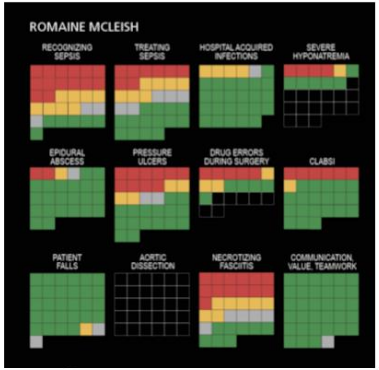
- If it's important, how do we teach 400 staff?
- Is an emailed powerpoint and quiz the best we can do?
  - HealthStream

- Founded in 2000 and is based in Boulder, Colorado - formerly known as Vivis Inc.
- Neuroscience-based education develops a learning software that improves knowledge transfer and enables long-term learning
- Accelerated memory protocol systematically translates information from a textbook, training document, or study material into a learner's long-term memory.
- Uses memory and learning characteristics to focus on acquiring, retaining, and recalling.
- Professional test prep, industry (food, manufacturing)

Knowledge Factor

Amplifire helps hospitals find and fix the confidently held misinformation that leads to patient harm and financial loss.

Individual level



Automated Micro Refreshers

90% Knowledge Retention at 12 months

THE TOOLKIT

Learner Engagement

Finds and Fixes Confidently Held Misinformation

Overcomes Regression with Forgetting Curve Analysis

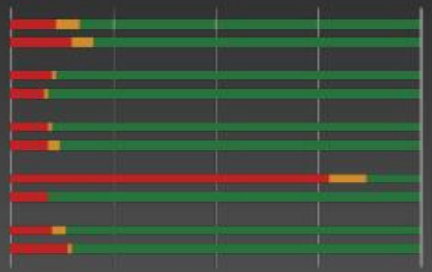
Personalized Refresher

6-minute Refresher (2 to 4 weeks)

Organizational Analytics

Struggle Analytics

Systemic or Environmental Issues



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ENDOSCOPY—**RISK**

STARTING KNOWLEDGE v. ENDING KNOWLEDGE

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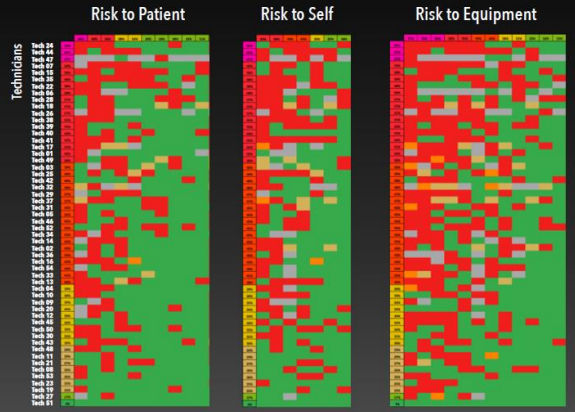
ENDOSCOPY—**RISK BY TECHNICIAN**

VARYING RISK ANALYSIS



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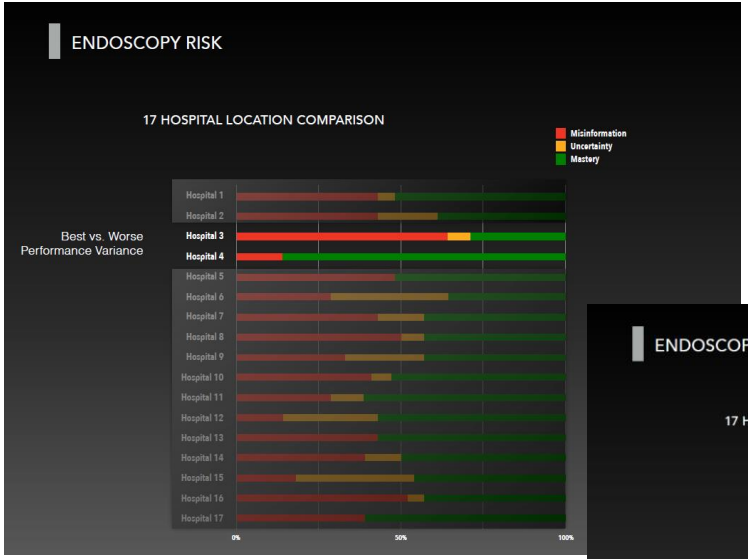
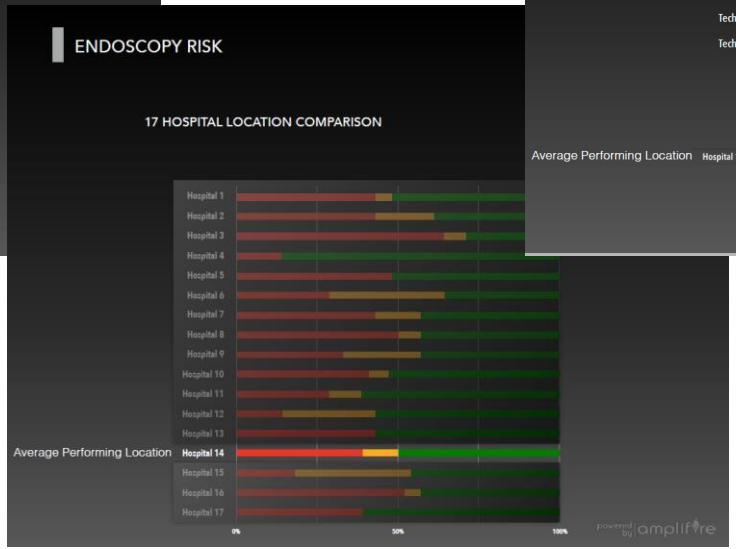

ENDOSCOPY RISK
17 HOSPITAL LOCATION COMPARISON
Misinformation
Uncertainty
Mastery
Best vs. Worse Performance Variance
Hospital 1
Hospital 2
Hospital 3
Hospital 4
Hospital 5
Hospital 6
Hospital 7
Hospital 8
Hospital 9
Hospital 10
Hospital 11
Hospital 12
Hospital 13
Hospital 14
Hospital 15
Hospital 16
Hospital 17
0%
50%
100%


ENDOSCOPY RISK
17 HOSPITAL LOCATION COMPARISON
Average Performing Location
Hospital 1
Hospital 2
Hospital 3
Hospital 4
Hospital 5
Hospital 6
Hospital 7
Hospital 8
Hospital 9
Hospital 10
Hospital 11
Hospital 12
Hospital 13
Hospital 14
Hospital 15
Hospital 16
Hospital 17
0%
50%
100%
powered by amplifire

ENDOSCOPY RISK
SINGLE HOSPITAL TECHNICIAN COMPARISON
Misinformation
Uncertainty
Mastery
Technician 2
Technician 11
Technician 16
Technician 24
Technician 33
Technician 38
Technician 45
0%
25%
50%
75%
100%
Average Performing Location
Hospital 14
powered by amplifire

Results

- Knowledge acquisition and retention increased significantly
- Significantly higher pass rate
- Outcomes pending……

Our Partners

Active

AgileMD
Alexa
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Mallinckrodt
CareLoop
PLAYERLYNC
BD
LeanTaaS
Pfizer
ScribeAmerica
Hatten Antidote
Evolution Health
Patient Insight
Qualcomm Life
Medtronic
Further, Together
RxRevu
CareSpan
Primary Care Everywhere
KnowledgeFactor
CodaMedica

Pending

QuantantShare
HealthPrize Technologies
XebraPro
LIFELINK
Google
statrad
MedAware
Eliminating prescription errors
BEAR Systems
SupplyNET
ProcuredHealth
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Animedix
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VisibleHand
ASPENWARE
telespine
Mentis Healthcare Partners
tectonic
NOWDiagnostics
The Nodule Project
A Product of Matrix Analytics
HMS

THANK YOU