

System-Wide Central Monitoring and Deployment of the Rothman Index Early Warning System to Improve Patient Outcomes

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Continuing Education Disclosure

- No financial disclosures

Objectives

1. Understand the strategies required when implementing novel clinical workflows related to partnerships between bedside care and remote monitoring teams
2. Describe the benefits of global remote monitoring utilizing early warning systems on patient outcomes and team-based care
3. Recognize the need for data gathering, analysis, and response when setting up new models of patient monitoring and care delivery.

**TOP
5%**



NATIONALLY IN NUMBER
OF RESIDENTS TRAINED
900 residents and fellows
in training each year



4TH
LARGEST PRIVATE
MEDICAL SCHOOL
IN THE NATION

10TH LARGEST US
MEDICAL SCHOOL

TOP 5%



worldwide in publishing
new knowledge



1,650
PHYSICIANS

610
ADVANCED
PRACTICE PROVIDERS

LARGEST
MULTI-SPECIALTY
PHYSICIAN PRACTICE
IN WISCONSIN



2.6 MILLION
PATIENT VISITS ANNUALLY

MCW PRACTICING PHYSICIANS
ACCOUNT
FOR

45%



OF WISCONSIN
DOCTORS LISTED IN
**BEST DOCTORS
IN AMERICA***

Froedtert

& MEDICAL
COLLEGE of
WISCONSIN

ACADEMIC MEDICAL CENTER

Froedtert & MCW



Licensed Beds	655 Beds
Staffed Beds	600 Beds
FY18 Patient Discharges	31,130
FY18 Outpatient Visits	799,127
Physicians	1,552
FTEs	5,073

COMMUNITY HOSPITAL DIVISION

Community Memorial Hospital



Licensed Beds	237 Beds
Staffed Beds	202 Beds
FY17 Patient Admissions	8,886
FY17 Outpatient Visits	101,497
Physicians	666
FTEs	1,060

St. Joseph's Hospital



Licensed Beds	70 Beds
Staffed Beds	70 Beds
FY17 Patient Admissions	3,751
FY17 Outpatient Visits	87,549
Physicians	465
FTEs	524

What is the Rothman Index?



[The Rothman Index](#) ▾

[Solutions](#) ▾

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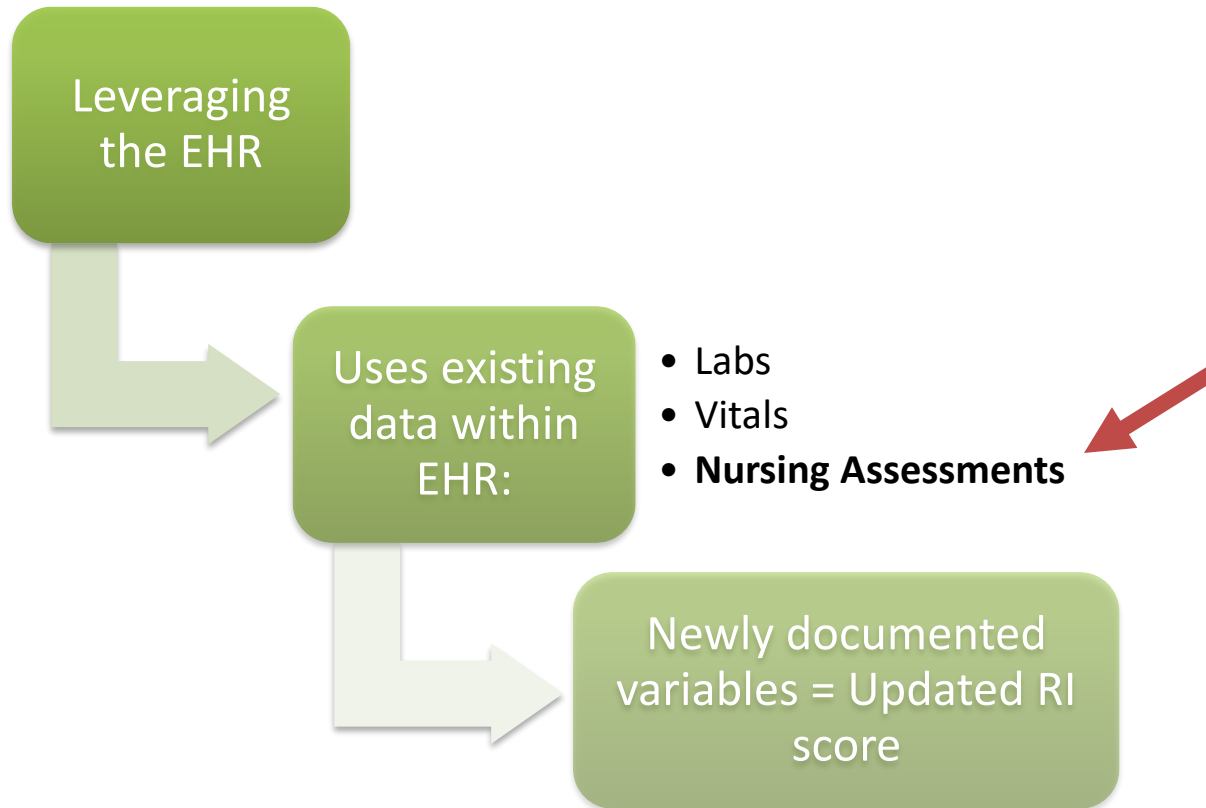
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We live to save lives.

Identify at-risk patients sooner for earlier intervention
with predictive, real-time clinical surveillance
solutions.

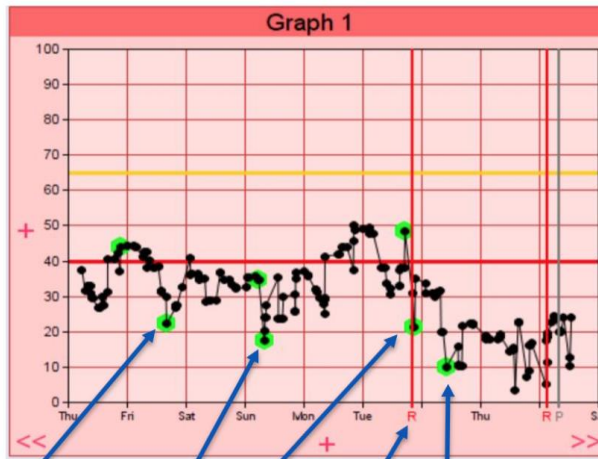
How Does It Work?



Rothman Index: Core Variables

Vital Signs	Cardiac Rhythm	Nursing Assessments
Temperature	Asystole	Cardiac
DBP	Sinus Rhythm	Respiratory
SBP	Sinus Bradycardia	Gastrointestinal
Pulse O ₂ %	Sinus Tachycardia	Genitourinary
RR	Atrial Fibrillation	Neurological
HR	Atrial Flutter	Skin
Lab Tests	Heart Block	Safety
Creatinine	Junctional Rhythm	Peripheral Vascular
Na	Paced	Food/Nutrition
Cl	Ventricular Fibrillation	Psychosocial
K	Ventricular Tachycardia	Musculoskeletal
BUN		Braden Score
WBC		
Hgb		

Rothman Index: Visualization



	Thu 21:07	Fri 16:00	Sun 05:18	Sun 07:49	Tue 17:06	Tue 21:00	Wed 10:03
Rothman Index	44.0	22.2	34.6	17.5	48.3	21.4	10.0
Temperature ° F:	97.7	98.1	98.3	97.4	97.1	97.1	97.0
Systolic BP:	110	133	118	99	120	126	142
Diastolic BP:	88	70	63	62	64	71	73
HeartRate:	72	87	86	98	58	91	74
RespRate:	18	22	18	20	20	20	10
PulseOx:	99	90	98	86	97	77	90
HeartRhythm:							
Braden:	19	16	16	16	19	15	12
Cardiac:	met	met	not met	not met	met	met	not met
Food:	met	not met	not met	not met	met	not met	not met
Gastrointestinal:	not met	not met	not met	not met	not met	not met	not met
Genito-urinary:	not met	not met	met	met	not met	not met	not met
Musculo-skeletal:	not met	not met	not met	not met	not met	not met	not met
Neurological:	not met	not met	not met	not met	not met	not met	not met
Peripheral-vasc:	not met	not met	not met	not met	not met	not met	not met
Psycho-social:	not met	not met	not met	not met	not met	not met	not met
Respiratory:	not met	not met	not met	not met	met	met	not met
Safety:	not met	not met	not met	not met	not met	not met	not met
Skin:	not met	not met	not met	not met	not met	not met	not met
BUN:	15	15	14	14	23	23	21
Creatinine:	0.7	0.5	0.5	0.5	0.7	0.7	0.7
WBC:	4.3	9.97	8.07	7.38	10.05	10.05	8.72
HGB:	9	9	8.4	8.9	9.7	9.7	9.3
Chloride:	87	88	85	85	83	83	88
Sodium:	120	120	122	122	130	130	133
Potassium:	4.6	4.9	4.1	4.1	3.3	3.3	3.6

Medium

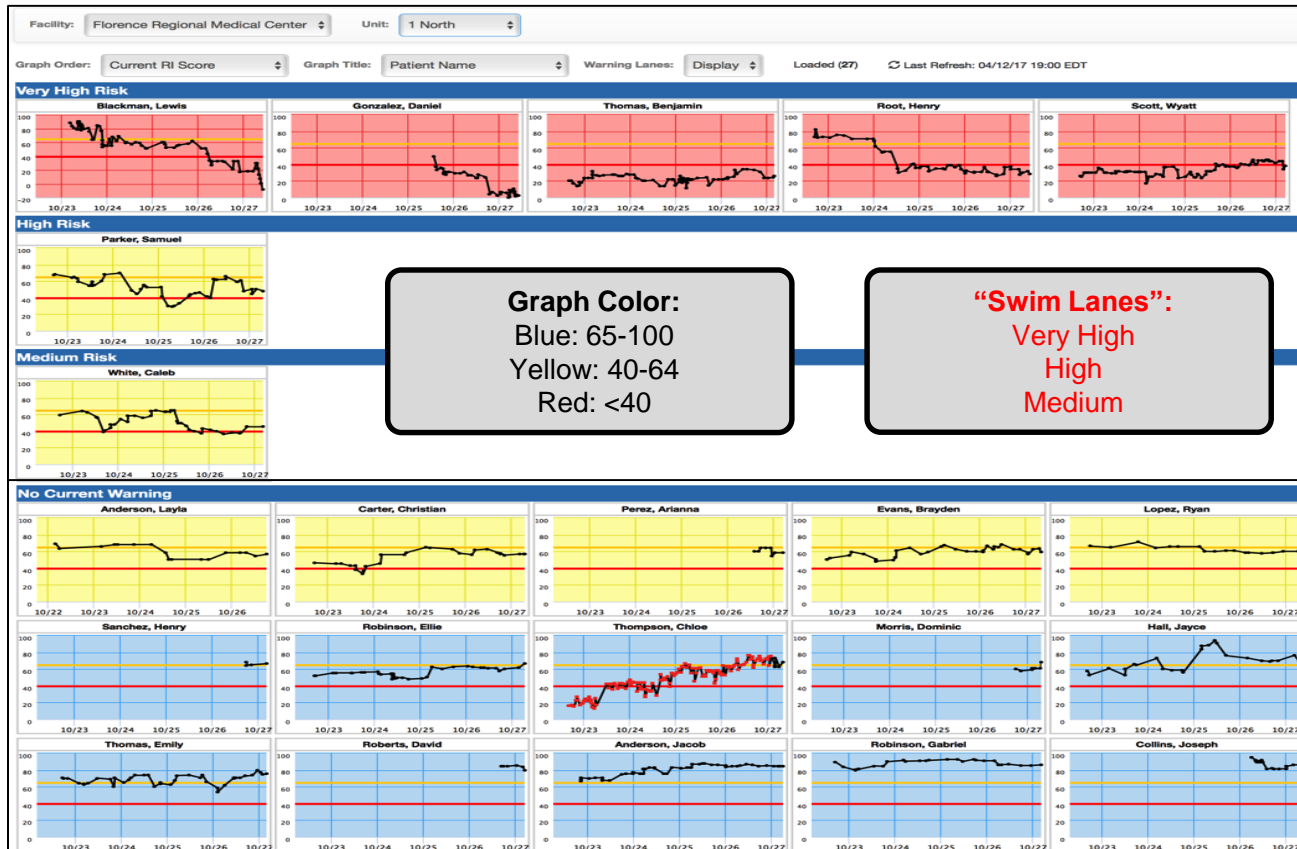
High

RRT

Very High

Clicking on the Rothman Index score provides clinical assessment details to support early intervention.

Rothman Index: Visualization



Graph Color:
 Blue: 65-100
 Yellow: 40-64
 Red: <40

“Swim Lanes”:
 Very High
 High
 Medium

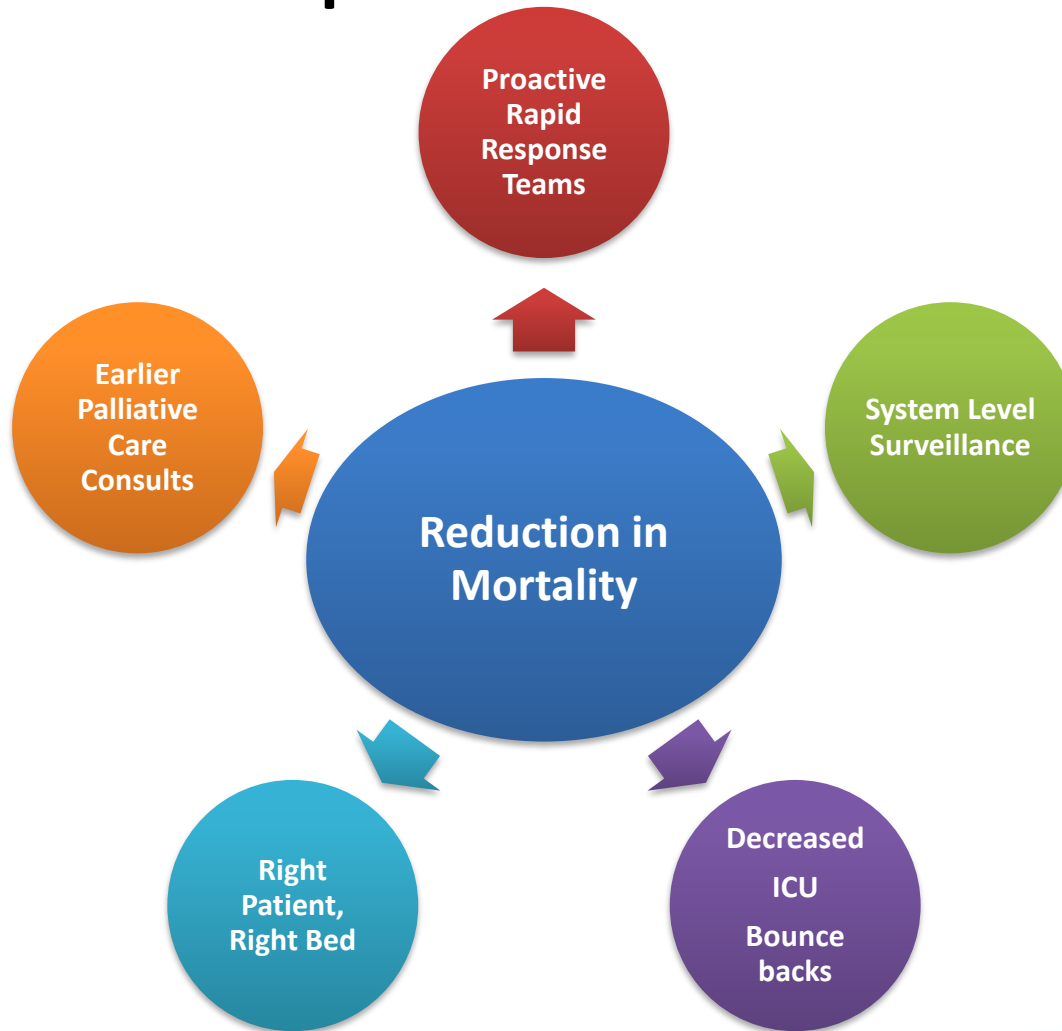
Historical Data Analysis and Trending

July 2017 through November 2017

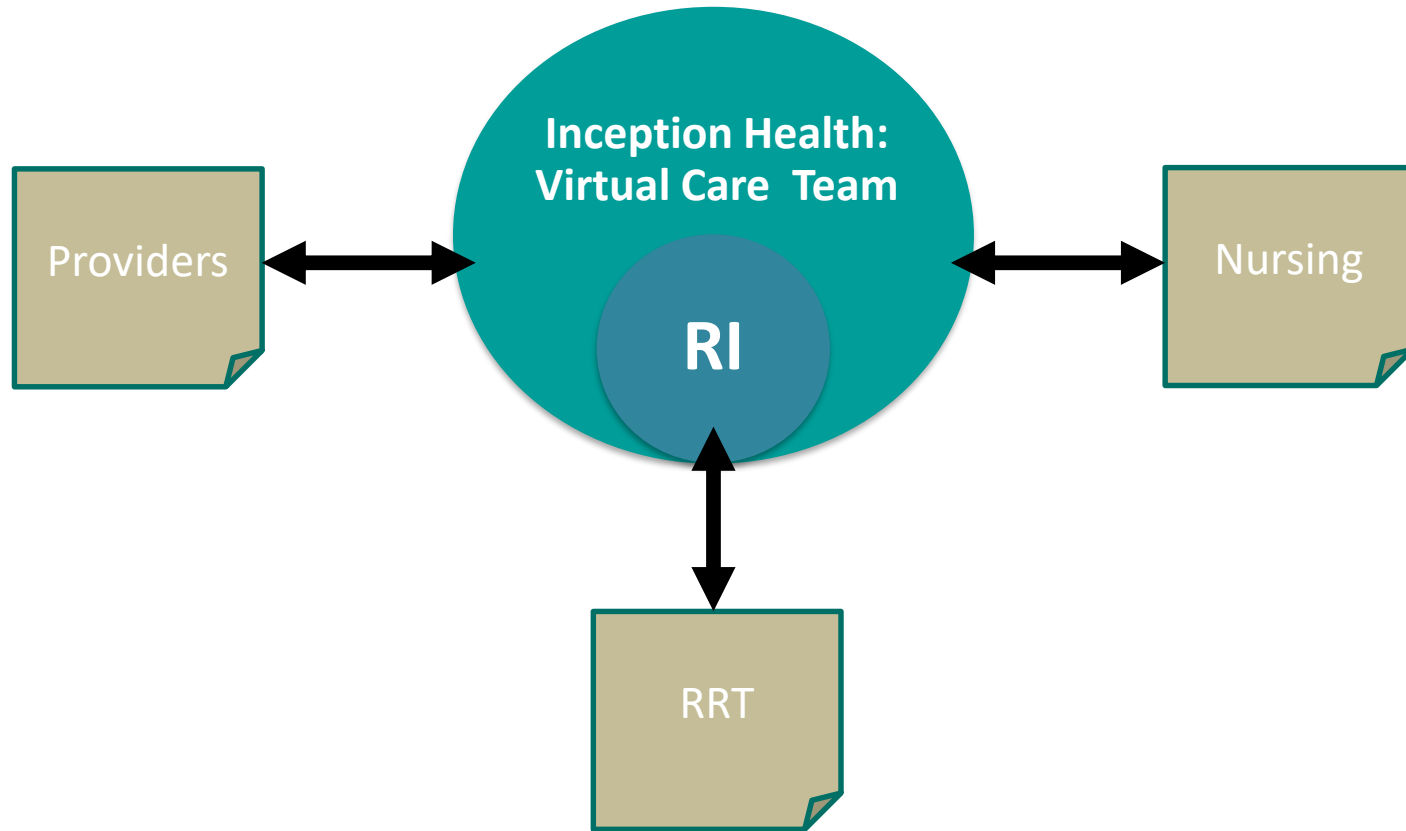
Facility	Very High		High		Medium	
	Rule	AWPS	Rule	AWPS	Rule	AWPS
Froedtert Hospital	RI < 15	2	RI Drops 45% in 12 hours	6	RI Drops 35% in 24 Hrs	12
Community Memorial	RI < 15	1	RI Drops 40% in 12 hours	2	RI Drops 30% in 12 hours	3
St. Joseph's	RI < 15	1	RI Drops 40% in 12 hours	11	RI Drops 30% in 12 hours <small>* AWPS = Alerts/Warnings per Shift * AWPS in Non-24 hours</small>	2

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 US Patent Nos. 8,092,380; 8,100,829; 8,355,925; 8,403,847 and 8,454,506; Canadian Patent No. 2,599,387 and other Canadian and foreign patents pending.

Top Use Cases



Implementation Planning



Project Charter: Leadership and Sponsorship

Executive Sponsors

- CMO and CIO

Clinical Lead

- CNO

Clinical Operations Steering Committee Leads:

- Associate CMO
- Director of Special Projects, Nursing
- Executive Director of Clinical Operations at Inception Health

Data Analytics Committee:

- CQO
- Partnership: Collaborative for Healthcare Delivery Science

Implementation Planning

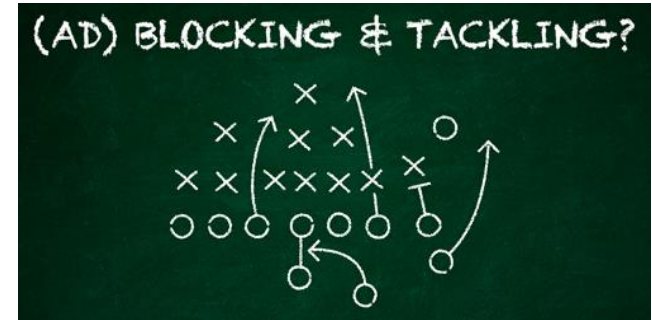
Assemble Teams

- **Operations Team**
 - » *Key stakeholders and frontline care providers*
- **Quality Department**
 - » *Process Improvement experts*
- **Organizational Learning**
 - » *Education/Training*
- **Communications**
 - » *Change Management*

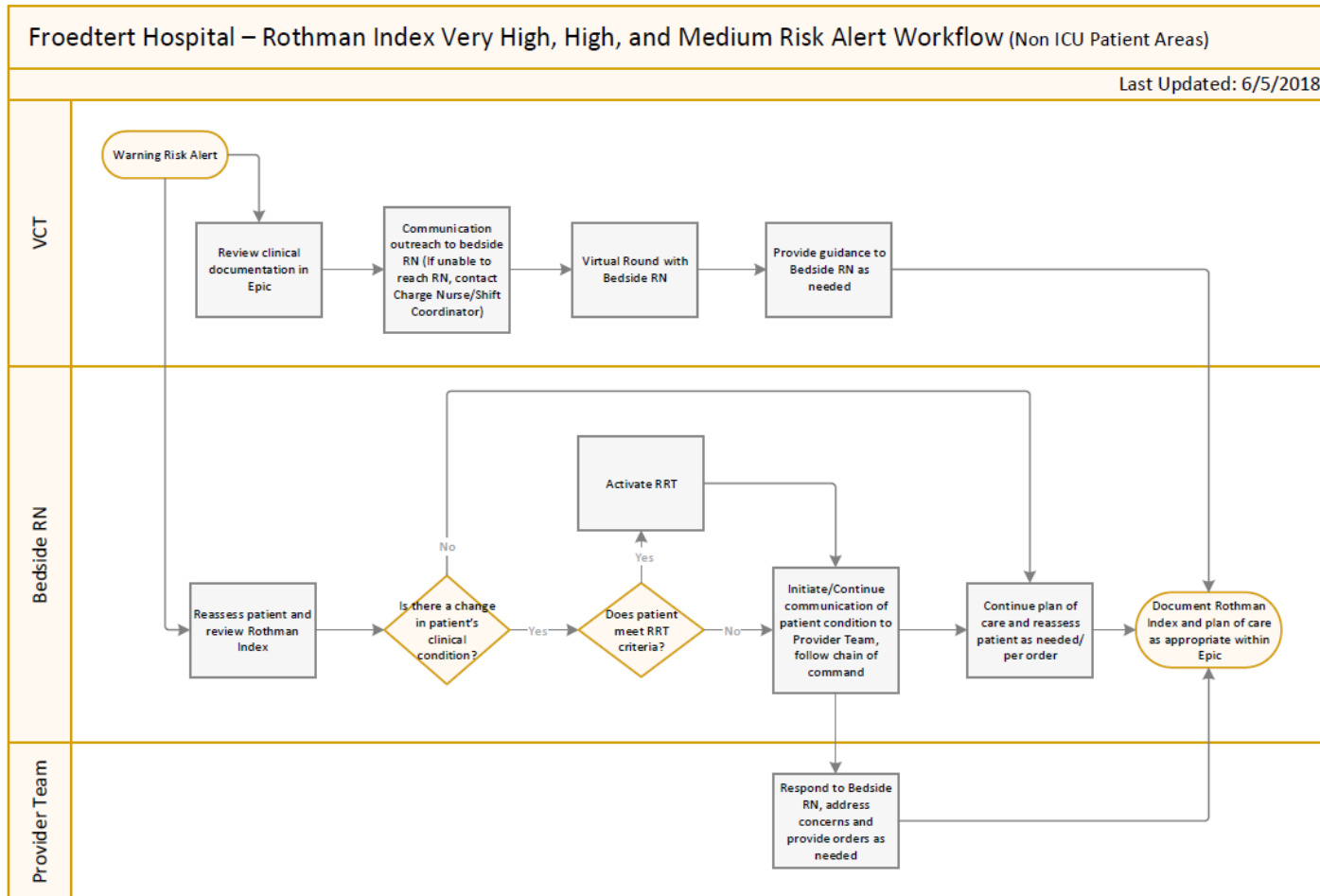


Implementation Strategy – The Basics

- Communication!
- Stakeholder Engagement
- Extensive Education and Training
- Ongoing Feedback, Support, and Response



Operationalization: Behind the Scenes Work



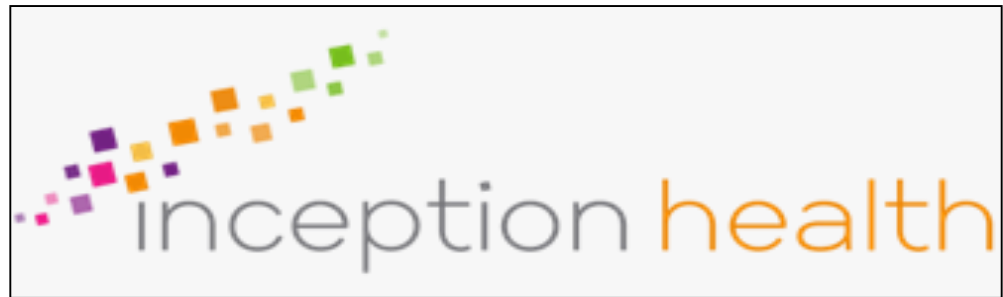
Change Management:

How Does this Impact Me and My Daily Work?

- Useful and powerful clinical tool
 - Assists in assessing a patient's overall condition
- Provides a “common language” for all patients
 - Transcends specialty
 - Improves efficiency in communication and care
- Helps prioritize and plan clinical work
- Goal: decrease patient decompensation response needs



Virtual Care Team (VCT)



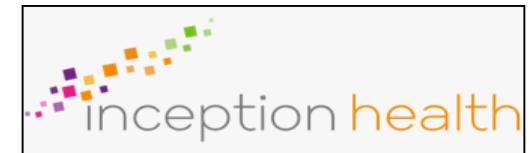
- Hub for Froedtert & The Medical College of Wisconsin health networks's digital health services
- Facilitate Innovation
- Collaborate to solve key health care problems
- Develop new ideas
- Scale solutions across the health network

“Eye in the Sky”



Virtual Care Team (VCT)

- Identified as key resource early in the operations planning process - integration of the RI into current care models
- Centralized team of expert clinicians
 - Intensivists/Advanced Practice Providers
 - eRNs
 - Innovators
- Versed in care optimization: provision of remote consultative support services
 - VICU (13 years)
 - Mature critical-thinking and communication skills
 - Nimble - masters of the iterative process
 - Early-adopters of technology



VCT and the RI

- First in the country to leverage centralized team as engine for continuous RI surveillance/care escalation
- System-wide surveillance
- Investigation and intervention - escalation algorithm
- Standardized workflows - streamline communication
- Pool for multidisciplinary input and engagement
- Evolution of “remote” care model

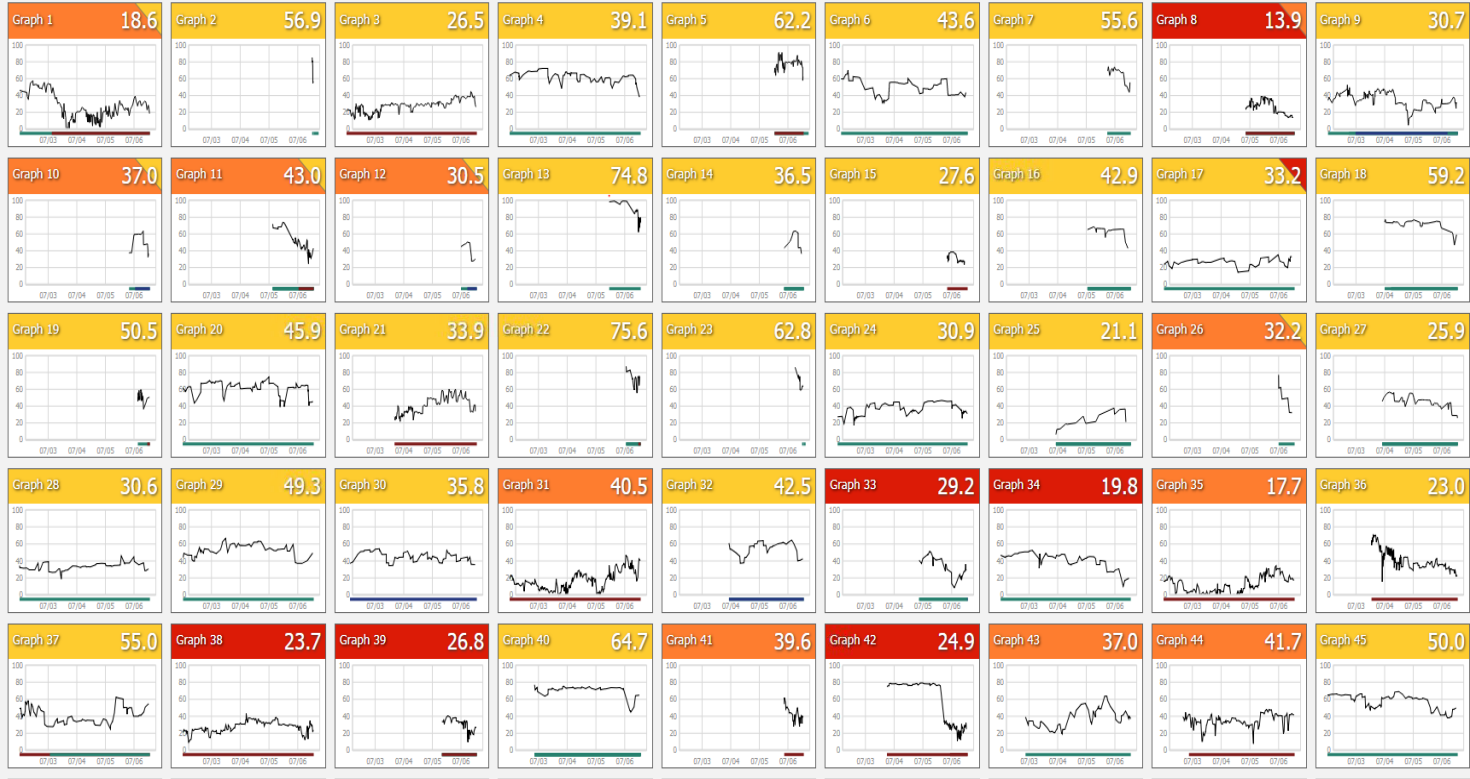
PeraWatch

Dashboard Search by name or MRN

GRAPH TITLE: Anonymous GROUP BY: None SORT BY: Warning Time

Viewing 692 Patients Across 46 Units

Last update



Impact: Process Measures

Rothman Index Data	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19
Warnings/Outreach	***							
Total # of warnings	875	2532	2401	2465	2367	2539	2747	2592
Average # of warnings/day	80	82	77	82	76	85	89	84
Total # of outreaches by VCT	845	2353	2284	2244	2184	1955	2008	1939
Average # of outreaches by VCT/day	28	76	74	75	70	65	65	63
Warning Detail								
% of total warnings--Very High Risk	7%	10%	7%	8%	8%	9%	4%	8%
% of total warnings--High Risk	24%	22%	24%	22%	24%	26%	24%	24%
% of total warnings--Medium Risk	69%	68%	69%	70%	67%	65%	72%	68%
Warnings by Site								
FMLH								
% of total warnings	72%	68%	70%	71%	71%	70%	66%	68%
Average # of warnings/day	58	56	54	58	54	60	59	57
CMH								
% of total warnings	19%	23%	21%	21%	20%	23%	24%	22%
Average # of warnings/day	15	20	16	18	15	20	22	19
SJH								
% of total warnings	9%	9%	9%	8%	9%	7%	10%	9%
Average # of warnings/day	7	7	7	6	7	6	9	8
Warning Disposition								
Continue Current Plan of Care	N/A	N/A	N/A	52%	56%	49%	51%	55%
Bedside RN/Dialysis RN already aware and interventions initiated	N/A	N/A	N/A	29%	29%	34%	32%	27%
Bedside RN/Dialysis RN to initiate interventions	N/A	N/A	N/A	15%	14%	16%	16%	17%
Bedside RN/Dialysis RN to activate RRT	N/A	N/A	N/A	4%	1%	1%	1%	1%

Impact Summary

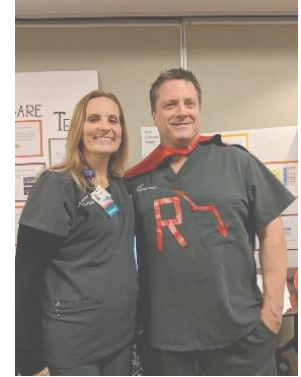
Volume Data Review (Jul 18 - Jan19)

- Average # of warnings per month 2500
- Average # of warnings per day 82
- Average # of VCT outreaches per month 2100
- Average # of VCT outreaches per day 70

Warning Disposition Detail (Sept 18 - Jan 19)

- Continue current plan of care 53%
- Bedside RN/Dialysis RN aware and interventions initiated 30%
- Bedside RN/Dialysis RN to initiate interventions 16%
- Bedside RN/Dialysis RN to activate RRT 2%

Relationships Matter



Support Services Evaluation

- Sustained 100% “Top Box” rating

“.....The VCT are incredible partners and have been integral to the success of our Rothman workflows within Imaging.”

“.....team is topnotch and willing to adapt to our ongoing changing needs. Kudos!”

“Great support with the Rothman Index and talking through patient situations with staff. Very helpful resource, especially to newer staff who are still developing their critical thinking skills.”

“The VCT has been a great partner to work with on the Rothman project. Thank you for the great collaboration!!”

QI/Patient Safety Work: Incorporating RI

System for vetting, approving, and tracking various QI proposals related to the RI

Ongoing Projects:

- Radiology Department Pilot
- Community Hospital: Safety Huddles, Step-down unit transfers
- Nurse staffing assignments
- LOS Pilot
- Mortality Reviews
- Others: Palliative Care Triggers, Readmissions, Surgical Risk (ASA)

Radiology-VCT Partnership

Problems: Isolated care area, rising RRT/Code 4 volumes, hand-offs

Goal: Safety assurance

- Extend “safety net”
- Ensure effective communication between care areas
- Proactive resource allocation



Solution: Radiology-VCT Partnership

- Radiology Team contacts VCT on patients with RI score <40 or active warning and scheduled to travel for a procedure
- VCT conducts a detailed review and partners with Radiology Team
 - Ensure appropriate resources available to support patient,
 - Recommendation for bedside procedure?

Dialysis-VCT Team Partnership

Problems: Isolated care area, RRT volumes, hand-offs

Goal: Bridge the Gap

- Optimize care delivery – develop partnerships
- Streamline communication
- Proactive interventions



Solution: Dialysis-VCT Partnership

- VCT outreaches to Dialysis Team with warning notification/support
 - Warning detail, Chart review findings, Support of “next steps”
- VCT also outreaches to Bedside RN with warning notification/support
 - Shared discussion: interventions and plan-of-care

Rapid Response Team-VCT Partnership

Problem: RRT being used for needs outside of service scope

- Stretched resources, potential missed opportunities

Goal: Right Resource-Right Time

- Streamline care delivery
- Optimize resource allocation
- Proactive intervention



Solution: RRT-VCT Partnership

- Bedside RN to utilize VCT – bidirectional outreach
- Virtual Rounds: RRT – VCT, review shared “watch list”
- VCT – RRT communication models

Our Journey: Importance of Agility

June 20th

- Rothman Index go-live (outreach for all warnings) across the enterprise—VCT supporting 900+ beds

July 9th

- Radiology-VCT Partnership launch

August 1st

- RRT-VCT Partnership launch

October 1st

- Dialysis-VCT Partnership launch
- RRT “Soft Call” transition to VCT

November 1st

- Revised Medium Warning Outreach Workflow go-live
- Radiology Team support scaled to include Nuc Med, PET, MR. VCT monitoring of 4th floor Radiology Suite

December 6th

- Revised Medium Warning Outreach workflow for fresh post-op patients/L&D patients

December 18th

- Revised Medium Warning Outreach workflow scaled to include all warnings for Palliative/Comfort Care patients

March 1st

- Continued Monitoring/Focused “Look-Back” launched



