

Managing by Prediction

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Workshop Session A7/B7
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523 Bed Medical Center
Admissions/Year – 32,981
900,000 outpatient visits
\$143 million externally funded research
\$ 1.3 billion dollar endowment



12,000+ employees
Surgical Procedures – 31,000 cases (20% Inpt)
17% average annual growth over past decade
National /International partnerships and affiliates

Core Business strategy at Cincinnati Children's

- **Research**-Conduct research to generate new knowledge that changes the paradigm-
- **Quality Improvement**-Reliably apply new and past knowledge (evidence) to transform outcomes

Strategic Commitment to Transform Outcomes, Experience and Value

- 1. Focus on large-scale, organizational changes**
- 2. Goal setting for systems based on 100% performance and 0% defects**
- 3. Emphasis on transparent processes for sharing successes and failures internally and externally with patients**

Being the Best at Getting Better

- Focus on the outcomes
- Patients and families as Partners
- **Integration and alignment**
- **Theory of knowledge, Building a learning system**
- Respecting the science
- **Capacity and capability**
- Transparency and Trust
- **Learning from other industries**
- **Prediction and management**
- Executing with a sense of urgency



Alignment in complex set up

Role of Structures
Connecting the dots

Alignment

- **Alignment:**
 - Align **measurement**
 - Align strategy and **accountability**
 - Build **improvement capability**
- **Integrate into daily work**
- **All strategic goals are part of each component of the organization with specific assignments and expectations down to the individual level**

The Elements of Prediction

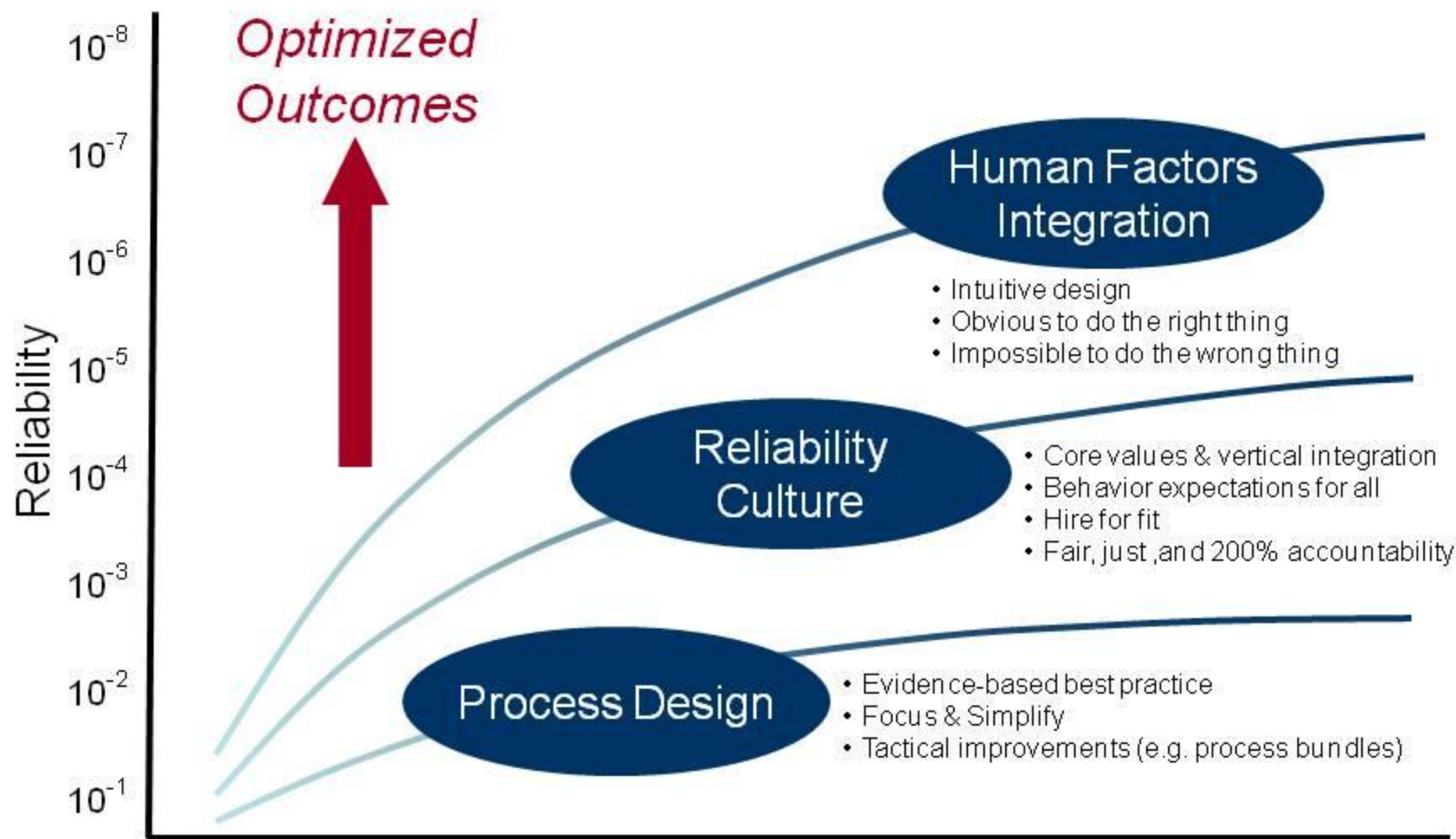
- **MEASURABILITY OF OUTCOME** – Will it be clear if the outcome happens or not?
- **VANTAGE** – Is the person making the prediction in a position to observe the predictions and context?
- **IMMINENCE** – Is the event to occur in the next week or years away? Is the prediction before the event?
- **CONTEXT** – Is the context clear to the person predicting?
- **PRE-INCIDENT INDICATORS (PINs)** – Are there detectable pre-incident indicators that will reliably occur before the outcome?
- **EXPERIENCE** – Does the predictor have experience with the specific topic involved?
- **COMPARABLE EVENTS** – Is it possible to study outcomes similar to the one being predicted?
- **OBJECTIVITY** – Is the person who is predicting objective enough to believe either outcome is possible?
- **INVESTMENT** – To what degree is the person predicting invested in the outcome?
- **REPLICABILITY** – Is it practical to test the exact issue being predicted in another situation?
- **KNOWLEDGE** – Does the person making the prediction have *accurate* knowledge of the topic? Is the knowledge relevant and accurate?

Connecting the Dots

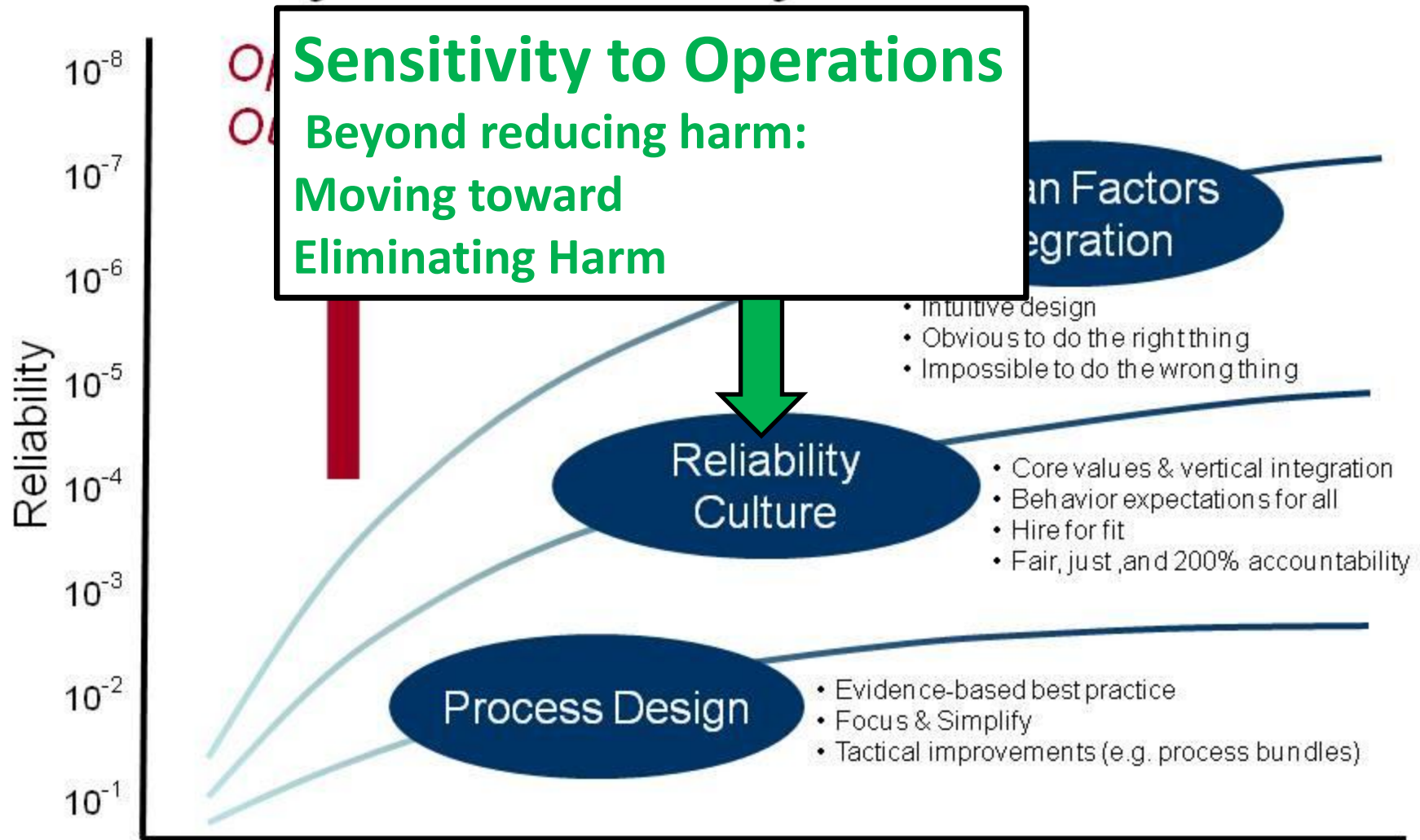
Putting it all together to achieve
System Wide Transformation
One Example: Patient Safety

Managing by Prediction: Patient Safety

Journey to Reliability – The Next Zero



Journey to Reliability – The Next Zero



Characteristics of HRO's

1. Preoccupation with failure

Regarding small, inconsequential errors as a symptom that something is wrong; finding the half-event

2. Sensitivity to operations

Paying attention to what's happening on the front-line

Situation Awareness, Managing by Prediction

3. Reluctance to simplify

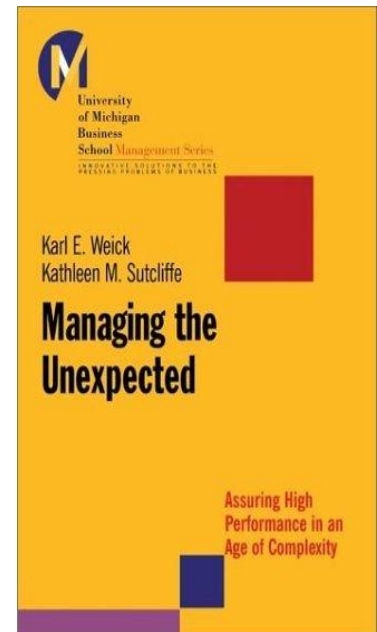
Encouraging diversity in experience, perspective, and opinion

4. Commitment to resilience

Developing capabilities to detect, contain, and bounce-back from events that do occur

5. Deference to expertise

Pushing decision making down and around to the person with the most related knowledge and expertise



What is Situation Awareness ?

- Simple Definition:
 - Knowing what is going on around you.
 - Having a notion of what is important.
 - Anticipation of possible future consequences of the current situation.

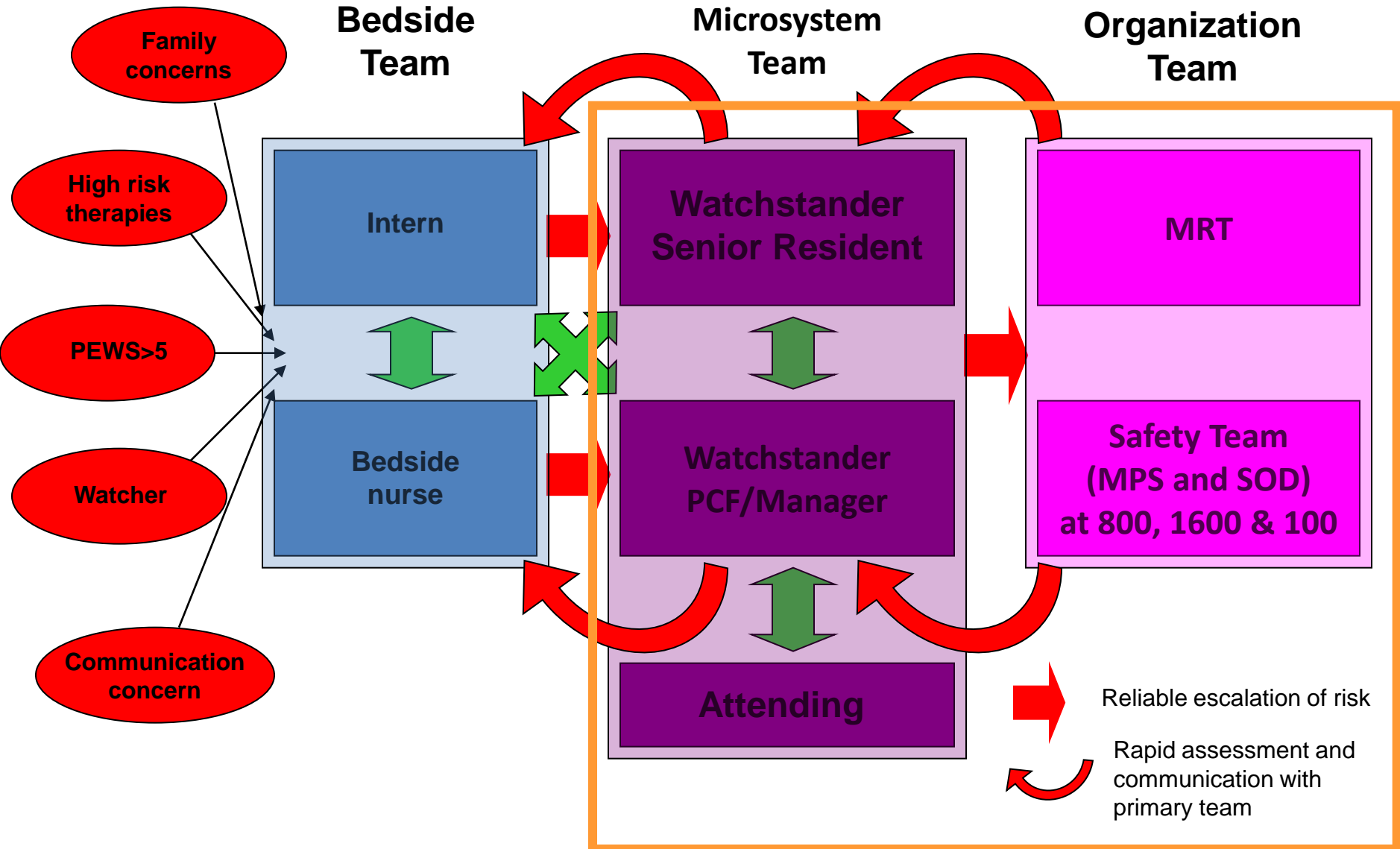
Dr. Mica Endsley (1995)

Prediction:

Patients at Immediate Risk

- **PEWS >5**
- **Family raises a concern**
- **Therapy unusual for this team**
- **“Watcher patient”**
- **Communication amongst team not adequate**

Situation Awareness Model



Focused Prediction for Safety: Inpatient Unit

- **Patients at Immediate Risk**
- **Staffing:**
 - ✓ Form the team
 - ✓ Adequate numbers
 - ✓ Unfamiliarity
- **Contingency Plans**
- **What if...?**

Focused Prediction for Safety: Pharmacy

- **Drug Shortages**
- **Unusual Therapies**
- **Chemotherapy Issues (Late starts)**
- **Staffing**

Organization Huddle

Adopted from the US Navy



- The Admirals' Huddle on a Carrier Task Force**
- **Look Back**
 - **Look Forward**
 - **Identify and Solve Issues**
- Every morning at 9AM**

Cincinnati Children's version

**Organization Daily
Safety Brief**

8:35 AM

**Department
Huddles**

8:00AM

**Unit-Clinic-Team
Huddles**

6:30-7:45AM

- **What Happened in the Previous 24 Hours?**
- **What's Predicted for the Next 24 Hours?**
- **Issues Which Need Resolution.**

Departments Reporting Out on Daily Safety Brief

Employee Safety

Inpatient (Liberty too) and ICU's

Surgery (Liberty too)

Emergency Department (Liberty too)

Outpatient

Psychiatry (A4C2 too)

Home Health Care

Pharmacy

Radiology

Family Relations

Laboratory

Infection Control

Supply Chain

Information Systems

Protective Services

Facilities

Others

Pyramid of Harm



Safety Focus: Operating Rooms

- **Clear Plan for the Case**
- **Multiple Surgical Teams**
- **Staffing appropriate**
- **Equipment available and staff competent**
- **Contingency Plans (add-ons)**

A photograph of three surgeons in an operating room. The surgeon on the left is wearing a green patterned scrub cap and a white head-mounted display (HMD) with 'LUXTEC' written on it. The surgeon in the middle is wearing a green scrub cap and a light blue surgical mask. The surgeon on the right is wearing a red, white, and blue American flag patterned scrub cap and a light blue surgical mask. They are all wearing blue scrubs and yellow gloves, and are focused on a surgical procedure. The background shows typical operating room equipment, including a large overhead light fixture and various medical supplies.

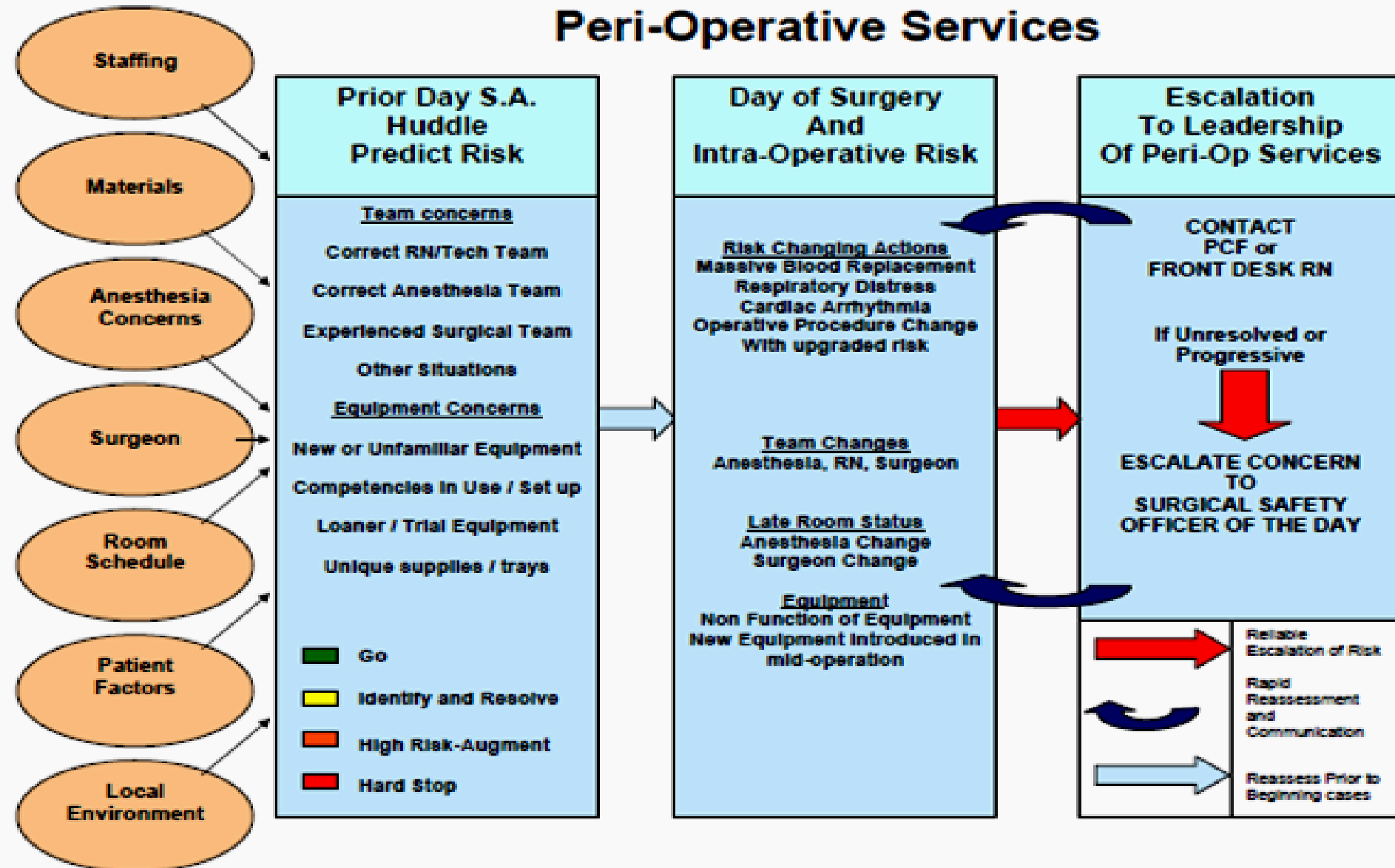
Situational Awareness

**in the
Operating Room**

Situational Awareness in Peri-Op Arena

- Predict – **Event / Patient Specific** Risks
 - “Huddles” each shift – Identify Situations at Risk
 - Nurses/Techs, Anesthesia, Leadership, Surgeons
- Mitigate - **Team** based solutions
 - Rounding with a purpose – update, mitigate
 - Provide resources
- Escalate / Communicate – **System** based solutions
 - Automatic increase in resources and help
 - Expected behavior, not sign of failure

Situational Awareness Model Peri-Operative Services



Risk Model : EMR Prediction

- Past History / Known Diagnosis
 - Congenital Anomalies
 - NICU experience
 - Co-Morbidities – Cardiopulmonary, DM, Neuro, Obesity,
- Past Experience in Institution
 - Prior Surgery
 - Airway management difficulties
- Prior Risk Incidents
 - SSI, ICU Admission, Anesthesia Experience

Risk Prediction Model

- Previous SSI
- Previous Critical Care Stay
- Anesthesia Pre-Screen/Consult conducted
- Prior return to ED
- At least one Complex Chronic Condition (Neuromuscular, Cardiovascular, Respiratory, etc)
- Morbid Obesity

Patient Name	MRN	Procedure Date	Previous SSI	Previous Critical Care	Previous Anesthesia Consult	Previous Anesthesia Screen	CCC Score	ED Days Prior
		11/29/2011	No	Yes, Last Stay: 11/23/2011	No	No	1	

Surgeon(s):	1)
Procedure(s):	1) MLB W/ BALLOON DILATION
Med Hx:	ANTERIOR GLOTTIC WEB OF LARYNX >>> Previous Discharge Dx: 11/23/2011 - 1) CONGENITAL WEB OF LARYNX; 2) STENOSIS OF LARYNX; 3) ATTENTION TO TRACHEOSTOMY; 4) ESOPHAGEAL REFLUX
Allergies:	OTHER - Dairy products cause constipation., Reaction: Constipation
Anes Comments:	need optical instruments for poss granulation tissue removal
Epic Problem List:	TRACHEOSTOMY STATUS; GERD (GASTROESOPHAGEAL REFLUX DISEASE); CONGENITAL LARYNGEAL WEB; SUBGLOTTIC STENOSIS; VASCULAR RING, AORTA; ADENOTONSILLAR HYPERTROPHY
Previous Patient Experience Issues:	international patient ; Hebrew

- **Green** - is all **CLEAR**, patient prepared and verified
- **Yellow** - is **“WATCH ROOM”**, notes elevated risk factors for patient safety identified. Proceed with caution. Communicate possible additional needs to PCF.
- **Orange** - is **“HIGH ALERT”** risk for patient vulnerability during the perioperative process. Requires additional resources and/or support from identified perioperative expert.
- **Red** - is the highest indicator which requires **“HARD STOP”** until the perioperative safety communication system has resolved the identified threat.

Classification of Cases – 30,700 Patients

Green	Yellow	Orange	Red
30,314	329	36	21

Distribution of Cases in Mix

- Otolaryngology – 12,000
- Pediatric Surgery – 4,100
- Neurosurgery - 525
- Orthopedic Surgery – 2,500
- Cardiac Surgery - 360
- Urology – 3,000
- Plastic Surgery - 825
- Others (dental, Gyn, GI, Pulm) – 8,000

Case Details

- **Green**
 - Routine Cases
- **Yellow (1 %)**
 - Re-Do Cardiac Surgery, Transplantation
- **Orange (0.12 %)**
 - Intraoperative Change in Status
- **Red (0.07%)**
 - Equipment Dysfunction
 - Multi-Service Pre-Operative planning
 - Intraoperative Deterioration

Situational Awareness Model

- Prediction of Risk
 - Intrinsic Patient Factors
 - Risk of Procedure
 - Experience of Team
 - Equipment
 - Work Environment
- Risk Report
- Color Coded Risk
- Plan for Mitigation
 - OR Staffing Models
 - Anesthesia Staffing
 - OR Team Composition
 - Just in Time Training
 - Environmental Assessment-
Case Mix
- Structured Response Level
(1-3)





Mitigation Planning

- Reactive – Depend on individuals to think their way through problems on the scene
- Predictive – Plan in advance for potential risks
- ***A carefully thought out plan developed in advance is nearly always better than a sudden decision made in the midst of an urgent situation.***

Risk Mitigation

- Round with Purpose
 - Structured time based – risk based attention
- Ask Questions . but . Ask the Right Questions
 - Update predictions – concerns, unexpected outcomes or changes
 - What are you worried about, resources met
- Focus on Safety Behaviors we believe will translate into better safer care – (the little stuff)
- Structured Escalation – Doesn't require someone to ask for Help


Risk Escalation / Communication

- Definition of a “Great Nurse / Doc” is no longer based on “work-arounds” and “solo-saviors” - emphasis now on getting the right assistance / team for safest care
-  **Risk**  **Automatic**  staff / support in room
- Skill level  with escalation
 - Not just more people, more of the right people
- Build Plans for anticipated risks in advance (advanced prediction = considered plan)

Safety Lessons we have Learned

- We were not clear about “Mission”
 - It is more than “Be a Safe Surgical Team”
- We were not clear about Expected Behaviors
 - Line Item Detail – ALL Providers (Not just RN’s)
- We were not clear on Execution
 - Unclear roles, role modeling
- We are still defining Personal Accountability
 - Violation of clear rule vs system problem
 - Blame-free culture vs required responsibility
 - No Exceptions

Leadership in Improvement

- ***Them*** – M.D's, R.N.'s, OR Techs, Residents
- ***Summary Knowledge*** – Experience, pitfalls
 - Know where improvement work  most improvement!
- ***Positional Power*** – As health care team leaders, we affect other's mood and attitude toward improvement efforts. Possess a **“Red Card”**
- ***Future Leaders*** – Need to constructively re-define the obligations of leadership **“Them” is Us!**
 - Role modeling – define and support change
 - Embed safety culture in our daily work
 - Innovative Thinking – Every Day Safer
- ***It's about the Patients – pretty simple***



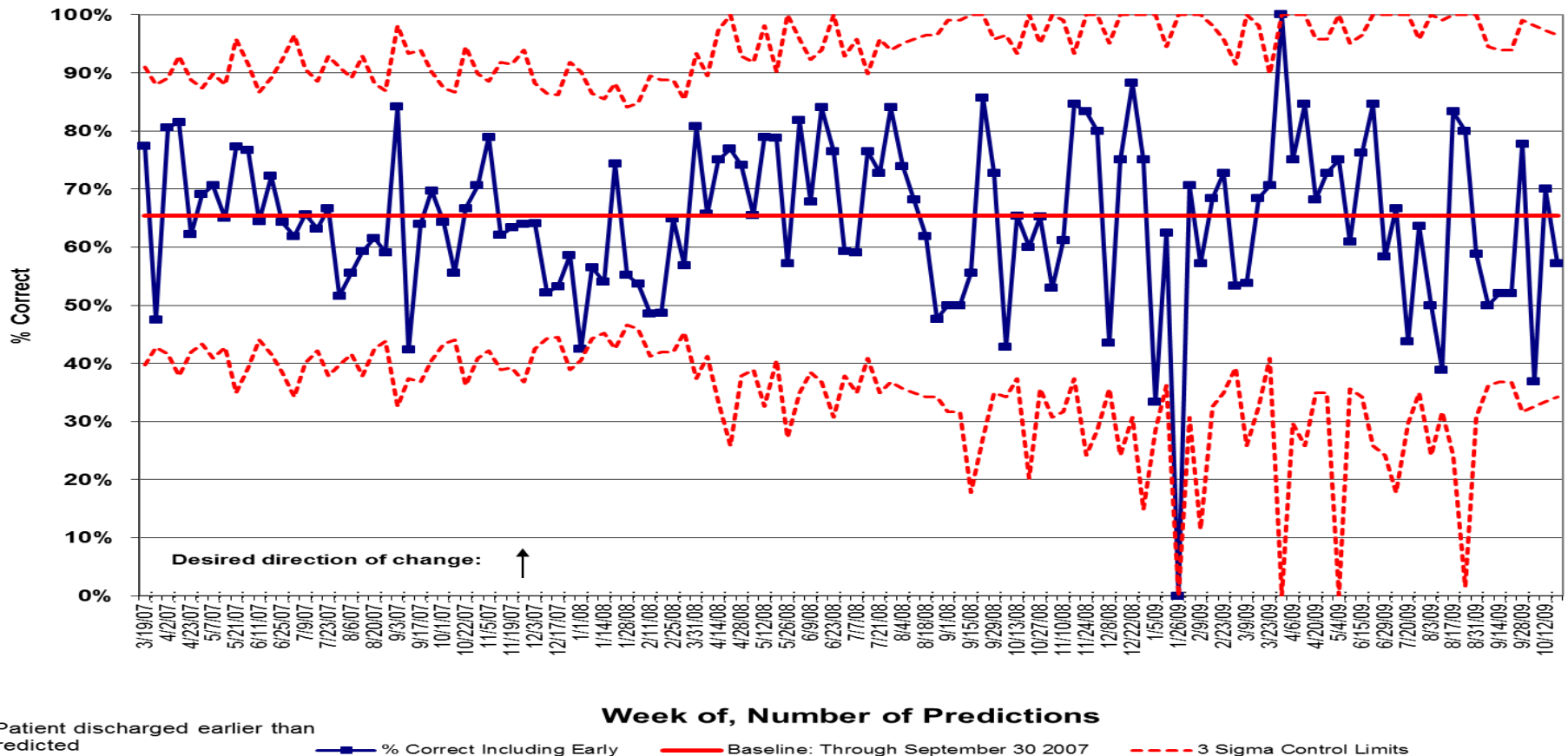
Prediction – Capacity Management

Discharge Prediction 3/2007-10/2009



A4N: % Correct Discharge Predictions

Same Day Predictions (Early Discharges Included*)



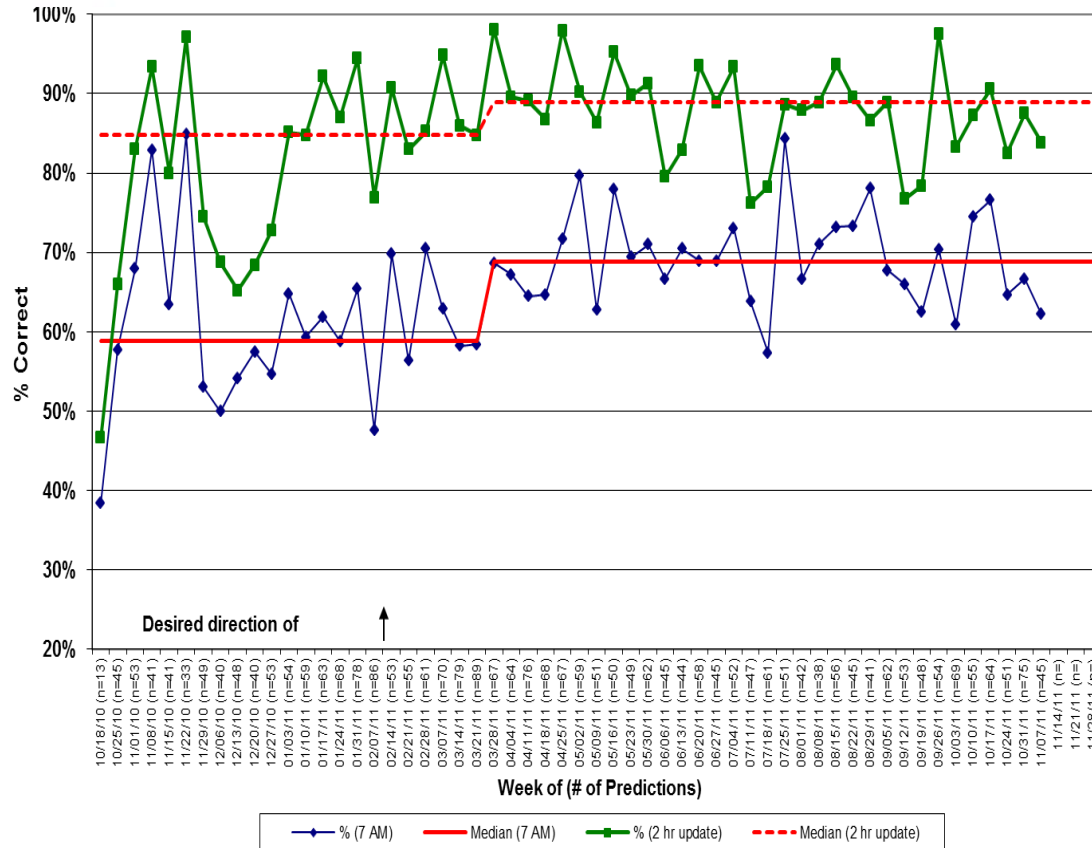
*Patient discharged earlier than predicted

Prediction – Capacity Management

Discharge Prediction 10/2010-11/2011



% Correct Discharge Predictions
A6N



Initiatives

- Prediction tied to RN shift
- Morning Bed Huddle Report
- Updated Prediction as day progresses
- Focus on Execution
- Failure Analysis

Prediction – Capacity Management

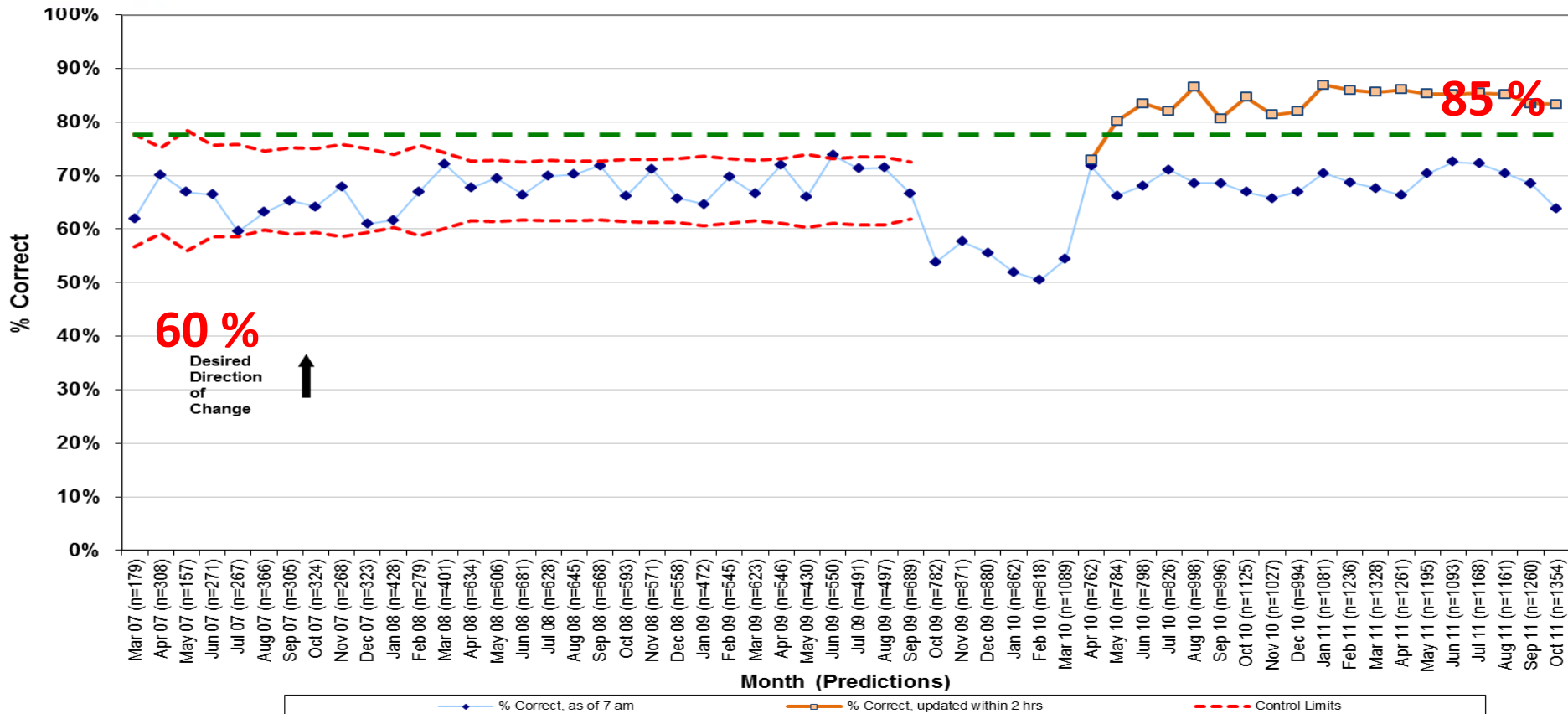
Discharge Prediction 3/2007-10/2011



Managing Discharge to Prediction

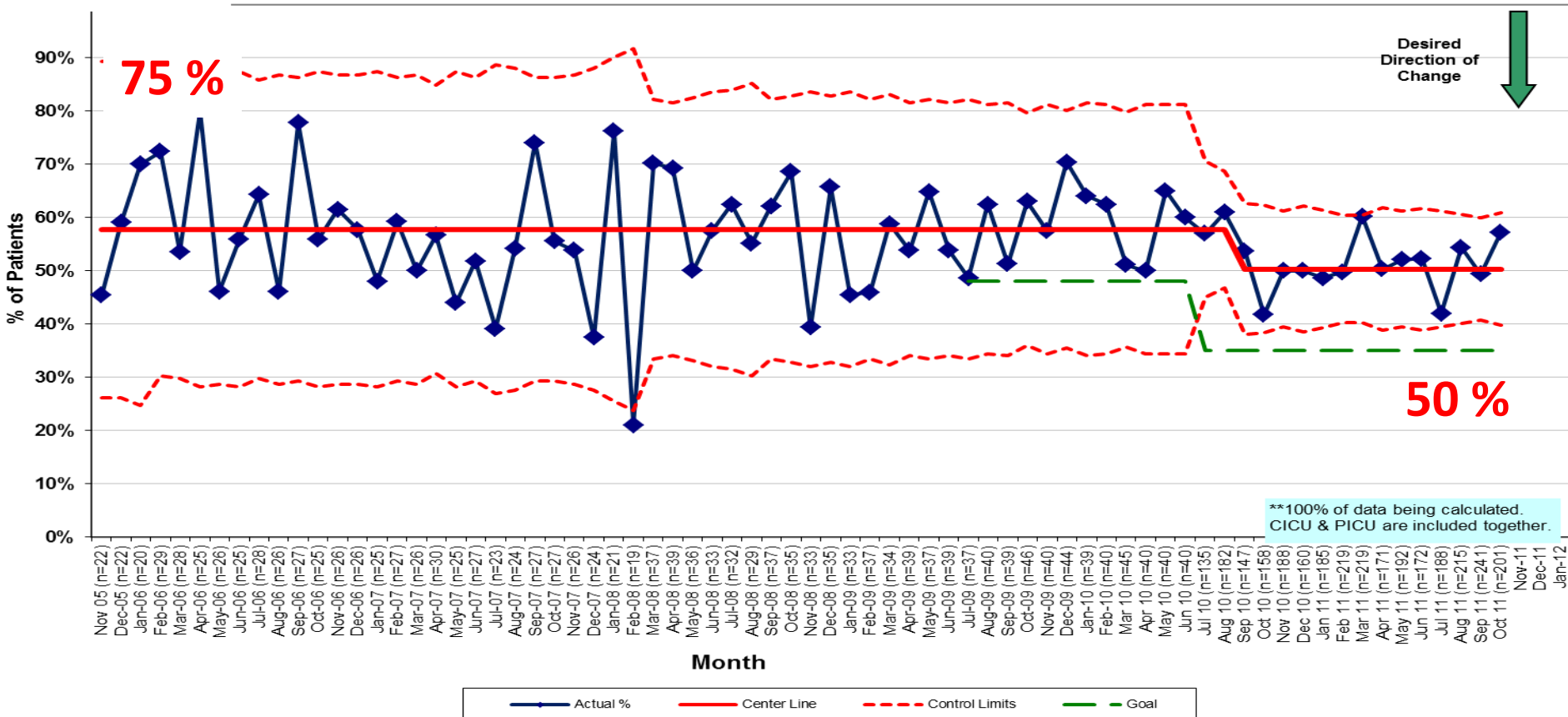
% Correct Discharge Predictions

Same Day Predictions (Early Discharges Included)



ICU to Floor Transfer Demand:Capacity Matching

Patients Waiting More than 2 hours* for a Transfer from the ICU to a Unit
Population: All Inpatients transferred from BCC or BHI** to another unit

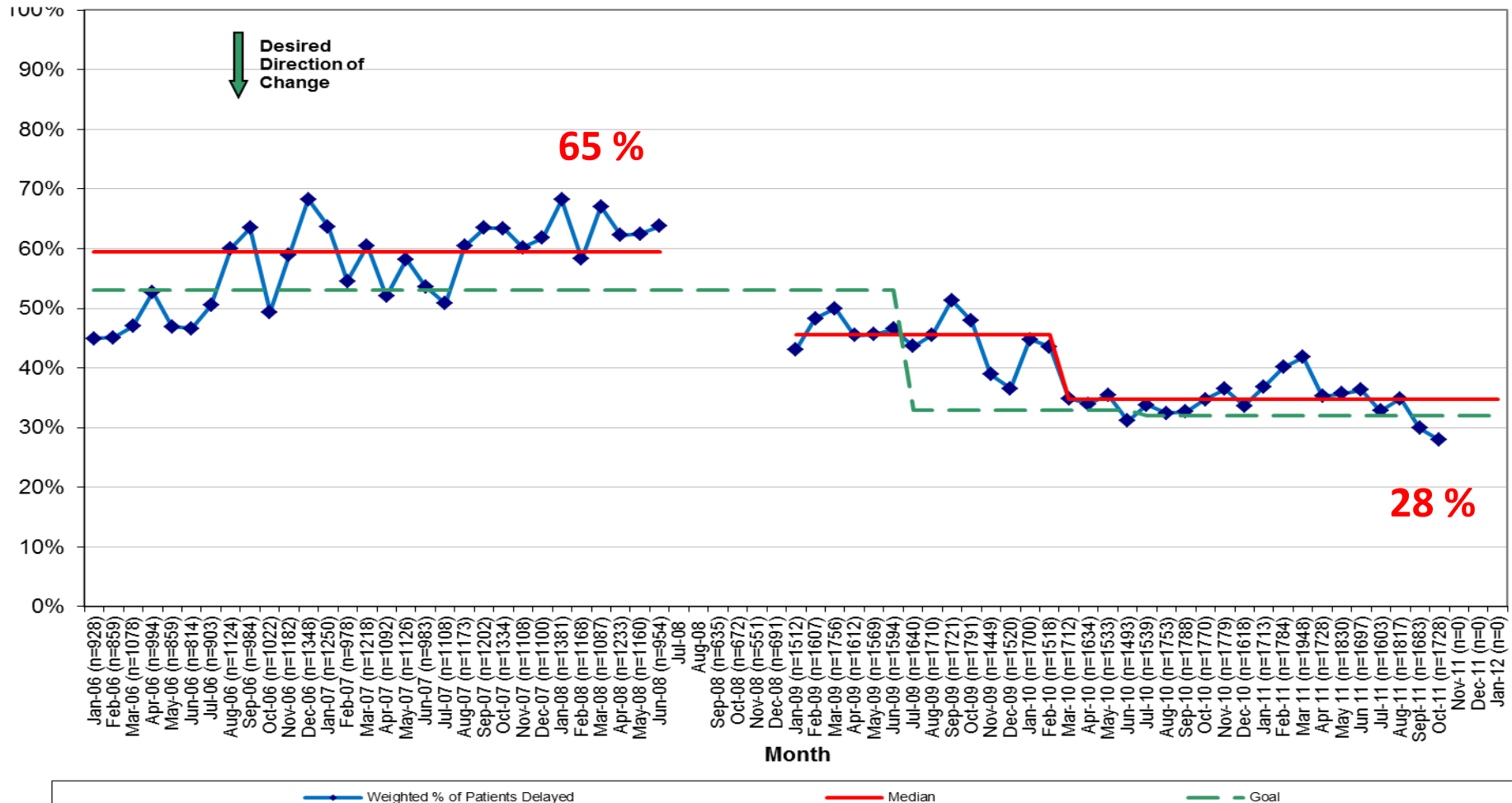


System Wide Delays



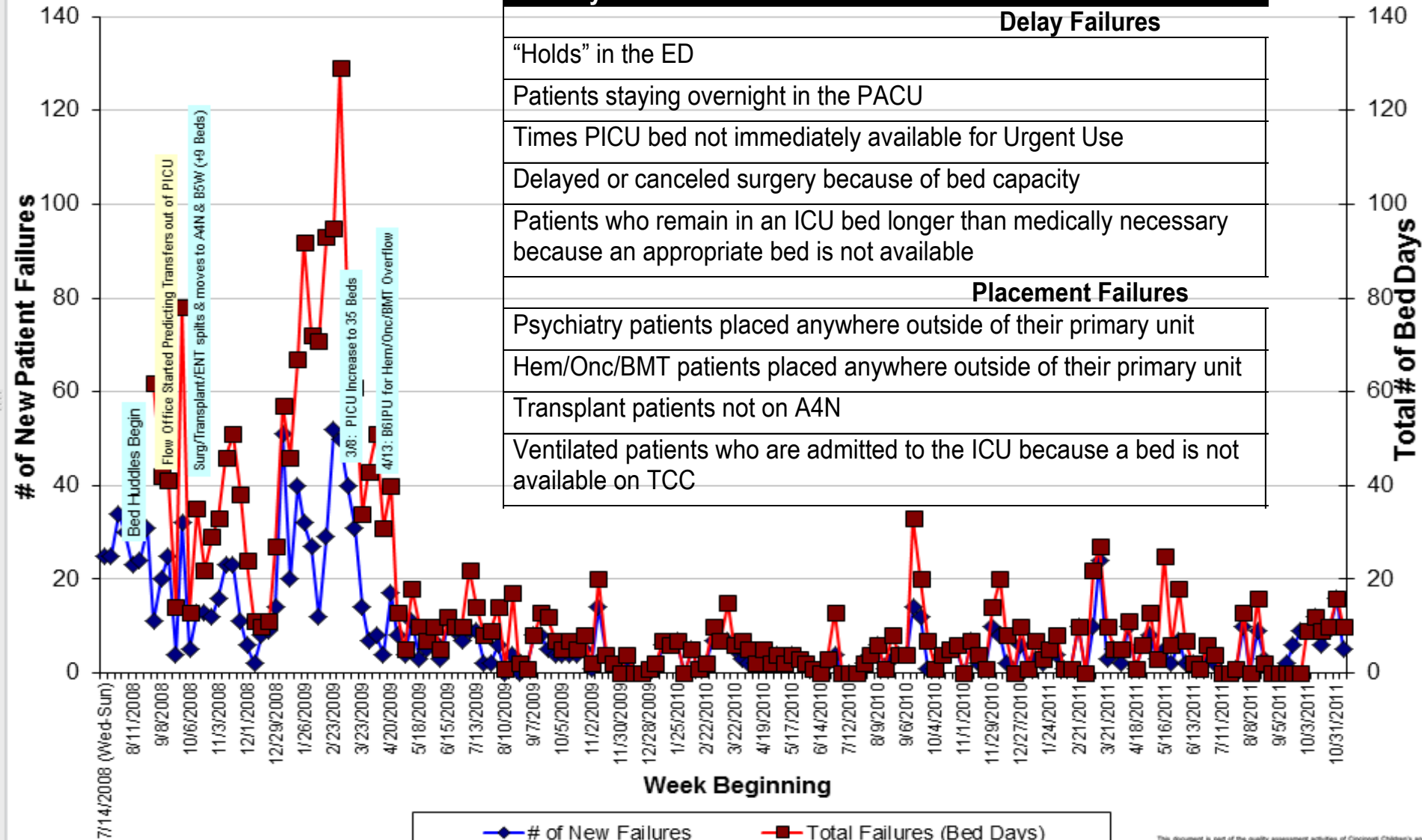
Percent of Patients Delayed

(Includes ED, PACU, and PICU*)



Weekly Critical Flow Failures

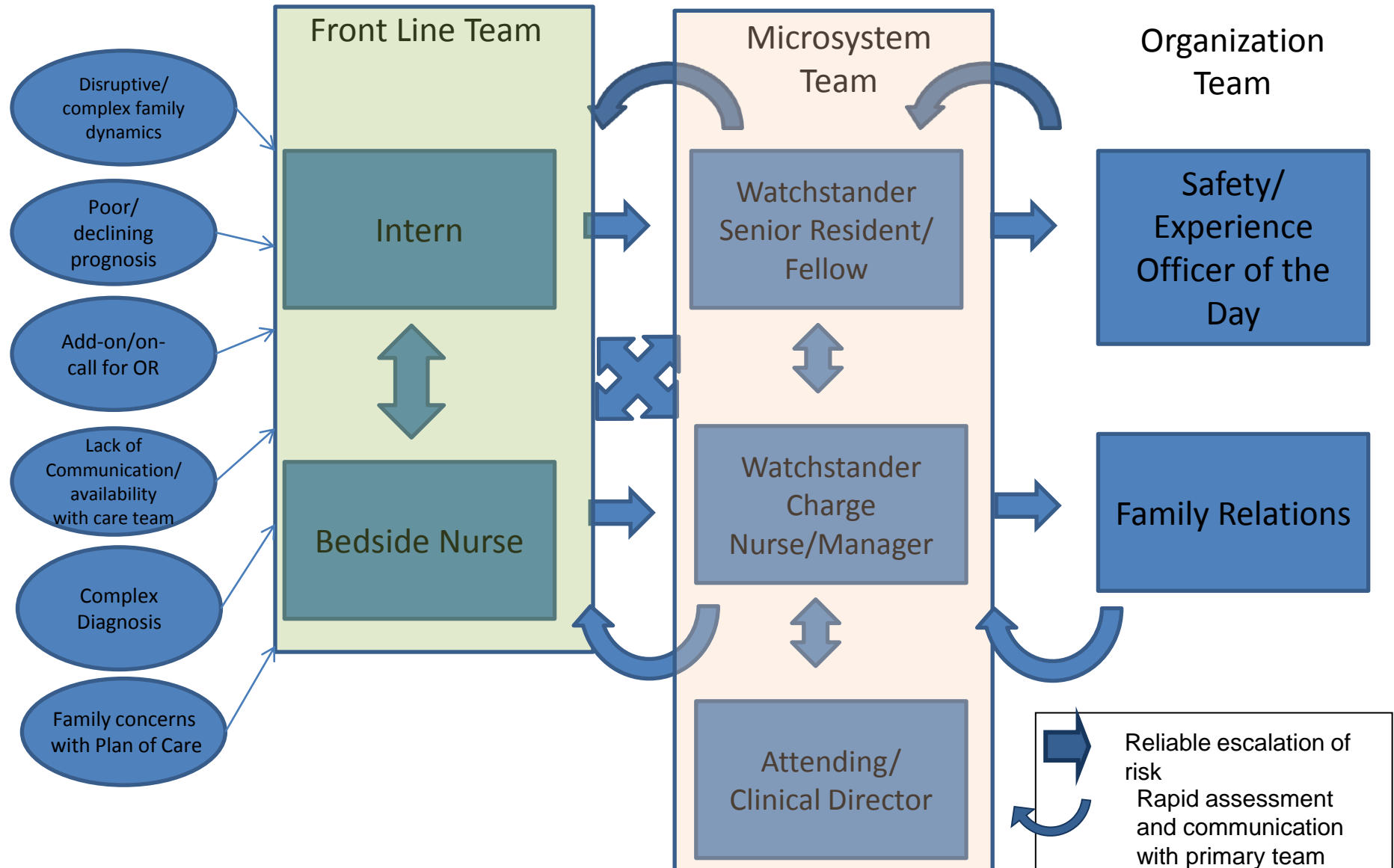
Flow System Failure	
Delay Failures	
"Holds" in the ED	
Patients staying overnight in the PACU	
Times PICU bed not immediately available for Urgent Use	
Delayed or canceled surgery because of bed capacity	
Patients who remain in an ICU bed longer than medically necessary because an appropriate bed is not available	
Placement Failures	
Psychiatry patients placed anywhere outside of their primary unit	
Hem/Onc/BMT patients placed anywhere outside of their primary unit	
Transplant patients not on A4N	
Ventilated patients who are admitted to the ICU because a bed is not available on TCC	



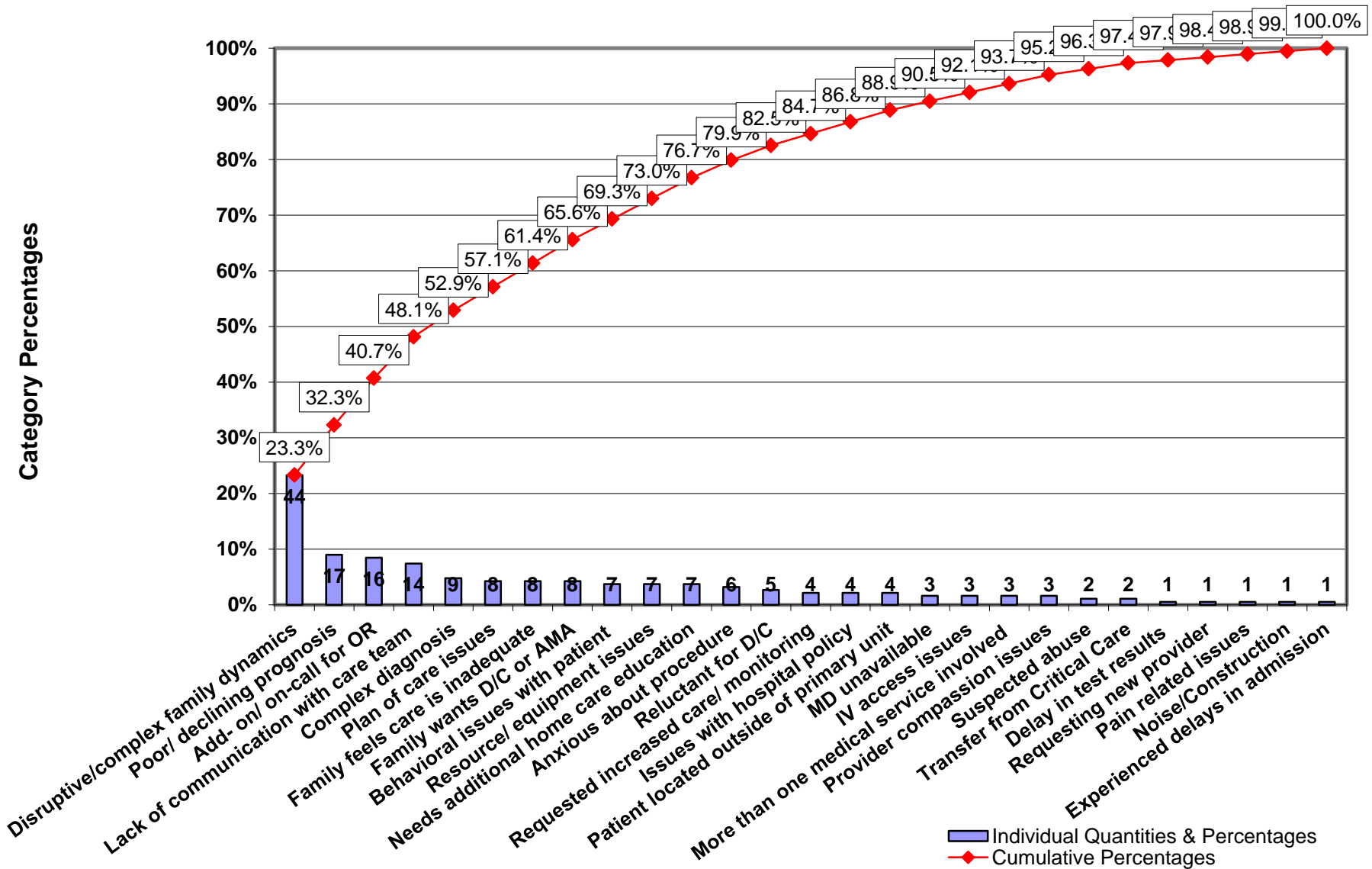
- **Getting to 85% Reliability**
 - Standardization, Decrease Variation
 - Evidence Based Care Pathways
 - “Bundles” of Care
 - Checklists
 - Scripted Behaviors (Handoffs)
- **Getting from 85% to 100%**
High Reliability Organization
 - Prediction of Future Risks
 - Mitigation / Communication Strategies
 - Resilience in face of adversity
 - Escalation to Experts



Situation Awareness: Identifying and Mitigating Experience Failures



Sources of Potential Triggers/Description of Predictions



Situation Awareness Process for Experience (Inpatient)

- 7:30 AM Unit Huddle
 - Unit staff predict patients/families at risk for a negative experience
- 8:00 AM Bed Huddle
 - Charge Nurses report predictions
- 8:30 AM Daily Safety Briefing
 - Family Relations report number of current concerns and current predictions
- Throughout Day
 - Patient/Family Advocates visit units to discuss/coach unit staff on mitigation plan
- 4:30 PM Bed Huddle
 - Charge Nurses report back and/or bring new predictions

Mitigation Strategies

- Proactive Rounding
- Clear communication of care plan
- Mitigating delays
- Proactive care interventions

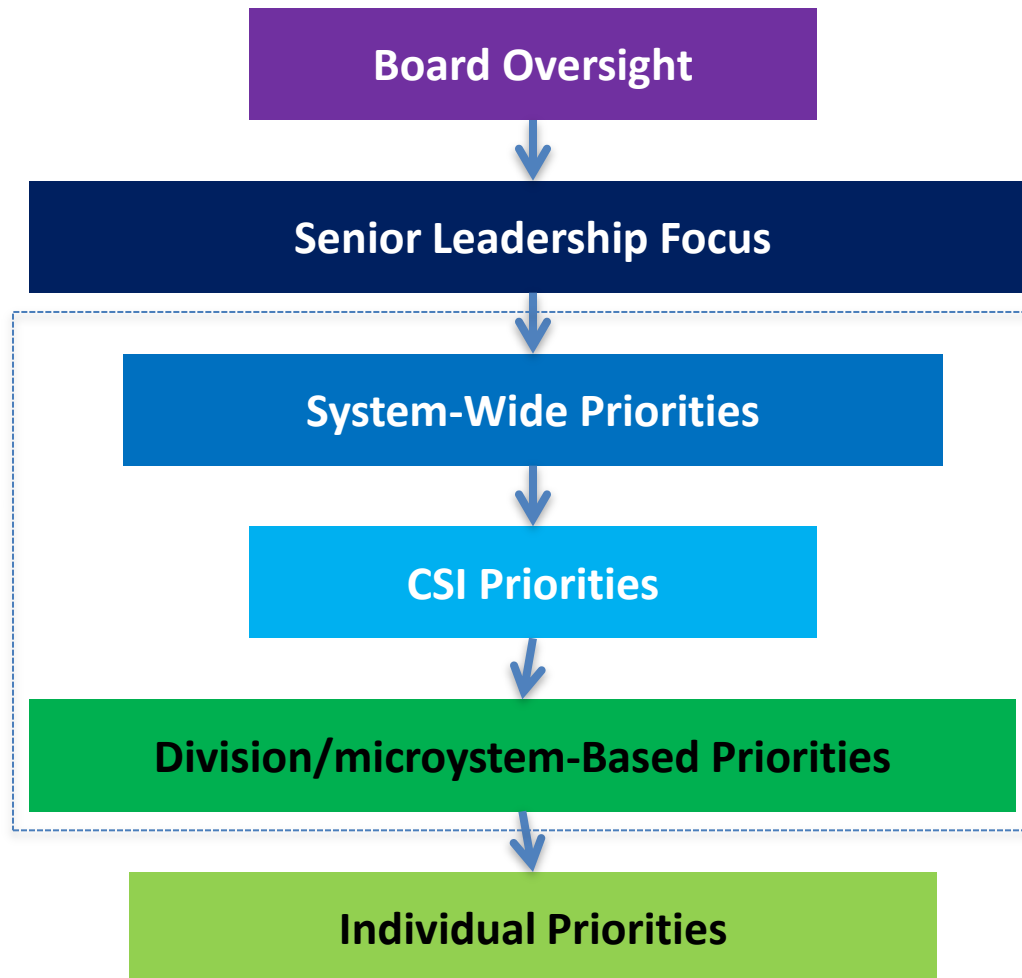
Prediction Stories (Inpatient)

- 9 year old patient with complicated medical history and previous escalated concerns.
 - **Prediction:** With pending complicated procedure, family likely to be dissatisfied.
 - **Mitigation:** Plan involved a communication strategy for the Attending to explicitly address previous concern issues, staffing arranged for an experienced RN to minimize noise and extra trips to the room, and to communicate to parents a clear escalation plan should it be needed.
- Critical care patient, mother with documented mental health issues.
 - **Prediction:** Mother complains that staff not answering her questions, though staff repeatedly provide this information.
 - **Mitigation:** Initially, unit staff felt as though they could do nothing to change “mom’s reality.” Later developed a plan to journal mom’s questions and staff responses.

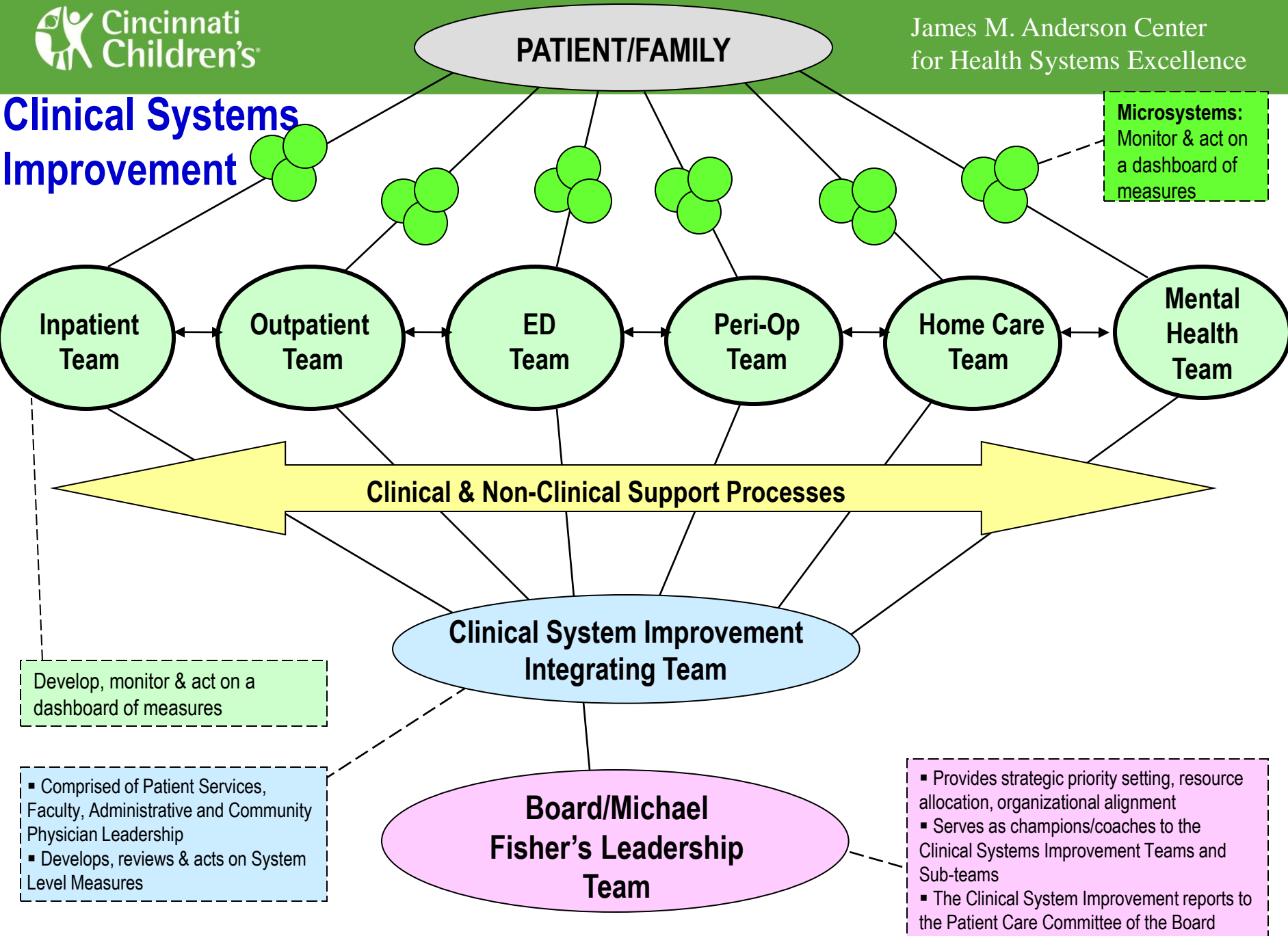
Alignment

- **Alignment:**
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 - Align strategy and **accountability**
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- **All strategic goals are part of each component of the organization with specific assignments and expectations down to the individual level**

Organizing For Transformation



Clinical Systems Improvement



Microsystems:
Monitor & act on a dashboard of measures

Develop, monitor & act on a dashboard of measures

- Comprised of Patient Services, Faculty, Administrative and Community Physician Leadership
- Develops, reviews & acts on System Level Measures

- Provides strategic priority setting, resource allocation, organizational alignment
- Serves as champions/coaches to the Clinical Systems Improvement Teams and Sub-teams
- The Clinical System Improvement reports to the Patient Care Committee of the Board

Capability vs Capacity

- Improvement Capability
 - An **individual's** knowledge & skill to to design improvement initiatives to achieve measurable results & the ability to execute (i.e. develop, test, measure & implement changes) improvement efforts & sustain results.
- Improvement Capacity
 - An **organization's resources** which enable it to initiate & sustain a transformation effort. This includes capable individuals but also structures, processes, infrastructure including quality experts & measurement experts.

Leverage Point	Target Audience	Competencies	CCHMC Target Categories	CCHMC Interventions
Macrosystem CCHMC (Whole System)	Sr. Leaders (e.g. CEO, Sr. VPs, VPs)	Lead the whole system based on Deming's System of Profound Knowledge	Approximately 28 Sr VPs & VPs	Intermediate Improvement Science Series (I2S2)
Mesosystem Clinical Systems Improvement {CSI} site of care teams and medical & surgical divisions	<ul style="list-style-type: none"> • CSI Leaders • MD Division Heads • Asst VPs • Directors/Sr. Directors • Strategic Improvement Project Team Leaders 	<ul style="list-style-type: none"> • Lead strategic improvement teams/complex/ cross-functional projects to get results • Articulate the role of dept/unit/division as a sub-system that is interdependent part of larger system of CCHMC • Coach others to do improvement publications • Disseminate results via external presentations & prof journals 	Dept. Heads/Division Heads, VP's, AVP's, selected MD's, Sr. Directors, Directors (includes typically M3-M5 – approx. 380 people +) (Includes selected APN's & some Clinical Directors)	<ul style="list-style-type: none"> • Intermediate Improvement Science Series (I2S2) • JIT coaching and continued use of I2S2 learning while developing a portfolio of projects • Advanced Improvement Methods (AIM) for faculty focused on publication • Quality Scholars Program for young faculty with leadership aspirations
Microsystem Department units, clinics, ORs, etc.	<ul style="list-style-type: none"> • Clinical managers • Lead MDs 	<ul style="list-style-type: none"> • Lead small teams/narrow scoped projects in a small microsystem & get results • Lead microsystem efforts to remove defects & waste from processes of daily work • Effectively participate in cross-functional & strategic improvement teams • Successfully complete a narrow-scoped project & get results 	Includes all clinical & nonclinical front-line supervisors & managers typically in the M1 & M2 bands-approx. 250 people) (Includes Clinical Managers, Supervisors, Leads, Coordinators, Lead APN's, CNS's, Care Managers when appropriate, Clinical Directors or at the next level & "Faculty-Routine QI activities": (~200)	<ul style="list-style-type: none"> • Rapid Cycle Improvement Collaborative (RCIC) & compressed team leader course • JIT coaching while participating in a QI project by I2S2 graduate, QIC, etc.
Individual Contributors Front Line Improvers	All front-line, non-management staff	<ul style="list-style-type: none"> • Engage in the improvement of daily work • Effectively participate in improvement teams 	<i>Includes APN's, RN's all attending physicians (~400), residents and fellows; medical, nursing & allied health students</i>	On-line courses: <ul style="list-style-type: none"> • Intro to Quality • Intro to Measurement

Thank You



- Questions?
- Comments?

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