AMERICA'S ESSENTIAL HOSPITALS

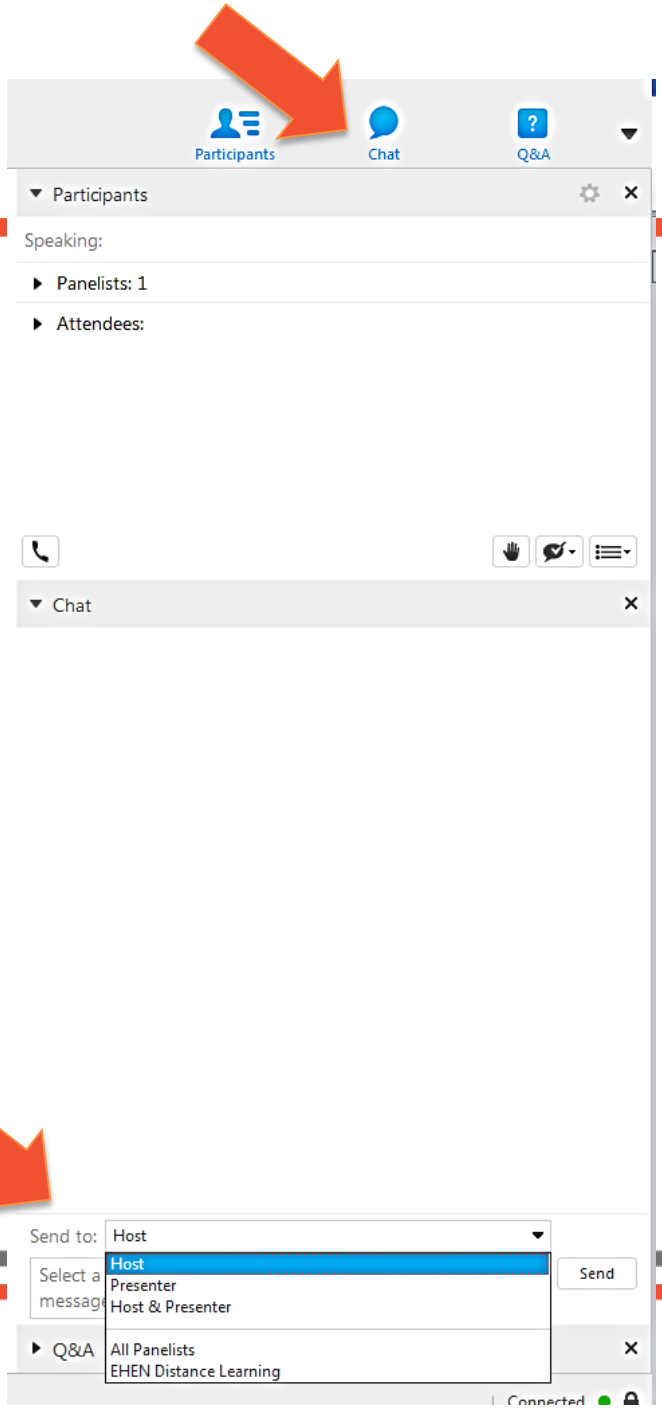
Improving Outcomes and Saving Lives in Real Time: How Hospitals Can Use Predictive Analytics Across the Care Continuum

Essential Hospitals Engagement Network

February 18, 2015

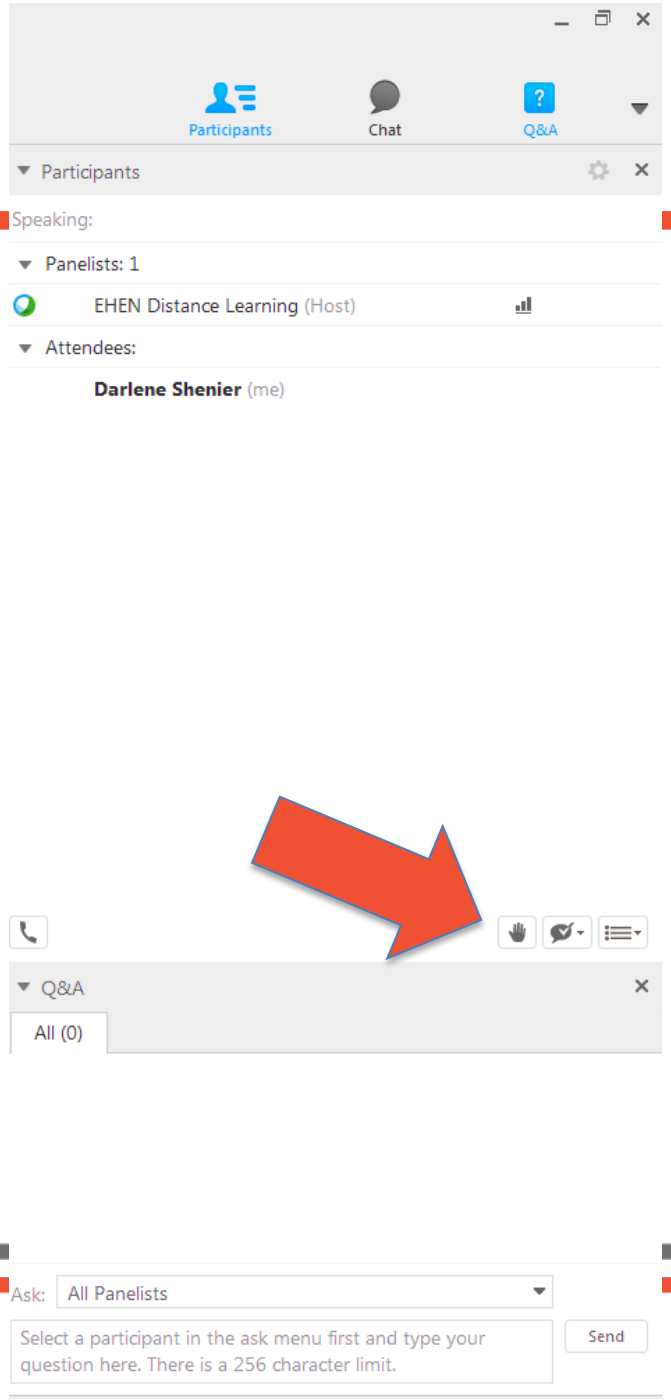
CHAT FEATURE

The chat tool is available to ask questions or comments at anytime during this event.



RAISE YOUR HAND

- If you wish to speak telephonically, please "raise your hand". We will call your name, when your phone line is unmuted



AGENDA

- **Overview**
  - » David Engler, PhD – America's Essential Hospitals
- **Improving Outcomes and Saving Lives in Real Time**
  - » Ruben Amarasingham, MD – Parkland Center for Clinical Innovation
- Q & A
- Wrap-up

SPEAKER INFORMATION

Ruben Amarasingham, MD, MBA
President and CEO
Parkland Center for Clinical Innovation

How hospitals can use real time predictive analytics across the care continuum:

A case study at a Texas essential hospital

Ruben Amarasingham, MD, MBA

Agenda

- Highlights
- Using Real-Time Prediction to Improve Sepsis Care and Outcomes
- Tackling Readmissions with Predictive Analytics
- Addressing the Social Determinants of Health
- Challenges in Predictive Modeling Applications
- Q&A

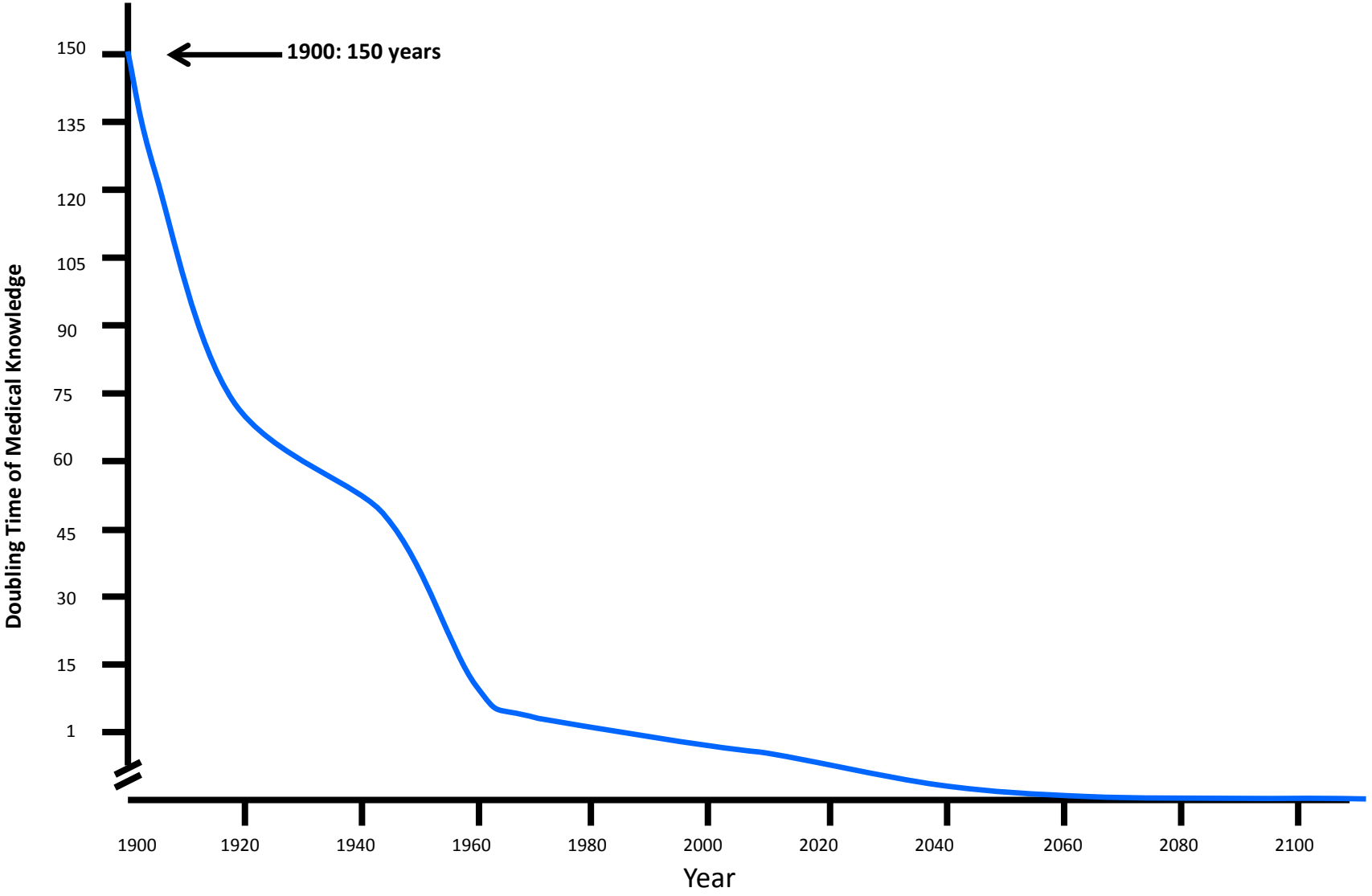
Case Study Highlights

ADVERSE EVENT	RESULTS
Sepsis	
➢ Parkland Hospital	**Relative improvement in sepsis bundle compliance: 100%** **Relative reduction in mortality: 17.4%** **Estimated yearly savings: $1.15M - $5.25M**
Readmission Reduction	
➢ Parkland Hospital	**1115 Waiver revenue recovery (FY13-FY14): $8M** **On pace for 1115 revenue recovery (FY15-FY16): $30M** **Penalty avoidance to date: $5.7M** **2013 Lowest CHF readmission rate (CMS peer group)**
➢ Texas Health Resource (HEB Hospital)	**Relative reduction in HF readmissions: ~40%** **Savings for every $1.00 spent: $4.59**
Chronic Kidney Disease outpatient management	
➢ Parkland Hospital	**Increase in compliance achieving goal SBP, DBP, medication best practices: 82%**

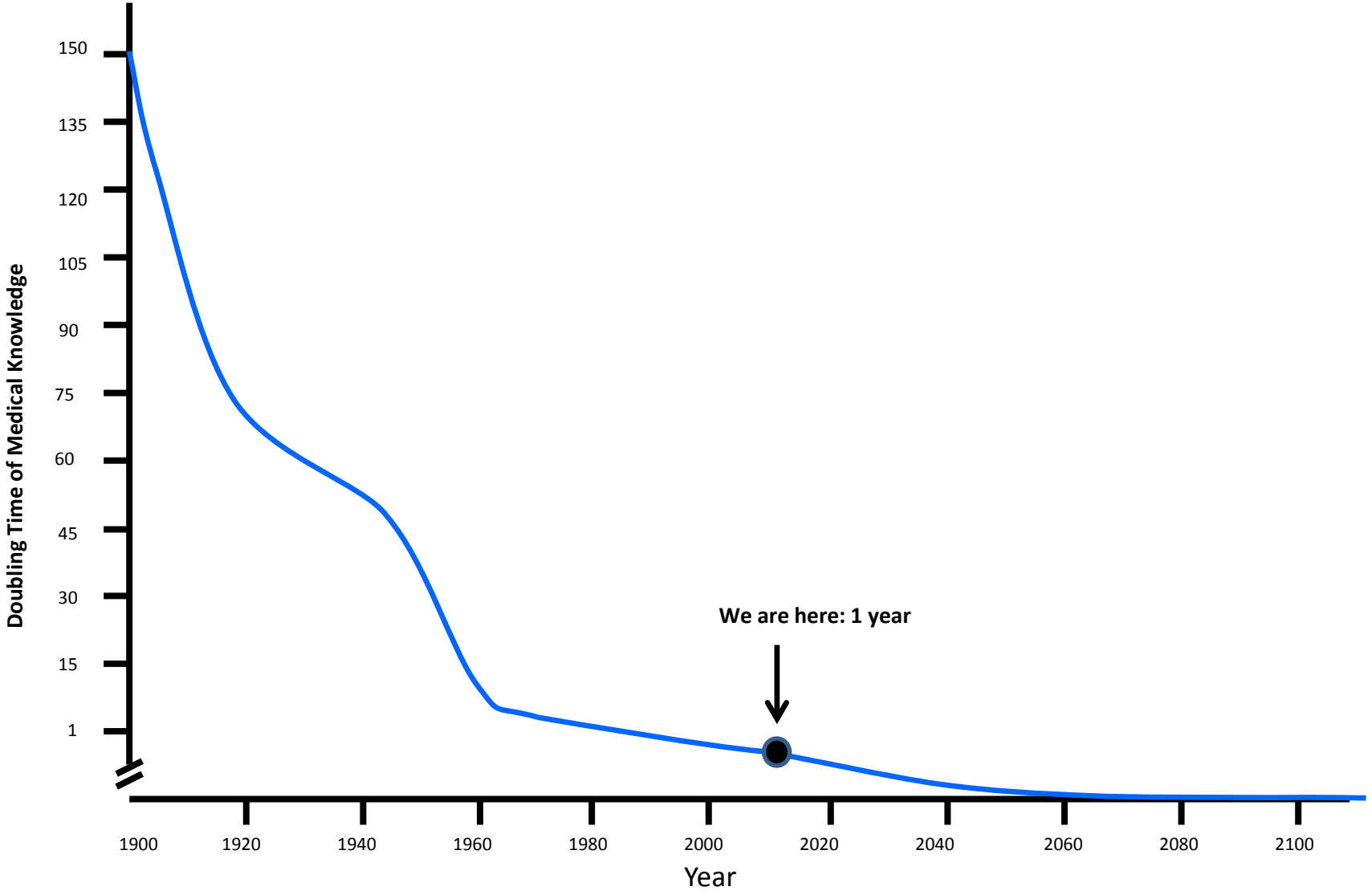
What Clinicians Do in Medicine: Prediction

1. What does this patient have?
2. What will this patient develop?
3. What will be the effect of a given therapy?

Prediction in the Context of Modern Medicine

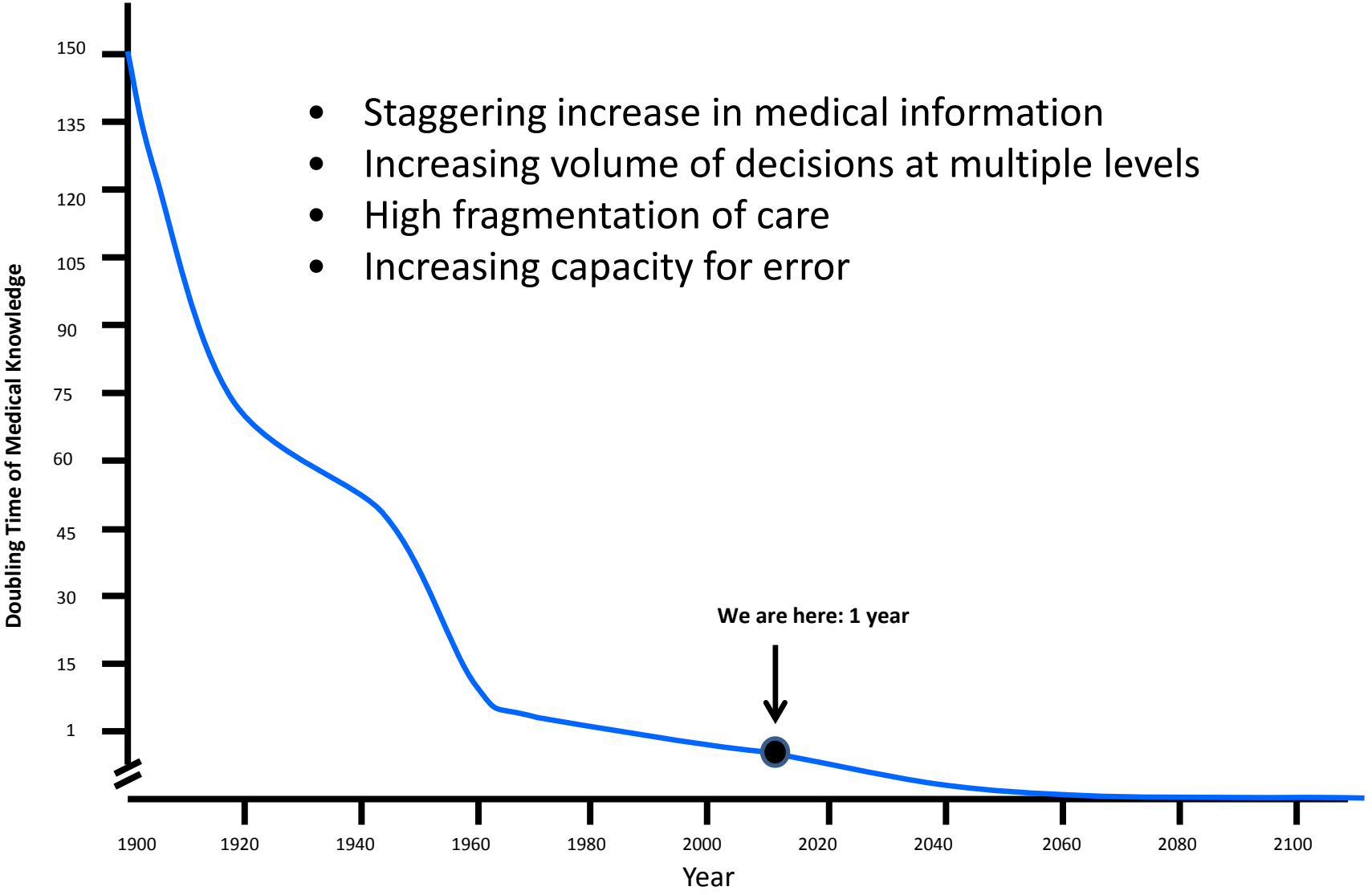


Prediction in the Context of Modern Medicine



Prediction in the Context of Modern Medicine

- Staggering increase in medical information
- Increasing volume of decisions at multiple levels
- High fragmentation of care
- Increasing capacity for error



What is Electronic Clinical Predictive Modeling and What is its Purpose?

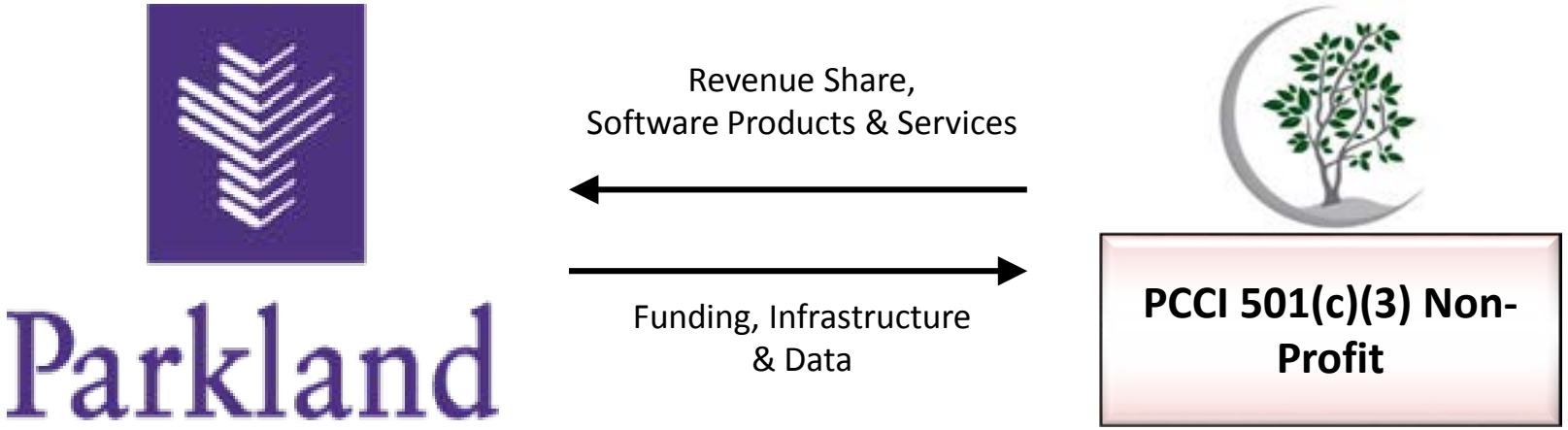
Using electronic data to predict future clinical events so that one can:

1. Discriminate between high and low risk patients
2. Prevent adverse events
3. Allocate scarce clinical resources under real-time demands
4. Suggest actions

PCCI Organizational Background

A 501c(3) non-profit research and development corporation specializing in the development of clinical prediction and surveillance software to help prevent adverse clinical events.

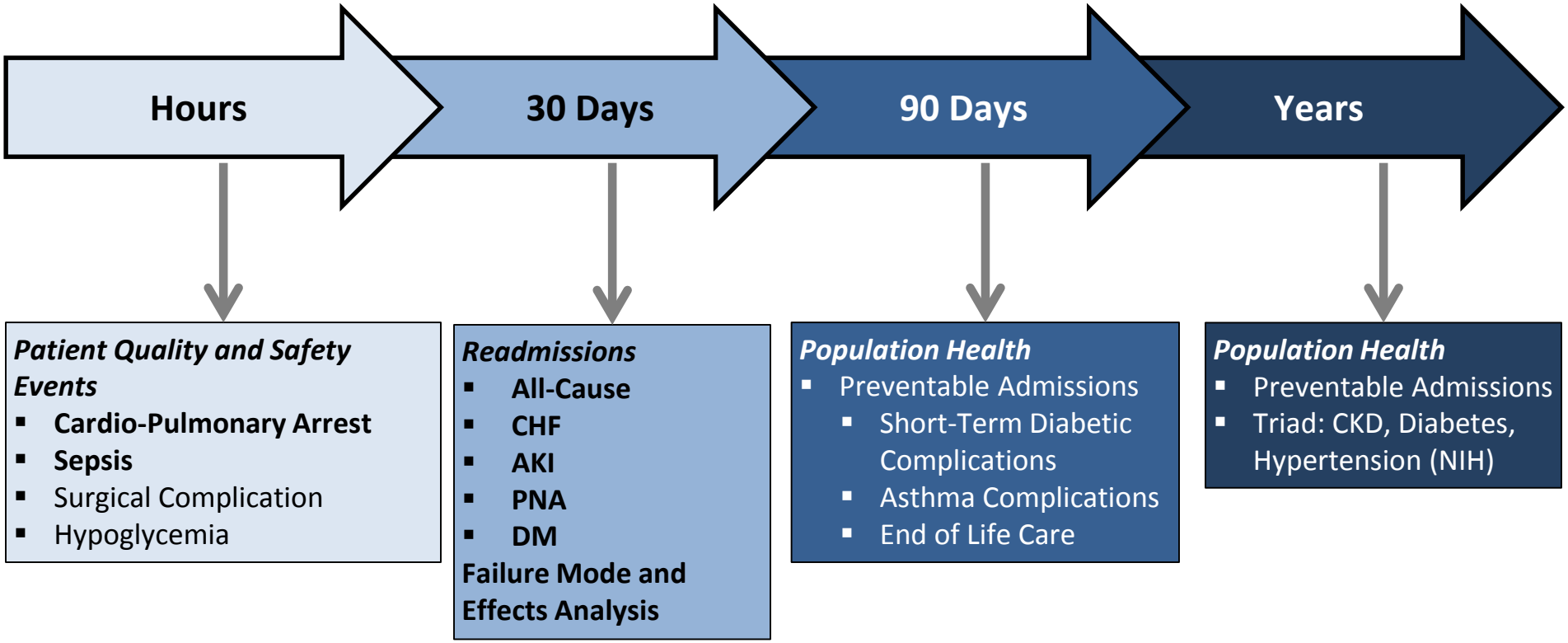
PCCI Relationship with Parkland



PCCI History, Funding, and Research

PCCI has obtained >$30M in scientific funding for predictive analytics.

Every Adverse Event has a Timeline



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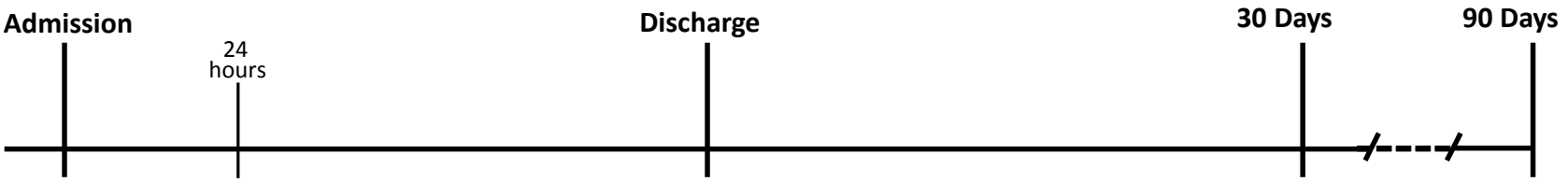

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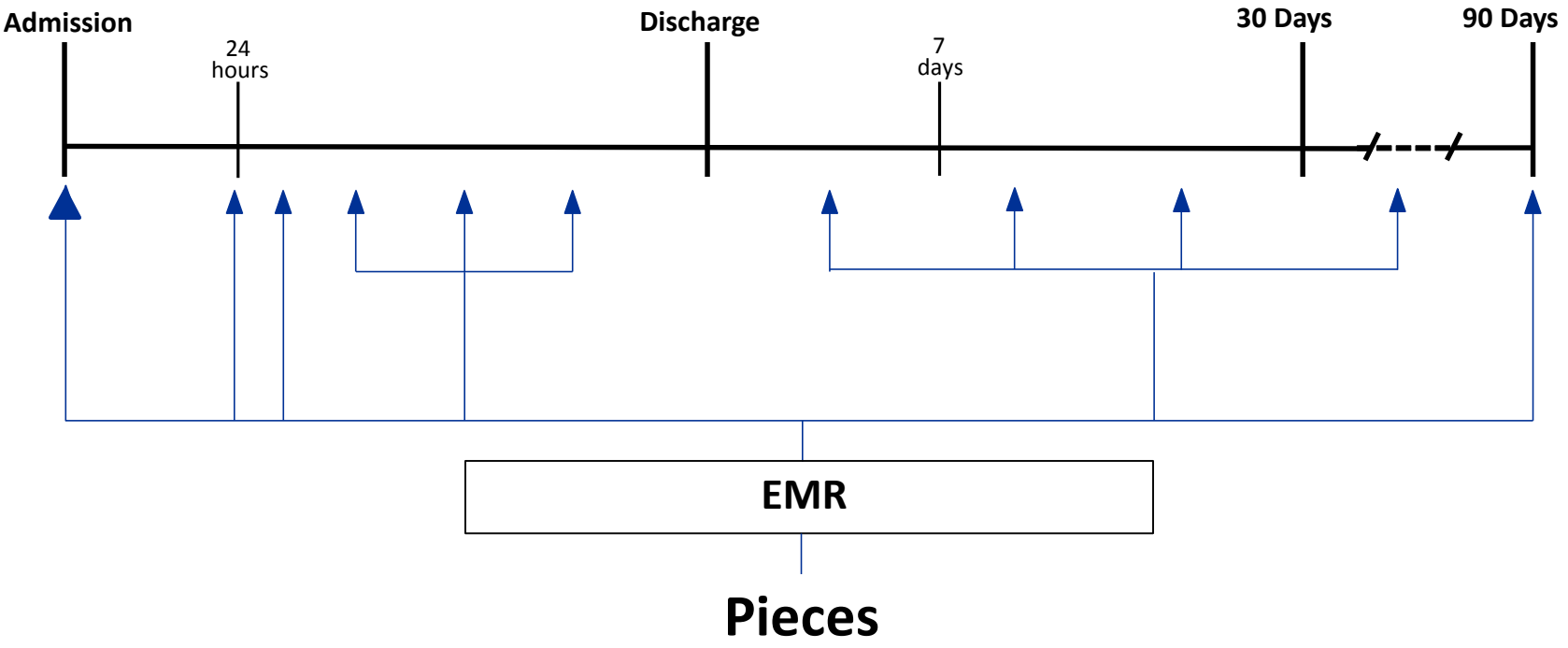


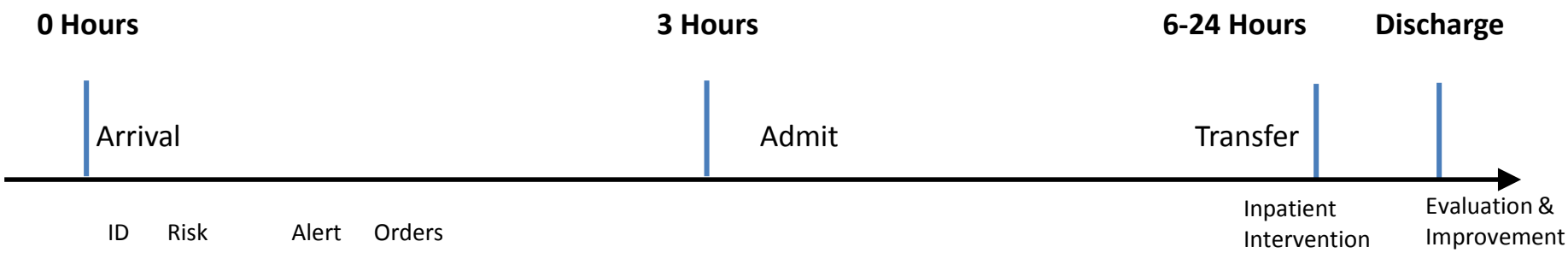
Sepsis is Common, Deadly, Expensive and On the Rise

- Major cause of morbidity and mortality
  - 750,000 cases of severe sepsis per year in the United States with a nearly 40 percent mortality rate[1,2]
  - Hospitalization rates have increased steadily[3]
  - In-hospital mortality for septic patients has been estimated at 17% by NCHS[4]
- Approximately $15.4 billion was spent in 2009 for septicemia hospitalizations alone

Sepsis diagnoses are projected to outpace population growth[1]

1. Angus DC, Linde-Zwirble WT, Lidicker J, Clermont G, Carcillo J, Pinsky MR. Epidemiology of severe sepsis in the United States: analysis of incidence, outcome, and associated costs of care. Critical care medicine. Jul 2001;29(7):1303-1310.
2. Infection and Sepsis-Related Mortality Hotspots Identified across the U.S. 2013; www.sciencedaily.com/releases/2013/05/130515113717.htm. Accessed 5/30/2013.
3. National Hospital Care Survey. Data Uses. National Hospital Care Survey 2012; http://www.cdc.gov/nchs/data/nhcs/Data_Uses_sepsis.pdf, 2013.
4. Hall MJ, Williams SN, DeFrances CJ, Golosinskiy A. Inpatient care for septicemia or sepsis: a challenge for patients and hospitals. NCHS data brief. Jun 2011(62):1-8

Sepsis Treatment Timeline: Overview



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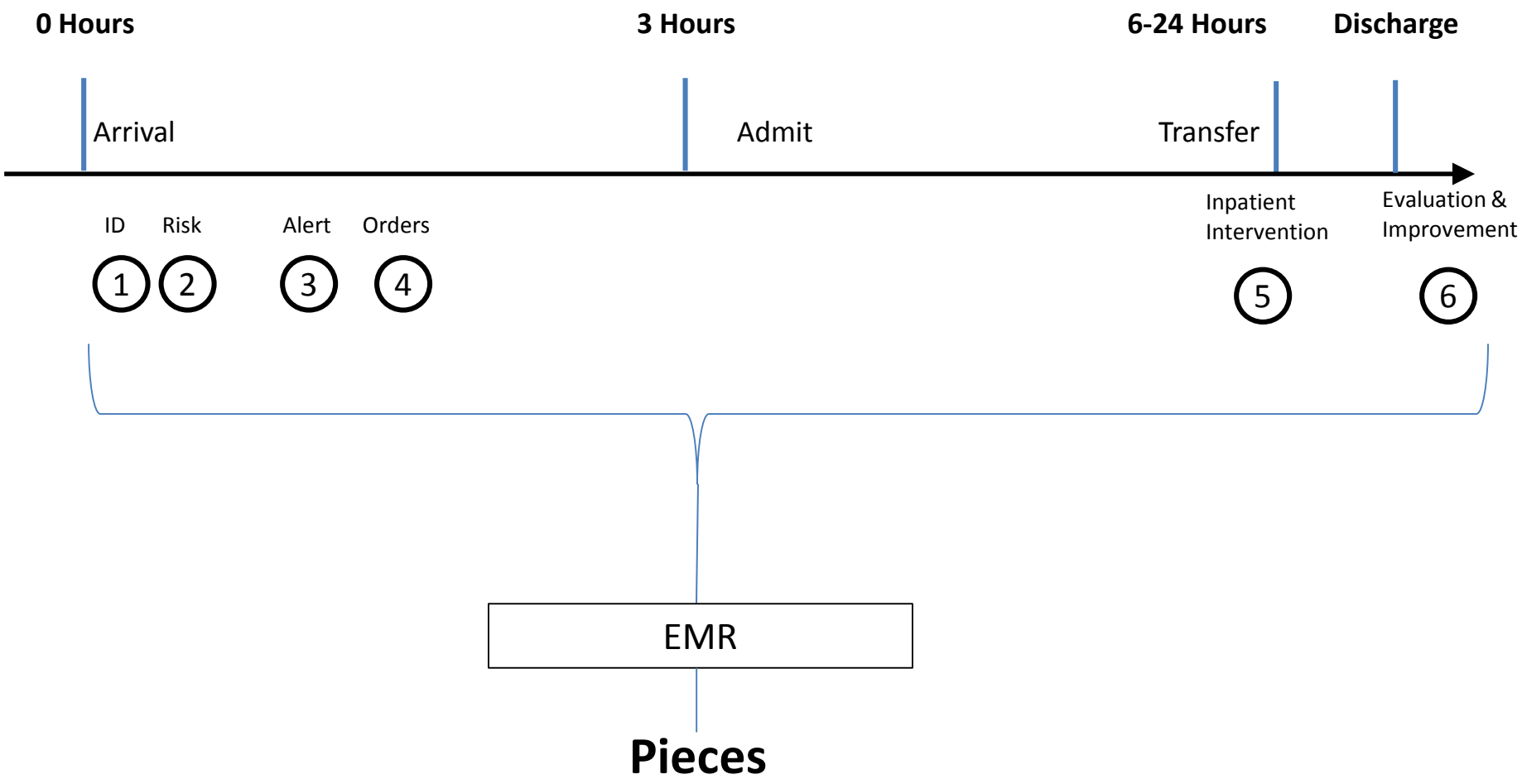

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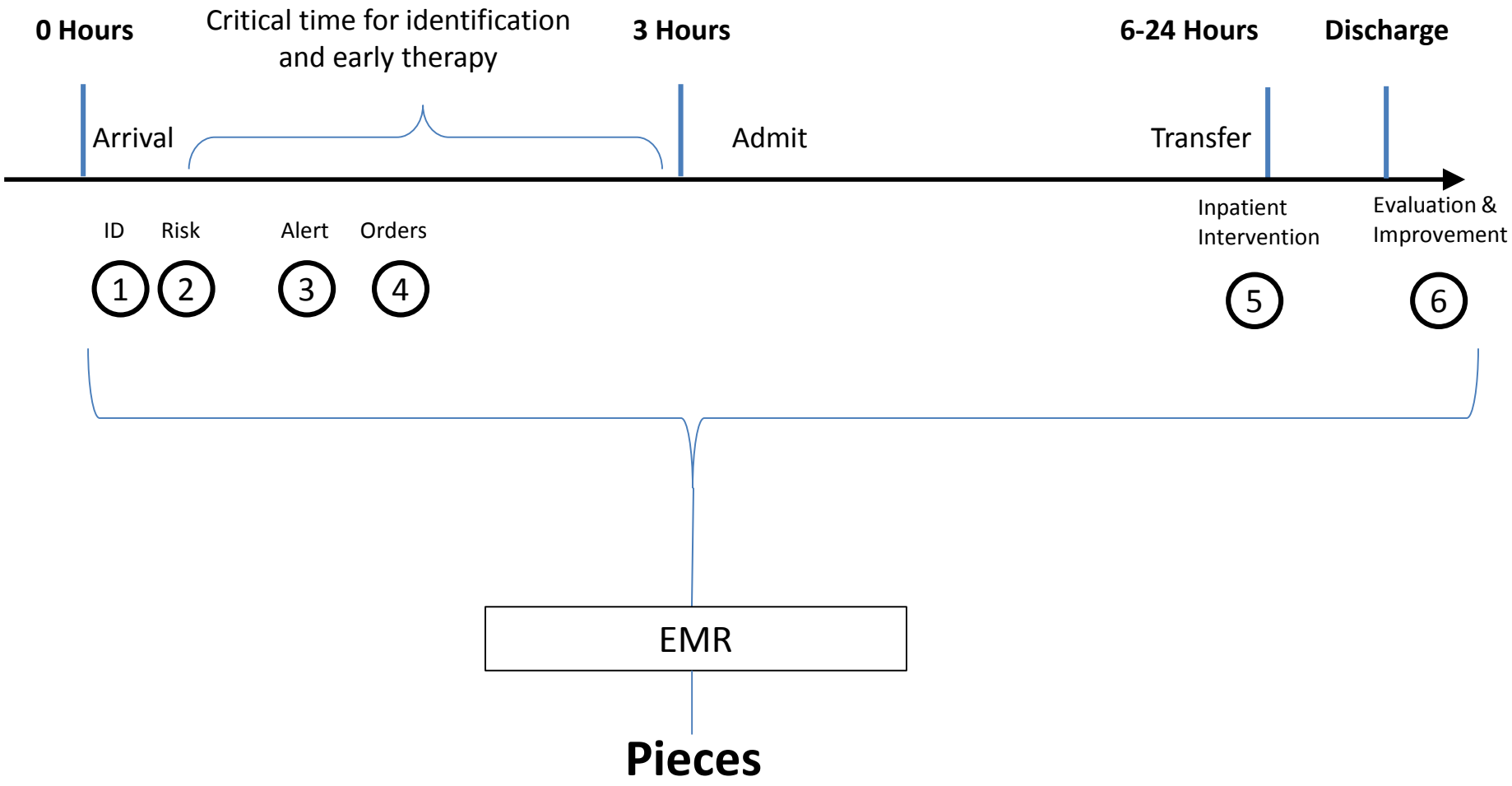
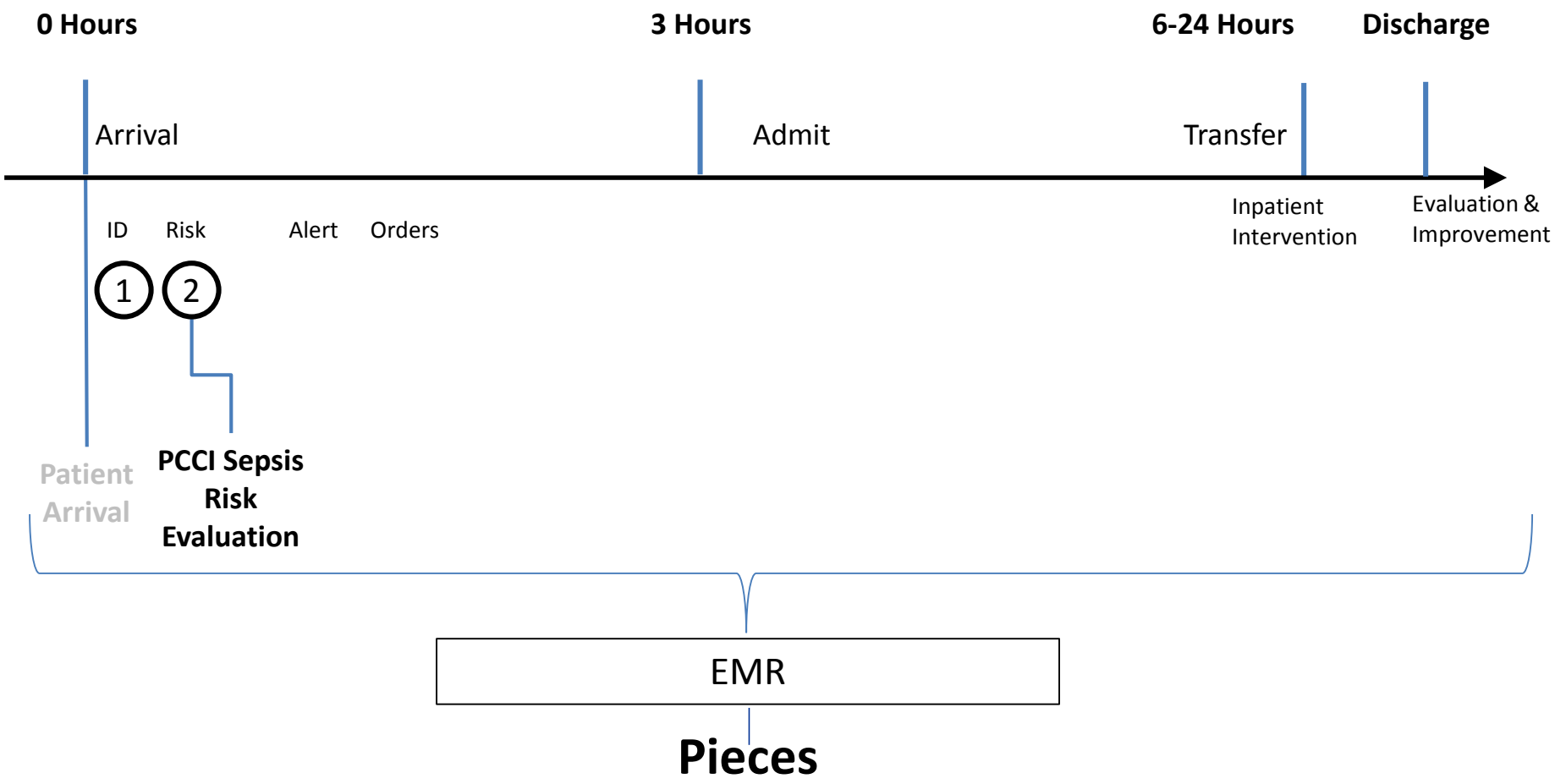
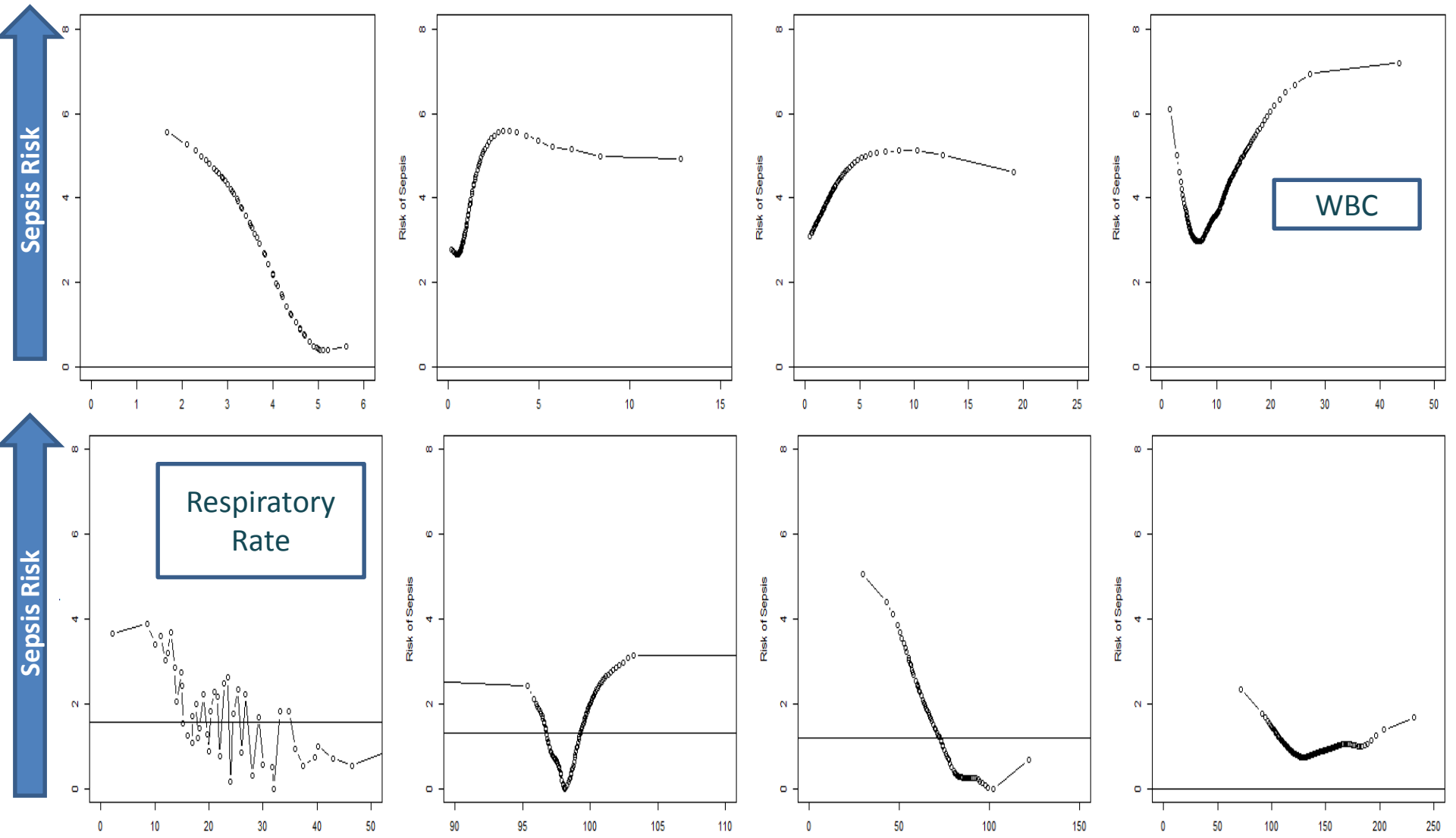


Sepsis Treatment Timeline: Arrival through Triage

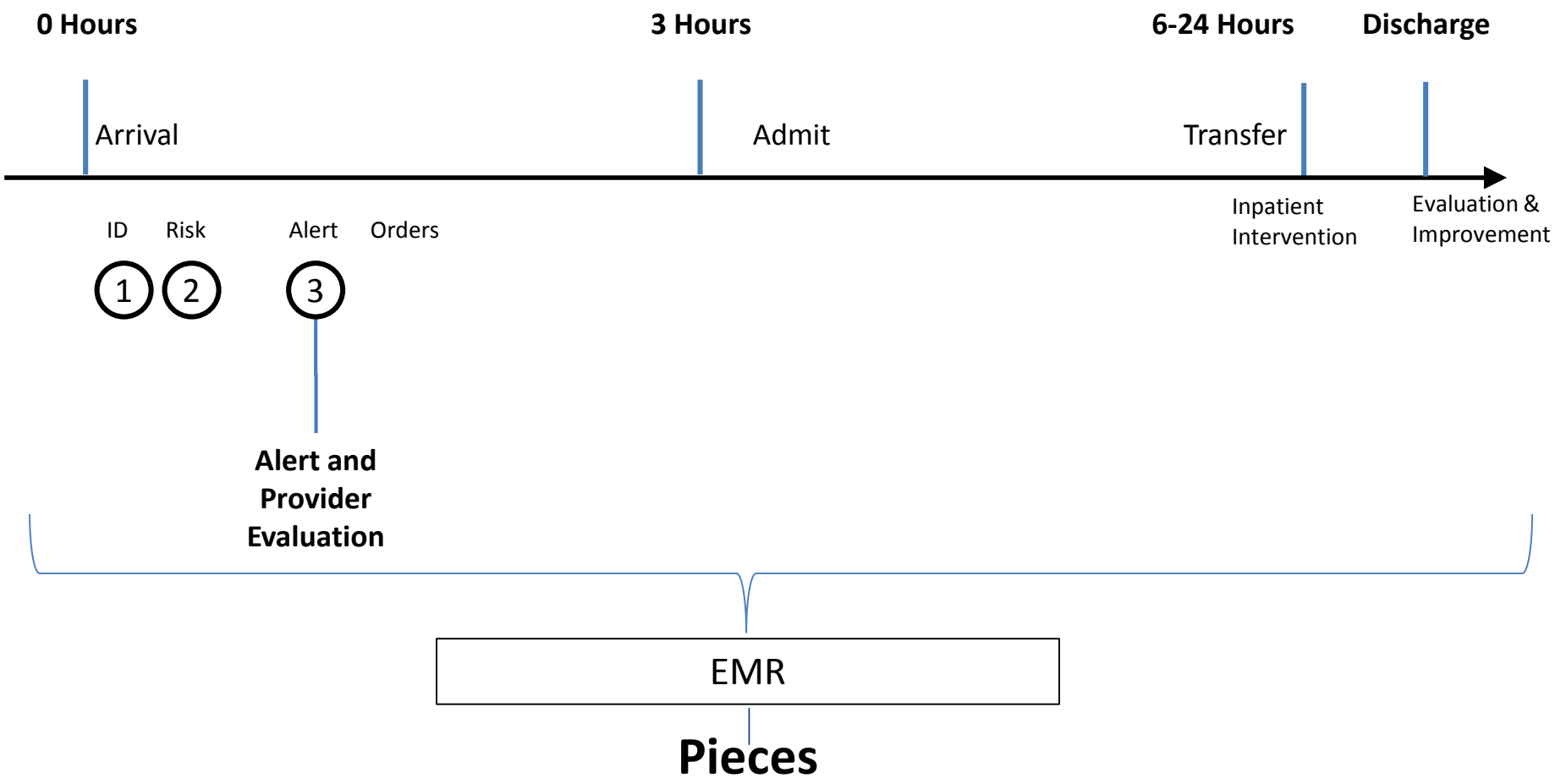


Developing the Sepsis Model: Variable Splines

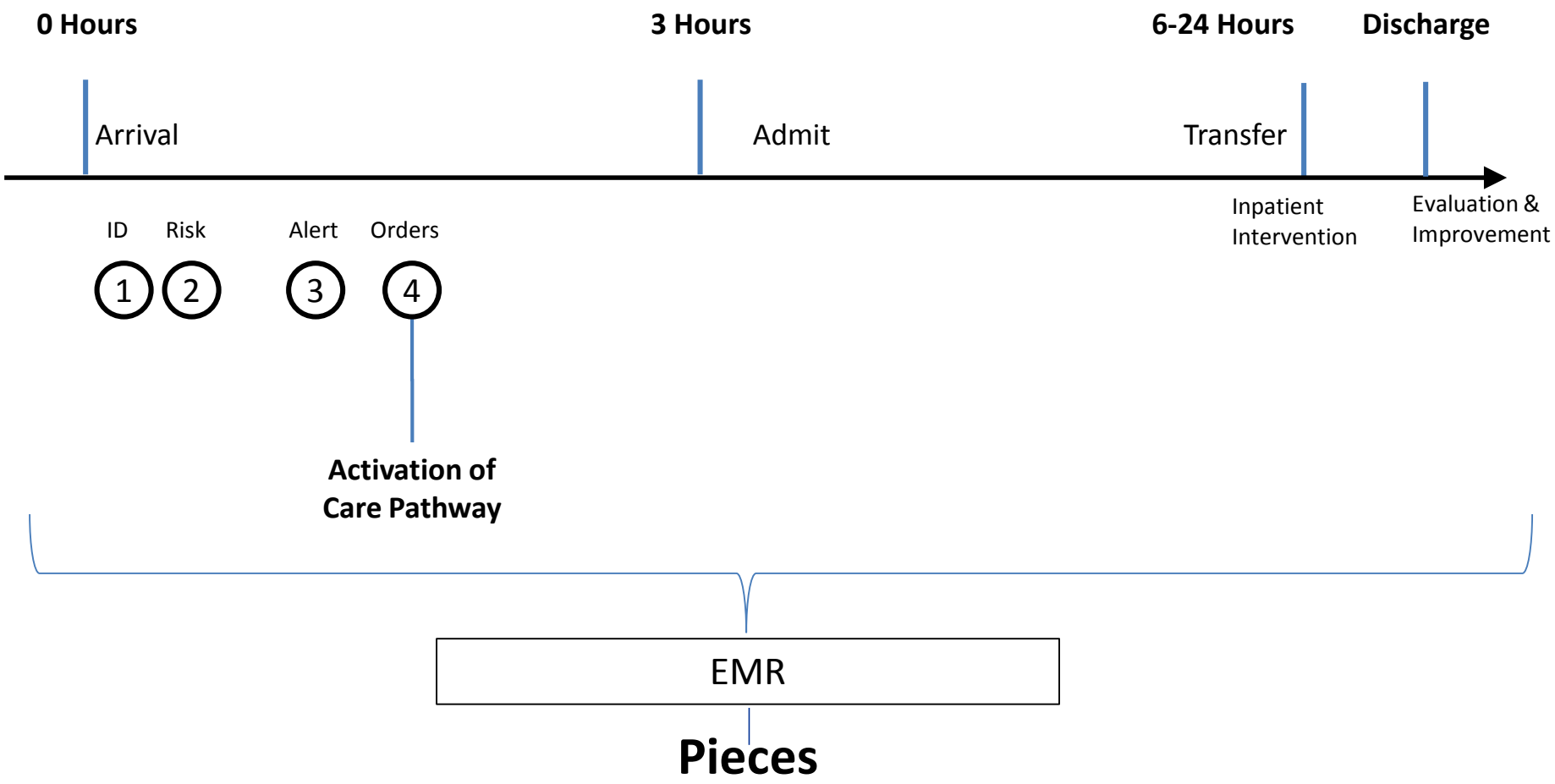


Lucena et al, Manuscript in preparation

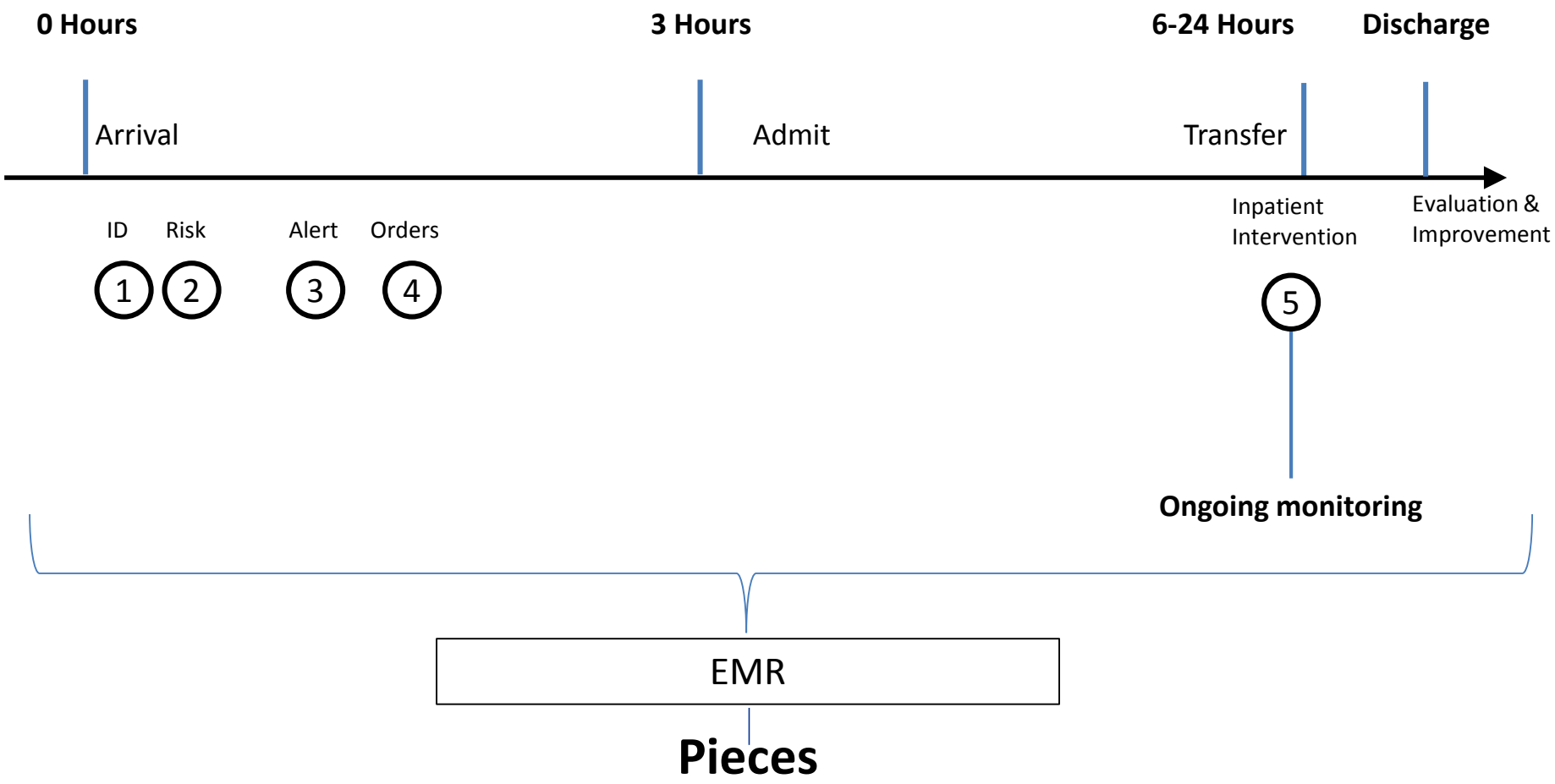
Sepsis Treatment Timeline: Sepsis Alert through Admission



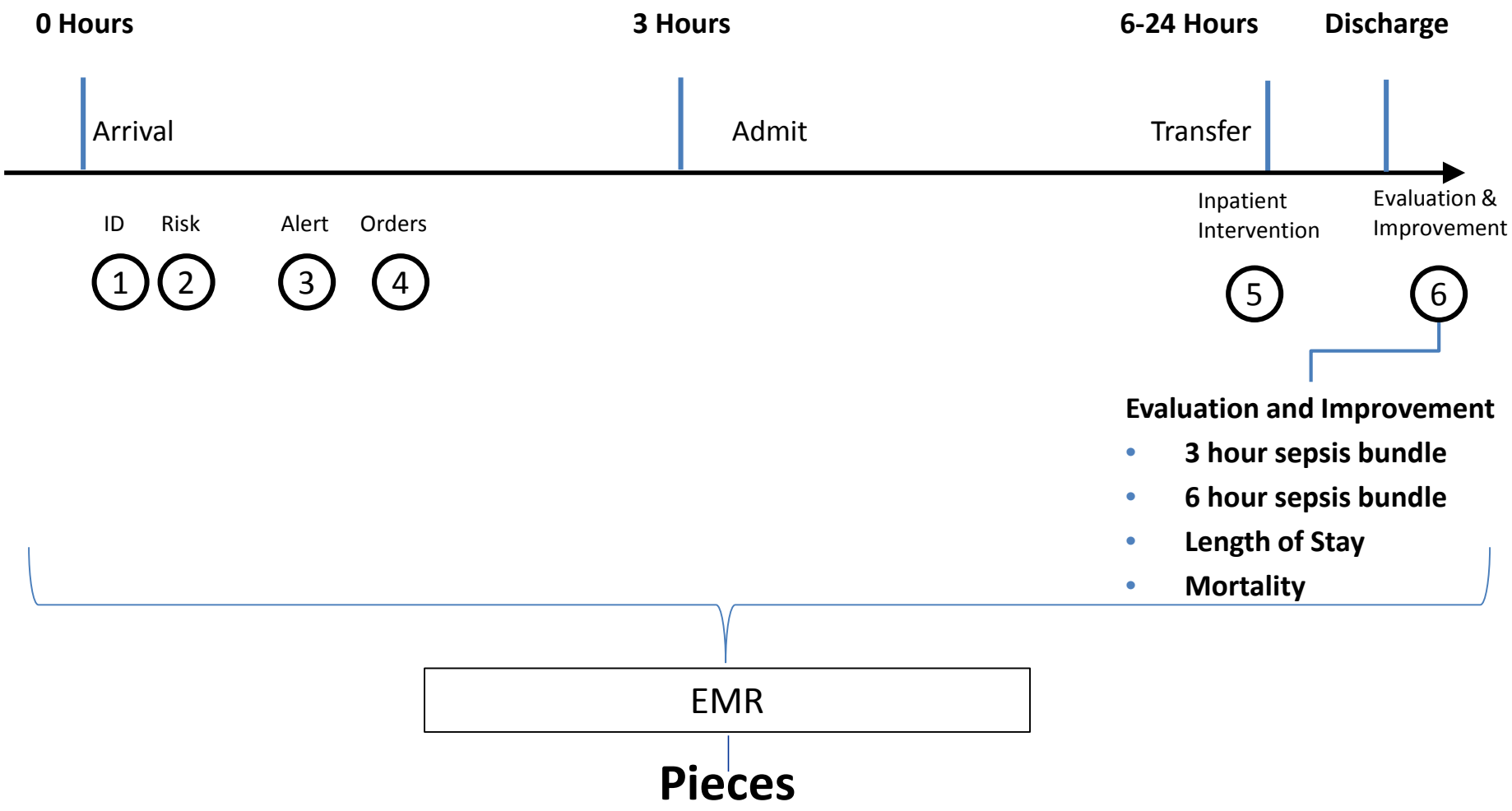
Sepsis Treatment Timeline: Sepsis Alert through Admission



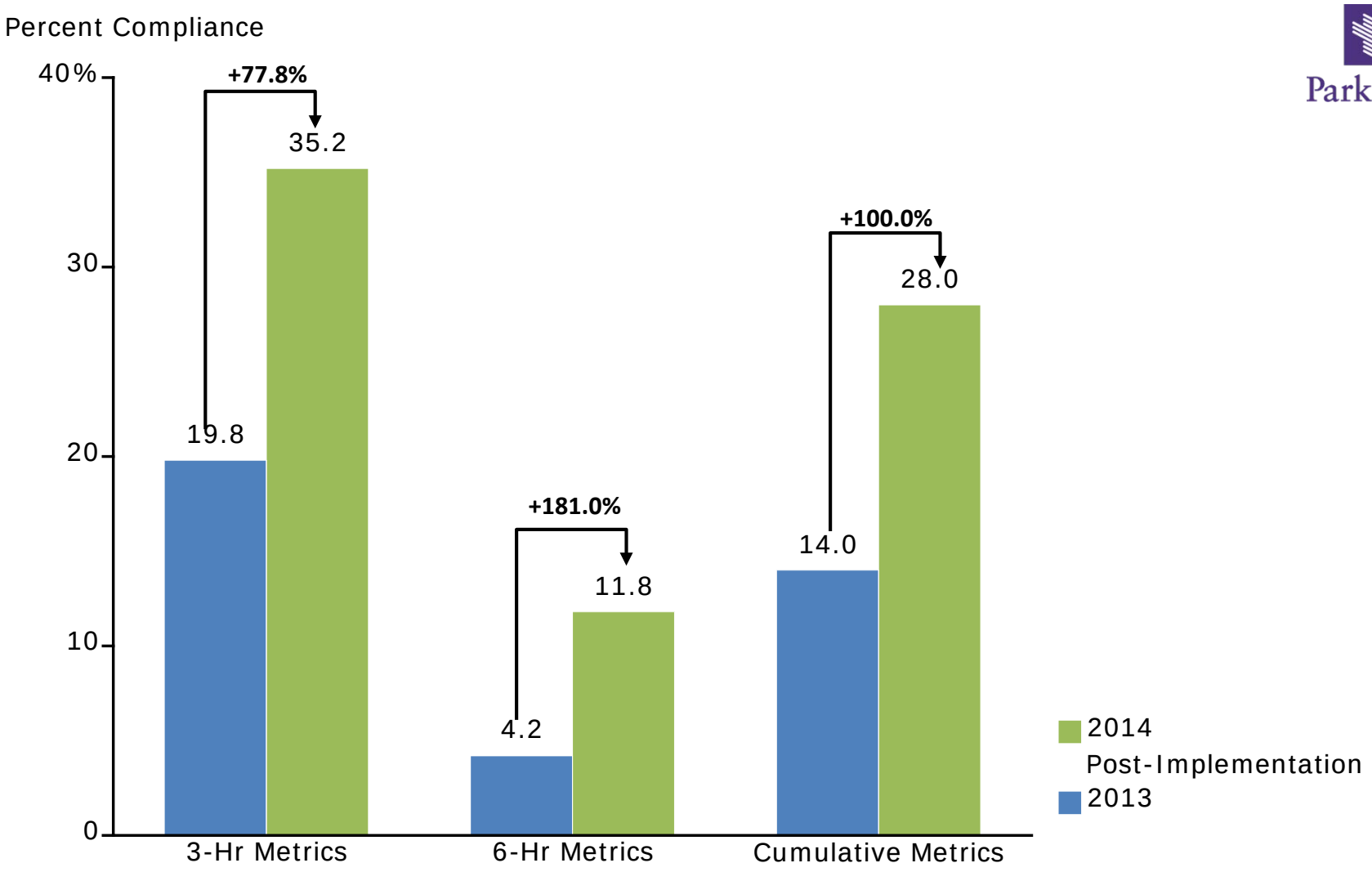
Pieces Continues to Monitor the Patient after Admission



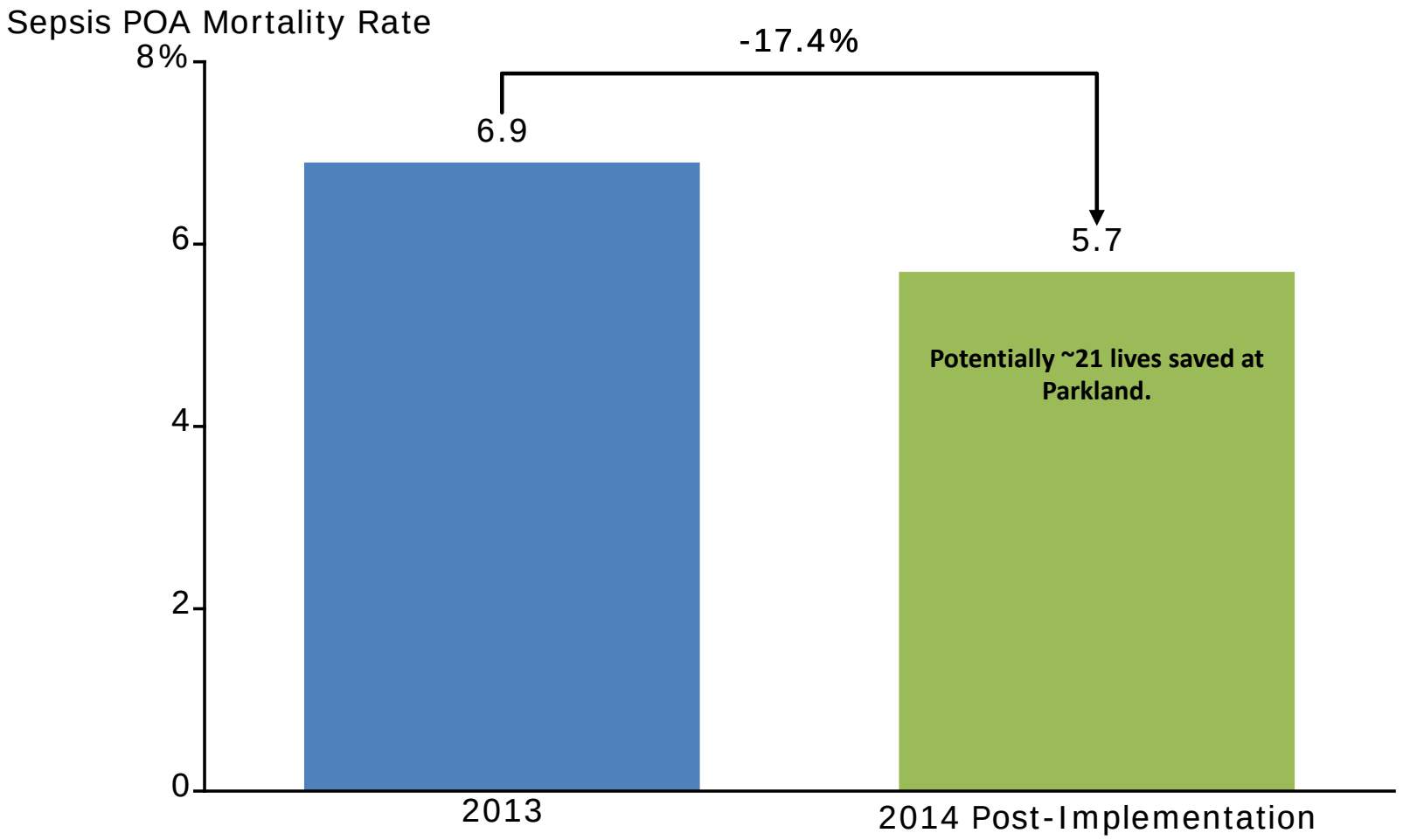
Reporting for Performance Improvement



Improved Compliance with Bundle Metrics



Substantial Early Impact on Mortality



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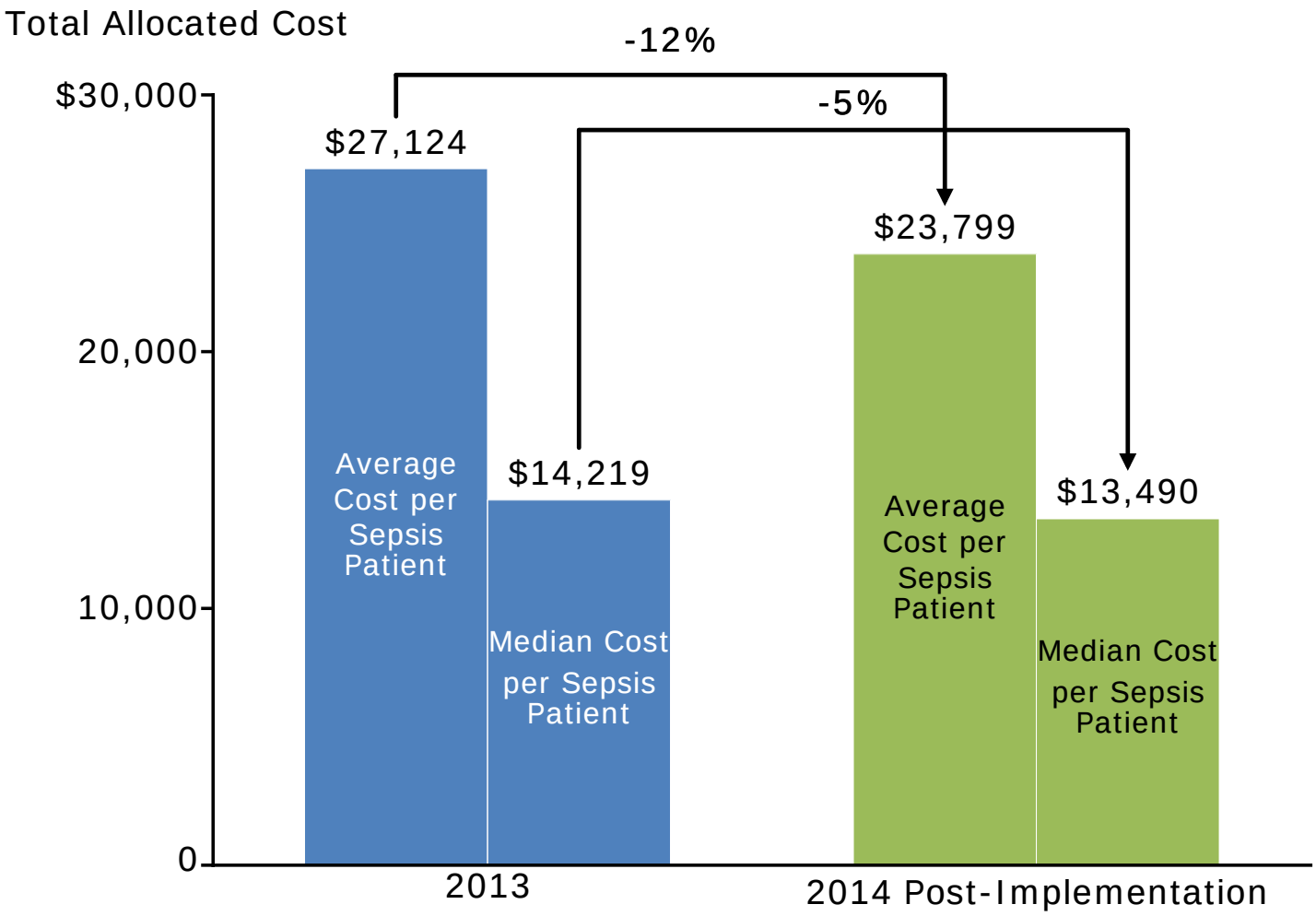
Cost Savings



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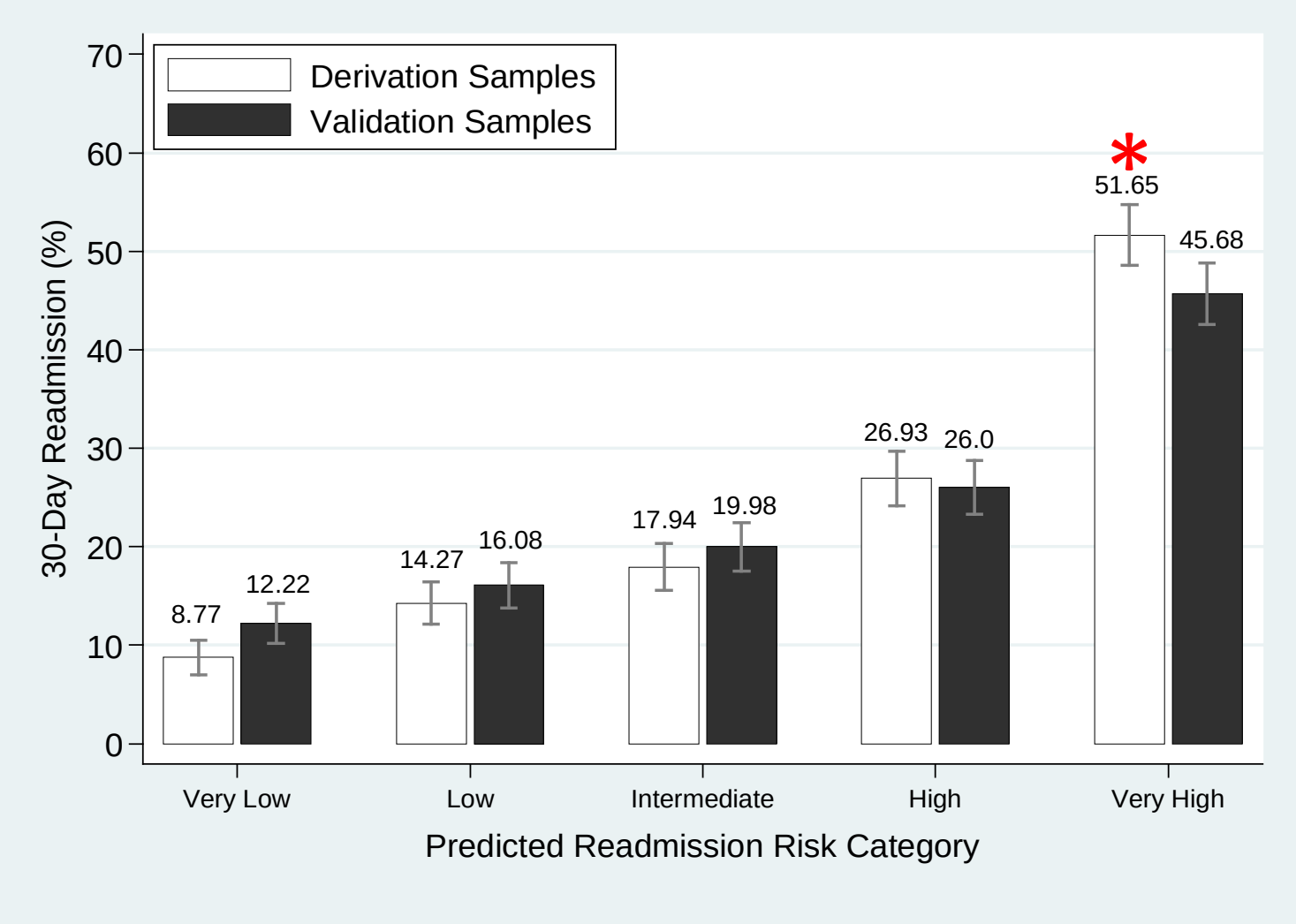
Readmission Model



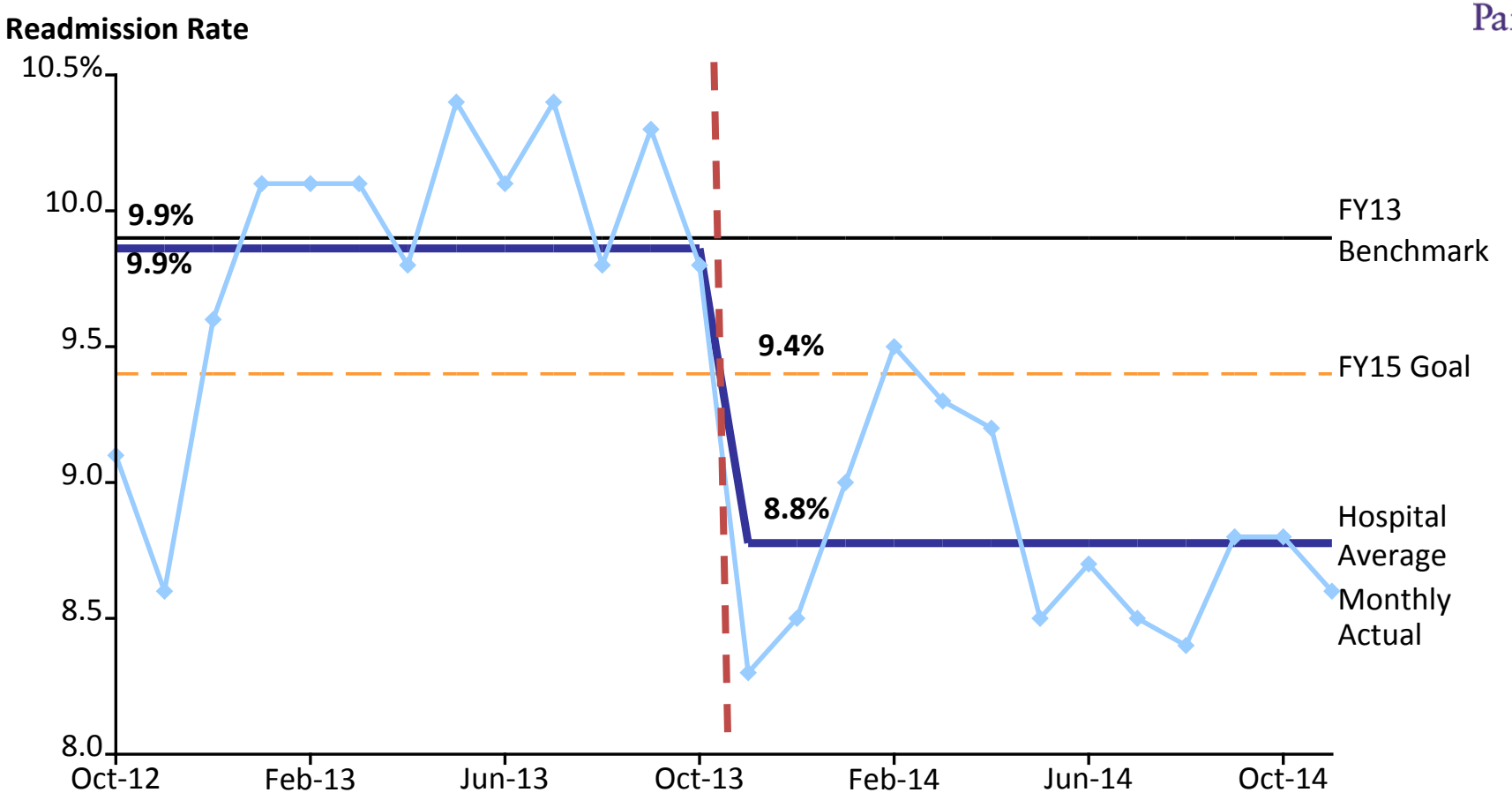
Amarasingham et al, Medical Care, 2010

Natural Language Processing for Readmission Models

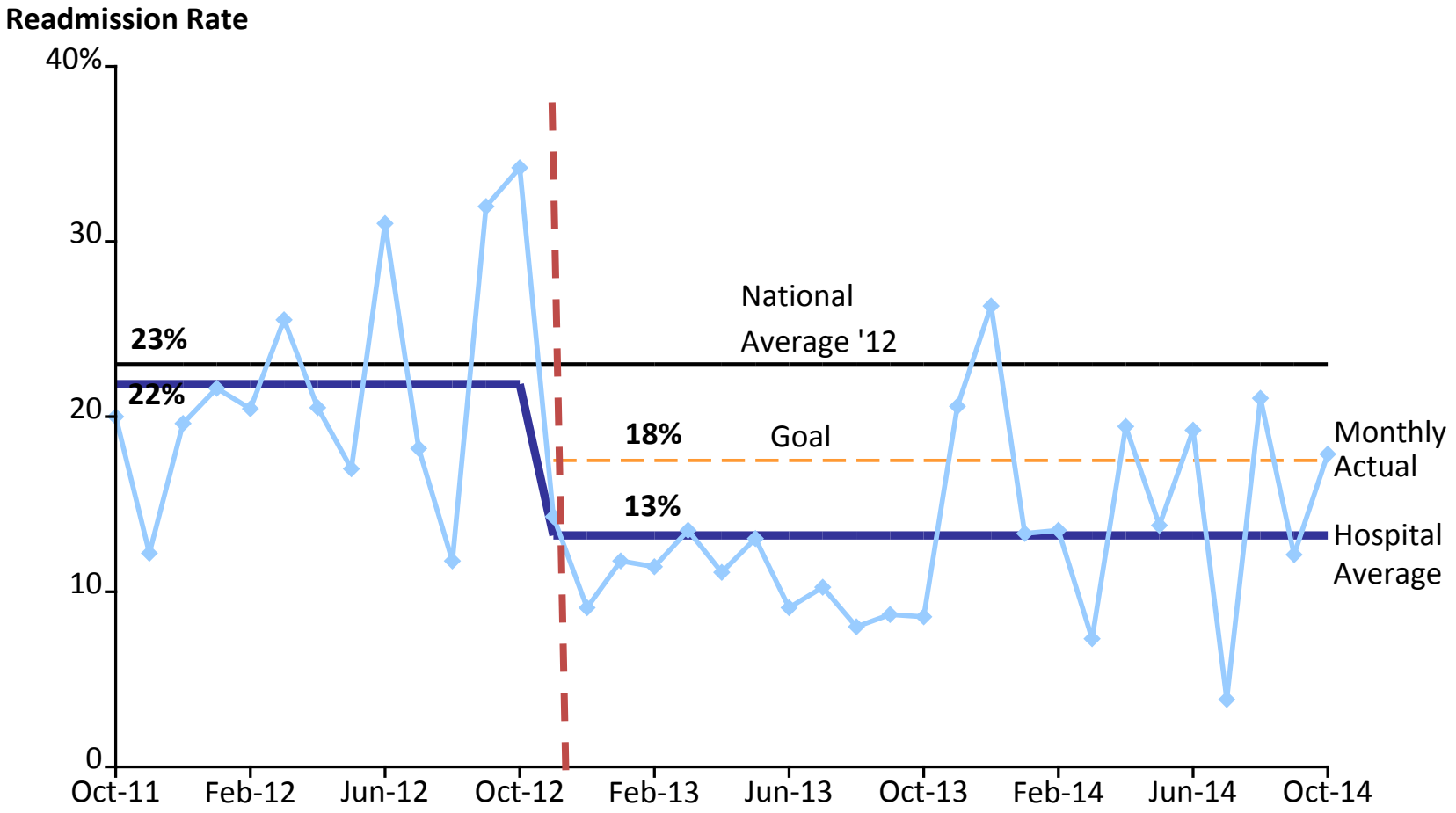
- "68 yo WF presents with acute on chronic non ischemic systolic and diastolic chf, severely depressed ef and grade ii diastolic dysfunction."

Disease/ Symptom	Time	Attribute
Acute Heart Failure	current and primary	• Systolic, significant depression in ejection fraction; • Diastolic dysfunction, grade 2 • Non-ischemic
Chronic Heart Failure	historic	

Success Highlights: All-Cause Readmissions at PHHS



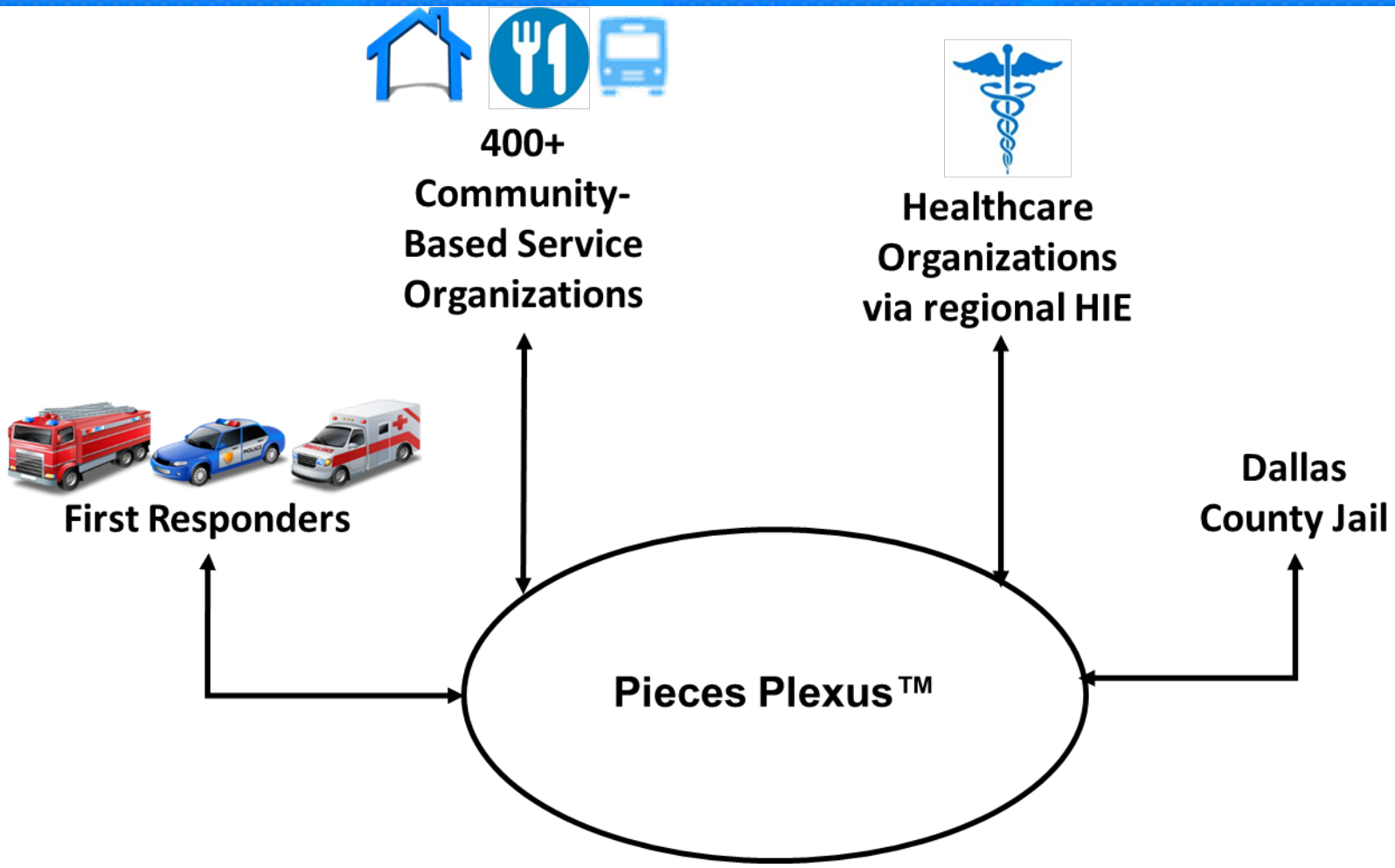
Community Hospital Results: HF Readmission



** This readmission rate does not account for: terminal illness, hospice, elective readmissions which would lower the CMS readmission rate. Full review of pre- and post-intervention states recommended.*

Source: THR Clinical Informatics

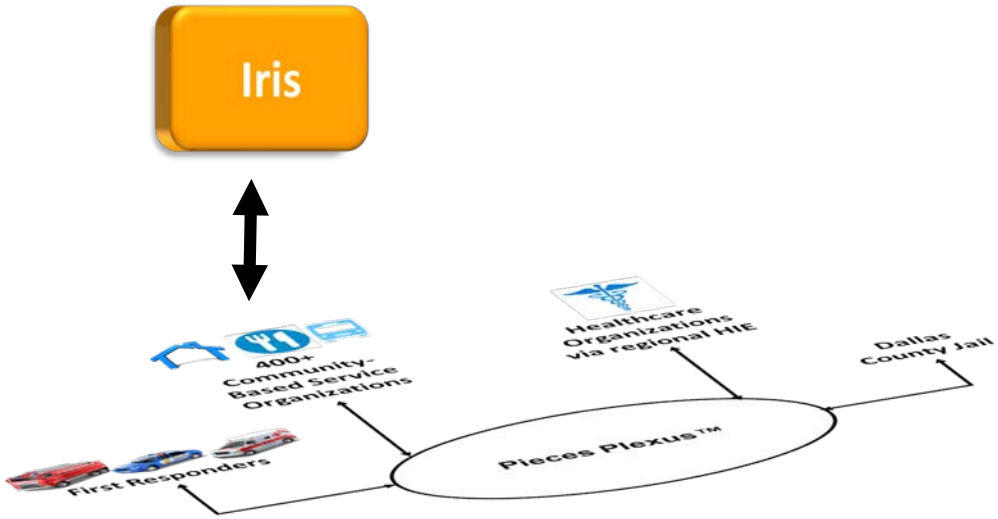
Connecting the DFW Community



We thank the W.W. Caruth, Jr. Foundation at Communities Foundation of Texas for the generous grant of up to $12 million grant to build, operationalize, and launch the Dallas IEP

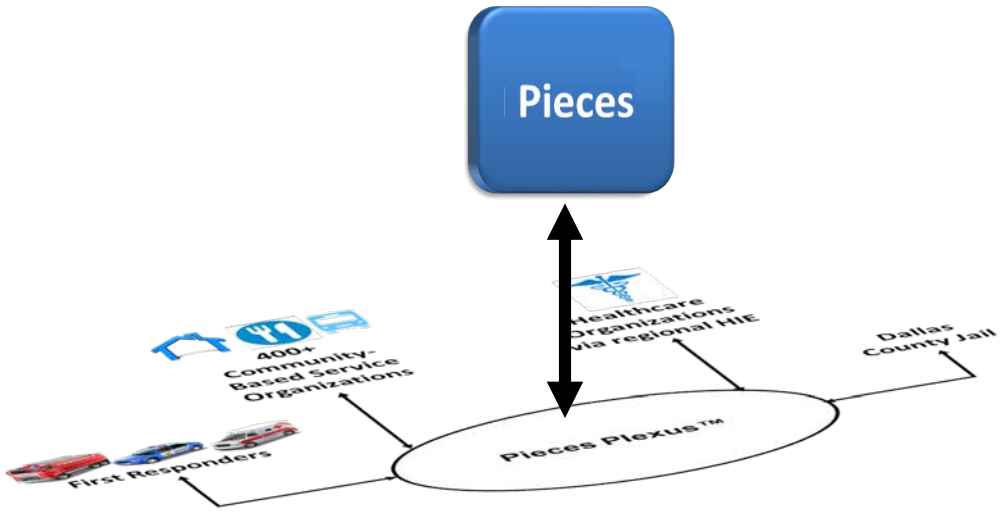
Partnerships

Connecting the Community



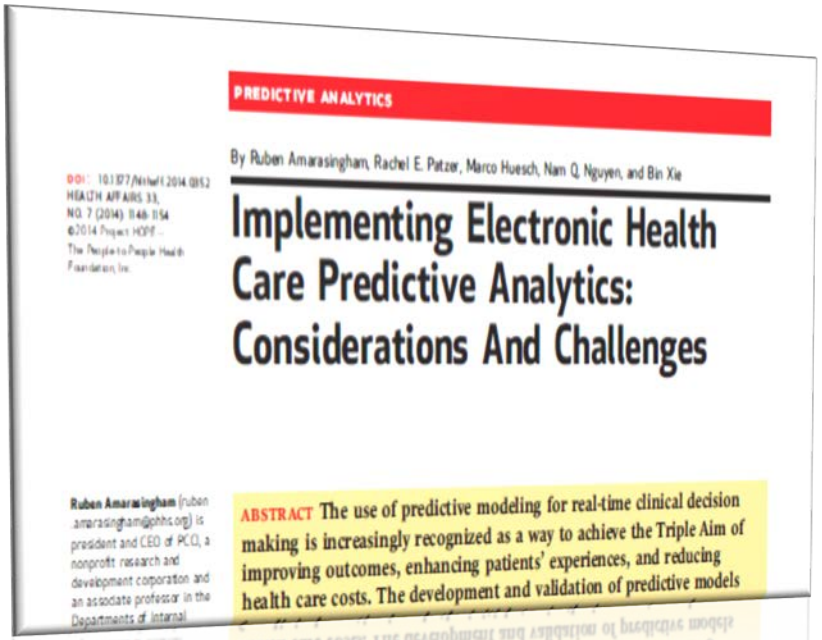
Low-cost and simple electronic case management and client tracking solution for connecting organizations working on social determinants of health

Pieces Analytics for the Community



Leverages predictive and prescriptive analytics on medical and social data to identify at risk individuals

Complexities of Predictive Modeling in Healthcare



The Complexities of Predictive Modeling

1. Interventions for highest risk patients *
2. Considering clinical vs. social risk
3. Explanation vs. Prediction
4. Non-health care data sources *
5. Changing EMR data models
6. Changing clinical interventions
7. Changing populations

Amarasingham et al, Health Affairs, 2014

Thank You!

Questions

Contact Information:

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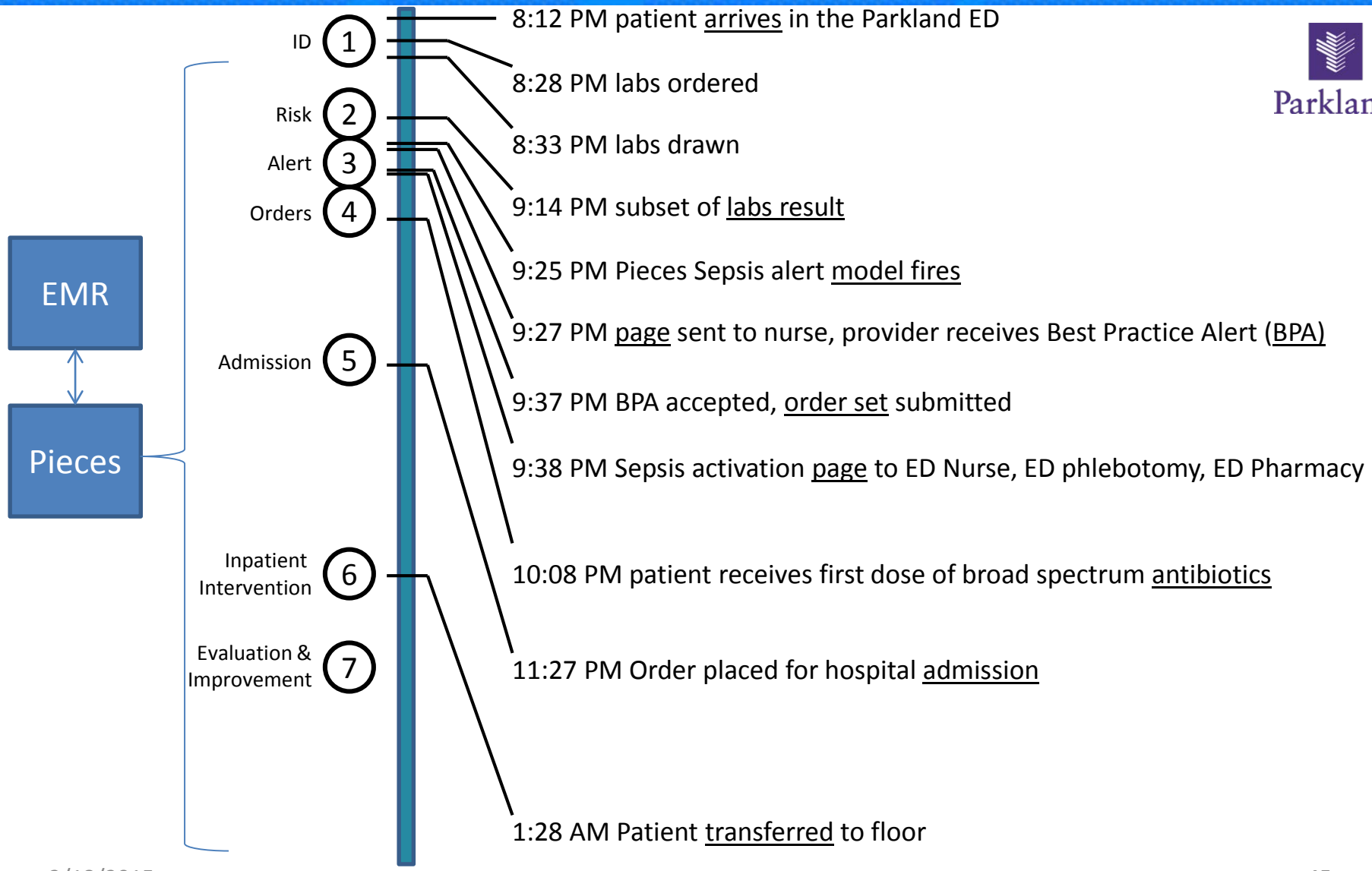
www.pccipieces.org

Sample Sepsis Treatment Timeline: Actual Events



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PHHS Sepsis POA Volumes

FY 2013 No Intervention	FY 2014 Post-Implementation
October 1, 2012 – September 30, 2013	June 2, ,2014 – September 30, 2014
1, 445 patients	579 patients

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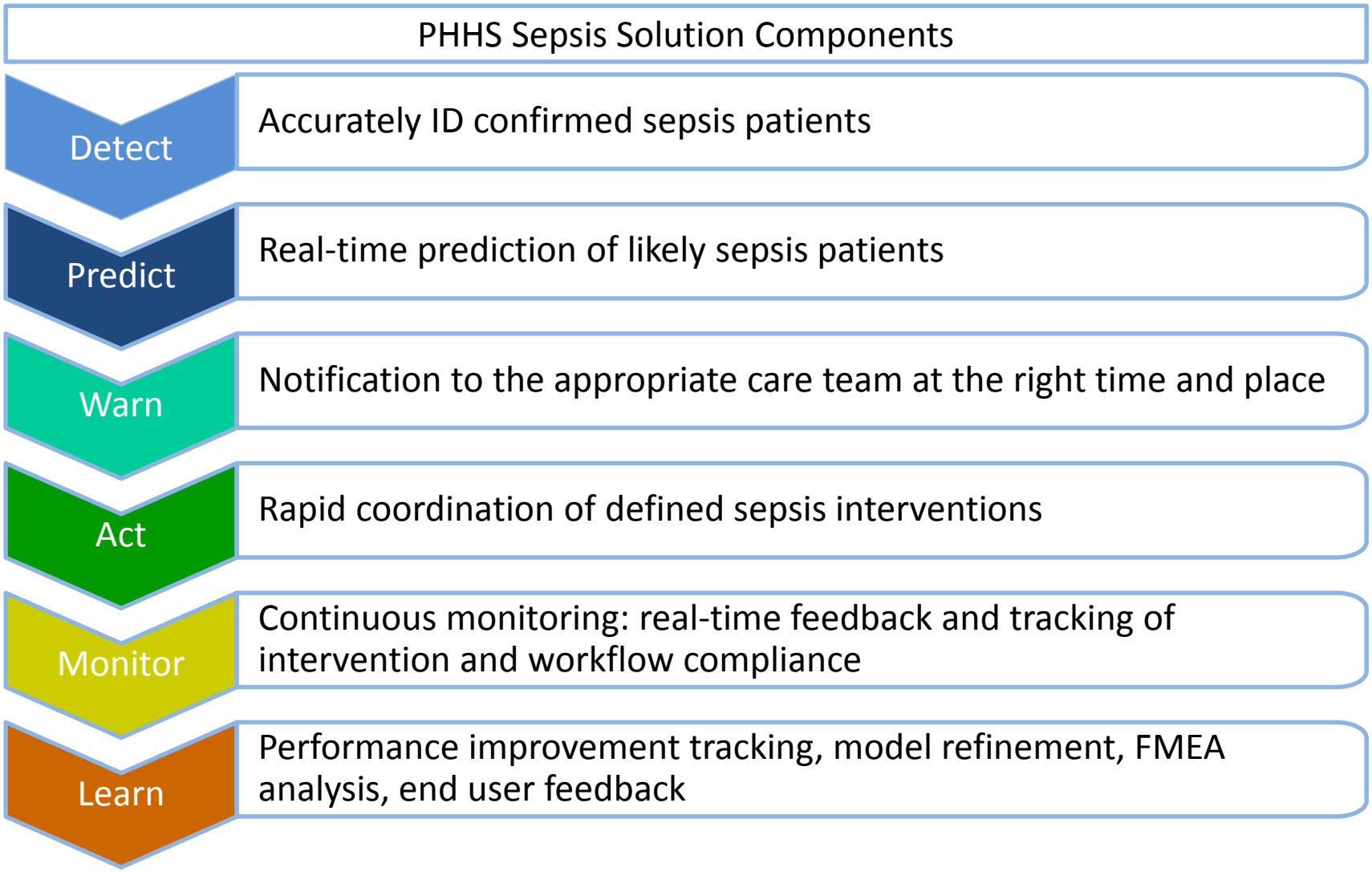
Six Key Components Every System Needs to Achieve Results



QUESTIONS

Ruben Amarasingham, MD, MBA
President and CEO
Parkland Center for Clinical Innovation

THANK YOU FOR ATTENDING

- **Upcoming Webinars and Events:**

  The Ebola Outbreak: Essential Hospitals on the Front Line
  February 25 | Webinar
  Register Here

  Policy Assembly
  March 17-18 | Washington, DC
  Register today at PolicyAssembly.essentialhospitals.org

  Vital2015
  June 24-26 | San Diego, CA
  Register today at vital.essentialhospitals.org

- **Evaluation:** When you close out of WebEx following the webinar, an evaluation will open in your browser. Please take a moment to complete. We greatly appreciate your feedback!