Supporting Clinical Decision-Making Through Technology

A Sepsis Story

Conflict of Interest Disclosure

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has no real or apparent
conflicts of interest to report.

Session Objectives

- Discuss how to use data to support changes to processes

- Demonstrate how rule based data mining can improve the accuracy of clinical response

- Discuss importance of giving clinicians information at the correct place in their workflow supports better practice

https://learn.premierinc.com/ebooks/sepsis-infographic

THR Sepsis Inpatient Mortality Rate / Premier & Internal O/E Graphs

There are six steps in the RCB design processes, completed for each care module

① Define **goals and outcomes** for each module

⑥ Identify **process measures** to gauge how progress and success will be tracked

② Define the **clinical specifications** for every patient to achieve desired outcomes

The design teams create "modules" of care, which include:

⑤ Finalize the **functional requirements** for creating the required enablers

③ Identify the **enablers** required to reliably deliver the specifications

④ Depict people, process and technology in an integrated **workflow**

It's all about... **OUTCOMES !**
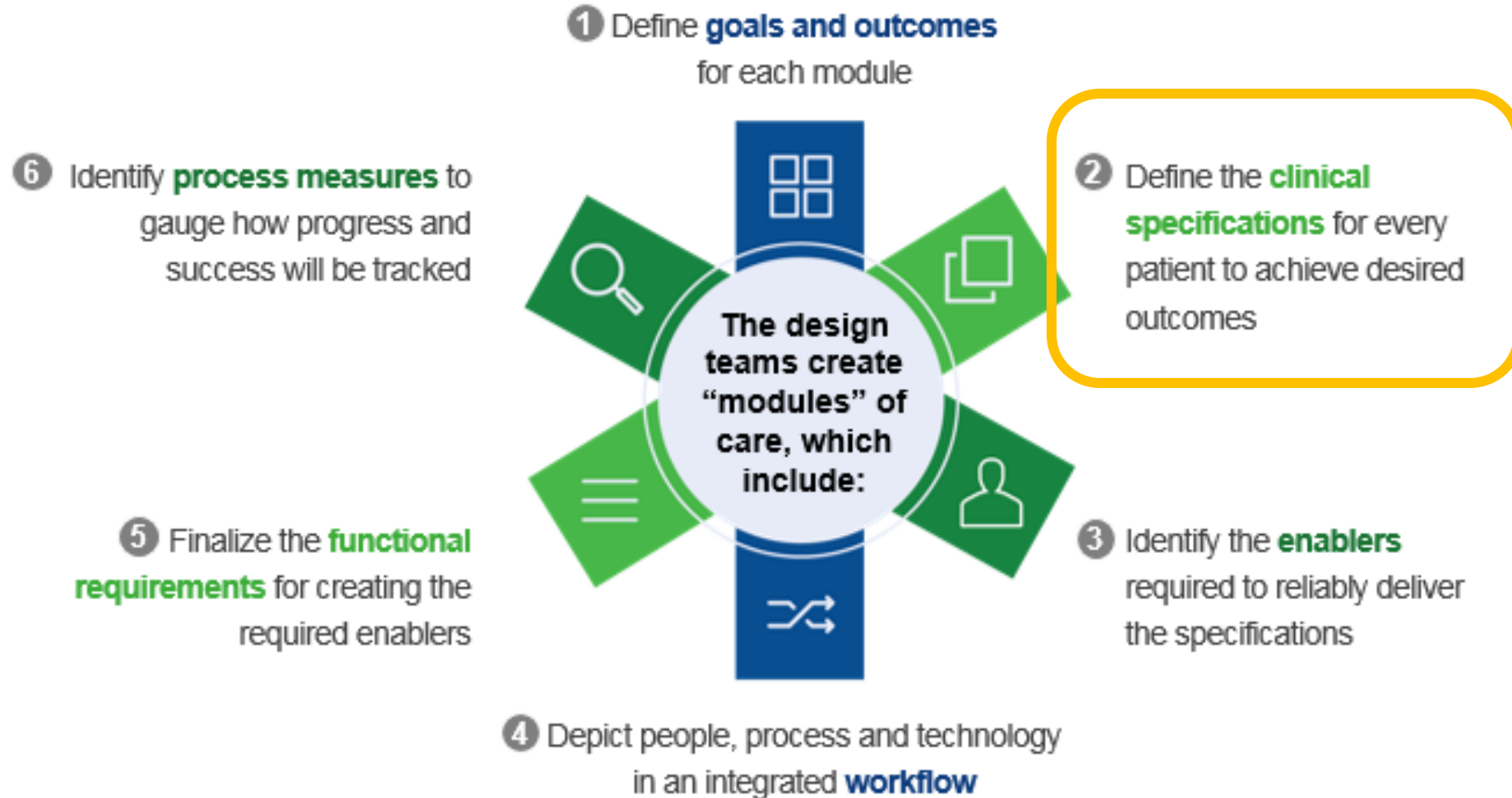
Excess Days Mortality Blood Utilization EHR Adoption **Length of Stay** Informatics **Readmissions**
Process Improvement Antimicrobial Stewardship Cost of Care Quality Data Warehousing **Efficiency** Care Variation **Safety**
Consumer Engagement Clinical Decision Support Value Realization Service Medication Errors eMeasures Analytics

Sepsis Screen

- Based on a paper tool
- Screened 100% of ED patients
- Expected the nurse to answer question based on limited information
- Does not utilize functionality that would facilitate accurate documentation and timely patient care

Sepsis Mortality Rates & Initial Documentation of Suspected Infection

Sepsis POA: Suspected Infection Documentation in ED Related to Patient Mortality
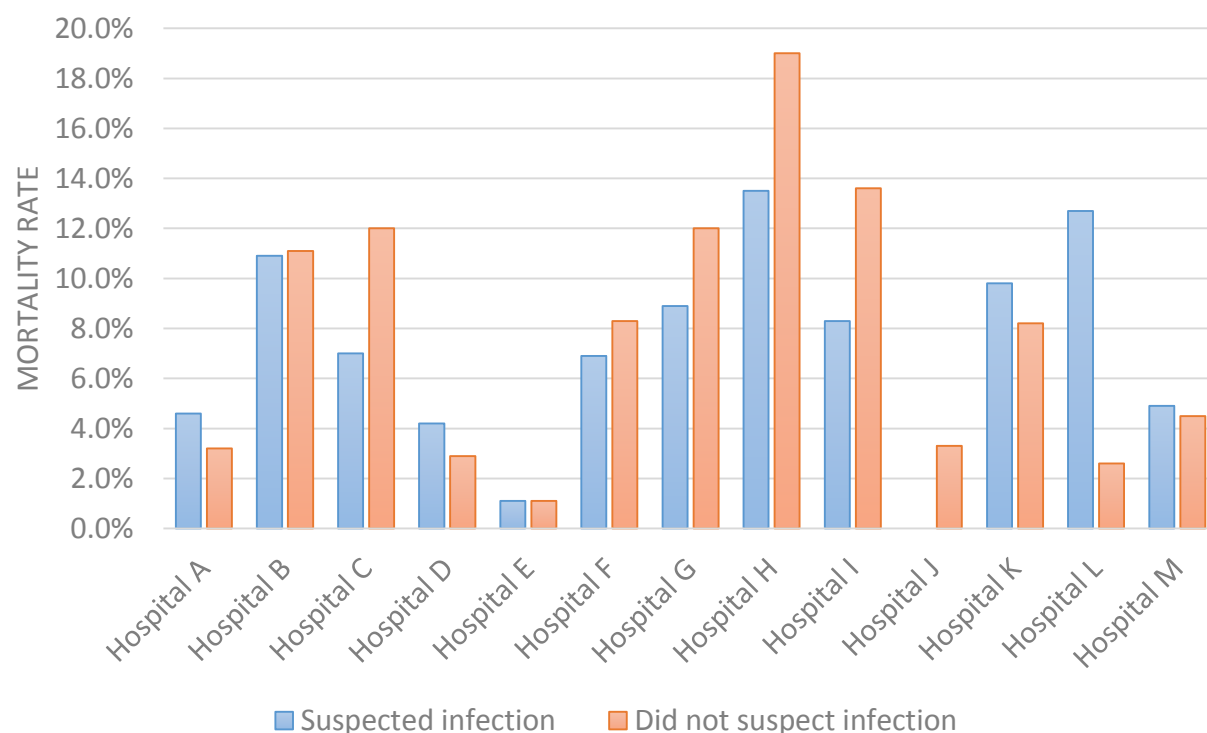
With some exceptions hospitals have higher mortality rates when suspected infection was answered 'No' during screening

Patient Population: Sepsis POA
Chief Complaints with Suspected Source of Infection of 'No' by ED RNs

TOP THREE
Shortness of Breath
Abdominal Pain
Altered Mental Status
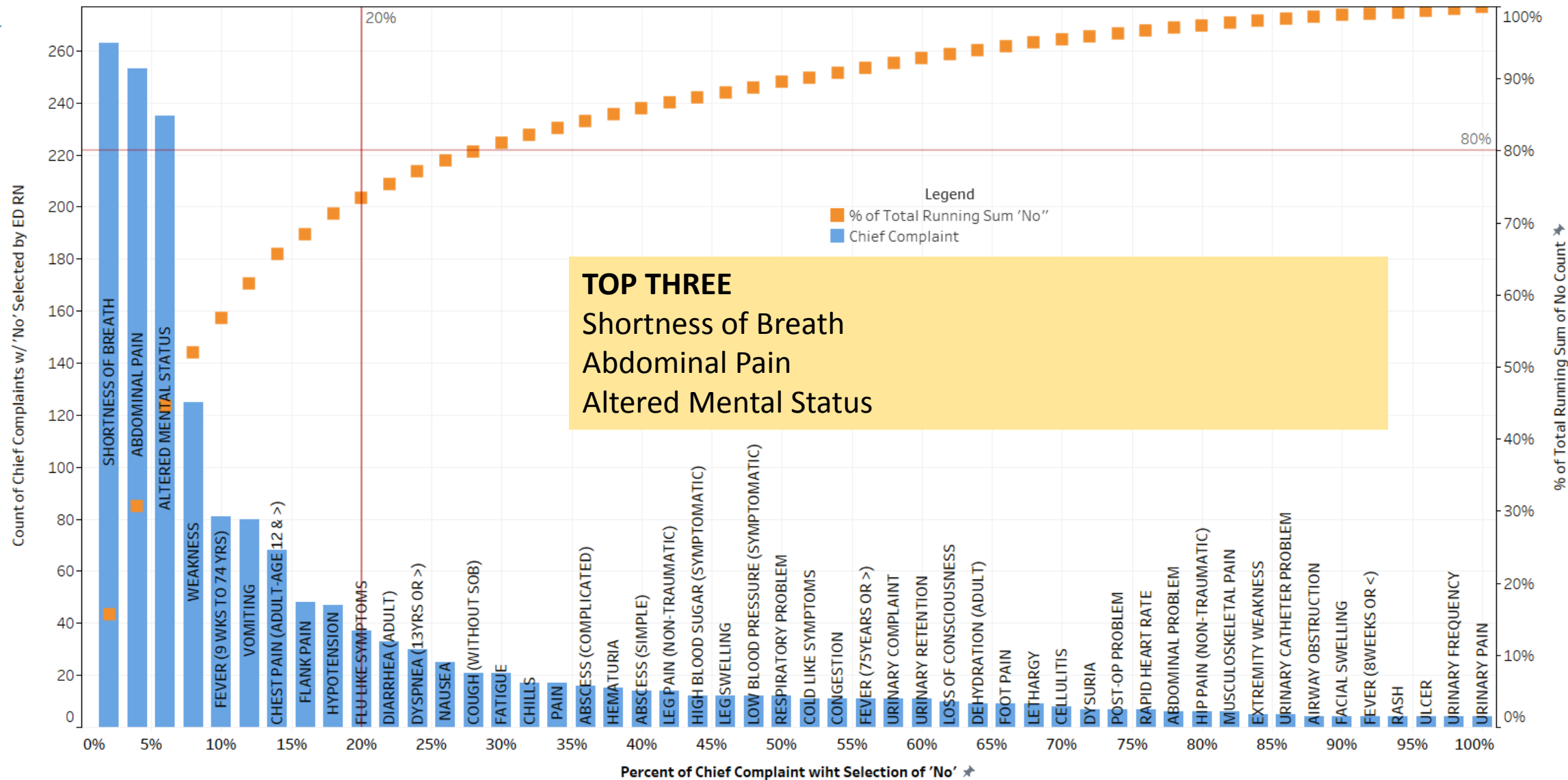
Suspected Infection with

SI+SIRS+MEWS

Quick SOFA   Sepsis Organ Failure Assessment

Systemic Inflammatory Response Syndrome

Modified Early Warning System   Shock Index

Excess Days   Mortality   It's all about...   Blood Utilization   EHR Adoption   Length of Stay   Informatics   Readmissions

Process Improvement   Antimicrobial Stewardship   Cost of Care   Quality   **OUTCOMES !**   Data Warehousing   Efficiency   Care Variation   Safety

Consumer Engagement   Clinical Decision Support   Value Realization   Service   Medication Errors   eMeasures   Analytics

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Time to Get Real

- Data and outcomes showed intended process was not followed
  - Even when screening was done correctly we were missing sepsis patients
- Eliminate the nurse's decision whether the patient has an infection
- Needed a better way to inform the clinician of the individual patient's risks/evidence of infection
- Put the right information in the right place, at the right time, in the right way, to the right person

Identification of At-Risk Patients in the ED

- Goal:
  - Identify risks for infection accompanied by early indicators of organ dysfunction
  - Ease the cognitive burden on clinicians
- Objective for identification of those at:
  - Leverage existing research and guidelines
  - Utilize known characteristics of infection/septic patients
  - Avoid complex scoring/weighting of attributes
  - Aggregate information found in numerous locations for succinct viewing
  - Notify clinicians when simple criteria is met

Phases of an ED visit
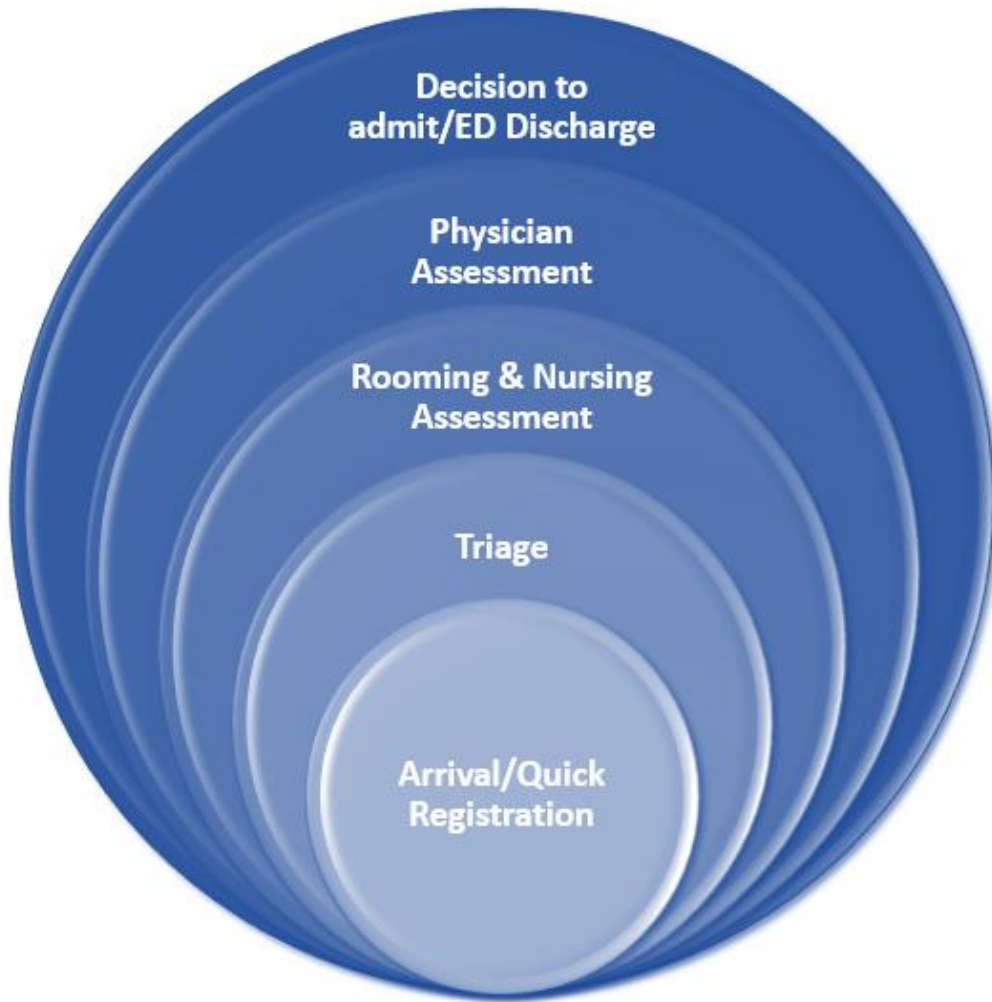
- Documentation and data availability increases as the patient moves through the phases of an ED visit

- Each phase contains evidence of suspected infection AND physiological changes when used in the right context

Using What We Know

- Who is at risk for infection
  - Recent hospitalization
  - Immunocompromised
  - Recent surgeries, invasive lines, visits for infection, antibiotic therapies
  - Elderly at higher risk, especially living in a healthcare facility
- What is an abnormal functioning body system?
  - Assessment findings can identify potential problems before it is actually diagnosed
  - Baseline function of body systems must be accounted for (i.e. renal failure)

Identification Begins Before ED Visit Begins

⭐ Patient Arrival

Recent Treatment for Infection
- Diagnosis
- Antibiotics
- Cultures
- Isolation

Recent Procedures
- Surgery
- Dialysis treatment
- Airways
- Wounds/ Incisions
- Invasive lines
- Implanted device/ports

Chronic Health Conditions
- Immuno-compromise
  - Cancer
  - HIV/AIDS
  - Asplenia

Extended Contact with Healthcare Institution
- Recent Admission
- Lives in a nursing home or institution

Registration
- Arrival Complaint

Triage
- Chief Complaint
- Vital Signs
- Home Meds
- Patient History
- Living Arrangements

Roomed
- Nursing Assessment

Treatment
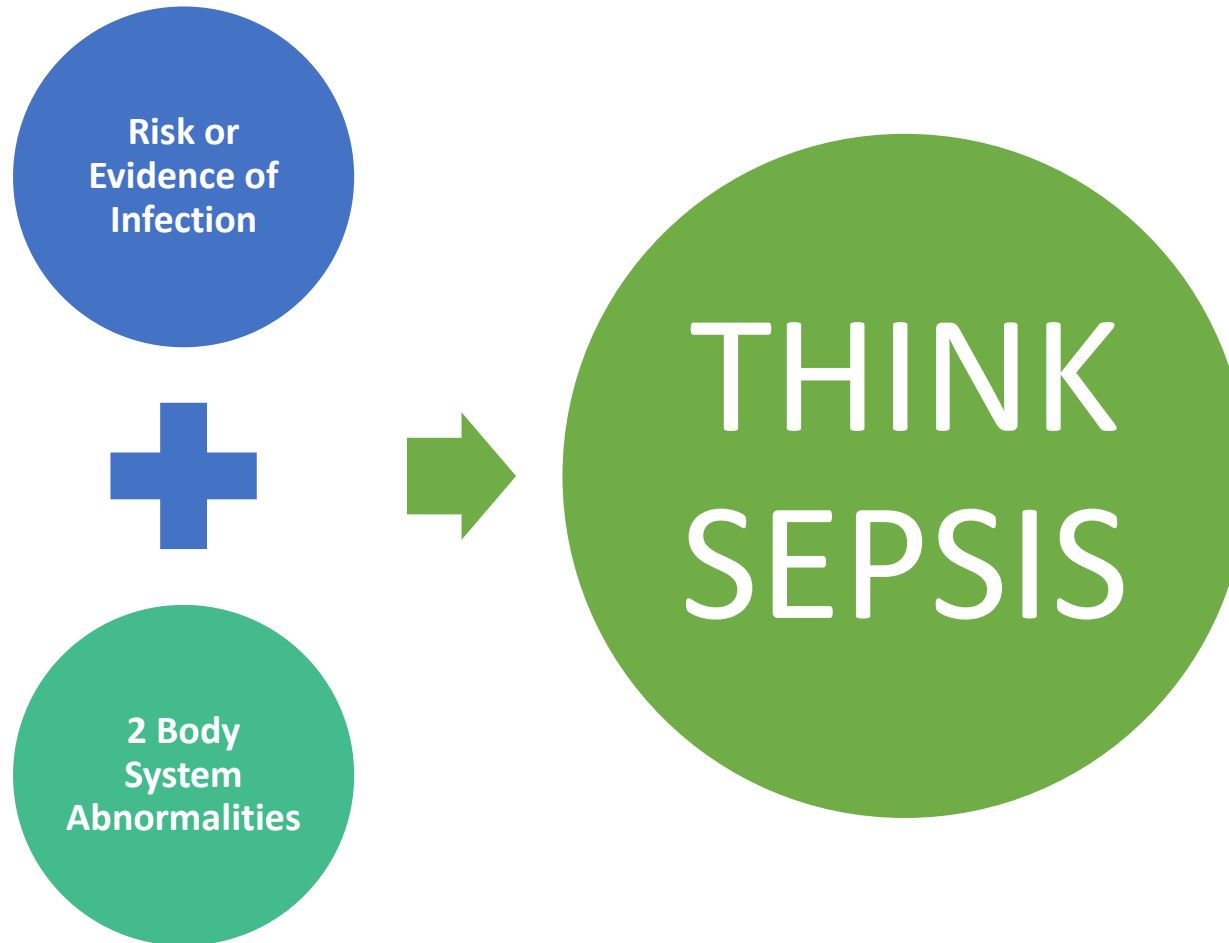- Orders-Infection-related
- Lab results

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It's all about... **OUTCOMES !**

Excess Days · Mortality · Process Improvement · Antimicrobial Stewardship · Cost of Care · Consumer Engagement · Blood Utilization · Quality · Clinical Decision Support · EHR Adoption · Value Realization · Length of Stay · Service · Data Warehousing · Medication Errors · Informatics · Efficiency · Care Variation · eMeasures · Readmissions · Safety · Analytics

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Simple Criteria

Risk or Evidence of Infection

+

2 Body System Abnormalities

→

THINK SEPSIS

Risk For Infection

Abnormal Body System Function
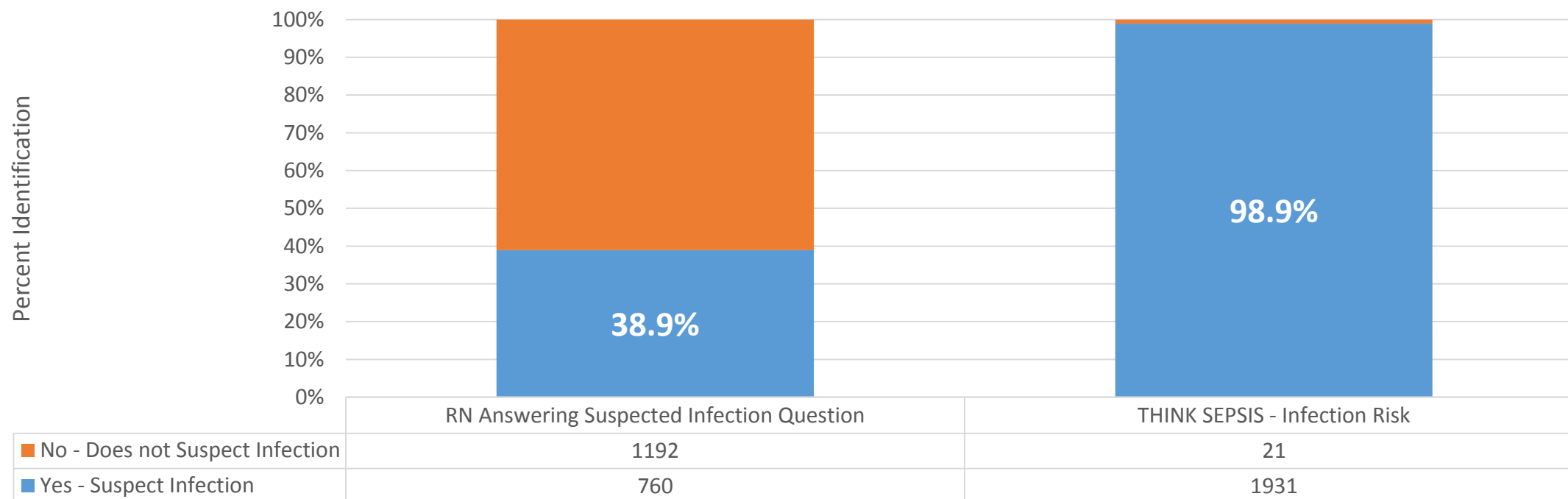
From Just Triggers to Real Change

Design Teams

- Iterative design team looked at the THINK SEPSIS infection risk identification tool and where to best place it in the ED workflow

  - Everyone was still thinking of this as a classic 'screening' tool, something done during assessment

- Physicians requested the new tool to fire for them instead of following the previous workflow of the nurse notifying the physician of a positive sepsis screen

  - Be very careful what you ask for

Infection Identification

Identification of Infection for Patients Who Had an Infection POA (ED Diagnosis or
Coded Diagnosis
9/13/2017 – 9/19/2017

	RN Answering Suspected Infection Question	THINK SEPSIS - Infection Risk
■ No - Does not Suspect Infection	1192	21
■ Yes - Suspect Infection	760	1931

Population: ED patients with Infection (ED physician diagnosis or Coded as POA)

Human Factors

- Easy to forget this is NOT a sepsis identification tool, it is a risk of infection identification tool

- Risk of infection is so common it is easy to be desensitized
  - Flu season = the whole world has an infection

- Over-firing versus including 'infection' in clinical thinking more often
  - Identifying infection means different work efforts

- Timing is everything
  - Information needs to be highlighted when the clinician can reasonably act on it

Sepsis Identification

Patients Who Had an Sepsis POA (ED Diagnosis or Coded Diagnosis)
9/13/2017 – 10/15/2017
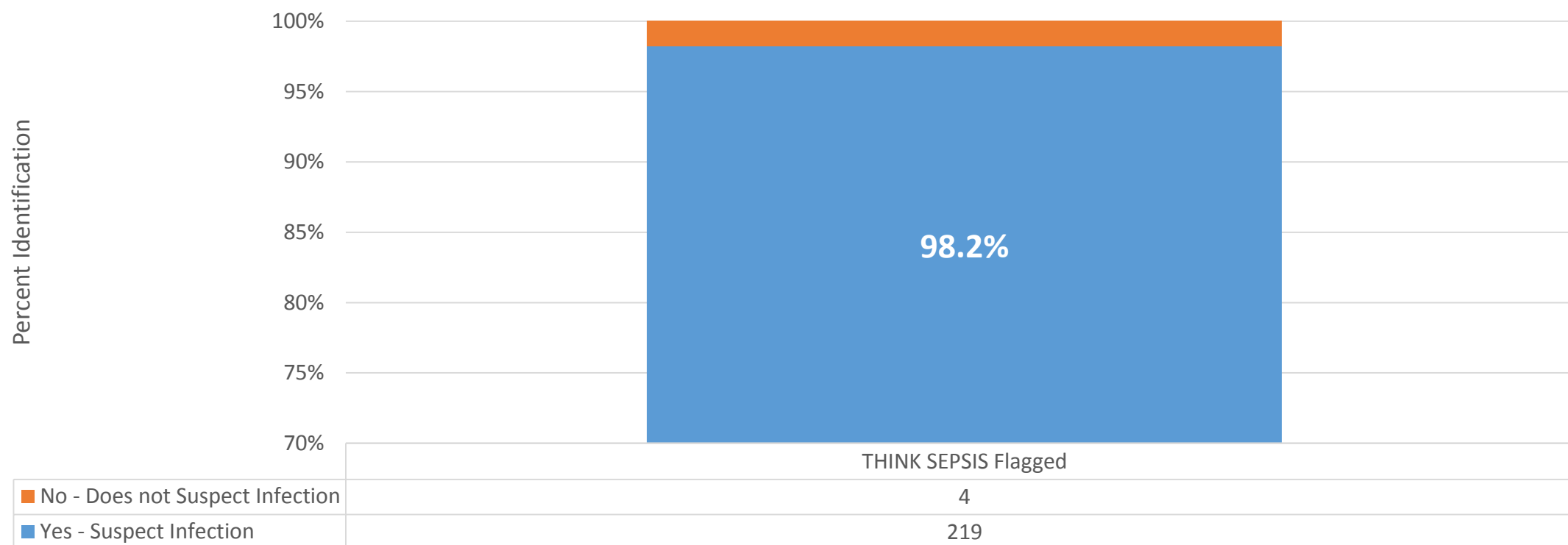
Population: ED patients with Sepsis (ED physician diagnosis or Coded as POA) who roomed in the ED 30 minutes or more

You don't know what you don't know

- Nurse designers and Physician designers
  - Approved the new workflow using the trigger tool and clinical decision support tools
- Triggers in wrong spot
  - Even after the trigger tool was adjusted to fire less, the alerts were still not in the best place in the workflow for clinicians to act upon
  - Just because the trigger is met does not mean that is the best time to tell the clinician.
  - Good intention of instant alert when criteria was met had bad outcome of delaying action to the alert
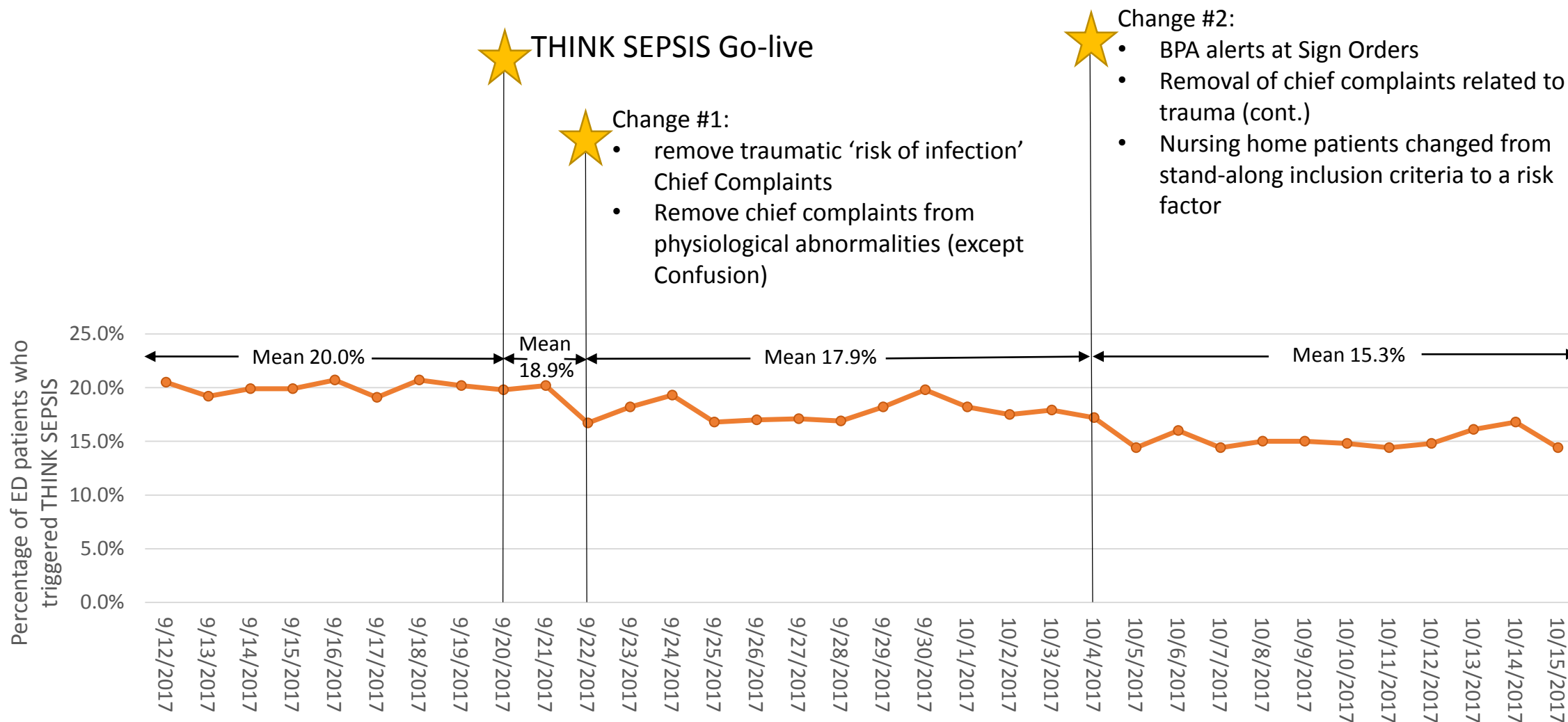
Flexibility and Rapid Cycle Change

- Knew this new process would have unique issues associated
  - Intense data scrutiny by team to identify issues early
  - Kept open lines of communication with front line clinicians
- Made several 'tweaks' to the process immediately
  - Adjusted triggers to appropriately reduce firing
- Knowing what you know now
  - Listened to clinicians struggles with when alert was firing
  - Listened to struggles with how to use clinical decision support tools (BPA buttons, order sets)
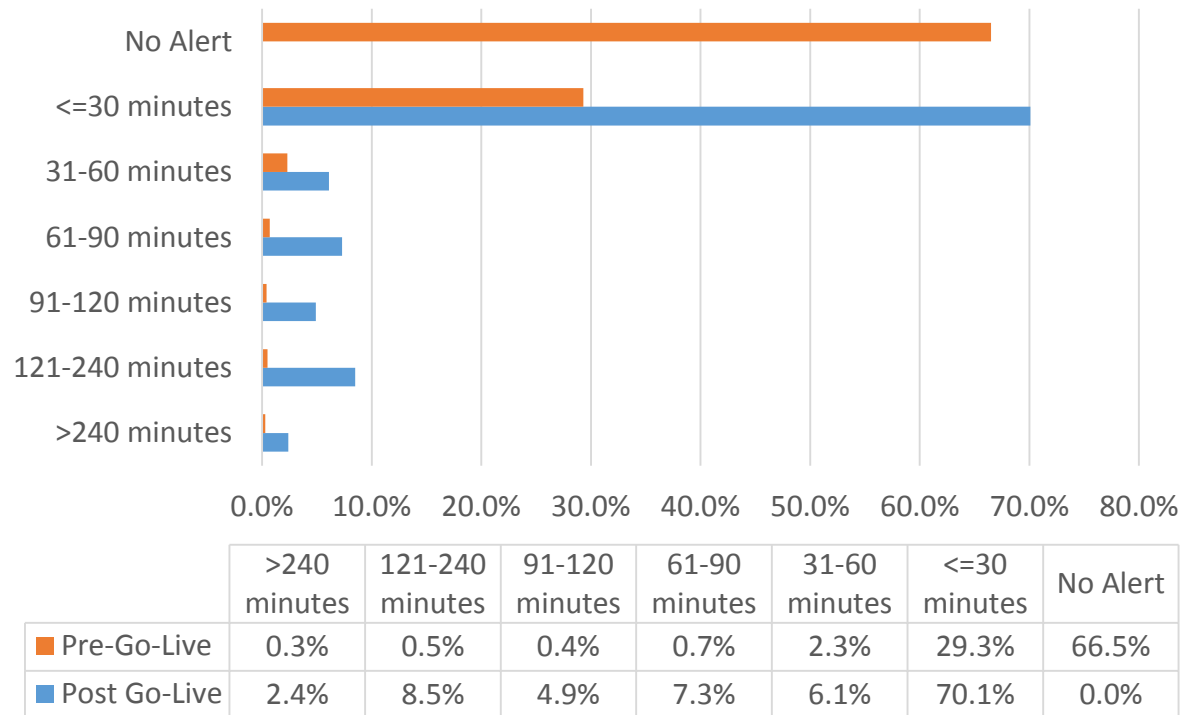 - Rapidly changed tools to meet the needs of front line staff

Sepsis POA – Time to Alert

Sepsis POA patients – Arrival Time to First BPA Alert

	>240 minutes	121-240 minutes	91-120 minutes	61-90 minutes	31-60 minutes	<=30 minutes	No Alert
Pre-Go-Live	0.3%	0.5%	0.4%	0.7%	2.3%	29.3%	66.5%
Post Go-Live	2.4%	8.5%	4.9%	7.3%	6.1%	70.1%	0.0%

Minutes to 1st BPA*

	n	Mean	Median	(Min-Max)SD
Pre Go-Live (Jan-Dec 2016)	6376	193.2	168	(0-1981) 202.8
Post Go-Live (Sep 20-Oct 8 2017)	163	50.6	11	(0–1511) 134.9

*ED total time in minutes used for patients who had no alert

Though the Post Go-Live sample is small we see an improvement of > 2.5 hours in alerting the clinicians

Sepsis POA – Time to First Intervention

Sepsis POA patients – Arrival Time to First BPA Alert

	>240 minutes	121-240 minutes	91-120 minutes	61-90 minutes	31-60 minutes	<=30 minutes	No Intervention
Pre-Go-Live	5.6%	8.4%	4.1%	6.8%	17.0%	58.0%	0.2%
Post Go-Live	3.6%	9.9%	3.6%	6.7%	19.7%	56.5%	0.0%
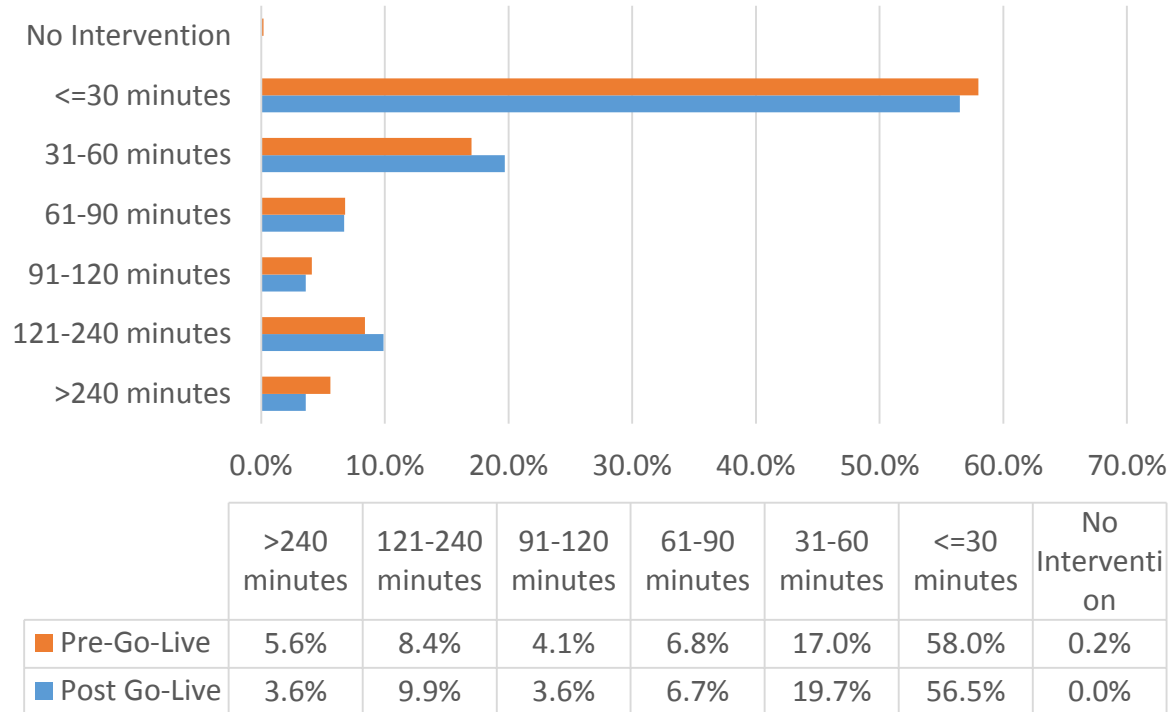
Minutes to 1st Intervention*

	n	Mean	Min Max SD	Median Time
Pre Go-Live (Jan-Dec 2016)	6376	75.49	(-19 to 2438) SD180.8	25
Post Go-Live (Sep 20-Oct 8 2017)	223	57.2	(2-549) SD 82.4	27

*ED total time in minutes used for patients who had no interventions

Though the post Go-Live sample is small, we see an improvement of 17 minutes to first intervention

Contact Information

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