Improvement Targets for Hospital-Acquired Sepsis



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Learning Objectives

- Identify human behavior factors that contribute to sepsis-related care management among clinical care teams.
- Develop tools that effectively and efficiently aid in the early identification of hospital-acquired sepsis (HAS) and support its clinical management.

Background and Motivation

- Sepsis is the most common hospital-acquired infection and the costliest complication for hospitals in the U.S.¹
- · One-fifth of sepsis cases are hospital-acquired sepsis (HAS)(UCSF internal reporting), resulting in more than 100 deaths per year at our institution.
- Prior efforts to improve sepsis outcomes have included deploying alerts in the electronic health record (EHR), enhancing reporting infrastructure, and conducting case reviews and root-cause analyses to support early recognition and treatment of sepsis in adult patients. These efforts have largely been on a case-by-case basis and mostly for community-acquired sepsis.
- A system-level understanding of the current state of HAS is often opaque. In response, the UCSF Sepsis Collaborative was formed and has used humancentered and service design principles to uncover care gaps and opportunities at a system-wide level to tackle HAS.

Service Design Principles



- The Sepsis Collaborative utilized a combination of quantitative and qualitative methods to discover key drivers and create solutions to improve sepsis identification, treatment, and management of HAS.
- Enhancements were made to the EHR considering the end user and including relevant clinical data.

Data Discovery: Findings from Our Local HAS Registry

- Vizient definition of HAS was used to identify the patient cohort.
- During FY23, Observed to Expected (O:E) mortality index was higher in those with HAS than those with community-acquired sepsis (Figure)(Vizient Clinical Database).
- Current version of sepsis Best Practice Alerts (BPAs) for HAS were being cancelled 50-85% of the time (Tables).



Provider		
Reason	Count of Records	% of Records
0	4	0%
ccept BPA (No Action aken)	145	1%
Activity Link	107	1%
Cancel BPA	9,734	85%
Sepsis	798	7%
Defer to primary team	640	6%
NULL	11	0%
Grand Total	11,439	100%

Human and Systems Factors Analysis



		Count of	% of
		Records	Records
A (No Action	0	7	0%
		54	0%
ık		258	2%
A		5,549	50%
ew/Audit		933	8%
being treated		275	2%
		2	0%
nallion or		3,820	35%
		121	1%
al		11,019	100%

Intervention: Sepsis Activation and **Management Solutions**

Open Order Set

Acknowledge Reason

 Defer to Primary Care
 Remind me in 2 hours
 Sepsis Treatment in Progress
 Comfort Care

Venous Blood gas with Lactate

X-ray chest

IV Fluids

Electrolyte

Antibiotics

Peripheral Blood Culture

Central Blood Culture

Lactated ringers bolus

Urinalysis with reflex urine culture

Streamlined Sepsis BPA – In Pilot Phase

- Streamlined the number of clicks required to acknowledge the BPA.
- Linked acknowledgment reasons to a standardized BPA silencing time.

Modified Sepsis Order-set – In Pilot Phase

- Reprioritized items to improve order-set navigation and workflow.
- Consolidated disparate orders together for efficiency.
- Added direct link to orderset within BPA to support clinical management.

Implemented Sepsis Clinical Summary- In Pilot Phase

Sepsi	s Clinical Summary
Time 01	Since Code Sepsis (hr:min) will be displayed: :33
Lacta	te Not Ordered
Blood	Culture Not Ordered
Antibi	iotics Not Ordered
Fluids	s Not Ordered
Lacta	te Ordered (not collected)
Blood	Culture Ordered (not collected)
Antibi	iotics Ordered (not given)
Fluids	3 Ordered (not started)
Lacta	te Collected
Blood	Culture Collected
Antibi	iotics Given
Fluids	Started
Visua	ls to Display Vital Trends will be presented

- Includes sepsis clock to encourage timely bundle compliance.
- Provides trends over time in relevant sepsis clinical data (i.e., vital signs, laboratory values).
- Provides a visual display of bundle compliance elements and completion status.
- Displays in a side panel of the EHR screen and is always visible.

Developed a machine learning based Early Sepsis Risk Predictor – In Beta Testing

- Model will display the probability that the patient will meet sepsis criteria.
- Eliminates redundant alerts through the conditional layer.
- Includes buttons to allow the provider to take early clinical action.

80% Sepsis Probability Score	This patient hi hours to have 200 features:	is a 80% pr sepsis. The	obability o probabilit	f current y score is	y having calculat	, or devel	oping Sepsis in the next 24 I on positivity in a total of over	
		Now	1 hr prior	2 hrs prior	3 hrs prior	6 hrs prior	10 hrs prior	
	Probability Score	80%	80%	79%	81%	73%	72%	
Sepsis 2 Criteria	The patient	nas also m	et the Sep	els 2 Cr	teria for	Severe	Sepsis/Septic Shock:	
	SIRS Criteri Temp >38 RR > 22 WBC >12			End O SBP < INR > Total B	rgan Fal 90 1.5 81 ≥ 4	lure		
epsis Bundle tatus	The following diagnosis: Given Initial Given Sops	Lactate Co S-Approvel Culture No	ecommen liected 1 Antibiotic 6 Collecter	s Given	the CDC	within 3	hours of a confirmed Sepsir	•
commend selecting	1 Blood II Repo II Fluids	et Lactate ? Not Starte	d	-				
commend selecting Open Orden	1 Blood 11 Repe 11 Fluids g the following o	of Lactate 1 Not Starte ptions: Do Not 1	d Open Orde	rset	IP Ad	luit Sepsi	s/Septic Shock Orders Provid	
commend selecting Open Orden Open Sepsis Clinica	1 Blood 11 Repe 11 Fluids 2 the following o set 2 Summary	at Lactate 1 Not Starte ptions: Do Not 1	d Open Orde	rset	IP Ad	lult Sepsi	a/Septic Shock Orders Provid	

Lessons Learned

- intervention roll-out.
- and improve patient care.
- and its management.
- inconsistency.

Key Takeaways

- management strategies.

Reference

Contact Information

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• Early engagement with key clinical partners & decision-makers is necessary for a successful

Given the need for provider and nurse coordination for sepsis management, ensure that there is consistency between workflows.

Traditionally, sepsis reporting is completed after a patient is discharged, making it difficult to monitor and improve sepsis management progress in real-time. Better real-time data availability is required to understand the current state of sepsis

Data validation is a critical step in creating a highquality sepsis registry and understanding the relationship between when the BPA is triggered

Early analysis showed variation not only in sepsis prevalence and mortality but also in sepsis management among different patient populations, making it important to streamline care to reduce

• The current version of the sepsis BPA was being canceled or ignored frequently, leading us to redesign the sepsis alert and orders to make it more user-friendly and drive practice.

• Visual cues (i.e., trend data, bundle compliance progress, sepsis clock) may further reinforce timely sepsis bundle compliance.

 New methodologies in clinical informatics, including artificial intelligence, may provide novel opportunities to improve sepsis identification and

Balch B. Sepsis is the third leading cause of death in U.S. hospitals. But quick action can save lives. AAMC.org. Published October 10, 2023. Accessed February 12, 2024. http://www.aamc.org/news/sepsis-third-leading-cause-deathus-hospitals-quick-action-can-save-lives#:~:text=lt

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