



Med Center Health

Improving Outcomes: Sepsis Tips, Tools & Automation

Laura White, MHA
Performance Improvement Engineer

Improving Outcomes: Sepsis Tips, Tools, & Automation

- MCBG SEP-1 Bundle Performance

Tips, Tools & Automation:

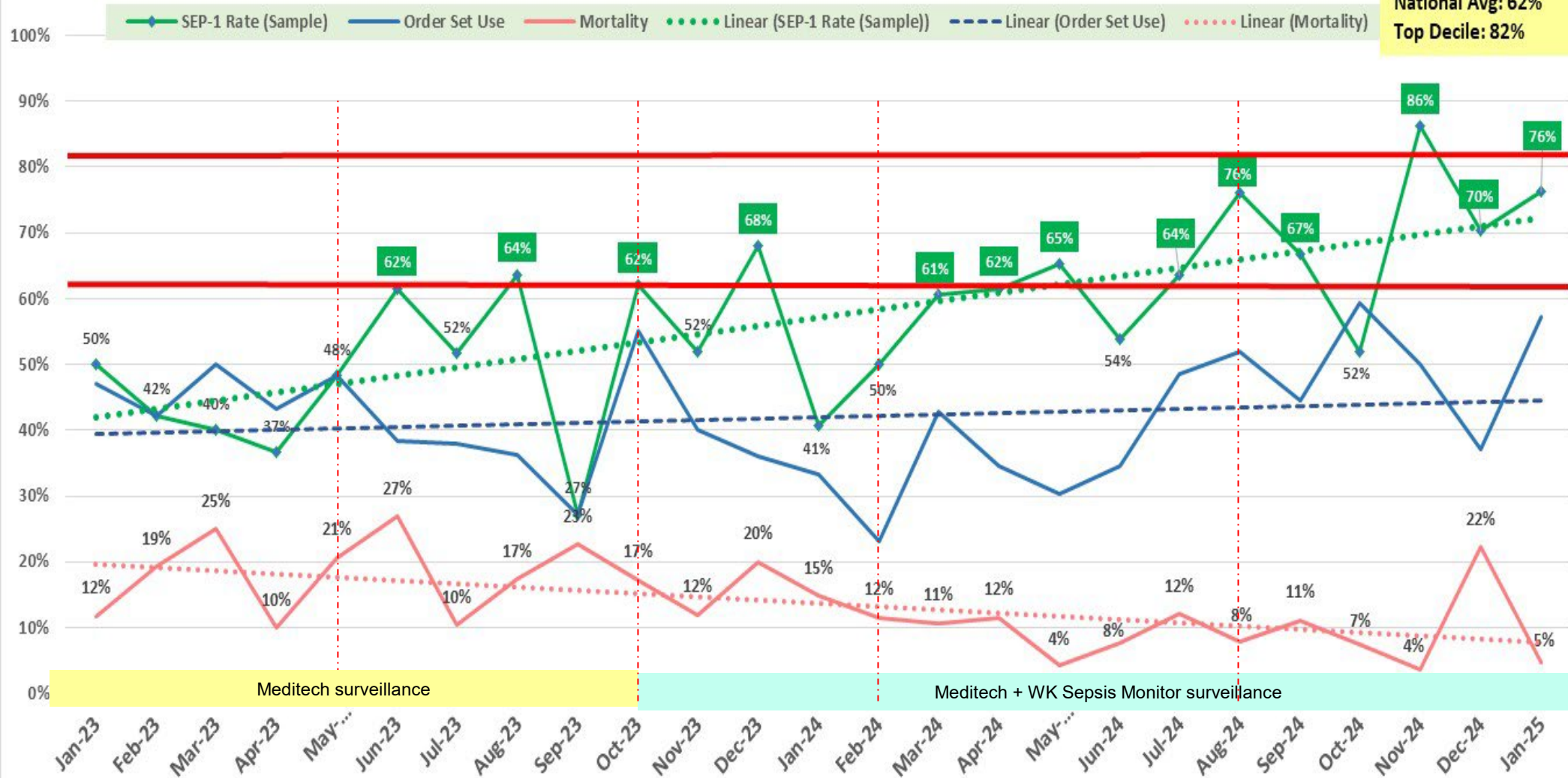
- EMR-based Automation & Software
 - Blood Culture alerting
 - Surveillance software
- Documentation Templates
 - Sepsis Event Note
 - Audit Trail Reports & CDAC Records Request workflows
- Transparency & Education
 - Audit Template & ER Peer-to-Peer Reviews
 - Provider-level performance distribution
 - New provider orientation



Improving Outcomes: SEP-1 Performance

MCBG SEP-1 Bundle Performance

KHA HRIIP Target: 59%
National Avg: 62%
Top Decile: 82%



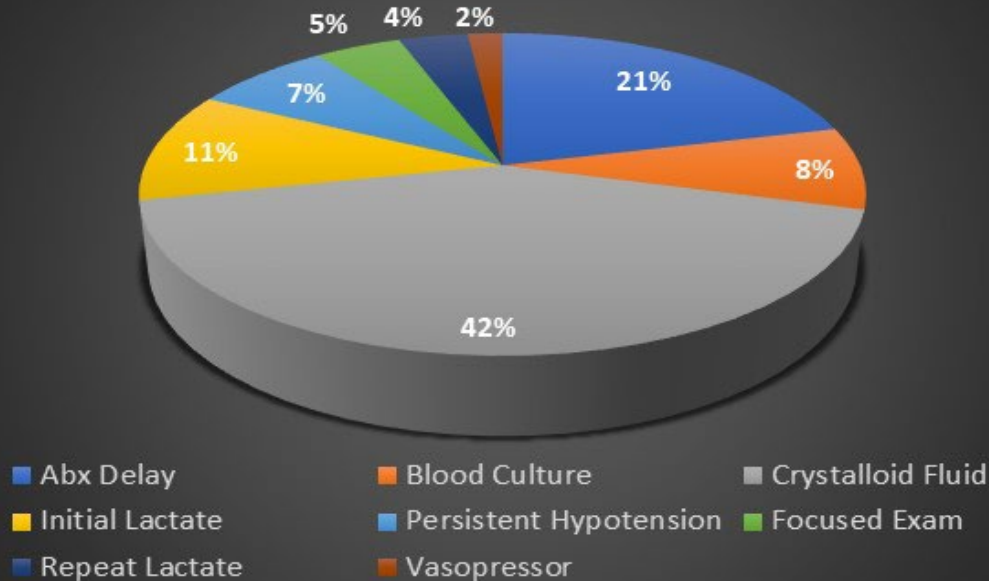
Sept22: EMR-based surveillance LIVE
May23: Blood Culture Alerting in EMR LIVE
Oct23: Sepsis Monitor surveillance LIVE (ER only)
Feb24: Lactic Acid w/Reflex order updated with 3rd collection logic
Aug24: Lactic Acid POC test in LIVE (ER only)



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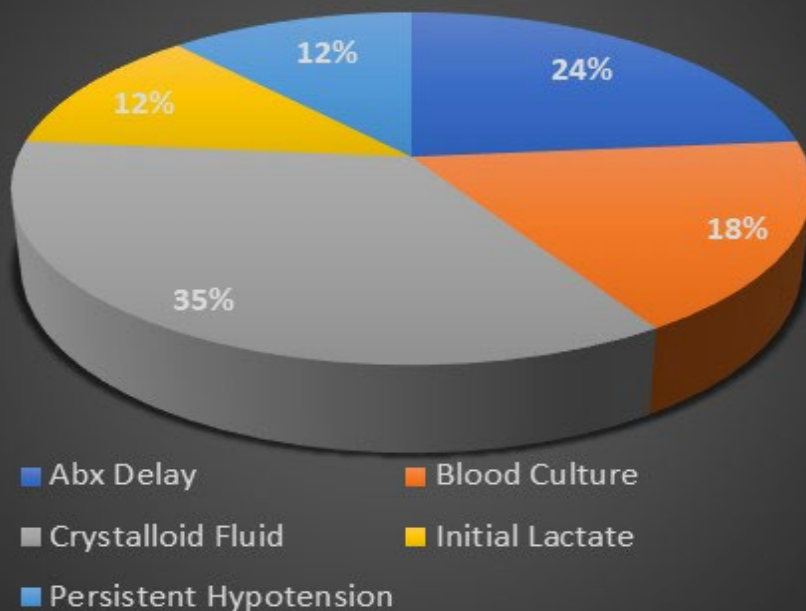
Improving Outcomes: SEP-1 Performance

Fallout Breakdown- Rolling 12 Months



Analyzing Top Fallout reasons underscores opportunity with Crystalloid Fluids but declining.

Fallout Breakdown- Rolling 3 Months



Jan25: No Crystalloid fluid fallouts!

- 2 fallouts for Persistent Hypotension
- 2 fallouts for Initial Lactic Acid
- 1 fallout for Abx Delay

Blood Cx CDM rules interrupted by EMR update.

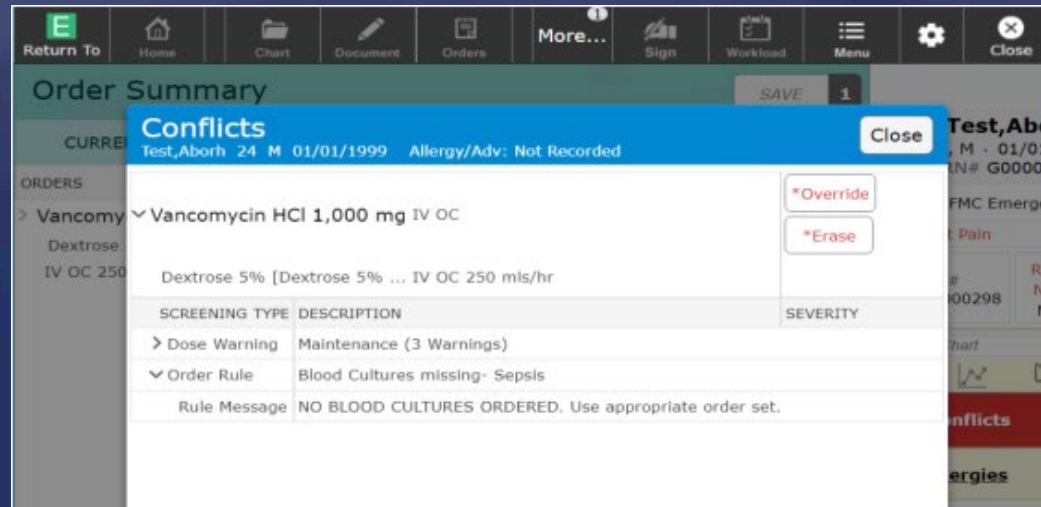


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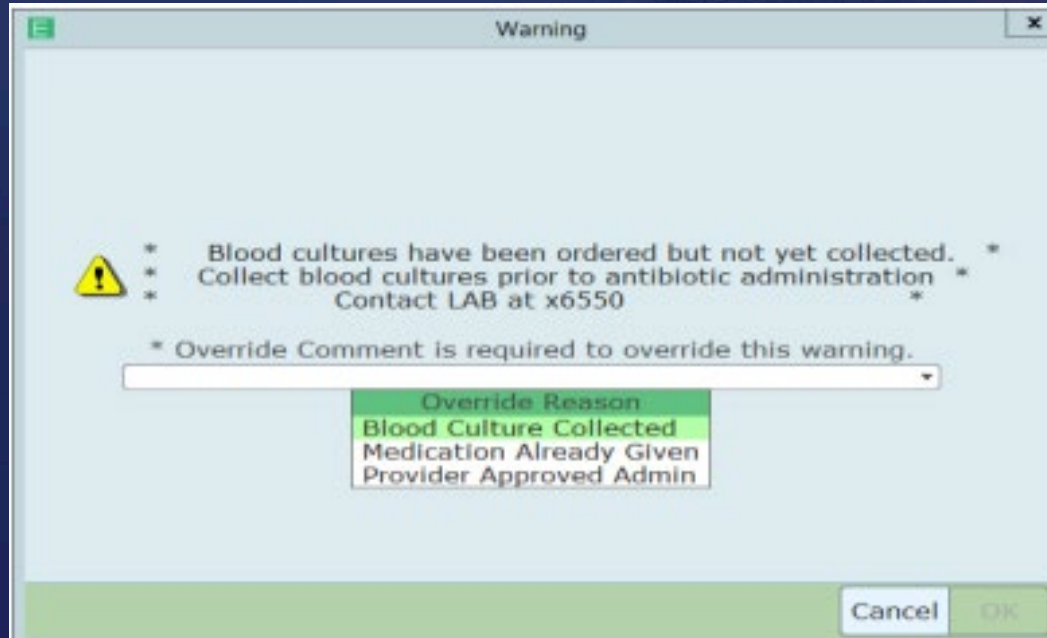
Improving Outcomes: EMR-based Automation-BCx Logic

Blood Culture CDS Project:

- Implement new clinical decision support (CDS) rules in the order management (OM) application and the medication administration record (MAR) to improve compliance with blood cultures being drawn prior to administration of IV antibiotics.



SCREENING TYPE	DESCRIPTION	SEVERITY
> Dose Warning	Maintenance (3 Warnings)	
▼ Order Rule	Blood Cultures missing- Sepsis	
Rule Message: NO BLOOD CULTURES ORDERED. Use appropriate order set.		



* Blood cultures have been ordered but not yet collected.
* Collect blood cultures prior to antibiotic administration *
* Contact LAB at x6550 *

* Override Comment is required to override this warning.

Override Reason
Blood Culture Collected
Medication Already Given
Provider Approved Admin

Blood Culture Clinical Decision Support Automation:

May23: Utilized EMR functionality to alert nursing and providers at different workflow junctures to consider blood culture order or collection.

TWO workflow scenarios alert clinicians to consider blood cultures with variation based on **patient setting** and **abx order indication/status**:

1. Providers at IV Abx order entry:

- When ordering an IV abx in the **ER setting** for **any clinical indication other than "surgical Prophylaxis,"** providers are flagged with a medication conflict alert to consider adding Blood Cultures.
- When ordering an IV abx in the **inpatient setting** for a **clinical indication of "sepsis" only,** providers are flagged with the medication conflict alert.

2. Nursing at IV Abx scanning:

- When scanning an IV abx to the MAR, nursing is alerted when blood cultures are on order in an uncollected status.
- Workflow also includes reporting functionality to search for clinician alerting for both scenarios.



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Improving Outcomes: EMR-based Automation- Surveillance

4A - 4A01 - 1 04/20/2025 00:00

Patient details

SEPSIS DATA

SIRS Criteria

16.8 k WBC 88 P 18 RR

95 O2Sat 98 T

Organ Function

80(47(58) BP 8.34 Creat

202 k PLT 1.0 Bili 2 Lactate

172 Glucose

Signs of Infection

Positive UA Antibiotics

Abx Indication-UTI UTI

Abx Indication-Sepsis 0.4 % ICs

Chronic Conditions

End Stage Renal Disease

OLDER

Other Meds

Heparinoids IV Fluids

Active Workups

Sepsis

Severe Sepsis with Hypotension Protocol

4A - 4A01 - 1

1 of 4

2.5h

Actions	Status	Details	Deadline
Initial Lactate	Ordered		04/21/2025 18:38
Blood Culture	Complete 04/20/2025 19:46		04/21/2025 18:38
Antibiotics	Ordered		04/21/2025 18:38
Fluid Resuscitation	Initiated		04/21/2025 18:50

Patient History

Autoset 04/21/2025 15:50
4A - 4A01 - 1

Name
Severe Sepsis with Hypotension Autoset

Workup type upgraded
Severe Sepsis Protocol -> Severe Sepsis with Hypotension Protocol

Autoset 04/21/2025 15:38
4A - 4A01 - 1

Name
Severe Sepsis Autoset

Workup created
Severe Sepsis Protocol

Autoset 04/21/2025 15:38
4A - 4A01 - 1

Name
Rule Out Sepsis Autoset

Click for additional history

Annotations:

- Creininine excluded from OD
- Picked up positive UA, Abx order for sepsis/ UTI and UTI diagnosis in Note.
- Severe Sepsis with Hypotension Protocol
- 1 of 4
- 2.5h
- Notice interface messages differentiate between ordered vs. administered/collected status.
- This patient did not initially qualify for Fluids but workup upgraded with later timeline.
- Patient List Rollup: At a glance, see treatment completed or on order.

Sept22: EMR-based sepsis surveillance enabled early detection-- 97% sensitivity. Only 79% specificity & no improvement in SEP-1 performance from baseline (45% Year 1).

EMR-based surveillance automation alerted clinicians with qualifying time and quick links to order sets & Sepsis Event Note but **no guidance on patient-specific treatment.**

Oct23: MCH deployed WK Sepsis Monitor web-based product in the MCBG ER interfacing with our EMR. It features **NLP to detect infection in unstructured text and guides clinicians on customized sepsis treatment plan for all 3-hour elements.**

SEP-1 performance improved to 59% in Year 1 (vs. 46% EMR) with the last 6 months 62%, better than national average.



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WK Sepsis Monitor surveillance product not only detects sepsis but **guides users on missing treatment and deadlines.**

Opportunities: Meditech does not accept third party messages so must be logged into website or setup to receive email alerts. NLP is not "intelligent."

Improving Outcomes: Documentation & Templates

Sepsis Event Note: Changed physician sepsis documentation template to prompt lesser volume fluid plan AND contraindication details to meet SEP-1 Manual Guideline for Crystalloid Fluid exclusion.

Increased ER physician usage through peer-to-peer feedback on crystalloid fluid fallouts.

IM: H&P

Principal Laura E White Contributors

HPI PMFSH Meds ROS Exam Sepsis Results A/P MIPS Quality

Past Medical History:

Medications/Allergies

Review of Systems:

Physical Exam:

Sepsis Event Note

Reason Bundle Intervention Not Administered

contraindication to fluids Covid-19 infection suspected refusal blood draw refusal IV fluids refusal IV antibiotics other

* Crystalloid Fluid Plan

30mls/kg at rate > 125mls/hr is standard unless contraindicated. Detail contraindication & state lesser fluid volume.

Administering amounts other than 30 mls/kg All

Administering only due to

Repeat Focused Exam (Septic Shock)

After Fluid Start for Ongoing Hypotension or LA >3.9

Date exam was performed

- Changing "Reason Bundle Intervention Not Administered to Multiple Responses
- "contraindication to fluids" requires Administering only" & "due to" free text entries.

SEP-1 Manual Guideline:

- (2220 mL - 222 mL - 1000 mL).
- A physician/APN/PA order for less than 30 mL/kg of crystalloid fluids is acceptable for the target ordered volume if all of the following criteria were met:
- There is a physician/APN/PA order for the lesser volume of crystalloid fluids as either a specific volume (e.g., 1500 mL) or a weight-based volume (e.g., 25 mL/kg).
 - There is physician/APN/PA documentation within a single source (e.g., note or order) in the medical record including all of the following:
 - The volume of fluids to be administered as either a specific volume (e.g., 1500 mL) or a weight-based volume (e.g., 25 mL/kg).
 - AND a reason for ordering a volume less than 30 mL/kg of crystalloid fluids. Reasons include and are not limited to:
 - concern for fluid overload
 - heart failure
 - renal failure
 - blood pressure responded to lesser volume
 - a portion of the crystalloid fluid volume was administered as colloids (if a portion consisted of colloids, there must be an order and documentation that colloids were started or noted as given)

PDOC View:

Sepsis Event Note

Treatment

Reason Bundle Intervention Not Administered: contraindication to fluids

Administering amounts other than 30 mls/kg: Administering only (500mls) and due to (CHF w/ EF 25%)



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Return To Home Chart Document Orders Discharge Sign Workload Chart Viewer

Diagnostics History & Problems Summary

Provider Notes Administrative Activity

Nurse/Allied Health Other Clinical Flowsheets

Medications Workload Items Health Mgmt

Provider Notes Date %

07/21/24 06:55 ER Physician Documentation Bacteremia due to Escherichia coli (+) Signed De Boer, Michael Emergency Medicine

Critical Care Time:

Critical Care Time
Critical Care Time: Yes
Total Critical Care Time (excluding separate services): 30-74 minutes (60)
Attestation:
Septic shock hypotension requiring Levophed, stabilization with fluids and antibiotics, critical care.

Discharge Plan

RN Discharge Info

ED Provider: De Boer, Michael H

ED Status: Hold

Time Seen by Provider: 07/21/24 05:08

Triaged At: 07/21/24 05:01

Patient Disposition: Admitted As Inpatient

Interventions:
ED Vital Signs Last Done: 07/21/24 08:24

Condition: critical

Physician Discharge Info

Clinical Impressions:
Sepsis

Chief Complaint: ED Skin/Abscess/Foreign Body

Document Initialized On: 07/21/24 0657
Documented By: Michael H De Boer, MD
Signed By: <Electronically signed by Michael H De Boer, MD>

ER Note Open Time: 6:55

07/21/24 0655
07/21/24 1707

Due to SEP-1 Manual Guidelines, often cases were held to inaccurate Severe Sepsis/Septic Shock times based on provider note open times.

How Audit Trail submission changes SEP-1 Timeline:

DATE: 07/21/24 TIME: 0725 USER: DEBOER = Michael H De Boer, MD CLIENT: BGM-CM03

EVENT: section 1 of report edited
ORIGINAL: Clinical Impressions:
EDITED: Sepsis

Instructions: Sepsis Education

Sepsis Actual Documented Time:
7:25, 30 mins after Open Time

DATE: 07/21/24 TIME: 0845 USER: DEBOER = Michael H De Boer, MD CLIENT: BGM-CM03

EVENT: section 1 of report edited
ORIGINAL: Discharge Plan

RN Discharge Info
ED Provider: De Boer, Michael H

EDITED: ED Status: Admit Orders
Critical Care Time:
Critical Care Time
Critical Care Time: Yes
Total Critical Care Time (excluding separate services): 30-74 minutes (60)
Attestation:
Septic shock hypotension requiring Levophed, stabilization with fluids and antibiotics, critical care,

Septic Shock Actual Documented Time:
8:45, 110 mins after Open Time

SEP-1 Manual Guideline for Infection element:

a. Documentation of an infection.

- Physician/APN/PA or nursing documentation referencing the presence of an infection is acceptable.
- Physician/APN/PA, nursing, or pharmacist documentation indicating a patient is receiving an IV or IO antibiotic for an infection and that antibiotic is documented as administered within six hours of criteria b and c is acceptable.

Example:

Levaquin is documented in MAR for pneumonia and nursing documentation within six hours of criteria b and c indicates the antibiotic was given.

- If documentation of an infection within a physician/APN/PA, nursing, or pharmacist note does not have a specific date and time or is documented using the acronym POA, use the date and time the note was started or **opened**.

After identifying that our EMR provides date/time stamps as providers document, we met with abstraction AND third party vendors who transmit CDAC requests on our behalf to discuss which documents are included in submission. **Workflow changed to include specific Provider Note Audit Trails for more accurate and often later infection documentation time stamps.**



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Improving Outcomes: Transparency & Education

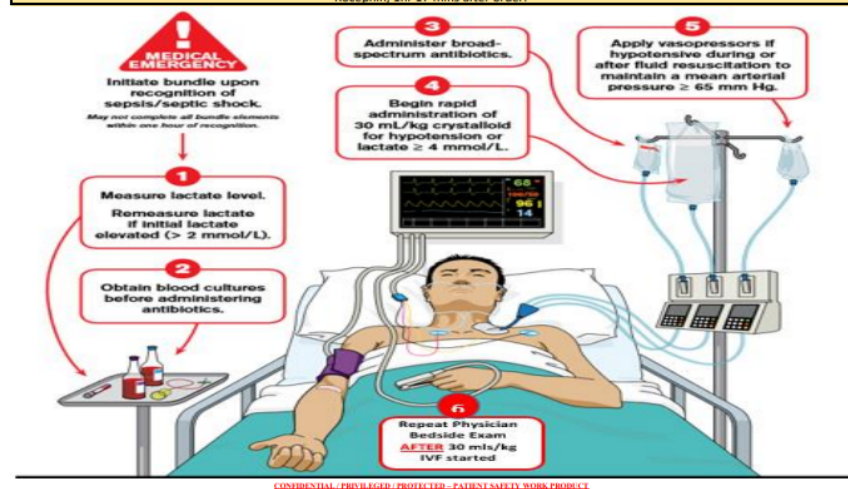
Feedback: All SEP-1 sampled cases that fail the Bundle have a secondary review by Performance Excellence. This secondary review audits for any documentation missed, coding challenges, or Manual interpretation opportunities. If agreement, Performance Excellence assigns fallout attribution and sends to physician champion or physician via email.

Transparency: performance is publically and routinely shared at Team Health & Sepsis Steering Committee meetings.

Provider SEP-1 Fallout Audit Template:

SEP-1 Core Measure Bundle			
Encounter ID	L00043547751		
Responsible Provider #1	Brooks		
Responsible Provider #2	ER Nursing		
Arrival & Transfer Details		Date/Time	
Arrival Time	12/14/2024 12:08		
Admit Time	12/14/2024 16:12		
Depart ER Time	12/14/2024 18:05		
Discharge Disposition	SNF		
SEP-1 Timer Details		Date/Time	
Severe Sepsis Time (SST)	12/14/2024 13:32		
Severe Sepsis Location	ER		
Initial Hypotension Time	n/a		
Surveillance Indicator Time	12/14/2024 13:32		
Septic Shock Time	12/14/2024 15:26		
Sepsis Details		Infection Type	
Code Sepsis	No		
Sepsis Order Set Use	No		
Sepsis Event Note Use	Yes		
Infection Type	urinary		
Clinical Criteria		Values	Source
SIRS	Pulse 110	Triage	12:14
SIRS	Resp Rate 30	Vitals	12:45
SIRS	WBC 13.8	Labs	13:18
Infection	Infection	Chest x-ray	13:20
OD	Lactic Acid 2.2	Labs	13:32
Other	UA +	Labs	14:46
Infection	UTI, cystitis	Rocephin order	15:48
SEP-1 Treatment			
IV Antibiotic Administration - 3hrs	12/14/2024 17:05	FAIL	Deadline 16:32, ordered 15:48 by Brooks for UTI
Blood Culture Collection - 3 hrs	12/14/2024 12:56	PASS	Deadline 16:32, ordered 16:11 by Essandoh
Initial Lactic Acid Collection - 3 hrs	12/14/2024 12:58	PASS	Deadline 16:32, ordered 12:43
Repeat Lactic Acid Collection - 6 hrs	12/14/2024 15:21	PASS	Deadline 19:32, reflexed from critical initial result
Crystalloid Fluid Administration - 3 hrs	12/14/2024 16:16	PASS	Deadline 18:26, ordered 15:48 by Brooks via 30 mL/kg NS order
Vasopressor Administration - 6 hrs	n/a		
Provider Focused Re-Exam - 6 hrs	12/14/2024 20:48	PASS	H&P by Essandoh notes exam

12:14, arrives from SNF with AMS and tachycardia with ED AMS set ordered per chief complaint. 13:18, WBC results 13.8 and 13:20 chest x-ray notes "could be infection." 13:32, Lactic Acid results 2.2 starting SEP-1 3-hour timer. 14:46, UA results positive with Leuk Esterase 4+ and WBC >100. 15:26, repeat lactic acid results increased to 5.4. 15:33, Brooks documents Sepsis Event Note diagnosing "severe sepsis." 15:48, Brooks orders IV Rocephin 1 gm for "UTI, cystitis" and 30 mL/kg of NS. 16:00, ER Note by Brooks adds UTI as clinical impression. 16:11, Essandoh adds missing Blood Culture order and orders admission for "severe sepsis/UTI." 16:16, ER nursing hangs 1st liter of 30 mL/kg volume. 17:05, ER nursing hangs IV Rocephin, 1hr 17 mins after order.



SEP-1 Performance by Attribution

SEP-1 Performance by Provider

Period: 2024Q4

1st Responsible Provider	Abx Delay	Blood Culture	Crystalloid Fluid	Initial Lactate	PASS	Persistent Hypotension	Total SEP-1 Cases	PASS Rate
Bryant			2		10		12	83%
Bondick			1		10		11	91%
Collins	4		2		5		11	45%
Wasson					8		8	100%
Strode	1		1	1	3		6	50%
Harris					6		6	100%
Brooks	1	1			2		4	50%
NURSING	1	1		1		1	4	0%
De Boer					4		4	100%
Shapiro					3		3	100%
Blackwell			2				2	0%
Williams					2		2	100%
Spurlin					2		2	100%
Goyal		1					1	0%
Chaffin					1		1	100%
Vachon					1		1	100%
Zul			1				1	0%
Edwards			1				1	0%
Avula			1				1	0%
Nemec			1				1	0%
Streckert					1		1	100%
Total	7	3	12	2	58	1	83	70%
ER Providers	6	1	6	1	57	0	71	80%
Hospitalist Providers	0	0	3	0	1	0	4	25%
Critical Care	0	1	0	0	0	0	1	0%

ER Physicians continue to improve nearing top decile performance!



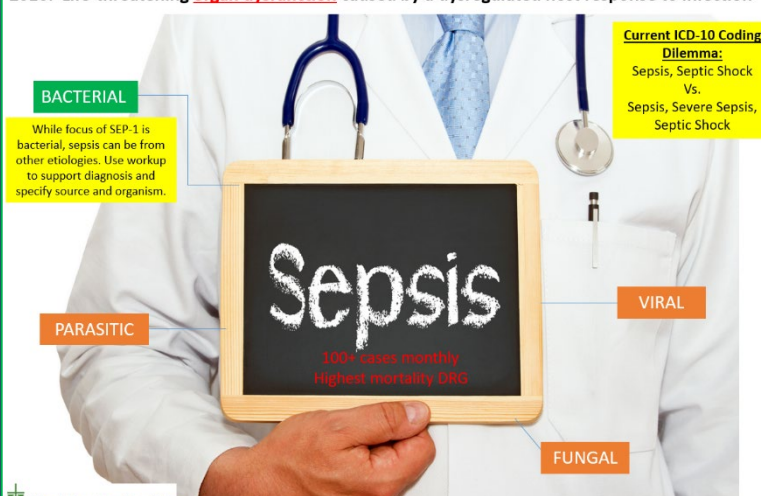
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Improving Outcomes: Transparency & Education

New providers and RNA classes participate in Sepsis Pathway orientation which reviews clinical criteria, SEP-Bundle EBC treatment, documentation best practices and EMR infrastructure.

Provider Orientation Presentation:

2016: "Life-threatening **organ dysfunction** caused by a dysregulated host response to infection"



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Laura White, Performance Imp
WhitE02@mchealth.net (2

Identify Infection Progressed to Sepsis: Sepsis-2 Definition

Clinical Criteria:

SIRS:

- Temperature > 100.9 or < 96.8 F
- Heart rate/Pulse > 90
- Respiration > 20 per minute
- WBC > 12,000 or < 4,000 or > 10% bands

Maternal SIRS:

- Temperature ≥ 100.4 or < 96.8
- Heart rate/Pulse > 110
- Respiration > 24 per minute
- WBC $> 15,000$ or < 4,000 or > 10% bands

Organ Dysfunction:

Circulatory

- SBP < 90 or decrease more than 40 pts
- MAP < 65

Renal

- Creatinine > 2.0
- Urine Output < 0.5 ml/kg/hr. for 2 hrs.

Hepatic

- Bilirubin > 2.0

Metabolic

- Lactic Acid ≥ 2.0

Respiratory

- New Need for CPAP, BiPAP, v60, MV

Hematologic

- Platelet Count < 100,000
- INR > 1.5 or aPTT > 60 sec

Documentation:

Problem: Septic shock secondary to community-acquired pneumonia with fever, leukocytosis, dyspnea, elevated PCT, AKI, elevated liver enzymes, and lactic acidosis.

Plan: Starting septic shock protocol of 30 ml/kg IV NS, IV Rocephin and Azithromycin, blood cultures pending.

Diagnosis:

SEVERE SEPSIS

Definition:

- Infection
- SIRS x2 linked to infection
- Sepsis-induced Organ dysfunction

SEPTIC SHOCK

Definition:

- Infection
- SIRS x2 linked to infection
- Sepsis-induced Organ dysfunction
- Lactate ≥ 4 or Persistent Hypotension 1 hr. after aggressive fluids

Confounding Variables: Link clinical criteria to other factors if not secondary to infection:

- medication (i.e. hypotension second to Propofol)
- chronic condition (Creatinine 2.3 due to CKD, T. Bilirubin due to chronic cirrhosis)
- acute non-infectious cause (i.e. Lactic acidosis second to cardiac arrest or seizure)

Nursing Sepsis Clinical Scenarios:

CASE STUDY #2:

Mr. Colon Tare, age 80, arrived for elective colon resection after detection of new, suspicious mass. On Day 3, AM labs reveal WBC dropped from 9.1 to 2.3, urinary output is low, and Pulse spikes 115, but BP stable and afebrile. At 14:00, nursing infection screen answers YES noting new fever/chills following recent procedure. Staff measure weight at 155 lbs.



Day 3 @ 7:15

- WBC 2.3
- Pulse 115
- RR 19
- Temp 98.9

Day 3 @ 14:01

- BP 93/41, MAP 58
- Resp Rate 20
- Pulse 98
- Temp 100.7

QUIZ:

- 1a. Sepsis indicator flag on nursing status board?
If so, which indicators?
Qualifying Values?
What is Qualifying Time?
2. Did indicator flag for physicians?
3. What is the suspected infection(s)?
4. What action should be taken?

CASE STUDY #2 continued:

Mr. Colon Tare, age 80, arrived for elective colon resection after detection of new, suspicious mass. On Day 3, AM labs reveal WBC dropped from 9.1 to 2.3, urinary output is low, and Pulse spikes 115, but BP stable and afebrile. At 14:00, nursing infection screen answers YES noting new fever/chills following recent procedure. Staff measure weight at 155 lbs.



Day 3 14:01

- BP 93/41, MAP 58
- Resp Rate 20
- Pulse 98
- Temp 100.7

14:20 Nurse calls attending notifying of positive sepsis screen citing Qualifying Values and asking to enter Sepsis protocol. Provider states he will review chart and enter orders.

14:45 CBC, CT abdomen/pelvis, Lactic Acid and PCT orders entered

15:30 PCT results 5.9, Lactic Acid results 1.9

15:40 Resp Rate spikes to 31, Pulse Ox 90%.

BP drops 88/50, MAP 63

16:00 IM provider orders IV Zosyn & 1L NS

QUIZ:

1. Organ Dysfunction present?
2. Septic Shock present?
3. Repeat Lactic Acid required?
4. What is the deadline to start IV abx?
5. What did provider miss?
6. What is the deadline to start IVF?
6a. How much?