Expanded MCH's Sepsis Pathway focus to consider hospital-based and private EMS roles in SEP-1 Treatment:

- 1/17/25- Southcentral KY EMS Director meeting
- 1/23/25 MCBG EMS
- 1/30/25 MCBG EMS

EMS Impact on Hospital SEP-1 Performance

Med Center Health

Laura White, Performance Improvement Engineer
WhitLE02@mchealth.net (270) 796-2114

MCBG Sepsis Population Arrival Mode

System Background: MCH is a non-for-profit integrated health system with hospitals in 6 Kentucky counties within the southcentral region. MCH's flagship hospital, Med Center Bowling Green (Warren county), has a hospital-based EMS agency while all other MCH hospitals are serviced by private EMS agencies.

Sepsis Population: On average, MCBG discharges around 100-120 sepsis patients monthly. MCBG oversamples SEP-1 and uses a 3rd party abstractor.

Influence of EMS on SEP-1:

64% of our SEP-1 sample for 2024 YTD (Jan-Nov24) **arrived via EMS transport**.

Of these EMS transports, **95%** were billed for sepsis present on admission.

25% who arrived via EMS transport were from a service **other than Med Center EMS.** However, in the last 6 months that increased to **41%.**

As the MCH hospital network continues to grow across the service region, I expect increased transports to MCH hospitals from surrounding county EMS agencies.

Mode of Arrival	Visits	%
Allen EMS	15	5%
Barren EMS	4	1%
Butler EMS	15	5%
Direct Admit	1	0%
Edmonson EMS	7	2%
Franklin Simpson EMS	9	3%
Grayson EMS	2	1%
Hart EMS	5	2%
Logan EMS	14	5%
MCBG EMS	111	39%
Metcalfe EMS	1	0%
Monroe EMS	1	0%
Walk-in	102	36%
Grand Total	**287**	100%
Other EMS Agencies	73	25%
Total EMS Transports	184	64%

64%
Arrive via EMS

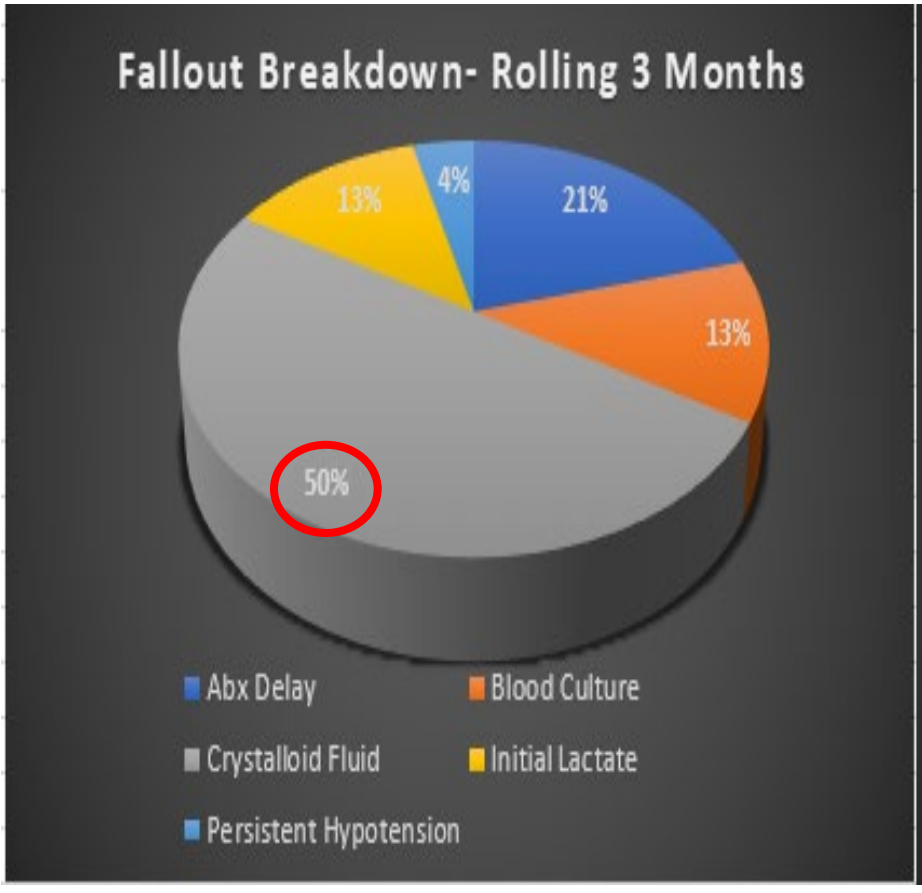
KBEMS Inspections Map

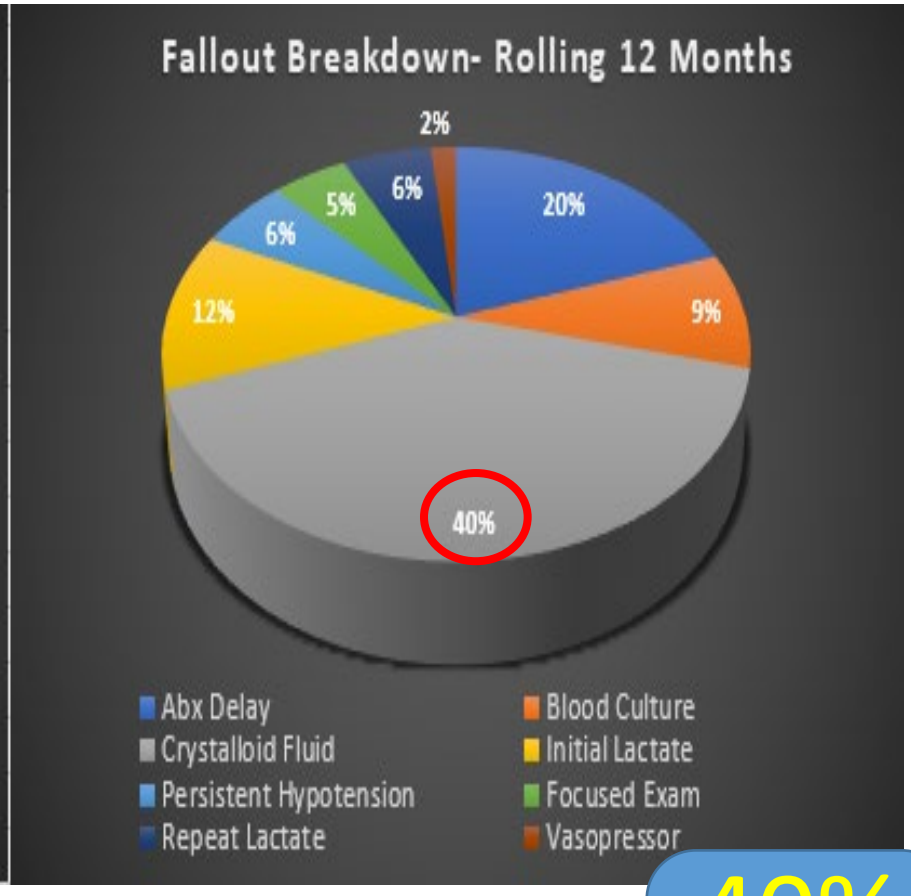
Region 1
Bryan Morris
(502) 226-0712
bryan.morris@ky.gov

Region 2
Ray Chesney
(502) 330-9005
ray.chesney@ky.gov

Region 3
Levi Hanshaw
(502) 682-2492
levi.hanshaw@ky.gov

MCBG SEP-1 Fallout Drill Down





EMS greatest points of treatment impact:

- Full set of vitals with ongoing BP monitoring- missing temps or single set of vital signs
- IV access
- Crystalloid Fluids – documentation opportunties
- Vasopressors
- Current medications include abx?

40%

Fallouts for Crystalloid Fluids

Med Center Health

Sepsis Screening in the Field

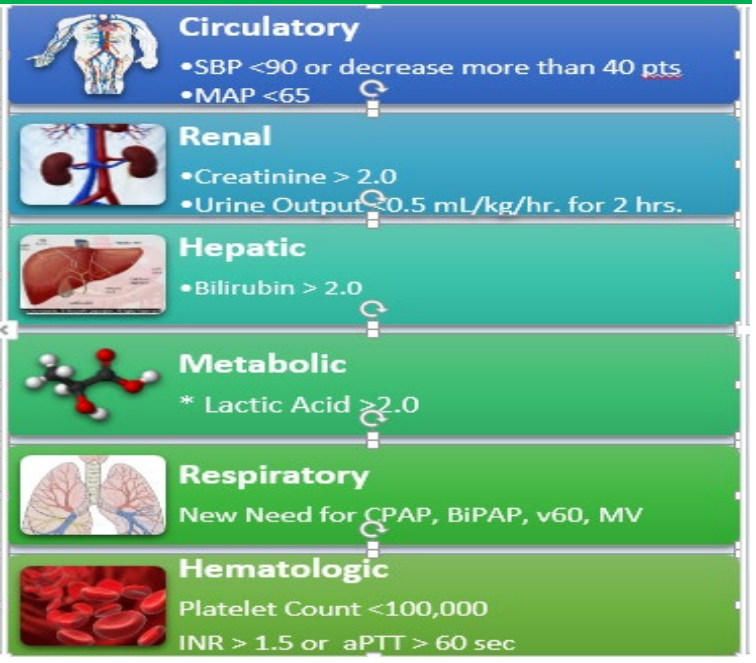
Clinical Criteria:

1. Suspected Infection Source:

2. 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

3. Organ Dysfunction:



Considerations:

- **Top Infection sources:** respiratory, urinary, skin/soft tissue; consider during physical exam and patient hx.
- Lung sounds, coughing/wheezing?
- Recent infection or antibiotic use?
- Dysuria, cloudy urine, reduced output?
- Skin/wounds with drainage/pain? Chronic diabetic wounds or pressure injuries?
- Any implants/lines/devices that appear suspicious?
- Sick contacts?
- Immunosuppressed?

ED Chief Complaint	% to Total
Dyspnea	21%
AMS	13%
Weakness	10%
Fever	7%
Abdominal Pain	7%
N/V/D	6%
Hypotension	5%
Urogenital	5%

Infection Source	% to Total
abdominal	12%
device/catheter	5%
respiratory	38%
skin/soft tissue	15%
unknown	4%
urinary	26%
ENT	0.3%
Total	**100%**

- **Vital Signs & Mental Status**
- Any vitals that are abnormal but within patient's baseline?
- Chills/fever?
- Change in mental status from baseline? More lethargic, decreased ADLs?

While Severe Sepsis Time cannot start earlier than hospital arrival, clinical criteria to start the timer can originate from vital signs in Ambulance Report or SNF Transfer records.

SEP-1 Guidelines for Pre-Arrival Documentation

CMS.gov | QualityNet

- Suspicion of infection/sepsis only acceptable from Nurse, PA, NP, Provider- **not EMT or paramedic**.

→ **Severe Sepsis Time** cannot start until after hospital arrival

- Advance Directives can exclude patient from measure sample; DNR order does not exclude from measure.

→ Request a copy if available and notify ER if patient is established as a palliative or hospice patient. Increased SNF and outpatient use of MOST.

- **Initial Hypotension Time (IHT)** is met with 2 hypotensive readings within 6 hours of Severe Sepsis Time (must be within 3 hrs of each other but not consecutive). If hypotensive pre-arrival but first BP after hospital arrival is NOT hypotensive, IHT element not met and algorithm ends.

→ Encourage **minimum of 2 BP readings by EMS**. Early fluid administration may cause BP to normalize, even if temporarily, preventing SEP-1 failure for not administering aggressive fluid volume within 3 hours.

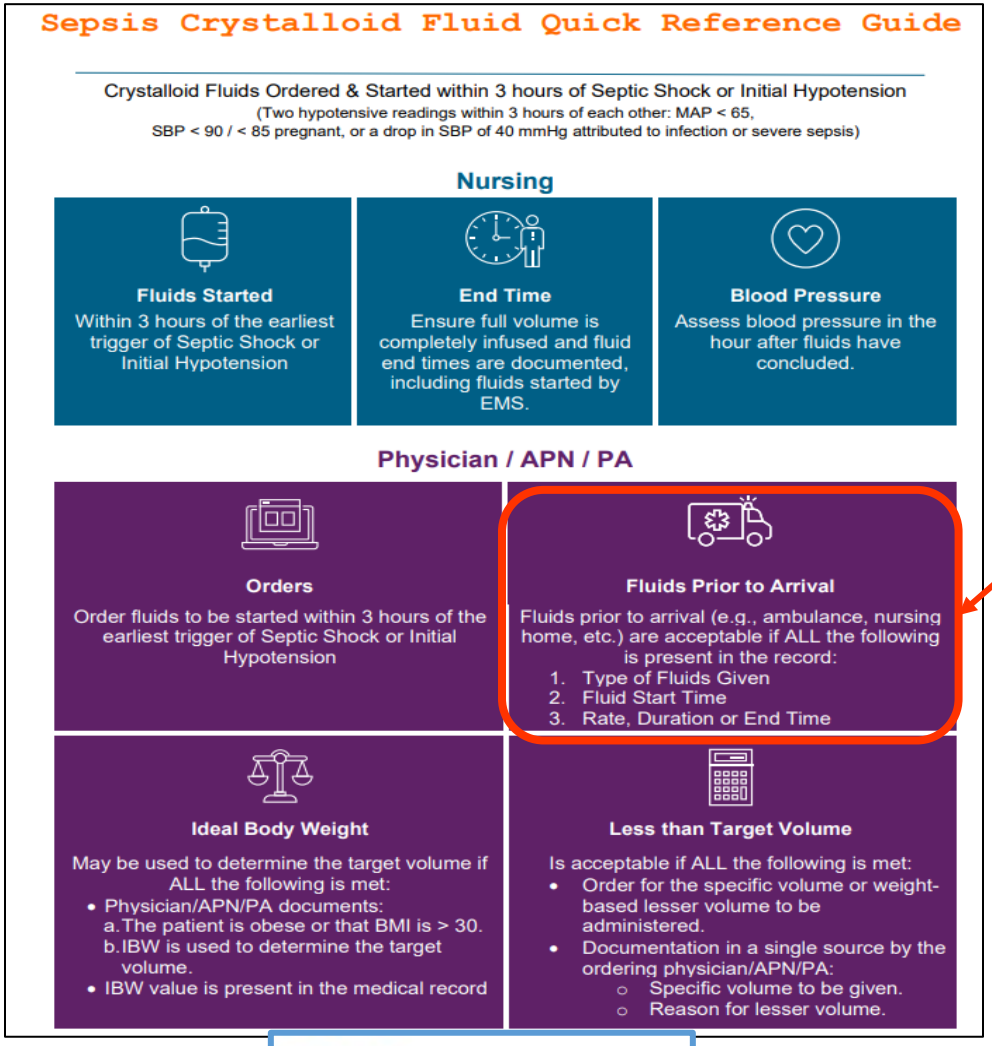
- Earliest IHT time is hospital arrival, not pre-arrival.

→ **Initial Hypotension Time** cannot start until hospital arrival. Hospital always gets at least 3 hours to start target volume of fluids even if hypotensive pre-arrival.

- EMT nor Paramedic documentation of fluid contraindication can be used- only provider, PA, or NP.

→ Hospital can still pass SEP-1 and not give 30 mLs/kg of Crystalloid Fluids for Lactic Acid >=4 or Hypotension but contraindication is not acceptable from EMS.

EMS Fluid Documentation



Sepsis Crystalloid Fluid Quick Reference Guide

Crystalloid Fluids Ordered & Started within 3 hours of Septic Shock or Initial Hypotension
(Two hypotensive readings within 3 hours of each other: MAP < 65,
SBP < 90 / < 85 pregnant, or a drop in SBP of 40 mmHg attributed to infection or severe sepsis)

Nursing

Fluids Started
Within 3 hours of the earliest trigger of Septic Shock or Initial Hypotension

End Time
Ensure full volume is completely infused and fluid end times are documented, including fluids started by EMS.

Blood Pressure
Assess blood pressure in the hour after fluids have concluded.

Physician / APN / PA

Orders
Order fluids to be started within 3 hours of the earliest trigger of Septic Shock or Initial Hypotension

Fluids Prior to Arrival
Fluids prior to arrival (e.g., ambulance, nursing home, etc.) are acceptable if ALL the following is present in the record:
1. Type of Fluids Given
2. Fluid Start Time
3. Rate, Duration or End Time

Ideal Body Weight
May be used to determine the target volume if ALL the following is met:
- Physician/APN/PA documents:
  a. The patient is obese or that BMI is > 30.
  b. IBW is used to determine the target volume.
- IBW value is present in the medical record

Less than Target Volume
Is acceptable if ALL the following is met:
- Order for the specific volume or weight-based lesser volume to be administered.
- Documentation in a single source by the ordering physician/APN/PA:
  - Specific volume to be given.
  - Reason for lesser volume.

CMS.gov | QualityNet

- **Exception for Prior to Arrival:** Documentation of crystalloid fluids administered prior to arrival to the hospital (e.g., ambulance, nursing home) that are part of the medical record are acceptable if the documentation of fluid administration contains the type, volume, start time, and either a rate, duration, or end time of the fluid infusion. A physician/APN/PA order for fluids administered prior to arrival is not required.

ER Providers are often aware of pre-arrival fluid volume communicated by ER nursing deducting this from their 30 mLs/kg fluid volume orders.

Pre-arrival fluids can **only** be used towards the target fluid volume if 3 required elements are documented. Consistently, EMS documents fluid type and start time but ***not end time or duration. Noting rate of "wide open" which is no longer acceptable.***

Action Plan: *ESO software for Ambulance Reports has a "stop time" field for IV Therapy and IV Bolus interventions.* ***Set expectation of documenting stop time on each fluid bag.***

Hand off communication:
Communicate volume infused en-route as this may impact our triage protocolized fluid volume.

If still infusing at ER hand-off, check bag and "call" a stop time and volume amount to triage nurse to ensure agreement on balance still infusing. Nurse will document balance fluid volume, type and end time.

MCH EMS Sepsis Protocol Revisions

KBEMS does not endorse a Sepsis protocol so many EMS agencies rely on general shock protocols to administer fluids.

MCH revised their EMS Sepsis Adult Protocol in regard to fluids ***detailing an indication of hypotension*** to recognize the ***delicate balance between aggressive fluid resuscitation and fluid overload*** for many patients with chronic conditions like CHF, ESRD, etc. (Since Jan 2022, SEP-1 allows any lesser volume if documented with contraindication).

For the Warren county service area, likely MCBG EMS won't administer 30 mls/kg volume but for other agencies with longer transport durations there is opportunity to administer multiple liters.

Adult - Sepsis — New Jan 2025

Advanced Standing Orders

A

- IV access x2 and administer fluids (NS) only to patients with a SBP of <90 mmHg and MAP <65. Otherwise, monitor and transport.

Paramedic Standing Orders

P

- Early vasopressor (NE preferred) to temporize until adequate IVF can be given
- Push dose epi if in extremis/severely hypotensive.
- See Shock Protocol above.

Sepsis- Adult — Effective 2017

Assessment Criteria for Inclusion in Sepsis Alert

- Suspicion of Possible Infection (Known/Suspected Infection Recent surgery, , UTI, Cellulitis, Recent Antibiotic Rx, Indwelling Catheter, HX CA, Transplant Candidate), **and any two or more of the following:**
- New Onset Altered Level of Consciousness
- Temperature > 38.3 C (100.9 F) or < 36 C (96.8 F)
- Heart Rate > 90
- Respiration Rate > 20
- SBP < 90 or MAP < 65
- Lactate > 2 mmol/L (18 mg/dL)

Basic Standing Orders

B

- Full set of vital signs including temperature, SpO2, HR & RR
- If 2 or more of the parameters listed in "Assessment Criteria for inclusion in Sepsis Alert" above, request ALS response
- Maintain SpO2 > 94%
- Transport to facility with ICU capability and **notify receiving ED of "Code Sepsis"**

Advanced Standing Orders

A

- Establish 2 large-bore IVs with Normal Saline and administer 30ml/kg over 30 minutes

Paramedic Standing Orders

P

- Hypotension (SBP<90) refractory to fluid bolus, consider Norepinephrine (Levophed) initially 0.2 to 1 mcg/min titrate up to 30 mcg/min prn. Usual therapeutic range is 8 to 12 mcg/min.

Revised 03/2017

51

EMS Case Example:

Crystalloid Fluid Goal 30 mLs/kg: 3,210 or 2,889 mLs

Vital Signs

Time	AVPU	Side	POS	BP	Pulse	RR	SPO2	ETCO2	CO	BG	Temp	Pain	GCS(E+V+M)/Qualifier	RASS	BARS	RTS	PTS
14:48	Alert		Sit	130/60 A	86 R	22 R	97 Rm			166	103.4 F/TY	0	13=4+4+5			12	
15:00	Alert		Sit	143/66 A	116 R	22 R	98 Rm					0 (Num)	13=4+4+5			12	
15:02	Alert		Sit	/	113 R	22 R	96 Rm					0 (Num)	13=4+4+5				
15:02	Alert		Sit	/	116 R	20 R	98 Rm					0 (Num)	13=4+4+5				
15:03	Alert		Sit	/	112 R	20 R	98 Rm					0 (Num)	13=4+4+5				
15:05	Alert		Sit	129/64 A	115 R	20 R	98 Rm					0 (Num)	14=4+4+6			12	
15:11	Alert		Sit	/	115 R	18 R	96 Rm					0 (Num)	14=4+4+6				
15:14	Alert		Sit	125/63 A	114 R	20 R	98 Rm					0 (Num)	14=4+4+6			12	
15:15	Alert		Sit	/	114 R	18 R	96 Rm					0 (Num)	14=4+4+6				
15:20	Alert		Sit	/	117 R	18 R	97 Rm					0 (Num)	14=4+4+6				
15:21	Alert		Sit	137/105 A	114 R	18 R	98 Rm					0 (Num)	14=4+4+6			12	
15:26	Alert		Sit	126/74 M	115 R	20 R	96 Rm			166	103.4 F/A	0	14=4+4+6			12	

Time	Treatment	Description
14:48	**ALS Assessment**	Patient Response: Unchanged; Successful; Complication: None; Medical Control: Protocol (Standing Order);
14:55	**IV Therapy**	Size: 18 ga; Antecubital-Left; Normal Saline (.9% NaCl); Total Fluid: 20; Patient Response: Improved; Successful; Complication: None; Medical Control: Protocol (Standing Order);
14:57	**IV Bolus**	Size: 18 ga; Antecubital-Left; Normal Saline (.9% NaCl); Total Fluid: 750; Patient Response: Improved; Successful; Complication: None; Medical Control: Protocol (Standing Order);
15:02	**IV Therapy**	Size: 18 ga; Antecubital-Right; Normal Saline (.9% NaCl); Total Fluid: 20; Comments: BP cuff D'Ced I/V; Patient Response: Improved; Successful; Complication: None; Medic
15:02	**12-Lead ECG**	Comments: Sinus Rhythm; Patient Response: Unchanged; Su Protocol (Standing Order);
15:03	**12-Lead ECG**	Comments: Sinus Rhythm; Patient Response: Unchanged; Successful; Complication: None; Medical Control: Protocol (Standing Order);
15:07	**Sepsis Notification**	Patient Response: Improved; Complication: None; Medical Control: Protocol (Standing Order);

No stop time for 1st 500 mL bag

01/13/25
16:05 by MRW

ED IV Access - Peripheral/SL

PIV/Saline Lock/Midline Access

No start time for 2nd 500 mL bag

18G LAC	
IVF Type	NS 500mL
IV Given	IV
IVF Rate	999ml/hr
IV Stop Time	16:05
IVF Intake (ml) (ml)	500
PIV/SL/Midline Note	started by EMS prior to arrival

Background: 74 y/o male who presented to Cardiac Rehab appointment and vomited with chills and fever. Upon arriving home, family noticed lethargic and called EMS.

Timeline:

14:17 EMS contact made @ Home/Residence
14:48-15:00 EMS vital signs included Pulse 116, Resp Rate 22, temp 103.4. **SIRSx3** with AMS-GCS 13, BP stable.
14:55 1st IV established to left AC
14:57 **500 mLs NS bag started, assume 2nd started continuously for total 750 mLs. No stop time.**
15:02 2nd IV established to right AC.
15:07 Sepsis Screening with Code Sepsis Pulsara alert per EMS protocol.
15:38 Triage: P-118, RR, 18, T-103.8, BP 144/76 **Code Sepsis called**, "EMS initiated 1L NS." **Infection criteria met.**
15:43 **Blood Culture #1 collected**
15:48 Triage nurse notes 500 mLs NS infused pre-arrival by EMS.
16:03 **Lactic Acid collected**
16:08 **POC Lactic Acid results 7.1- OD & SST**
16:05 Responsible ER Nurse notes 2nd 500 mLs NS bolus stop time.
16:28 **1L NS @ 999 mls/hr started**
16:43 **WBC results 2.7- SIRS #4**, Platelets 126
17:07 **2nd Lactic Acid collected**
17:17 **IV Rocephin started**
17:24 **1L @ 500 mLs LR started**
18:00 **BP drops 89/51**
18:13 Lactic results 6.2, BP drops 80/55
19:08 3-hour deadline

How could we have passed?

Recommend EMS documenting start and stop time of each fluid bag. If a bag still infusing at hand-off, EMS & nursing agree on total volume given and how much left that nursing will document with stop time.

Outcome: 3L given by 3-hour deadline but only 2L will be counted towards Crystalloid Fluid element failing SEP-1.