Sepsis Overview

UNIVERSITY OF MICHIGAN HEALTH-WEST
MICHIGAN MEDICINE

Sepsis Impact

- Affects 1.7 million American adults each year
- Sepsis is the leading cause of death in U.S. hospitals
- Sepsis occurs in just 10% of U.S. hospital patients, but it contributes to as many as half of all hospital deaths
- U.S. spends $62 billion per year to treat sepsis

More than 700 people die each day from sepsis in the U.S.

More facts can be found at:
https://www.sepsis.org/education/resources/fact-sheets/
provided by Sepsis Alliance

Sepsis Mortality Risk Factors

- Size/technological level of center
- Increasing elderly population
- Immune suppression
  - Malignancies and the aggressive treatments
  - Transplant patients
- Invasive procedures
- Antibiotic resistance

Sepsis Definition History

- 1991 – Consensus conference developed initial definition of sepsis pairing SIRS with infection (Sepsis-1)
- 2001 – Definition revised to incorporate the thresholds for organ dysfunction/damage (Sepsis-2)
- 2016 – Newest definition for sepsis and septic shock; replaces SIRS with qSOFA (Sepsis-3)

CMS continues to support the Sepsis-1 definition

Current Sepsis Definition

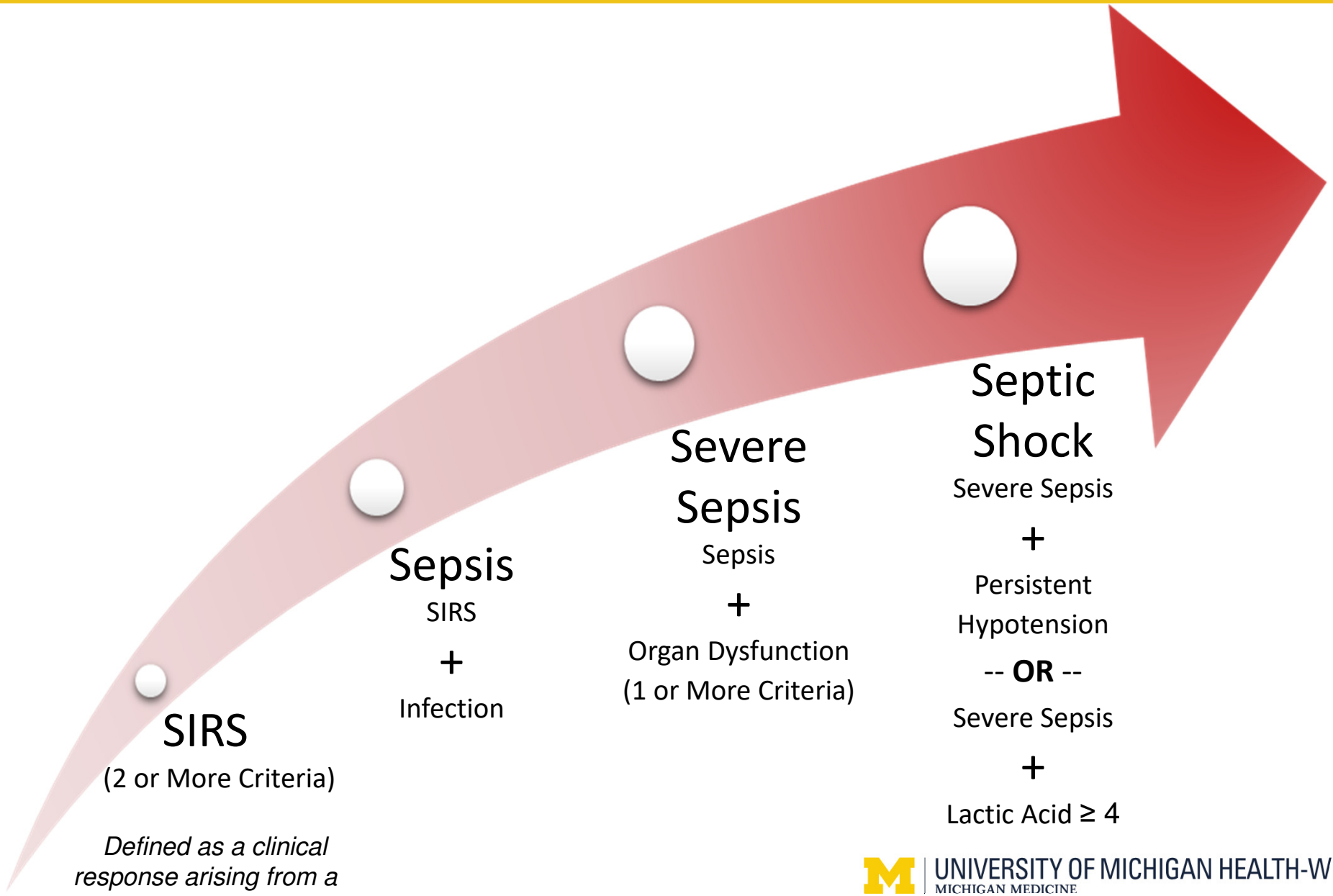
A life-threatening organ dysfunction caused by a dysregulated host response to infection

- Describes organ dysfunction as an acute increase in total sequential organ failure assessment (qSOFA)
- Eliminates mention of SIRS

Septic Shock Definition

Subset of sepsis in which underlying circulatory and cellular/metabolic abnormality are profound enough to substantially increase mortality.

Defining a Disease Continuum



Definitions
(Used by CMS and Coders)

- **Infection:** pathological process caused by invasion of normally sterile tissue or fluid or body cavity by pathogenic or potentially pathogenic micro-organisms
- **Sepsis:** infection + SIRS (2 or more)
- **Severe Sepsis:** infection + SIRS (2 or more) + end organ dysfunction
- **Septic Shock:** severe sepsis with persistent hypotension **OR** a lactic acid ≥ 4 mmol/L
  - Hypotension = systolic BP < 90, MAP < 65, or 40 mmHg decrease from their baseline after initial fluid bolus (30 mL/kg)

Surviving Sepsis Campaign (SSC)
2021 Guidelines

- A joint initiative (Society of Critical Care Medicine [SCCM[1]] and the European Society of Intensive Care Medicine [ESICM]) led by multidisciplinary international experts.
- GRADE[2] system used to guide assessment of quality of evidence from high to very low and to determine the strength of recommendations as strong or weak
- Utilizes Best Practice Statements/Recommendations:
  Best Practice Statement, Strong, Weak, No Recommendation

Strong , *moderate-quality evidence*

[1]SSC: www.sccm.org

[2]GRADE – Grading of Recommendations, Assessment, Development and Evaluation: www.gradeworkinggroup.org

SSC 2021 Guidelines:
Best Practice Statement

"Sepsis and septic shock are medical emergencies, and we recommend that treatment and resuscitation begin immediately."

Surviving Sepsis Campaign, 2021

Severe Sepsis & Septic Shock
Standards of Treatment

- Set Quality Benchmarks:
  - The Joint Commission
  - CMS
  - CDC
  - HMS (The Michigan Hospital Medicine Safety Consortium)
    - A collaborative quality initiative with a goal to improve quality of care for the hospitalized medical patients who are at risk for adverse events
    - Hospital participation is required
    - Funded by BCBSM
    - Current initiatives: Antimicrobial Use, PICC/Midline Use, Sepsis (newest)
  - 3rd Party Payers

Sepsis = SIRS + Infection (2 or more)

- Temp > 38.3 C (100.9 F)
  < 36.0 C (96.8 F)
- RR > 20
- HR > 90
- WBC > 12 k
  < 4 k
  > 10% bands

Must document therapeutic intervention (warfarin) or chronic conditions (CKD, ESRD, cirrhosis, thrombocytopenia) to correlate against lab values associated with these medications or conditions that are normal or "baseline" for patient.

Sepsis = SIRS + **Infection** (Suspected or Documented)

Examples of terms used to meet infection criteria:

Sepsis / Severe Sepsis / Septic

Shock

Infection / Infectious

Purulence / Pus

UTI

Pneumonia

C. difficile

Abscess / Cellulitis / Gangrene / Necrosis

Soft Tissue / Bone / Joint Infection

Intra-abdominal / Acute Abdomen / Ischemic Bowel

COPD Exacerbation – *presumed to be caused by a bacterial source if severe sepsis/septic shock criteria is met*

Meningitis (Bacterial)

Pelvic Inflammatory Disease

Inflammation (Colitis, Cholecystitis, etc.) – *only if covered with an antibiotic*

Severe Sepsis = Sepsis + End Organ Dysfunction

- SBP < 90 / MAP < 65
- Respiratory failure
  - Intubated
  - NIPPV (new)
- UO <0.5 mL/kg/hr x 2 hours
- Creatinine > 2
- T. bili > 2
- INR > 1.5 / PTT > 60 sec
- Platelets < 100k
- Lactic Acid > 2

Must document therapeutic intervention (warfarin) or chronic conditions (CKD, ESRD, cirrhosis, thrombocytopenia) to correlate against lab values associated with these medications or conditions that are normal or "baseline" for patient.

Septic Shock

Severe sepsis + Persistent Hypotension

OR

Severe sepsis + Lactic Acid ≥ 4

- Persistent Hypotension
  - Occurs within 1 hour after completion of fluid bolus
  - SBP < 90
  - MAP < 65

Must document therapeutic intervention (warfarin) or chronic conditions (CKD, ESRD, cirrhosis, thrombocytopenia) to correlate against lab values associated with these medications or conditions that are normal or "baseline" for patient.

Pregnant Patients

- New parameters set by CMS (July 2022)
- Inclusive of patients 20 weeks pregnant thru 3 days post-delivery

SIRS Criteria Differences			
Non-Pregnant		**Pregnant**	
Temp	≥ 38.3 C (100.9 F)	Temp	≥ 38.0 C (100.4 F)
RR	> 20	RR	> 24
HR	> 90	HR	> 110
WBC	> 12 k	WBC	> 15 k
Organ Dysfunction Criteria Differences			
SBP	< 90	SBP	< 85
Creat	> 2	Creat	> 1.2

Patient Presentation

- General appearance
- Obtain a thorough history
- Complete a physical exam
- Obtain labs & imaging
  - Review trends & baseline
- If patient presents with SIRS criteria, maintain a high suspicion for infection
- Sepsis identified – look for severe sepsis/septic shock
  - If found – the clock starts (AKA time zero)

3- and 6-Hour Bundles

WHY do I need to know this?

- Standard of initial care in severe sepsis and septic shock patients
- Delayed care = increased mortality
- Performance is tied to reimbursement

Components:

- Antibiotics (IV only)
- Blood Cultures
- Initial Lactic Acid
  - Repeat Lactic Acid (if initial > 2)
- Fluid resuscitation
- Pressors (IV only)
- Perfusion exam

UMH-West Data

CMS Core Sepsis Measure Compliance

UMH-West Data

HMS Sepsis Initiative Compliance

Defining Time Zero…

Per **CMS / SEP-1**, time zero for severe sepsis is …

- The documentation time that the patient meets all clinical triggers
  - SIRS criteria (2 or more)
  - New or worsening organ dysfunction (at least 1)
  - Documentation of a presumed or confirmed infection
    - Clinical trigger documentation can be from any source – providers, nursing, pharmacist, labs, x-ray, use of an order set, admitting diagnosis, etc.
- The time that a provider documents “severe sepsis”
  - Provider can be physician, advanced practice nurse or physician’s assistant

Defining Time Zero…

Per **CMS / SEP-1**, time zero for septic shock is …

- The patient meets all clinical triggers for severe sepsis AND any one of the following:
  - Initial lactate ≥ 4
  - Persistent hypotension in the hour after the initial fluid bolus is completely infused
    - Hypotension defined as
      - SBP < 90 mmHg or MAP < 65 mmHg or
      - 40 mmHg drop in SBP from patient's baseline
      - There must be 2 documented within 1 hour
- The time that a provider documents "septic shock"
  - Provider can be physician, advanced practice nurse or physician's assistant

Defining Time Zero…

Per **HMS**, time zero for severe sepsis AND septic shock is …

ED/Hospital Arrival

(AKA ED triage check-in)

- Using the earliest documented time of arrival is exogenous eliminating bias and variation (which can often be affected by delayed collection of vitals and labs).

UMHW uses the time of ED/Hospital arrival as time zero

**Unless the severe sepsis/septic shock presents days into the admission, then CMS's time zero process is used.*

3-Hour Bundle

To be completed within 3 hours from time zero

1. Measure lactic acid
2. Obtain blood cultures *prior* to administration of antibiotics
3. Administer broad spectrum antibiotics
   - Ideally, the RN will administer within 1 hour of the order being placed
4. Initiate 30 mL/kg crystalloid bolus (for hypotension or lactate ≥ 4mmol/L)
   - Administer within 6 hours

Fluid Bolus

- How fast should fluid boluses be given?
  - Fluid bolus orders must include duration (i.e., over 1 hour) or rate (i.e., 1000 mL/hr) – input these parameters if not already populated into the order
  - Without one of these specified, the abstractor cannot use the fluid order to meet the requirement
  - Terms “bolus”, “wide open”, “open” are acceptable to use in place of the rate or duration if included in the order
- Gravity or pressure bag – *not by infusion pump*
- How much? 30 mL/kg (“target volume”)
- What about dialysis patients?
- What about patients with CHF or low ejection fraction?

Fluid Bolus
Special Populations

In patients with ESRD/CHF, less than 30 mL/kg is acceptable if:

- There is an order for the lesser volume as either a specific volume (1500 mL) or a weight-based volume (25 mL/kg)
- The ordering physician documents within a *single* note:
  - The volume to be administered either as a specific volume (1500 mL) or a weight-based volume (25 mL/kg)
  - AND a reason for ordering a volume less than 30 mL/kg of crystalloid fluids
    - "Concern for fluid overload"
    - "Heart failure"
    - "Renal failure"
    - "Blood pressure responded to a lesser volume"
    - Portion of the fluid was administered as colloids (if there is an order and it is documented as given on the MAR)

Why Do Patients Need Volume?

- Vascular volume is lost into interstitial space due to diffuse capillary leaking from cytokine release
- Both venous and arteriolar tone is reduced, and blood volume occupies a larger intravascular space than normal
- Many patients also have GI and skin losses

Being Successful
Fluid Bolus

- NS or Balanced Solution (LR & Plasmalyte)
  - Balanced solution = Better outcome and reduced mortality
    - LR – incompatible with common ABX
    - Plasmalyte – expensive
  - Recommendation: 80% of the 30 mL/kg is a balanced solution
- 30 mL/kg ("Target Volume")
  - Calculate this for your patient and order the full bolus in a *single order*, if appropriate (ex: 74 kg x 30 mL/kg = 2220 mL)
  - Includes dialysis/CHF patients *(unless absolutely contraindicated)*
  - Multiple 0.5-1L boluses = fall out *(difficult to complete within 3 hours)*
  - IBW – Document "obesity" or "BMI >30" if using IBW-based volume
  - The sepsis fluid order set will calculate the volume according to your selection (actual or IBW)

6-Hour Bundle

To be completed within six hours of time zero

5. Repeat lactic acid (if initial elevated)
   - Must be completed within *4 hours* of initial lactic acid
6. Vasopressors (IV only)
   - To maintain a mean arterial pressure (MAP) ≥ 65 mmHg for hypotension that does not respond to initial fluid resuscitation
   - No Midodrine
7. Re-assess volume status and tissue perfusion
   - In the event of persistent hypotension after initial fluid administration or if initial lactate was ≥ 4 mmol/L and document findings

Reassessing Tissue Perfusion

CMS requires provider documentation of a tissue perfusion reassessment after initial interventions completed for ALL patients with elevated initial lactate or persistent hypotension

Must be completed AFTER the crystalloid fluid was administered

Provider must document one of the following:

- Repeat focused exam by provider (physician, APN, PA)
  - Must contain vital signs review, capillary refill, peripheral pulses, cardiopulmonary and skin assessment
  - Statement in note: “Tissue perfusion exam completed” or “sepsis reassessment completed”
- Results of one of the following:
  - Measure CVP
  - Measure $ScvO_2$
  - Bedside cardiovascular ultrasound
- Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
- *.sep1 or .sep1exam satisfies this requirement*

Challenges

- Severe Sepsis and shock definition is evolving
- SEP-1 is an all or none measure
  - One error and the case fails
- SEP-1 time zero is heavily affected by provider documentation
- Real time compliance awareness
- Transitions of Care (unit to unit, provider to provider)
  - Many fallouts happen when transitioning patient from ER to IP and repeat measures/6-hour bundle not being carried out.
    - i.e., no repeat LA, crystalloid fluid bolus incomplete, etc.

Common Reasons for Fallouts

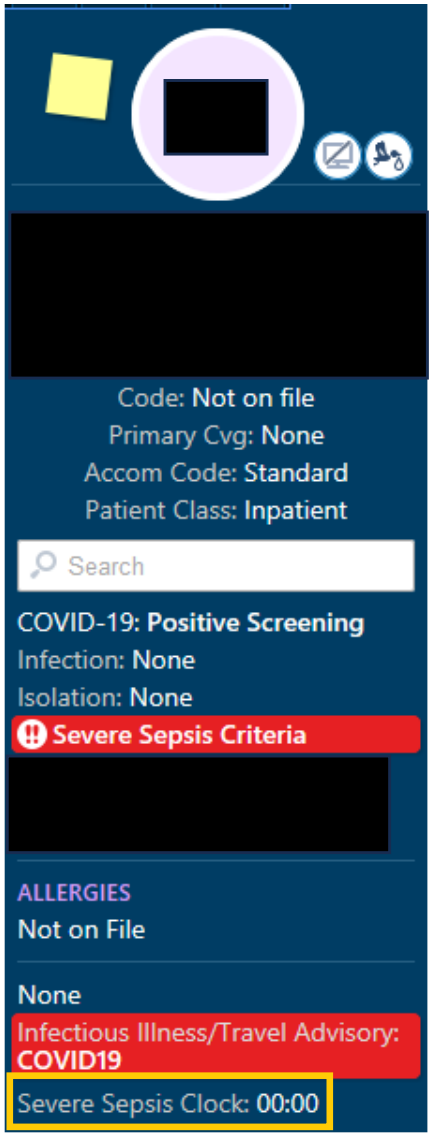
- Atypical presentation
- Unaware of hypotensive reading
- Repeat lactic acid not ordered within 4 hours
- ABX delay or selection
- Inadequate fluid bolus
- Pressors (IV only…no midodrine)
- SEP-1 tissue perfusion exam after fluid bolus
- Transition of care
- Documentation!!

Exclusion Criteria

- Discharge
- Age <18
- Transferred from surgical center, outlying ED, another hospital
- Non-infectious etiology (must document this)
- Viral, fungal, or parasitic causes (must document this)
  - Sole infectious source is due to a bacterial infection, no “septicemia”
- Comfort measure order / Palliative Consult / Hospice Consult (within 6 hours of time zero)

Set Yourself Up For Success

- Know where the clock is
- Know the measure and its elements
- See the patient in the ED
- Communicate regarding new data and outstanding elements
- Code status clarification
- Document any exclusion criteria, non-infectious etiology, inclusion criteria attributable to chronic condition or meds



Documentation Tips
Inclusion vs Exclusion

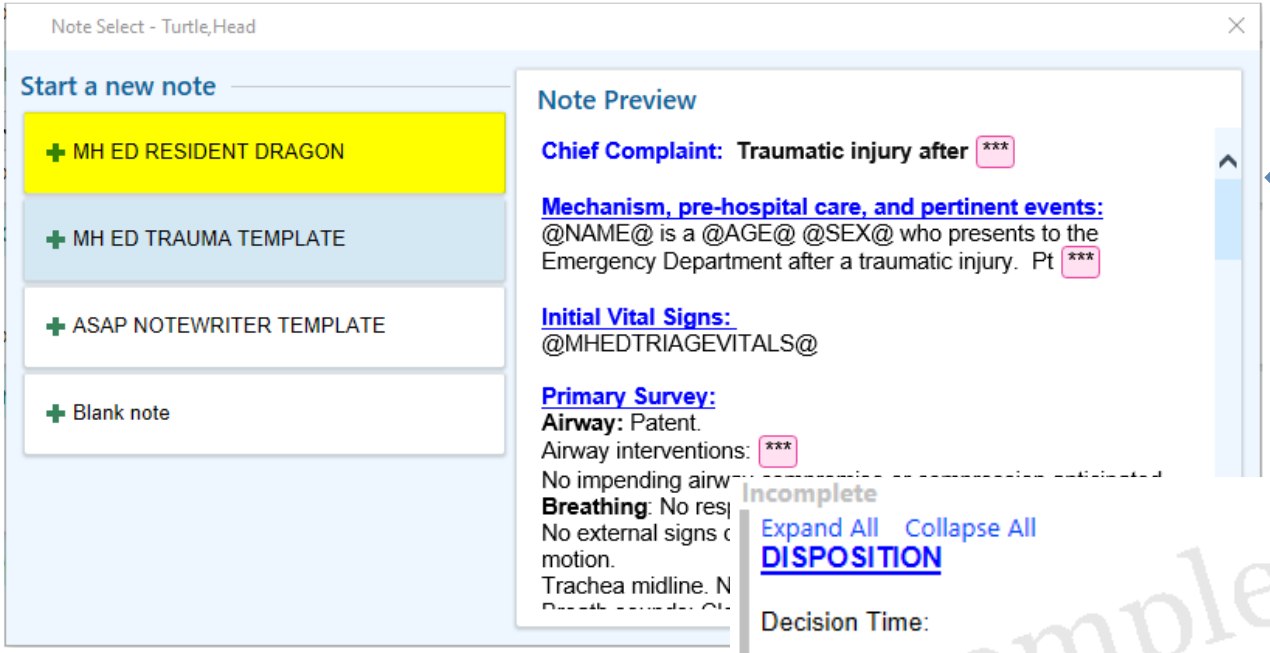
- Inclusion terms
  - Possible
  - Rule out
  - Suspected
  - Likely
  - Probable
  - Differential diagnosis
  - Suspicious for
  - Concern for
- Exclusion terms
  - Impending
  - Unlikely
  - Doubt
  - Risk for
  - Ruled out
  - Evolving
  - Questionable

Documentation Tips

- A severe sepsis/septic shock diagnosis that does not have time linked to it defaults to the note open time.
  - Document the time you were concerned/patient met criteria for this, so we don't fall out timeframe.
    - Ex. – "Severe sepsis identified when lactic acid returned as > 2 at 1918."
  - Use the correct template that includes a smart phrase, which timestamps any sepsis-related diagnoses with a date/time
- If severe sepsis/septic shock isn't suspected – Document!
  - "Not present throughout the ED stay up to the transfer to inpatient floor at 2000".
  - Must include a time to show severe sepsis occurred *after* the ED stay/transfer to IP floor

Documentation Tips

- ED Resident Template: MH ED RESIDENT DRAGON



This is the template you should be using for all patients *(except trauma cases)*

Example of smart phrase within the template

Documentation Tips

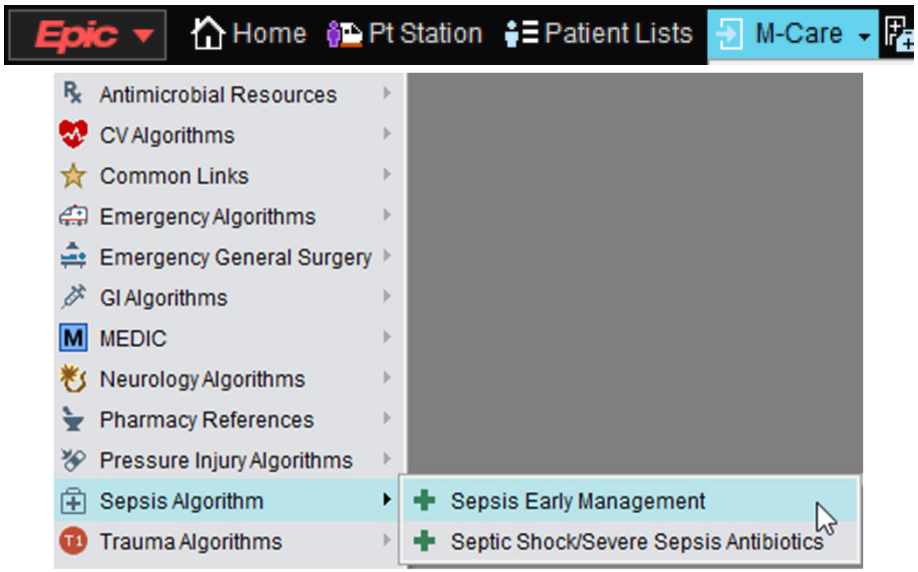
- Be careful when using terms *Present on Arrival* or *Present on Admission* – this time starts the clock for other components in the bundle which can cause fall outs

Present on arrival – per CMS this means severe sepsis/shock present upon the patient's *arrival to the ED*.

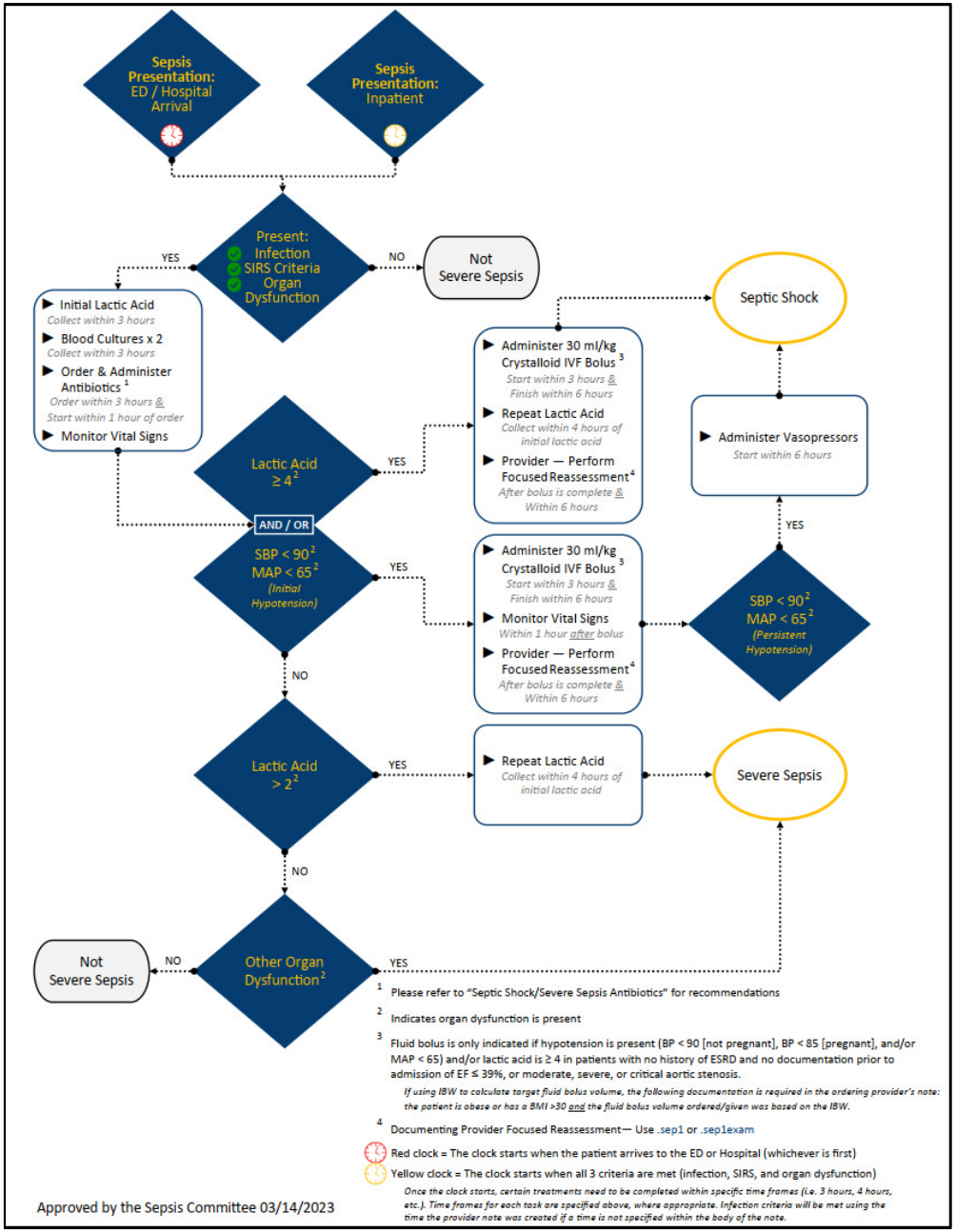
Present on admission – per CMS this means it was present on admission to the *inpatient floor*.

Resources

- M-Care in EPIC
  - Sepsis algorithm
    - Sepsis early management
    - Septic Shock/Severe Sepsis ABX



- Focused physical exam
  - .sep1 or .sep1exam



Resources

- MDCalc/Up to Date
- Pharmacist x[redacted]

- Sepsis Point Persons
  - Name – ED physician
  - Name – Hospitalist
  - Name – Sepsis Coordinator & HMS Abstractor
  - Name – CMS Abstractor

In Summary

- Maintain high clinical index of suspicion for infection in patients with SIRS/qSOFA
- Early antibiotics and fluid resuscitation are key
- 3- and 6-hour check points
- DOCUMENT and COMMUNICATE
- Close the gap between transitions of care

Questions?

Name

Email

Number

Name

Email

Number

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