



SEPSIS AND COVID-19 CLINICAL CONSIDERATIONS FOR COMPLEX CARE

February 17, 2017

CONTINUING EDUCATION

- The link for the evaluation of today's program is:
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- Please be sure to access the link, complete the evaluation form, and request your certificate. The evaluation process will remain open **two weeks** following the webcast. Your certificate will be emailed to you when the evaluation process closes after the 2-week process.
- If you have any questions, please contact Dorothy Aldridge (Dorothy.Aldridge@ohiohospitals.org)

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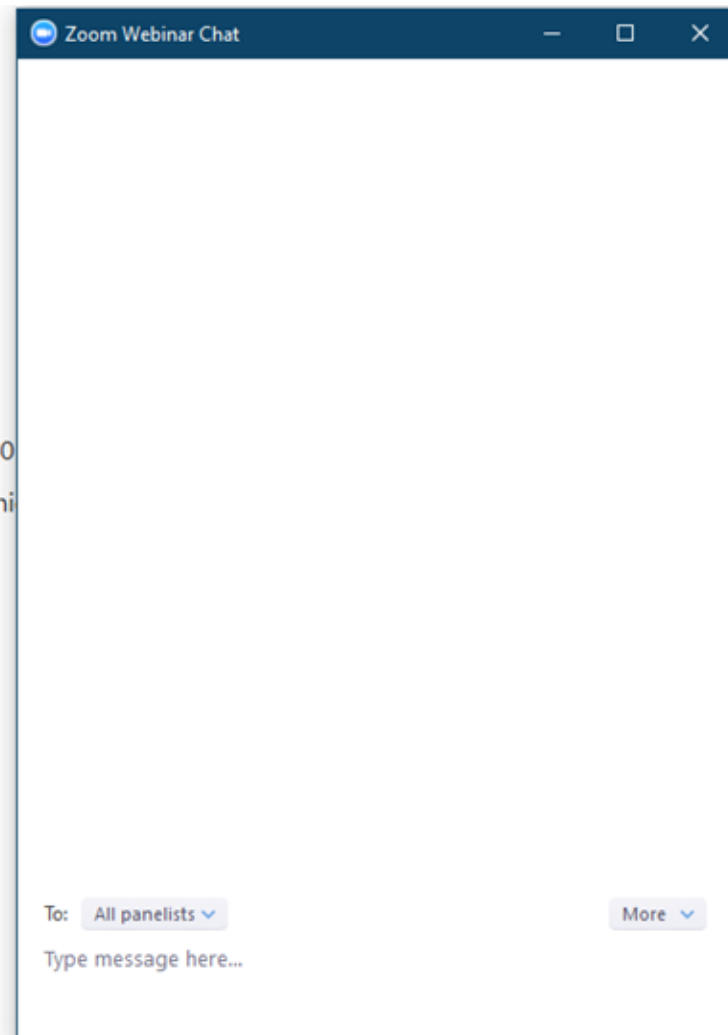
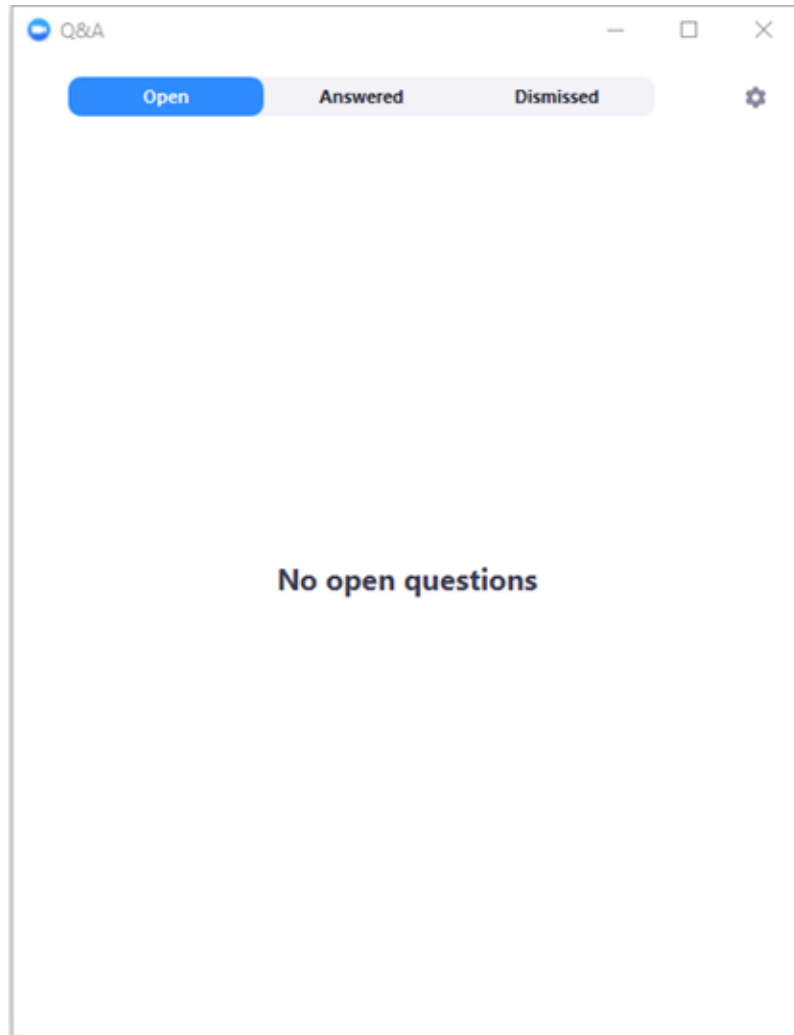


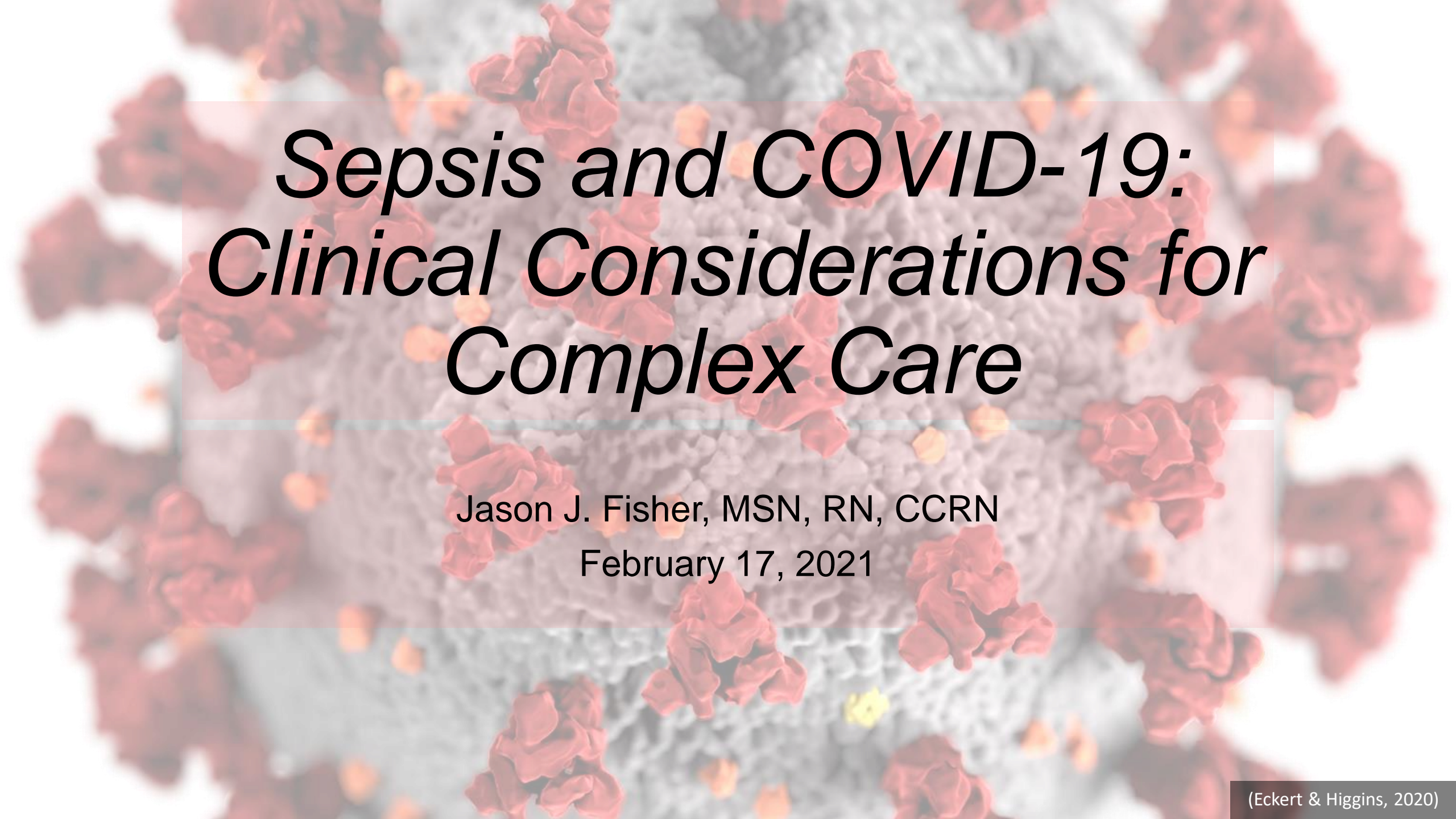
Sepsis

Reducing Sepsis Mortality in Ohio Through Early Recognition, Appropriate Intervention

The OHA Board of Trustees identified reducing sepsis mortality in Ohio as one of the key focus areas for OHA and Ohio hospitals. Sepsis is the body's overwhelming and life-threatening response to infection that can lead to tissue damage, organ failure and death. In other words, it's your body's over active and toxic response to an infection. Sepsis impacted an estimated 41,000 Ohioans in 2017. Early recognition and treatment can reduce the morbidity and mortality of sepsis.

SUBMITTING QUESTIONS





Sepsis and COVID-19: Clinical Considerations for Complex Care

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February 17, 2021

Conflict of Interest Disclosure

The author of this presentation represents that there are neither real, nor to the best of their knowledge perceived conflicts of interest that relate to this presentation.

Disclaimer

The content of this presentation is for educational purposes only and is not intended as medical advice.

Learning Objectives

- Describe the complex care considerations included in the care of patients with COVID-19 and the challenge of identifying sepsis and septic shock.
- Analyze a case study of a patient with COVID-19 to determine if they have sepsis or septic shock.
- Identify the three elements of sepsis and how they relate to COVID-19.
- Apply the steps involved in assessing for sepsis to a case study of a patient with COVID-19.
- Describe the clinical course of patients with COVID-19 and sepsis.
- Identify the ways in which the care of patients with COVID-19 continues to evolve.

Case Study: Questions to Consider

- This patient had COVID-19.
- Do they also have sepsis or septic shock?
- If so, at what points in the clinical course?

Case Study

- An individual in mid-30s is admitted to an emergency room with shortness of breath. The shortness of breath started to get progressively worse over the past 24 hours. HPI includes a fever 4 days ago along with ongoing fatigue, but no other symptoms. There is no past medical history.
- The patient appears ill and is breathing rapidly, but is not in acute distress. VS: T 37.9, R 30, HR 110, BP 138/78, SpO2 85% on 2L NC. Denies pain. The BMI is 29. Lungs are clear and diminished, otherwise exam is unremarkable.
- He is a PUI for COVID-19.



Case Study

- The oxygen is titrated to 6L NC. Patient is admitted to a COVID-cohort hospital floor within the same health system. Upon arrival the SpO₂ is 83%, so the patient is transferred to an ICU where they are quickly intubated.
- On day 3, the patient's COVID-19 test is positive. On day 4 the patient has a suspected pneumonia based on increasing FiO₂ requirements to keep the SpO₂ > 90%, new rales, and chest radiographs that are “whited out.”
- Blood cultures and lactate are collected, along with several other laboratory specimens. Of note, patient has elevated WBCs, an elevated lactate of 1.5, and platelet count of 138. Patient is started on broad spectrum IV antibiotics.



Case Study

- Over the course of the next 24 hours the patient's blood pressure and urine output are normal, but continually decline. IV fluids are started.
- The blood cultures result positive and over the next 48 hours, the patient's P:F ratios continue to steadily decline to 150, IV pressors are started and the patient develops an acute kidney injury. On day 6 the decision is made to prone the patient and consult the ECMO team.
- On day 7, the lactate continues to trend upward but has now jumped to 3.8. Late in the afternoon, the ECMO team consults remotely stating that the patient is not a candidate as he does not meet regional criteria and the likelihood of survival is low.



Case Study

- On day 10, the ECMO team is informally consulted again to reconsider by multiple intensivists without success.
- On day 15, the RN and RT are performing a head turn on the patient who remains prone when he begins to bleed frank red blood from the ETT and into the ventilator circuit. The patient quickly codes and dies.
- The patient's family was unable to visit due to visitation restrictions with exceptions only made for those actively dying. They were offered the opportunity to visit via iPad during the patient's stay, but were too anxious and upset to see the patient while in critical condition.

Sepsis and COVID-19: Presentation

Sepsis-3

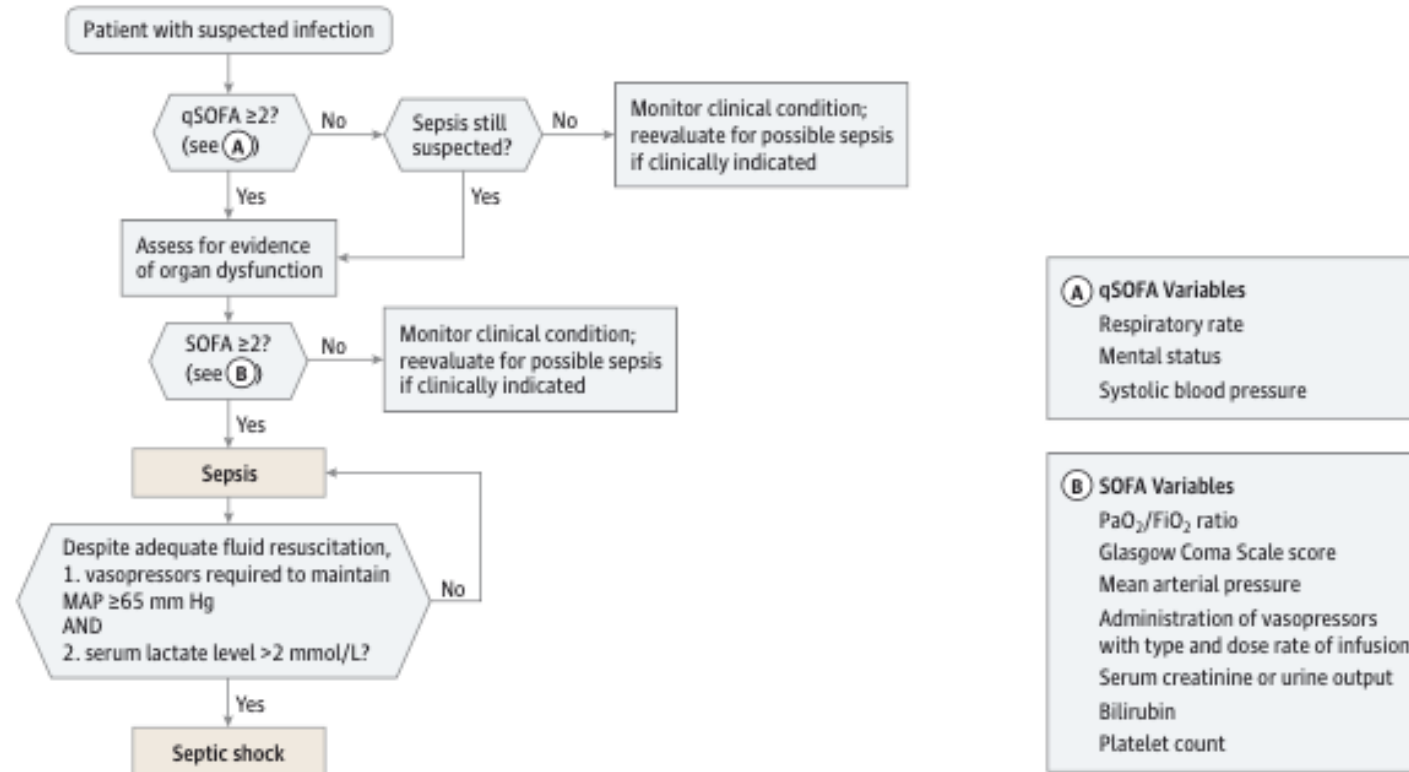
- Sepsis is “life threatening organ dysfunction caused by a dysregulated host response to infection” (Singer et al., 2016).
- Not an illness, but a syndrome.
- Three elements to sepsis:
 - **Infection** (can be viral)
 - **Host response**
 - **Organ dysfunction**

COVID-19

- **Infection** by a novel virus.
- Dysregulated **host inflammatory response**
- **Organ dysfunction** most often beginning in the lungs, later kidneys, vasculature, myocardium, brain, blood (coagulopathies)

Sepsis and COVID-19: Assessment Algorithm

Figure. Operationalization of Clinical Criteria Identifying Patients With Sepsis and Septic Shock



The baseline Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score should be assumed to be zero unless the patient is known to have preexisting (acute or chronic) organ dysfunction before the onset of infection. qSOFA indicates quick SOFA; MAP, mean arterial pressure.

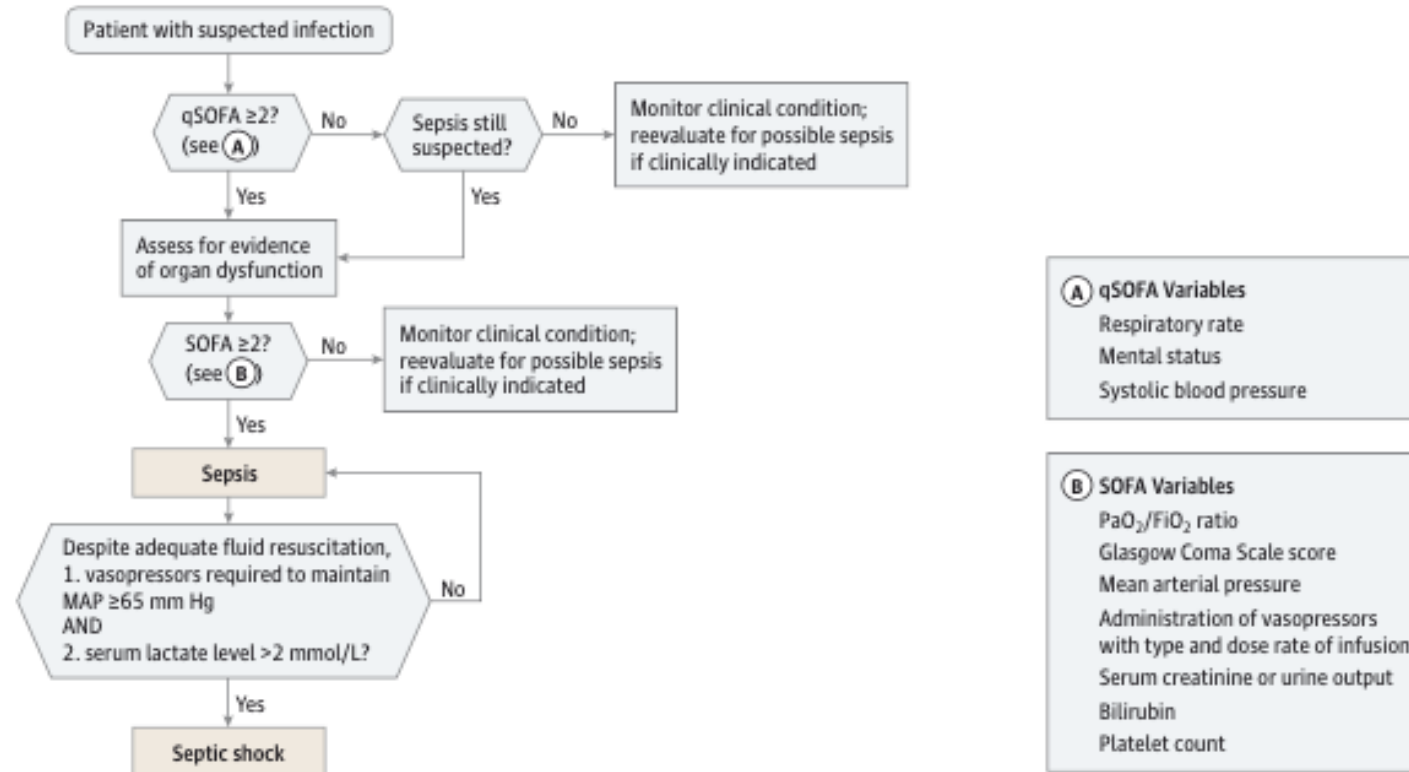
qSOFA Application

- The patient in the case study had an elevated respiratory rate of 30.
- There are no mental status changes.
- The systolic blood pressure is 138.

- Do we suspect sepsis?

Sepsis and COVID-19: Assessment Algorithm

Figure. Operationalization of Clinical Criteria Identifying Patients With Sepsis and Septic Shock



The baseline Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score should be assumed to be zero unless the patient is known to have preexisting (acute or chronic) organ dysfunction before the onset of infection. qSOFA indicates quick SOFA; MAP, mean arterial pressure.

Sequential [Sepsis-Related] Organ Failure Assessment (SOFA) Score

Table 1. Sequential [Sepsis-Related] Organ Failure Assessment Score^a

System	Score				
	0	1	2	3	4
Respiration					
PaO ₂ /FIO ₂ , mm Hg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
Coagulation					
Platelets, ×10 ³ /μL	≥150	<150	<100	<50	<20
Liver					
Bilirubin, mg/dL (μmol/L)	<1.2 (20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
Cardiovascular					
	MAP ≥70 mm Hg	MAP <70 mm Hg	Dopamine <5 or dobutamine (any dose) ^b	Dopamine 5.1-15 or epinephrine ≤0.1 or norepinephrine ≤0.1 ^b	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1 ^b
Central nervous system					
Glasgow Coma Scale score ^c	15	13-14	10-12	6-9	<6
Renal					
Creatinine, mg/dL (μmol/L)	<1.2 (110)	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440)	>5.0 (440)
Urine output, mL/d				<500	<200

Abbreviations: FIO₂, fraction of inspired oxygen; MAP, mean arterial pressure; PaO₂, partial pressure of oxygen.

^a Adapted from Vincent et al.²⁷

^b Catecholamine doses are given as μg/kg/min for at least 1 hour.

^c Glasgow Coma Scale scores range from 3-15; higher score indicates better neurological function.

(Singer et al., 2016, p. 804)

SOFA Application

- The P:F ratio upon the quick transfer from the floor to the ICU is 296.
- On day 4 the patient has a platelet count of 138.
- Do we suspect sepsis and when?

- IV pressors are started on day 5.
- On day 7 the lactate is 3.8.
- Do we suspect septic shock and when?

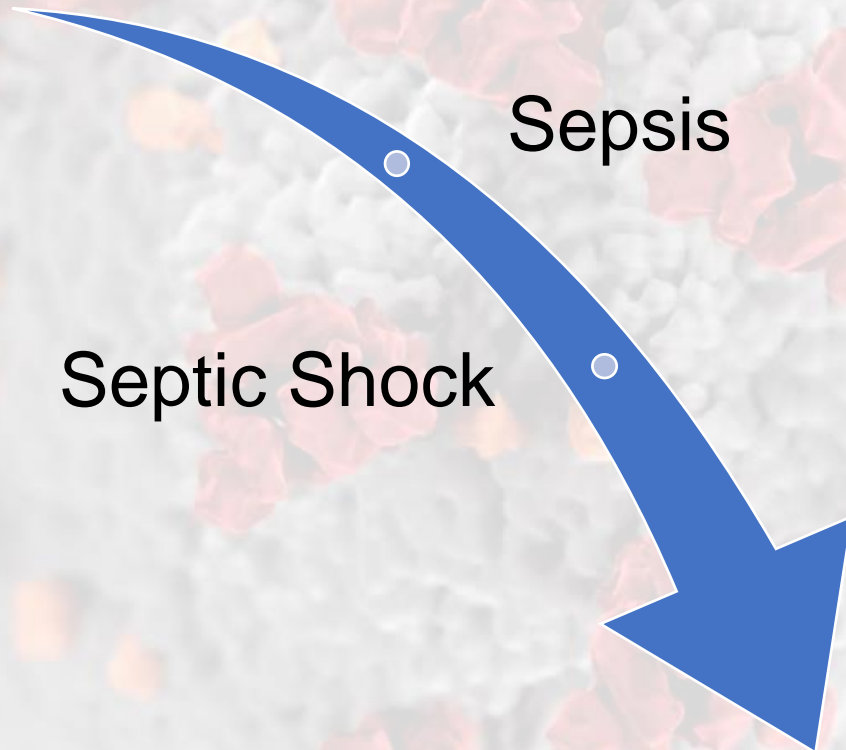
Sepsis & COVID-19 Clinical Course

SARS-CoV-2
Infection

Sepsis

Septic Shock

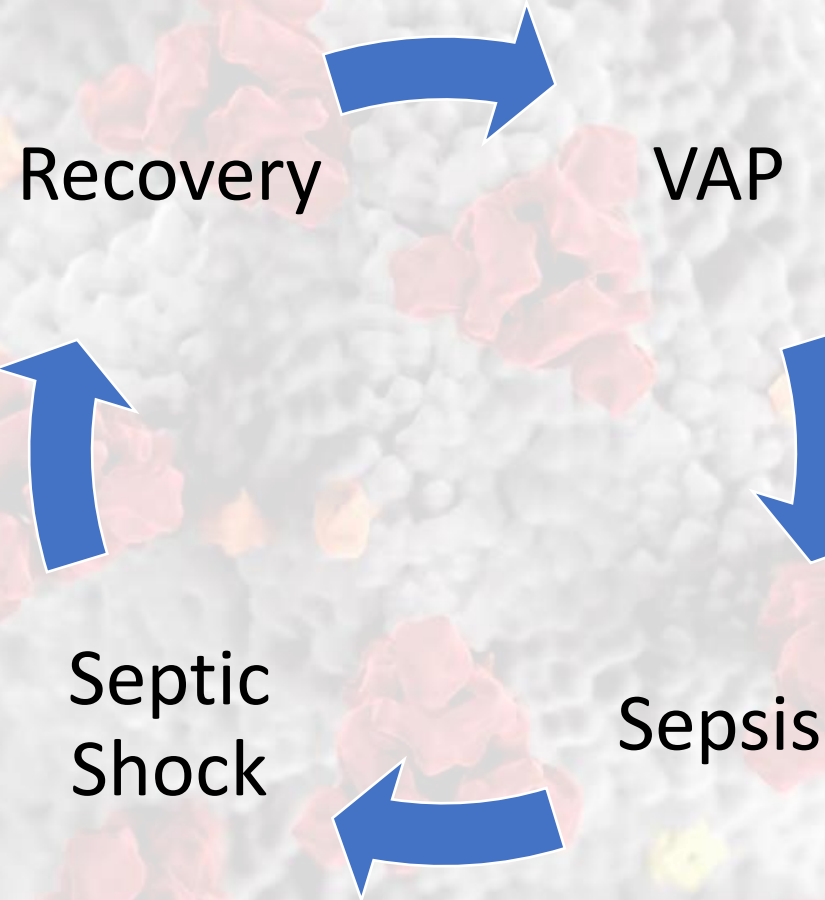
36% Mortality (Abate et al., 2020) or
Recovery



Complexity of Care with Septic Patients with COVID-19

- Approximately 1/3 of patients with COVID-19 rapidly deteriorate with ARDS, requiring the ICU.
- We tend to focus on the ARDS and ignore the progression of sepsis and septic shock.
- The novelty of the virus and associated characteristics of care likely contribute to the lack of prompt recognition of sepsis and septic shock.

Complexity of Care with Septic Patients with COVID-19



Complexity of Care with Septic Patients with COVID-19

- Symptoms including fevers, tachycardia, and tachypnea last for days and weeks.
- Patients require high and continuously escalating levels of sedation, not common in other critical care settings or patient populations.
- Vasopressors often are up-titrated for the increasing sedation requirements, confounding recognition of worsening hypotension from septic shock.
- COVID-19 infection often results in MODS, sometimes DIC, CVAs, and more.
- Fluid balance can be a challenge with sepsis/septic shock and ARDS.

Complexity of Care with Septic Patients with COVID-19

- Nearly all ICU patients are ventilated, depending upon facility.
- Not uncommon to have 1/3 to 1/2 or more of an ICU prone and paralyzed.
- Also not uncommon to have 1/5 of an ICU with CRRT.
- Ventilator weaning is a serious challenge with almost ubiquitous ICU delirium and agitation that lasts weeks.



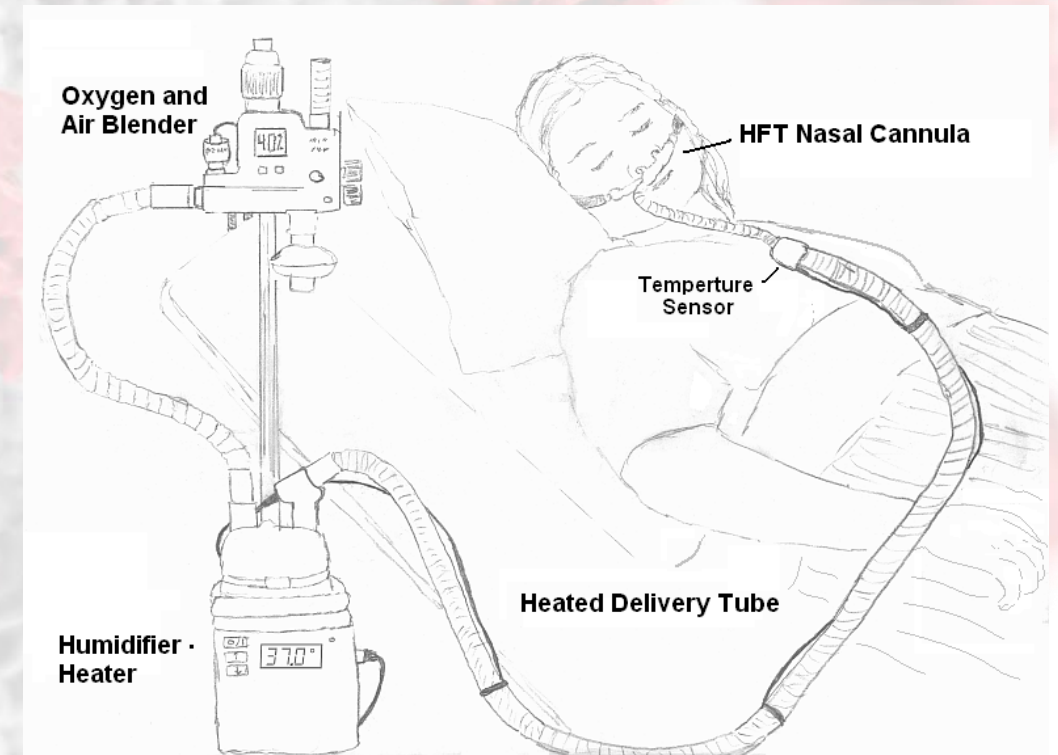
(MSNBC, 2020)

Complexity of Care with Septic Patients with COVID-19

- Staffing challenges exacerbated by both growing census, acuity, and workload/isolation precautions.
- Shortages:
 - Medications
 - PPE – N95s, surgical masks, gowns, gloves
 - Negative pressure rooms and HEPA filtration
 - Medical supplies
 - Ventilators, respiratory equipment
 - Extracorporeal life support (ECLS)
 - Oxygen
- Burnout, the emotional toll, politicization, and disinformation
- Generally decentralized, ad hoc national response in the US largely driven by individual states.

Continuously Evolving Practice & Science

- Our practice continues to evolve, and the body of evidence continues to grow with respect to COVID-19.
- We used to intubate quickly, but now we are finding better outcomes from a more conservative approach.
- Typically we now escalate oxygen from a nasal cannula to a high-flow nasal cannula, then bipap as appropriate before intubating.



(StrangeCow, 2011)

Summary: Opportunities to Consider

- We can recognize that sepsis is highly prevalent among our patients with COVID-19.
- The clinical course is not just linear, but often cyclical.
- Caring for patients with COVID-19 is highly complex, in part because of the clinical course but also due to the environment of care.
- Careful assessment, early recognition and intervention results in reduced mortality.

Case Study Revisited

- Had our patient been cared for in February 2021 instead of in June 2020, we likely would have waited longer to intubate. Instead, we may have tried escalating high-flow nasal cannula and bipap. Might the outcome have been different?
- Our patient had sepsis early from the SARS-CoV-2 virus. The qSOFA did not suggest sepsis, but we still were concerned and thought it important to continue looking into it. The SOFA tool helped us determine that our patient likely had sepsis.
- Our patient required vasopressors on day 5, but was on significant sedation. His lactic acid continued to trend up, but on day 7 it jumped above 2.0, suggesting septic shock.
- It is important to use critical thinking and always suspect sepsis in our patients with COVID-19.

Resources

- Wealth of educational resources at the Sepsis Alliance Institute with CE credit: <https://www.sepsisinstitute.org/>
- Critical care educational resources with CE credit: <https://www.aacn.org/education/ce-activities>

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