SEPSIS BULLETIN
December 2020

Sepsis

Age-related incidence and outcomes of sepsis in California, 2008-2015
Wardi G et al
J Crit Care. 2020;62:212-7
Sepsis remains amongst the most common causes of death worldwide. It has been described as a disease of the elderly, but contemporary data on risk factors and mortality is lacking. MATERIALS AND Age remains an important sepsis risk factor, but other conditions correlated more closely with sepsis-associated death. Patients over 85 years of age suffering from septic shock may have a better chance of survival than previously thought.

Aminoglycosides in Immunocompromised Critically Ill Patients With Bacterial Pneumonia and Septic Shock: A Post-Hoc Analysis of a Prospective Multicenter Multinational Cohort
Lopez R et al
Shock. 2020;54(6):731-7
The routine use of empiric combination therapy with aminoglycosides during critical illness is associated with uncertain benefit and increased risk of acute kidney injury. This study aimed to assess the benefits of aminoglycosides in immunocompromised patients with suspected bacterial pneumonia and sepsis. Aminoglycoside combination therapy was not associated with hospital mortality or need for renal replacement therapy in immunocompromised patients with pulmonary sepsis.

Association Between Doppler Snuffbox Resistive Index and Tissue Perfusion in Septic Patients
Wang C et al
Shock. 2020;54(6):723-30
Peripheral vascular disorders leading to tissue hypoperfusion play a central role in the pathophysiology of organ failure in septic shock. The Doppler snuffbox resistive index (SBRI) can be an accurate parameter to evaluate the status of peripheral vasculature at the bedside. We evaluated whether the SBRI is related to lactate levels or the peripheral perfusion index (PI) and its ability to predict lactate clearance in septic

patients. The Doppler SBRI is correlated with tissue perfusion parameters in critically ill patients. An abnormal SBRI may be better than the PI for predicting poor lactate clearance in septic patients. Further investigations are required to determine whether correcting an abnormal SBRI and PI may improve the success rate of septic shock resuscitation.

Association between plasma adiponectin levels and left ventricular systolic dysfunction in sepsis patients
Wang H et al
J Crit Care. 2020;60:195-201
As a well-known cardioprotective factor, the relevance of adiponectin (APN) to heart function following sepsis remains largely unknown. The present study evaluated the effects of plasma APN levels on heart function and 28-day mortality in sepsis patients. Low APN levels were associated with the incidence of LVSD and 28-day mortality in sepsis patients. Adiponectin may be a novel factor that may be useful for the diagnosis of LVSD.

Association of triage hypothermia with in-hospital mortality among patients in the emergency department with suspected sepsis
Ramgopal S et al
J Crit Care. 2020;60:27-31
To identify if triage hypothermia (<36.0 degrees C) among emergency department (ED) encounters with sepsis are independently associated with mortality. Up to one in three patients with sepsis have triage hypothermia, which is independently associated with mortality. 10-20% of patients with hypothermic sepsis do not have other vital sign abnormalities.

Autotaxin Activity Predicts 30-Day Mortality in Sepsis Patients and Correlates With Platelet Count and Vascular Dysfunction
Sexton T et al
Shock. 2020;54(6):738-43
We investigated whether platelet count associated with biomarkers of endothelial function, and additionally sought to identify novel predictors of outcomes in a cohort of patients with severe sepsis at a quaternary care academic medical center. Platelet count, the ratio of angiopoietin-2/1, and autotaxin activity all predicted 30-day mortality. Autotaxin activity within the plasma correlates with both platelet counts and vascular dysfunction biomarkers across both survivors and non-survivors indicating a possible involvement of autotaxin within sepsis.

Core-to-skin temperature gradient measured by thermography predicts day-8 mortality in septic shock: A prospective observational study
Amson H et al
J Crit Care. 2020;60:294-9
Septic shock is associated with altered peripheral perfusion. Core-to-skin temperature gradient depends on skin perfusion and microcirculatory function. We hypothesized that a high core-to-skin temperature gradient is correlated with mortality in septic shock. Core-to-index finger temperature gradient higher than 7 degrees C predicts day-8 mortality in septic shock and is correlated with other tissue perfusion markers.

Early Prediction of Sepsis From Clinical Data Using Ratio and Power-Based Features
Nesaragi N and Patidar S
Crit Care Med. 2020;48(12):e1343-e9
Early prediction of sepsis is of utmost importance to provide optimal care at an early stage. This work aims to deploy soft-computing and machine learning techniques for early prediction of sepsis. DESIGN: An algorithm for early identification of sepsis using ratio and power-based feature transformation of easily obtainable clinical data. The proposed study supports the realization of a hospital-specific customized solution in the form of an early-warning system for sepsis. However, an extended analysis is necessary to apply this framework for hospital-independent diagnosis of sepsis in general. Nevertheless, the clinical

utility of hospital-specific customized solutions based on the proposed method across a wide range of hospital systems needs to be studied.

Early Sepsis Prediction Using Ensemble Learning With Deep Features and Artificial Features Extracted From Clinical Electronic Health Records

He Z et al

Crit Care Med. 2020;48(12):e1337-e42

Sepsis is caused by infection and subsequent overreaction of immune system and will severely threaten human life. The early prediction is important for the treatment of sepsis. This report aims to develop an early prediction method for sepsis 6 hours ahead on the basis of clinical electronic health records. We realized a 6-hour ahead early-onset prediction of sepsis on the basis of clinical electronic health record by ensemble learning. The results indicated the proposed model functioned well in the early prediction of sepsis. In particular, ensemble learning had a significant ($p < 0.01$) improvement than any single model in performance.

Effect of phenylephrine push prior to continuous infusion norepinephrine in patients with septic shock

Hawn JM et al

Chest. 2020

Intravenous pushes of phenylephrine may be utilized for patients with septic shock with the intent of rapidly achieving mean arterial pressure (MAP) goals. However, the clinical effectiveness and safety of this approach is unclear. Therefore, we sought to answer the question, in patients with septic shock, is administration of a phenylephrine push prior to norepinephrine initiation associated with a higher incidence of hemodynamic stability? Phenylephrine pushes were associated with a higher incidence of early but not sustained hemodynamic stability, and were independently associated with higher ICU mortality. Caution is warranted when clinicians are considering the use of phenylephrine pushes in patients with septic shock.

Empiric Antibiotic Therapy for Staphylococcus aureus Septic Shock: Is Vancomycin Indicated?

Villanueva RD et al

Crit Care Med 2020;48(12):e1370-e1. 10.1097/CCM.0000000000004593

We describe the epidemiology of sepsis across the transition from the International Classification of Diseases, 9th Edition, and International Classification of Diseases, 10th Edition, coding systems, evaluating estimates of two previously published International Classification of Diseases, 10th Edition, coding strategies. The Institute for Health Metrics and Evaluation International Classification of Diseases, 10th Edition, coding strategy for identifying sepsis may capture a larger patient population within administrative datasets that are different from those identified with previously deployed International Classification of Diseases-based methods. Further work is required to determine the optimal International Classification of Diseases, 10th Edition, coding strategy for use in hospital discharge data.

Exacerbation of circadian rhythms of core body temperature and sepsis in trauma patients

Coiffard B et al

J Crit Care. 2020;60:23-6

This study aimed to describe by mathematical modeling an accurate course of core body temperature (CBT) in severe trauma patients and its relation to sepsis. Trauma patients exhibit complex temperature circadian rhythms. Early exacerbation of the temperature rhythmicity (in frequency and amplitude) is associated with the development of sepsis. This observation accentuates the concept of circadian disruption and sepsis in ICU patients.

Impact of Right Ventricular Dysfunction on Short- and Long-Term Mortality in Sepsis: A Meta-Analysis of 1,373 Patients

Vallabhajosyula S et al

Chest. 2020

Right ventricular (RV) dysfunction in sepsis and septic shock has been infrequently studied and has uncertain prognostic significance. Does RV function impact mortality in sepsis and septic shock? In this

meta-analysis of observational studies, RV dysfunction was associated with higher short-term and long-term mortality in sepsis and septic shock.

Management of clinical chorioamnionitis: an evidence-based approach
Conde-Agudelo A et al
Am J Obstet Gynecol. 2020;223(6):848-69
This review aimed to examine the existing evidence about interventions proposed for the treatment of clinical chorioamnionitis, with the goal of developing an evidence-based contemporary approach for the management of this condition. We identified the following promising interventions for the management of clinical chorioamnionitis: (1) an antibiotic regimen including ceftriaxone, clarithromycin, and metronidazole that provides coverage against the most commonly identified microorganisms in patients with clinical chorioamnionitis; (2) vaginal cleansing with antiseptic solutions before cesarean delivery with the aim of decreasing the risk of endometritis and, possibly, postoperative wound infection; and (3) antenatal administration of N-acetylcysteine, an antioxidant and antiinflammatory agent, to reduce neonatal morbidity and mortality. Well-powered randomized controlled trials are needed to assess these interventions in patients with clinical chorioamnionitis.

Pharmacological principles guiding prolonged glucocorticoid treatment in ARDS
Meduri GU et al
Intensive Care Med. 2020;46(12):2284-96
Current literature addressing the pharmacological principles guiding glucocorticoid (GC) administration in ARDS is scant. This paucity of information may have led to the heterogeneity of treatment protocols and misinterpretation of available findings. GCs are agonist compounds that bind to the GC receptor (GR) producing a pharmacological response. Clinical efficacy depends on the magnitude and duration of exposure to GR. We updated the meta-analysis of randomized trials investigating GC treatment in ARDS, focusing on treatment protocols and response. We synthesized the current literature on the role of the GR in GC therapy including genomic and non-genomic effects, and integrated current clinical pharmacology knowledge of various GCs, including hydrocortisone, methylprednisolone and dexamethasone.

Procalcitonin Is Not an Adequate Tool for Antimicrobial De-Escalation in Sepsis
Maves RC
Crit Care Med. 2020;48(12):1848-50
Procalcitonin is a peptide precursor of calcitonin, the production of which is upregulated in response to bacterial antigens such as lipopolysaccharide. Conversely, viral infections typically lead to increased production of interferon gamma, which decreases production of procalcitonin. The absolute level of circulating procalcitonin corresponds to the magnitude of the bacterial load in an infected patient and decreases with effective antimicrobial therapy. We discuss procalcitonin as a biomarker for determining the duration of therapy in bacterial sepsis

Procalcitonin Is Useful for Antibiotic Deescalation in Sepsis
Plata-Menchaca EP and Ferrer R
Crit Care Med. 2020;Publish Ahead of Print
A significant burden of evidence supports procalcitonin-guided ADE in sepsis, and promoting its implementation as a complement for subjective clinical impressions is useful.

Role of microbiological tests and biomarkers in antibiotic stewardship
Rub DM et al
Semin Perinatol. 2020;44(8):151328
Laboratory tests are critical in the detection and timely treatment of infection. Two categories of tests are commonly used in neonatal sepsis management: those that identify the pathogen and those that detect host response to a potential pathogen. Decision-making around antibiotic choice is related to the performance of tests that directly identify pathogens. Advances in these tests hold the key to progress in

antibiotic stewardship. Tests measuring host response, on the other hand, are an indirect marker of potential infection. While an important measure of the patient's clinical state, in the absence of pathogen detection these tests cannot confirm the appropriateness of antibiotic selection. The overall impact these tests then have on antibiotic utilization depends the test's specificity for bacterial infection, clinical scenario where it is being used and the decision-rule it is being integrated into for use. In this review we discuss common and emerging laboratory tests available for assisting management of neonatal infection and specifically focus on the role they play in optimizing antibiotic utilization.

Sepsis and Coronavirus Disease 2019: Common Features and Anti-Inflammatory Therapeutic Approaches
Beltran-Garcia J et al
Crit Care Med. 2020;48(12):1841-4
Great efforts are being made worldwide to identify the specific clinical characteristics of infected critically ill patients that mediate the associated pathogenesis, including vascular dysfunction, thrombosis, dysregulated inflammation, and respiratory complications. Recently, coronavirus disease 2019 has been closely related to sepsis, which suggests that most deaths in ICUs in infected patients are produced by viral sepsis. Understanding the physiopathology of the disease that lead to sepsis after severe acute respiratory syndrome coronavirus 2 infection is a current clinical need to improve intensive care-applied therapies applied to critically ill patients. Although the whole representative data characterizing the immune and inflammatory status in coronavirus disease 2019 patients are not completely known, it is clear that hyperinflammation and coagulopathy contribute to disease severity. Here, we present some common features shared by severe coronavirus disease 2019 patients and sepsis and describe proposed anti-inflammatory therapies for coronavirus disease 2019 which have been previously evaluated in sepsis.

Sepsis Epidemiology Across the International Classification of Diseases, 9th Edition, to International Classification of Diseases, 10th Edition, Chasm
Jordan Kempker A et al
Crit Care Med. 2020;48(12):1881-4
Describe the epidemiology of sepsis across the transition from the International Classification of Diseases, 9th Edition, and International Classification of Diseases, 10th Edition, coding systems, evaluating estimates of two previously published International Classification of Diseases, 10th Edition, coding strategies. The Institute for Health Metrics and Evaluation International Classification of Diseases, 10th Edition, coding strategy for identifying sepsis may capture a larger patient population within administrative datasets that are different from those identified with previously deployed International Classification of Diseases-based methods. Further work is required to determine the optimal International Classification of Diseases, 10th Edition, coding strategy for use in hospital discharge data.

Timeline of sepsis bundle component completion and its association with septic shock outcomes
Hu B et al
J Crit Care. 2020;60:143-51
We assess the impact of the timeline of sepsis bundle completion with clinical outcomes in septic shock. We showed an association between the completion of SSC bundle components within three hours with lower mortality or earlier shock reversal. This relationship was not evident when compared to bundle completion in 1 h vs. within 3 h.

Transfusion in the mechanically ventilated patient
Juffermans NP et al
Intensive Care Med. 2020;46(12):2450-7
Red blood cell transfusions are a frequent intervention in critically ill patients, including in those who are receiving mechanical ventilation. Both these interventions can impact negatively on lung function with risks of transfusion-related acute lung injury (TRALI) and other forms of acute respiratory distress syndrome (ARDS). The interactions between transfusion, mechanical ventilation, TRALI and ARDS are complex and

other patient-related (e.g., presence of sepsis or shock, disease severity, and hypervolemia) or blood product-related (e.g., presence of antibodies or biologically active mediators) factors also play a role. We propose several strategies targeted at these factors that may help limit the risks of associated lung injury in critically ill patients being considered for transfusion.

Use of Hydrocortisone, Ascorbic Acid, and Thiamine in Adults with Septic Shock
Vail EA et al
Am J Respir Crit Care Med. 2020;202(11):1531-9
In December 2016, a single-center study describing significant improvements in mortality among a small group of patients with severe sepsis and septic shock treated with hydrocortisone, high-dose ascorbic acid, and thiamine (HAT therapy) was published online. This study aims to describe the administration of HAT therapy among U.S. adults with septic shock before and after study publication and to compare outcomes between patients who received and did not receive HAT therapy. Publication of a single-center retrospective study was associated with significantly increased administration of HAT. Among patients with early septic shock, receipt of HAT was not associated with mortality benefit.

NEWS2

NEWS2 is a valuable tool for appropriate clinical management of COVID-19 patients
Rigoni M et al
Eur J Intern Med. 2020
During the pandemic outbreak, the WHO recommended the use of medical early warning scores (e.g., NEWS2) to facilitate the early recognition and escalation of deteriorating patients. National Early Warning Score 2 (NEWS2) was also recommended for the management of COVID-19 patients in critical care by the National Institute for Health and Care Excellence (NICE). We want to bring evidence supporting the hypothesis that the NEWS2 is a valuable tool for SARS-CoV-2 patients' risk stratification and prediction of intrahospital mortality.

Neonatal, paediatric and maternal sepsis

S100A8 and S100A9 Are Important for Postnatal Development of Gut Microbiota and Immune System in Mice and Infants
Willers M et al
Gastroenterology. 2020;159(6):2130-45 e5
After birth, the immune system matures via interactions with microbes in the gut. The S100 calcium binding proteins S100A8 and S100A9, and their extracellular complex form, S100A8-A9, are found in high amounts in human breast milk. We studied levels of S100A8-A9 in fecal samples (also called fecal calprotectin) from newborns and during infancy, and their effects on development of the intestinal microbiota and mucosal immune system. S100A8 and S100A9 regulate development of the intestinal microbiota and immune system in neonates. Nutritional supplementation with these proteins might aide in development of preterm infants and prevent microbiota-associated disorders in later years.

Comparison of Prognostic Factors Between Direct and Indirect Pediatric ARDS
Kim DH et al
Respir Care. 2020;65(12):1823-30
Pediatric ARDS is a heterogeneous disease entity with high morbidity and mortality. In this study, we categorized pediatric ARDS by direct and indirect initial triggering events and identified characteristics of survivors and nonsurvivors in these 2 subtypes. Direct and indirect pediatric ARDS had distinct clinical characteristics, especially in terms of prognostic factors. Variables related to mechanical ventilation were significantly associated with mortality among subjects with direct pediatric ARDS, but not among subjects with indirect pediatric ARDS. Thus, this study provides evidence of the potential benefit of categorizing patients with pediatric ARDS by subtype for evaluating prognostic factors and developing adjusted management strategies to improve clinical outcomes.

Reproductive sequelae of parental severe illness before the pandemic: implications for the COVID-19 pandemic
Kasman AM et al
Fertil Steril. 2020;114(6):1242-9
We investigate, with pre-COVID-19 data, whether parental exposure to severe systemic infections near the time of conception is associated with pregnancy outcomes. In a pre-COVID-19 cohort, parental preconception severe systemic infection was associated with increased odds of preterm birth and pregnancy loss when conception was soon after the illness.

Antibiotic stewardship for early-onset sepsis
Kuzniewicz MW and Puopolo KM
Semin Perinatol. 2020;44(8):151325
Antibiotics are administered to the vast majority of preterm newborns and to a substantial proportion of term infants in the hours after birth due to risk for early-onset sepsis. The approaches taken to determine which newborns should be evaluated for early-onset sepsis, and what type and duration of antibiotics are administered, are important elements of neonatal antibiotic stewardship. The use of multivariate prediction models for sepsis risk assessment among infants born >/=35 weeks' gestation can safely reduce the use of empiric antibiotic therapy. Approaches incorporating serial physical examination may also contribute to decreasing empiric antibiotic exposure among such infants. Among infants born <35 weeks' gestation, delivery characteristics can be used to identify preterm infants at low enough risk of early infection that empiric therapies are not required. Data informing the epidemiology, microbiology and antibiotic susceptibility patterns of early-onset sepsis pathogens can be used to optimize antibiotic choice for empiric and targeted antibiotic therapy to ensure that effective therapies are administered, while decreasing the risks associated with broad-spectrum antibiotic exposure. Optimal use of blood culture and time to positivity data can also contribute to decreasing the risks associated with prolonged antibiotic administration in the face of sterile cultures.

Expanding antimicrobial stewardship strategies for the NICU: Management of surgical site infections, perioperative prophylaxis, and culture negative sepsis
Zachariah P and Saiman L
Semin Perinatol. 2020;44(8):151327
We review antibiotic stewardship strategies for neonatal intensive care units (NICU) in the areas of management of surgical site infections, perioperative prophylaxis and culture negative late onset sepsis. Effective implementation of these antimicrobial stewardship strategies in the NICU can reduce unnecessary antimicrobial use and limit the emergence of resistant pathogens.

Postdischarge Outcome Domains in Pediatric Critical Care and the Instruments Used to Evaluate Them: A Scoping Review
Maddux AB et al
Crit Care Med. 2020;48(12):e1313-e21
Assessing outcomes after pediatric critical illness is imperative to evaluate practice and improve recovery of patients and their families. We conducted a scoping review of the literature to identify domains and instruments previously used to evaluate these outcomes. A comprehensive, generalizable understanding of outcomes after pediatric critical illness is limited by heterogeneity in methodology, populations, domains, and instruments. Developing assessment standards may improve understanding of postdischarge outcomes and support development of interventions after pediatric critical illness.

A Core Outcome Set for Pediatric Critical Care
Fink EL et al
Crit Care Med. 2020;48(12):1819-28
More children are surviving critical illness but are at risk of residual or new health conditions. An evidence-informed and stakeholder-recommended core outcome set is lacking for pediatric critical care outcomes. Our objective was to create a multinational, multistakeholder-recommended pediatric critical care core

outcome set for inclusion in clinical and research programs. The PICU core outcome set and PICU core outcome set-extended are multistakeholder-recommended resources for clinical and research programs that seek to improve outcomes for children with critical illness and their families.

Pediatric Emergency and Critical Care Resources and Infrastructure in Resource-Limited Settings: A Multicountry Survey

Muttalib F et al

Crit Care Med. 2020;Publish Ahead of Print

We describe the infrastructure and resources for pediatric emergency and critical care delivery in resource-limited settings worldwide. Contemporary data demonstrate significant disparity in the availability of essential and advanced human and material resources for the care of critically ill children in resource-limited settings. Minimum standards for essential pediatric emergency and critical care in resource-limited settings are needed.

Efficacy of Early Prophylaxis Against Catheter-Associated Thrombosis in Critically Ill Children: A Bayesian Phase 2b Randomized Clinical Trial

Faustino EVS et al

Crit Care Med. 2020;Publish Ahead of Print

We obtained preliminary evidence on the efficacy of early prophylaxis on the risk of central venous catheter-associated deep venous thrombosis and its effect on thrombin generation in critically ill children. These findings suggest the efficacy and safety of early prophylaxis that should be validated in a pivotal randomized clinical trial.

Infection control and other stewardship strategies in late onset sepsis, necrotizing enterocolitis, and localized infection in the neonatal intensive care unit

Aleem S et al

Semin Perinatol. 2020;44(8):151326

Suspected or proven late onset sepsis, necrotizing enterocolitis, urinary tract infections, and ventilator associated pneumonia occurring after the first postnatal days contribute significantly to the total antibiotic exposures in neonatal intensive care units. The variability in definitions and diagnostic criteria in these conditions lead to unnecessary antibiotic use. The length of treatment and choice of antimicrobial agents for presumed and proven episodes also vary among centers due to a lack of supportive evidence and guidelines. Implementation of robust antibiotic stewardship programs can encourage compliance with appropriate dosages and narrow-spectrum regimens.

Impact of neonatal sepsis calculator in West Midlands (UK)

van Hasselt TJ et al

Arch Dis Child Fetal Neonatal Ed. 2020

The Kaiser Permanente Sepsis Risk Calculator (KP-SRC) was developed to predict early-onset neonatal sepsis (EOS), using continuous variables (local EOS incidence rates, maternal factors, infant well-being) to guide decision making. We performed a virtual application of the KP-SRC versus NICE guidance on postnatal antibiotic usage and length of stay. We conclude that implementation of KP-SRC could reduce antibiotic exposure in 49%–88% of infants with a reduction in hospital stay by 18%–38%.

COVID-19 and sepsis

Does Severe Acute Respiratory Syndrome Coronavirus 2 Cause Sepsis? Crit Care Med

Shappell CN et al

Crit Care Med 2020;48(12):1707-9. 10.1097/CCM.0000000000004601

Coronavirus disease 2019 (COVID-19), the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), poses an unprecedented threat to human health, healthcare systems, and our global economy. Since its emergence, clinicians have attempted to extrapolate the pathophysiology and management strategies for more well-known disease processes such as acute respiratory distress syndrome and other respiratory viruses. One important disease paradigm that has been variably applied to COVID-19, however, is sepsis. Although some experts have

unequivocally asserted that multiple organ failure arising from COVID-19 is sepsis, other case series of severe COVID-19 infections have not labeled the disease as sepsis despite the fact that patients have proven infection and organ dysfunction and therefore meet the formal definition of sepsis. We believe it is worth exploring why this is the case, and whether or not it truly serves our patients to think about severe COVID-19 infections as sepsis.

Systematic evaluation and external validation of 22 prognostic models among hospitalised adults with COVID-19: an observational cohort study

Gupta RK et al

Eur Respir J. 2020;56(6):2003498-

The number of proposed prognostic models for coronavirus disease 2019 (COVID-19) is growing rapidly, but it is unknown whether any are suitable for widespread clinical implementation. Admission oxygen saturation on room air and patient age are strong predictors of deterioration and mortality among hospitalised adults with COVID-19, respectively. None of the prognostic models evaluated here offered incremental value for patient stratification to these univariable predictors.

Predicting severe COVID-19 in the Emergency Department

Holten AR et al

Resusc Plus. 2020;4:100042

COVID-19 may lead to severe disease, requiring intensive care treatment and challenging the capacity of health care systems. The aim of this study was to compare the ability of commonly used scoring systems for sepsis and pneumonia to predict severe COVID-19 in the emergency department. NEWS2 predicted severe COVID-19 disease more accurately than SIRS and qSOFA, but not significantly better than CURB65 and PSI. NEWS2 may be a useful screening tool in evaluating COVID-19 patients during hospital admission.).