Sepsis is a systemic response to infection and inflammation. Classified as sepsis, severe sepsis and septic shock, the more severe responses have a hallmark of dehydration due to intravascular volume depletion[1]. Our project uses a novel sepsis dehydration algorithm and **scoring system** to predict the length of stay of patients in the hospital. The sepsis dehydration score uses a normalized or aggregated score with markers such as BUN, creatinine, lactate and HCO3. By leveraging these indicators, the algorithm aims to improve the accuracy of length-of-stay predictions, identify utilization of pressors, which eventually will aid in **clinical decision making.**

The SIRS criteria being poorly specific[2] but reasonably sensitive, is used to identify systemic inflammatory response syndrome, and plays a crucial role in early sepsis detection. One of the classic understandings is that patients with Sepsis tend to have relative hypovolemia and due to that reason fluid administration is part of the initial management process[3]. Although starting with fluid hydration based on weight might seem simple, it is important to quantify dehydration from sepsis to avoid fluid overload along with reduction in morbidity and mortality[3].

BUN + Cr + lactate - HCO3

normal BUN + normal Cr + normal lactate - normal HCO3

Objectives

- develop a scoring system utilizing biomarkers BUN, Cr, lactate, and Co2 to predict the length of hospital stay
-use the scoring system to understand clinical decisions by correlation of length of stay with numerical score values
-correlate with vasopressor/inotrope support in critically ill patients

Study Design

Prospective cohort study with 376 patients in multiple facilities

Inclusion and Exclusion

-18+
- Confirmed diagnosis of severe sepsis or septic shock based on established criteria.

-cardiogenic shock
-active UGIB
-decompensated liver cirrhosis
-patients on renal replacement therapy

Limitations

Observational study will limit our ability to obtain any causal information, or any interventional change. Due to the design of this study, we will only be able to obtain correlational information

Analysis

- utilization of the formula yields a numerical value which will be known as that patient's **Sepsis dehydration score (SDS)**.
- This value will be compared with the input variables which are **length of stay and utilization of pressors in patients**
- A correlational analysis will be done subsequently **comparing the relationship of the SDS and input variables**, assessing the question, does a **higher score lead to higher length of stay and more pressor use?.**

Novel Sepsis Dehydration Scoring Algorithm to assess Intravascular depletion to predict clinical outcomes


Nirmay Sonar, MD

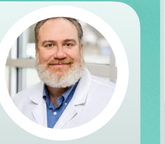

Parisha Masud, MD


Zaynah Sadiq, MD


Gurvinder Kaur, MD


Shohan Pervaze, MD


Nida Maurice, DO, FACOI


Bernie Sergent, DO, FACOI

Our project plans to integrate these biomarkers into a sepsis dehydration score using the formula BUN/Normal BUN + Cr/normal Cr + lactate/normal lactate - Co2/normal Co2 (bicarb), guiding treatment decisions, and potentially reducing hospital stay durations for patients diagnosed with severe sepsis[4][5][6]. Further validation and clinical trials will be essential to assess the algorithm's effectiveness and applicability in real-world healthcare settings.

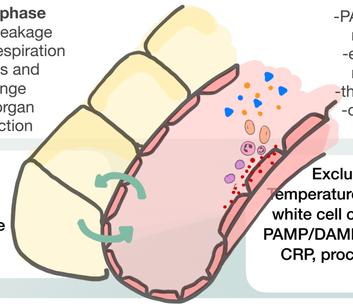
Norton Community Hospital Internal Medicine Residency Program, Norton, Virginia

SIRS criteria: [1][2]
T, P, R, WBC
Sepsis criteria: lactate with organ dysfunction
Septic shock: lactate or hypotension

Understanding intravascular depletion

Cellular phase
-enzyme leakage
-anerobic respiration
-acidosis and exchange
-multi organ dysfunction

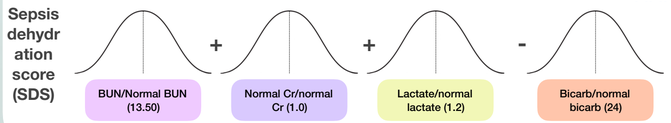
Vascular phase
-PAMP/DAMP response
-endothelial response
-third spacing
-cell assault



Included variables:
BUN, Cr, CO2, lactate

Excluded variables:
Temperature, pulse, respiration, white cell count, platelets, Igs, PAMP/DAMP such as urea, ESR, CRP, procalcitonin, IL-6, pre albumin

[7][8][9]

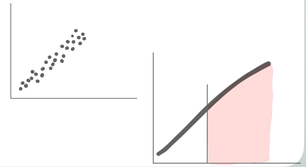


SDS

Length of stay (days)

Vasopressor requirement

Estimated Projections



1. Marik, P. E., & Taeb, A. M. (2017). SIRS, qSOFA and new sepsis definition. Journal of Thoracic Disease, 9(4), 943–945. https://doi.org/10.21037/jtd.2017.03.125
2. Wang, C., Xu, R., Zeng, Y., Zhao, Y., & Hu, X. (2022). A comparison of qSOFA, SIRS and NEWS in predicting the accuracy of mortality in patients with suspected sepsis: A meta-analysis. PLOS ONE, 17(4), e0266755. https://doi.org/10.1371/journal.pone.0266755
3. Brown, R. M., & Semler, M. W. (2018). Fluid Management in Sepsis. Journal of Intensive Care Medicine, 34(5), 364–373. https://doi.org/10.1177/0885066618784861
4. Han, D., Zhang, L., Zheng, S., Xu, F., Li, C., Yang, R., Ma, W., Yin, H., & Lyu, J. (2021). Prognostic Value of Blood Urea Nitrogen/Creatinine Ratio for Septic Shock: An Analysis of the MIMIC-III Clinical Database. BioMed Research International, 2021, 1–16. https://doi.org/10.1155/2021/5595042
5. Helmy, T., El-reweny, E., & Ghazy, F. (2017). Prognostic value of venous to arterial carbon dioxide difference during early resuscitation in critically ill patients with septic shock. Indian Journal of Critical Care Medicine, 21(9), 589–593. https://doi.org/10.4103/ijccm.ijccm_64_16
6. Bou Chebl, R., Jamali, S., Sabra, M., Safa, R., Berbari, I., Shami, A., Makki, M., Tamim, H., & Abou Dagher, G. (2020). Lactate/Albumin Ratio as a Predictor of In-Hospital Mort,5ality in Septic Patients Presenting to the Emergency Department. Frontiers in Medicine, 7, 550182. https://doi.org/10.3389/fmed.2020.550182
7. UpToDate. (n.d.). Www.uptodate.com. Retrieved September 23, 2023, from https://www.uptodate.com/contents/assessment-of-kidney-function?
8. UpToDate. (n.d.). Www.uptodate.com. Retrieved September 23, 2023, from https://www.uptodate.com/contents/evaluation-of-and-initial-approach-to-the-adult-patient-with-undifferentiated-hypotension-and-shock?search=normal%20plasma%20lactate%20level&source=search_result&selectedTitle=4~150&usage_type=default&display_rank=4
9. UpToDate. (n.d.). Www.uptodate.com. Retrieved September 23, 2023, from https://www.uptodate.com/contents/simple-and-mixed-acid-base-disorders?search=normal%20plasma%20CO2%20level&source=search_result&selectedTitle=3~150&usage_type=default&display_rank=3