Sepsis Early Detection Systems (SEDS)
User Manual

The Sepsis Early Detection System (SEDS) employs advanced AI predictive models for the diagnosis of sepsis patients, aiming to assist clinicians in diagnosing patients. After successfully registering an account and logging into the system, clinicians can view various basic information of patients, and diagnose patients based on AI model prediction results and medical experience.

Upon logging into SEDS, each clinician will be randomly assigned to a numbered patient. For example, consider patient number 10078. The initial interface clinicians encounter, as shown in Figure 1, provides the related information for the assigned patient. Clinicians are required to complete the preliminary diagnosis and treatment plan within 4 hours. Once this is done, the system will display the patient's subsequent examination data, as depicted in Figure 2. This process helps ensure timely and informed decision-making in the treatment of sepsis patients.

Note : The patient's examination information listed below is for reference, intended to illustrate the operation process and system functions. The actual data is subject to the officially deployed system data.

1.Logout
2.Sepsis
3.AI model -> sepsis
4.Predicting the probability of sepsis 0h : 1.0,3h : 1.0
5.Basic Information
6.Temperature : 36.61℃
7.Heart rate : 88.0bpm
8.Blood pressure : 120/64mmHg
9.24-hour fluid (input/output 0/0 ml)
10.Consciousness: normal consciousness
11.Respiratory rate : 19insp/min
12.Systolic blood pressure : 115mmHg
13.Historical data
14.Chief complaints
15.Confusion,difficulty breathing.
Reason for MICU transfer : Hypotension
16.Demographic information and medical history
17.Gender:male
18.Age : 54
19.Weight : 85.4kg
20.Marriage: widowed
21.Race: white
22.Past and present medical history
23.Current time : 2149/12/11 16:46~2149/12/11 17:46
24.Historical inspection data
25.Preliminary diagnosis
26.Please choose
27.Initial treatment plan within 4 hours
28.Drugs
29.Please select drugs
30.Dose
31.Box
32.Diluted solutions of drugs
33.None
34.Determine
35.Back to Patients Catalog
36.Next patient

Figure 1. Preliminary Diagnosis Interference

1.Next inspection
2.Procalcitonin
3.Routine blood test
4.Arterial blood gas analysis
5.Anticoagulant
6.Imaging examination
7.Pathogenic examination
8.Culture/Smear
9.Respiratory system Pao2/FiO2
10.Mechanical ventilation
11.Coagulation system
12.Platelet
13.Reference scope : 125~350|10^9/L
14.Liver
15.Bilirubin : 51.3umol/L
16.Reference scope : 1.71~21|μmol/L
17.Cardiovascular system
MAP : 87.0mmHg
18.Reference scope : 70~105|mmHg
19.Central nervous system
gcs : 15.0
20.Reference scope : 3~15
21.Kidney
22.Creatinine : 97.24umol/L
23.Reference scope : 57~97|umol/L
24.Urine volume
25.Final diagnosis
26.Please choose
27.Final treatment plan within 4 hours
28.Drugs
29.Please select drugs
30.Dose
31.Box
32.Diluted solutions of drugs
33.None
34.The time required to manage similar patients in real clinical practice
35.Minutes (15 Minutes)
36.Hours (5 Hours)
37.Determine
38.Back to Patients Catalog
39.Next patient

Figure 2. Final Diagnosis Interference

The detailed introduction of the Sepsis Early Detection System (SEDS) is as follows.

Diagnostic Patient Interface

Patient ID

After logging into the system account, the clinician randomly assigns a patient with the number 10078. (The patient's examination information listed below is for reference, intended to illustrate the operation process and system functions. The actual data is subject to the officially deployed system data.)

Figure 3. Patient ID

Model Diagnosis

Diagnosis result of patient model numbered 10078: The patient was diagnosed with sepsis using an AI model. The model predicts a probability of 1 for sepsis to occur currently, and a probability of 1 for sepsis to occur within the next 3 hours.

Figure 4. Model diagnosis

Basic Information

The basic information of the patient mainly includes: temperature, blood pressure, heart rate, 24-fluids (input/output), QSOFA score, QSOFA examination items (respiratory rate, consciousness, systolic blood pressure), and historical data of the above examinations. In the historical data, the historical examination results of each examination item are sorted in descending order according to the examination time.

Figure 5. Basic Information

Figure 6. Historical Data

Demographic Information and Medical History

The demographic information of the patient mainly includes gender, age, weight, marriage, and race. Additionally, click on 'Past Medical History and Present Medical History' to view the patient's medical history.

Figure 7. Demographic information

Figure 8. Past Medical History and Present Medical History

Current Time

The current time indicates that the above basic information of the patient is valid during this time. The current time for the patient's basic information is from 16:46 on December 11, 2149 to 17:46 on December 11, 2149.

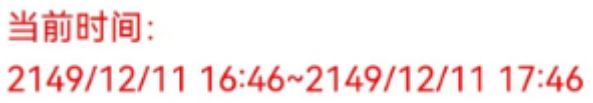

Figure 9. Current Time

Historical Inspection Data

The historical examination data includes examination items before the current time, mainly including routine blood routine, arterial blood gas analysis, anticoagulation, imaging examination, pathogenic examination, culture/smear, and historical medication. The inspection items in the historical inspection data are based on descending time series, displaying the corresponding inspection item data at historical time points.

Figure 10. Historical Inspection Data

Preliminary Diagnosis

The clinician makes a preliminary diagnosis based on demographic information, medical history, basic data of the current time, and historical data before the current time. The preliminary diagnosis mainly confirms whether the patient has sepsis or the suspected degree of sepsis. There are two ways for clinicians to complete preliminary diagnosis:

① Diagnosis in the selection list: The current system's diagnosis list includes severe sepsis, general sepsis, highly suspected sepsis, low-grade suspected sepsis, and no sepsis. If the clinician's current diagnostic needs are met, the diagnosis name in the list can be directly selected.
② Autonomous diagnosis addition: If the diagnosis in the list does not meet the current diagnosis requirements, the clinician can enter the diagnosis name in the blank box below the "Preliminary Diagnosis" button, click the " Determine " button in the figure, and save the input current diagnosis.
Note: After completing the treatment plan, you can click the " Determine " button below the "Initial Treatment Plan within 4 Hours" to save both the diagnosis and treatment plan.

Figure 11. Preliminary Diagnosis - List Selection

Figure 12. Preliminary Diagnosis – Self Add

Preliminary Treatment Plan

Based on the preliminary diagnosis results, a preliminary treatment plan is formulated, which requires filling in the medication, dosage, and drug dilution solution. There are two ways for clinicians to complete the preliminary treatment plan:
① Select List Drug Name: Select the drug name to be used in the drug list, match it by entering a single word in the space box at the top of the list, which helps to efficiently filter the matching drug names in the list. Then select the drug dosage and unit, confirm whether to dilute the solution and dosage, and click the "plus sign" on the right to complete the addition of the drug name to the list.

If the input drug name cannot be matched in the list, use the following method to add the drug name independently.

② Add drug name independently: Enter a custom drug name in the space box at the top of the list without matching it with a drug, then select the drug dosage and unit, confirm whether to dilute the solution and dosage, and finally click the "plus sign" on the right to complete the custom drug name addition.

Figure 13. Drug List

Figure 14. Autonomous Input Therapy Plan

After the initial diagnosis and initial treatment plan within 4 hours, there are two situations in the system operation, which are respectively explained:

① If there is a lack of preliminary diagnosis or initial treatment plan within 4 hours, simply click the "Determine" button, and the system will prompt that the current patient's preliminary diagnosis or treatment is not completed, and the next steps of the patient's examination cannot be displayed.

② After ensuring that the initial diagnosis and initial treatment plan within 4 hours are filled in correctly, click the " Determine " button, and the system will record the initial diagnosis time in the background. At the same time, the system will automatically display the patient's next examination data, and the clinician can continue to diagnose the patient based on the displayed next

examination data.

Special note: Only after completing the preliminary diagnosis and the initial treatment plan within 4 hours and clicking " Determine ", will the system display the patient's next examination data. If the preliminary diagnosis or the initial treatment plan within 4 hours has not been completed, the system will hide the patient's next examination data.

Figure 15. Initial Diagnosis Not Filled In

Figure 16. Initial Treatment Plan Not Filled In

Next Step Inspection

After completing the initial diagnosis and treatment plan within 4 hours, the system will display the patient's next examination data. In the next step of the examination, it mainly includes: procalcitonin, blood routine, arterial blood gas analysis, anticoagulation, imaging examination, pathogen examination, and culture/smear. The clinician further diagnoses the patient's condition by selecting the necessary examination items. It should be noted that the time required for the next examination may affect the timeliness of the patient's treatment.

Figure 17. Next Step Inspection

SOFA

Clinicians can view the SOFA examination items of the patient during the current time, which mainly include six major parts: respiratory system, coagulation system, liver, cardiovascular system, central nervous system, and kidneys. The respiratory system data needs to be displayed after arterial blood gas analysis, and the coagulation system data needs to be displayed after blood routine examination.

Figure 18. SOFA

Final Diagnosis

The clinician makes a final diagnosis of the patient based on basic information and all data from the next examination. There are two ways for the clinician to complete the final diagnosis:
① Diagnosis in the selection list: The current system's diagnosis list includes severe sepsis, general sepsis, highly suspected sepsis, low-grade suspected sepsis, and no sepsis. If the clinician's current diagnostic needs are met, the diagnosis name in the list can be directly selected.
② Self add diagnosis: If the diagnosis in the list does not meet the current diagnostic needs, the clinician can enter the diagnosis name in the blank box below the "Diagnosis" button.
Note: After completing the final 4-hour treatment plan, you can click the " Determine " button to save both the diagnosis and treatment plan.

Figure 19. Final Diagnosis - List Selection

Figure 20. Final Diagnosis - – Self Add

Final Treatment Plan

After determining the final diagnosis, it is necessary to develop a final treatment plan within 4 hours. There are two ways for clinicians to complete the final treatment plan:
① Select List Drug Name: Select the drug name to be used in the drug list, match it by entering a single word in the space box at the top of the list, which helps to efficiently filter the matching drug names in the list. Then select the drug dosage and unit, confirm whether to dilute the solution and dosage, and click the "plus sign" on the right to complete the addition of the drug name to the list. If the input drug name cannot be matched in the list, use the following method to add the drug

name independently.

② Add drug name independently: Enter a custom drug name in the space box at the top of the list without matching it with a drug, then select the drug dosage and unit, confirm whether to dilute the solution and dosage, click the "plus sign" on the right to complete the custom drug name addition.

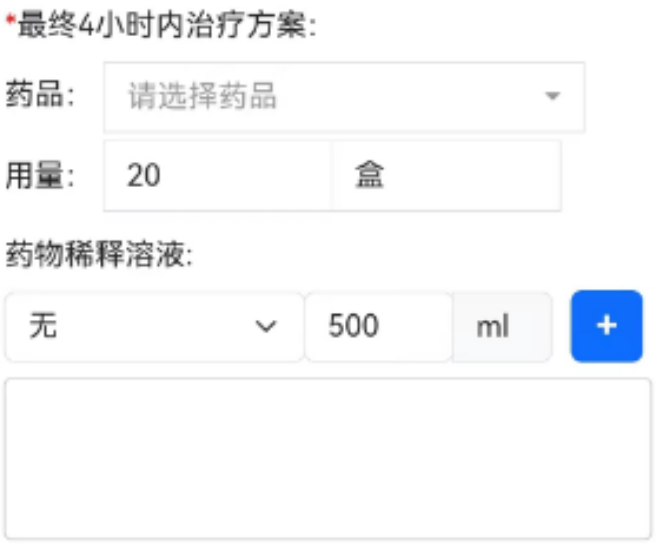

Figure 21. Final Treatment Plan Within 4 hours

Time Assessment and Determination

After completing the final diagnosis and treatment plan, clinicians must choose the time required to treat similar patients in real clinical practice. By pulling the progress bar to select the length of time, after completing all the above steps, click "confirm" to complete the diagnosis of the patient!

Special note: When clicking "confirm", there may be two situations:

① If there is a lack of final diagnosis or treatment plan within 4 hours, simply click the "Determine" button, and the system will prompt that the current patient's final diagnosis or treatment is incomplete, and the patient's final diagnosis and treatment plan data cannot be saved.

② Ensure that the initial diagnosis and final treatment plan are filled in correctly within 4 hours, and complete the time evaluation. Click the " Determine " button, and the system will record the final diagnosis time in the background, successfully saving the patient's final diagnosis, treatment plan, and time evaluation data.

Figure 22. Time Assessment and Determination

Figure 23. Final Diagnosis Not Filled In

Figure 24. Final Treatment Plan Not Filled In

Next Patient

There are two possible outcomes of clicking on the 'Next Patient' operation, which explain:

① Successfully transitioned to the next patient. This situation indicates that there are still undiagnosed patients allocated by the system in the current clinician's account, and the system selects undiagnosed patients for display.

② Cannot jump to the next patient. This situation indicates that all patients allocated by the system in the current clinician's account have been diagnosed.