

Sepsis Prediction

Industry:
Healthcare

Client:
Healthcare
Company

Location: U.S.A

CHALLENGE

Our client wanted to find a precise and quick way to determine which patients are at high risk of developing sepsis. Sepsis is a life-threatening illness caused by the body's response to an infection. The immune system protects the body from many illnesses and infections, but it's also possible for it to go into overdrive in response to an infection. Sepsis develops when the chemicals the immune system releases into the bloodstream to fight an infection cause inflammation throughout the entire body instead. Severe cases of sepsis can lead to septic shock, which is a medical emergency. There are more than 1 million cases of sepsis each year, according to the Centers for Disease Control and Prevention (CDC) and this type of infection kills more than 258,000 Americans a year. Often, nurses use manual surveillance methods to screen the patients admitted to the hospital for sepsis risk, which may not be an efficient use of their time.

SOLUTION

Sepsis is viewed as a three-stage syndrome, starting with sepsis, progressing through severe sepsis to septic shock. Our team created a proof of concept to determine which patients are more prone to sepsis infection. The initial sepsis condition was identified using vital signs such as body temperature, pulse rate, and white blood cell (WBC) count.

The following criteria were applied.

1. Sepsis- exhibit two of the three symptoms:

- Temp > 100.9 or < 96.8
- Pulse Rate > 90
- Respiratory Rate > 20
- WBC > 12,000 or <4,000 or > 10% band



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2. Severe Sepsis- sepsis plus one of the following:

- Systolic Blood Pressure < 90 or Mean Arterial Pressure < 65 or drop in Systolic Blood Pressure by 40 points
- Creatinine > 2.0 or Urine output < 0.5ml/kg/hr. for 2 hours
- Bilirubin > 2 mg/dl (34.2 mmol/L)
- Platelet count < 100,000
- INR > 1.5 or APTT > 60
- Lactate > 2 mmol/L (18.0 mg/dl)
- Acute Respiratory Failure- documented need for ventilation (mechanical or nonmechanical)

3. Septic Shock- severe sepsis plus blood pressure that does not respond to fluid replacement.

TECHNOLOGY STACK

IBM Netezza (Structure Data)
Cerner CCL Utility (Clinical Documentation)
Machine Learning – R, Python

BENEFITS

- Predictions were provided for the potential target % of patients who were prone to sepsis.
- A tool was developed to help clinicians in decision-making.
- The tool helped nurses save time to provide better patient care by reducing the time spent on manual sepsis surveillance.



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