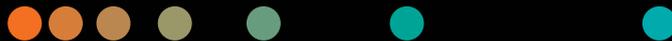
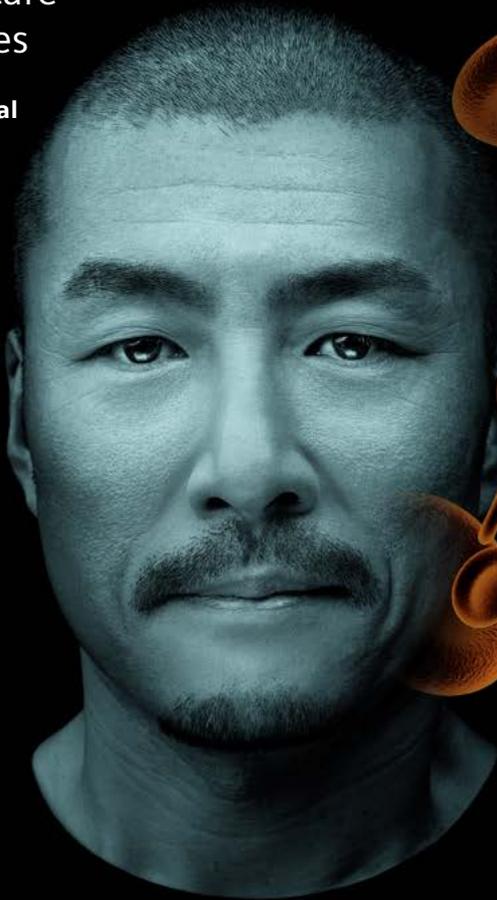


Clinical Utility of the epoc Blood Analysis System in the Pre-hospital Setting

Transforming pre-hospital care to improve patient outcomes

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Clinical Utility of the epoc Blood Analysis System in the Pre-hospital Setting

Pre-hospital personnel, including emergency medical services (EMS) first responders, EMTs, and paramedics, are trained to assess patient signs and symptoms and deliver specific, protocol-based treatments in the field, serving a critical role in improving the outcomes of both acute diseases and acute exacerbations of chronic illnesses.¹

The availability of point-of-care-testing in the pre-hospital setting can supplement the expert clinical assessment provided by these healthcare professionals and potentially improve diagnostic accuracy, leading to rapid initiation of appropriate therapeutic actions.

Point-of care testing (POCT) is demonstrated to be reliable, valid, and helpful to clinical care, where it enables both pre-hospital initiation of care and the relay of information from POCT to a receiving facility.²

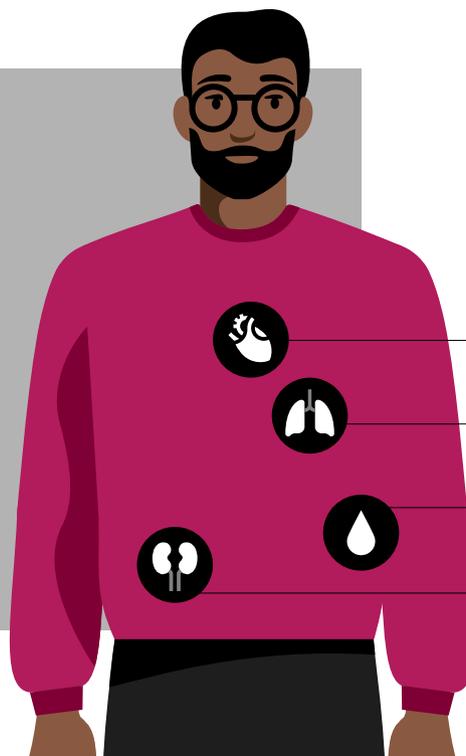


Some potential scenarios for use of POCT in the pre-hospital setting include⁴:

- Identification of hyperkalemia (high potassium) as the cause of EKG changes that could precede a cardiac arrest
- Identification of septic shock by an elevated lactate level in the presence of a known infection
- Measurement of creatinine to identify acute kidney injury (AKI)
- Blood gas testing to distinguish respiratory distress from respiratory failure, determine who should receive CPAP or intubation, and to monitor/adjust ventilator settings

A University of Alabama at Birmingham study demonstrated implementation of POCT in critical care transport led to a change in treatment, or therapeutic yield, of 30% in patients with a wide variety of diagnoses, including trauma, cardiac, pulmonary, and transplant conditions, and premature birth.³

Point-of-care blood analysis systems that provide on-the-scene measurements, including metabolites, electrolytes, and blood gases, have been demonstrated to be valuable tools in improving patient outcomes.³



These tests can provide a snapshot of a patient's health, indicating problems such as⁵:

Heart rhythm changes

Respiratory distress

Insulin shock or diabetic coma

Kidney failure

See Tables 1 and 2.

Table 1: Indications for the use of pre-hospital blood analysis in emergency situations^{6,7,8}

Indication	Test
1 All forms of dyspnea or hypoxia	Blood gases
2 Cardiopulmonary resuscitation	Blood gases and electrolytes
3 Suspected acidosis	Blood gases and electrolytes
4 Cardiogenic shock resistant to therapy	Blood gases and electrolytes
5 Control of mechanical ventilation	Blood gases
6 Cardiac arrhythmias and tachycardia	Electrolytes
7 Tissue hypoxia, sepsis, septic shock, and hypovolemic shock	Lactate
8 Diabetes, altered mental state, seizure, acute coronary syndrome, organ injury, trauma, sepsis, septic shock, and burns	Glucose
9 Internal or external hemorrhage; estimation of blood loss	Hemoglobin and hematocrit
10 Hydration status	Electrolytes
11 Kidney function prior to administration of contrast agents in CT or MRI	Creatinine

Table 2. Key measurements from point-of-care blood analysis, a snapshot of patient health.^{8,9,10}

Metabolites	Electrolytes	Blood Gas
<p>This collection of tests—sometimes referred to as basic chemistries or a basic metabolic panel—provides a snapshot of a patient’s health, including kidney function, blood sugar levels, and levels of key ions involved in fluid balance. These measurements include:⁸</p> <ul style="list-style-type: none"> • Blood Urea Nitrogen (BUN) • Creatinine (Cr) • Glucose • Lactate 	<ul style="list-style-type: none"> • Sodium (Na+) • Potassium (K+) • Chloride (Cl-) • Ionized Calcium (Ca++) • Anion Gap 	<p>Blood gas analysis provides several important measurements, which together provide insight into a patient’s pulmonary gas exchange, blood oxygenation and acid-base balance.⁹ These measurements can be affected in a range of respiratory and non-respiratory diseases.</p> <ul style="list-style-type: none"> • pH – Hydrogen Ion (H+) • Carbon Dioxide Partial Pressure (pCO₂) • Bicarbonate (HCO₃⁻) • Base Excess (BE) • Oxygen Partial Pressure (pO₂) • Oxygen Saturation (sO₂) • Hemoglobin (Hb)

The epoc Blood Analysis System: A Valuable Tool in Pre-hospital Care

The epoc® Blood Analysis System enables fast, accurate, and easy measurement of metabolites, electrolytes, and blood gas from only a few drops of blood (see Table 3).⁹

Room-temperature stability



Arterial, venous, or capillary samples



Results available in < 1 minute



Published reports demonstrate that emergency medical services that have implemented the epoc system have experienced the value of adding point-of-care diagnostic testing to their pre-hospital care.^{11,12}

A North Carolina hospital-associated critical care transport team implemented the epoc Blood Analysis System as a way to begin sepsis treatment in the field.¹¹ Using the epoc system to obtain a lactate level in the field helped them achieve their goal:

“In the first year they reduced mortality from 47% to 24%, eventually dropping to 14%.”

Additionally, they reported:

“We’ve found that nearly half the time someone runs labs in one of our vehicles, they can directly link that to a change in the care provided to that patient.”

A Texas EMS agency reported using the epoc system on approximately 50% of their calls, referring to the lab results it provides as “a game changer” and reporting that the response from receiving facilities was quite positive:¹²

“I’ll tell you, nothing makes the receiving emergency department staff (nurses and physicians) happier than when you walk in the door with labs in hands.”

“They’re even happier when you walk in with initial labs in hand, and explain your treatment plan and follow-up labs showing improvement and/or complete resolution of the issue.”

“It alleviates a lot of the workload, as the nursing staff isn’t scrambling to draw labs, and allows the staff to focus on a proper transfer of patient care.”¹²

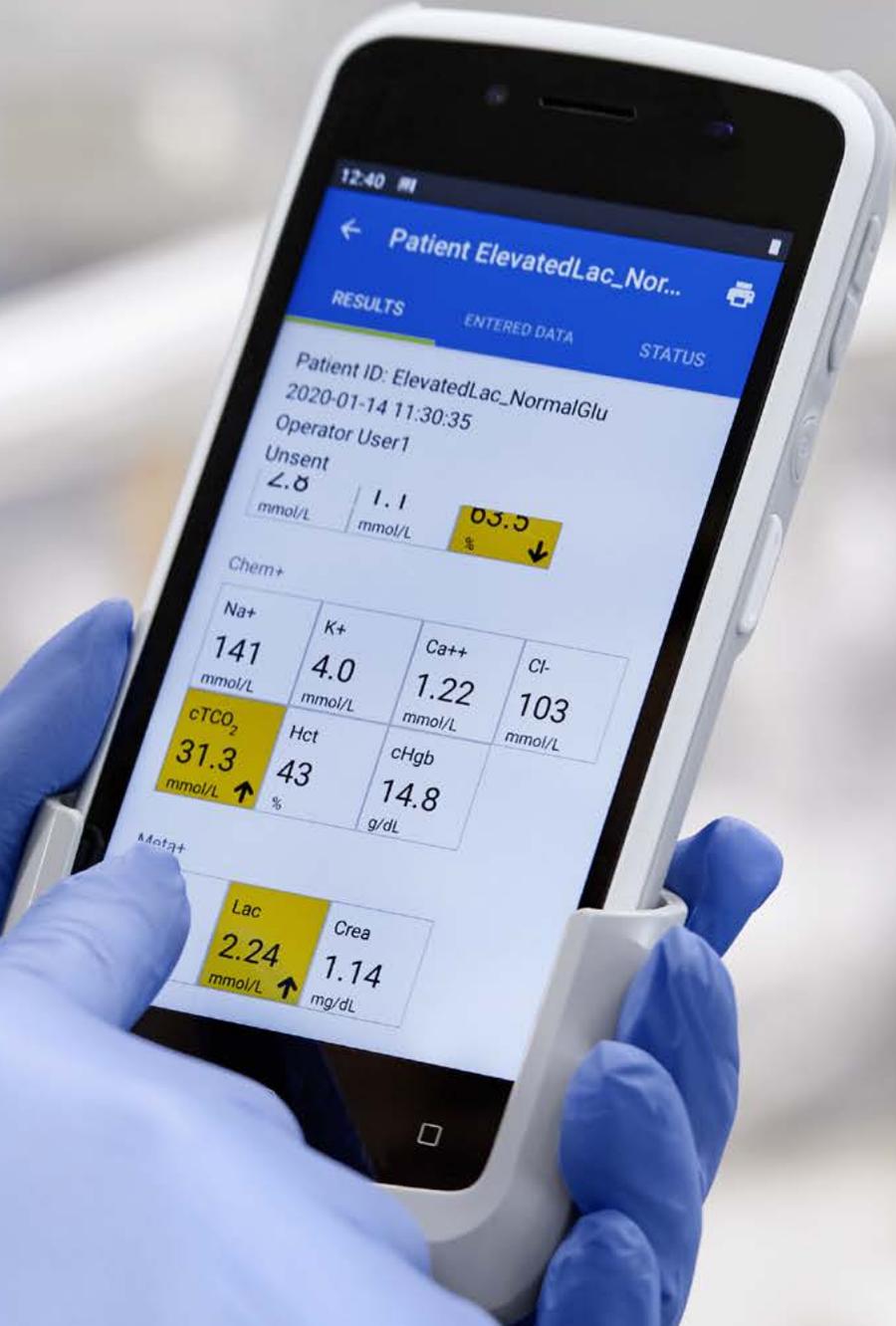
epoc Blood Analysis System

Blood Gas, Electrolytes, and Metabolites (BGEM) Test Card^{9,10}

Table 3. epoc Blood Analysis System: measured and calculated parameters.

Measured Values	
pH, pCO ₂ , pO ₂ (blood gases)	Diagnosis and treatment of life-threatening acid-base disturbances
Total Carbon Dioxide (TCO ₂)	Diagnosis and treatment of disorders associated with changes in body acid-base balance
Sodium (Na ⁺)	Diagnosis and treatment of diseases involving electrolyte imbalance
Potassium (K ⁺)	Diagnosis and treatment of diseases involving electrolyte imbalance
Calcium (Ca ⁺)	Diagnosis and treatment of parathyroid disease, a variety of bone diseases, chronic renal disease, and tetany
Chloride (Cl ⁻)	Diagnosis and treatment of electrolyte and metabolic disorders
Glucose (BGL)	Diagnosis and treatment of carbohydrate metabolism disorders, including diabetes mellitus and idiopathic hypoglycemia, and of pancreatic islet cell tumors
Lactate	Evaluation of acid-base status and diagnosis and treatment
Blood Urea Nitrogen (BUN)	Diagnosis and treatment of certain renal and metabolic diseases
Creatinine (Cr)	Diagnosis and treatment of certain renal diseases and in monitoring of renal dialysis
Hematocrit	Distinguishing normal from abnormal states of blood volume, such as anemia and erythrocytosis
Calculated Values	
<ul style="list-style-type: none"> • Bicarbonate (cHCO₃) • Calculated Total Carbon Dioxide (cTCO₂) • Base Excess (BE) • Oxygen Saturation (cSO₂) • Alveolar Oxygen (A) • Arterial Alveolar Oxygen Tension Gradient (A-a) • Arterial Alveolar Oxygen Tension Ratio (a/A) • Anion Gap (AGap) • Anion Gap K⁺ (AGapK) 	<ul style="list-style-type: none"> • Estimated Glomerular Filtration Rate: <ul style="list-style-type: none"> – GFRmdr – GFRmdr-a – GFRckd – GFRckd-a – GFRswz • BUN/Crea Ratio • Urea/Crea Ratio • Hemoglobin (cHgb)

[↗ Learn more](#)



At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey toward expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare.

An estimated 5 million patients globally benefit every day from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics, and molecular medicine, as well as digital health and enterprise services.

We're a leading medical technology company with over 120 years of experience and 18,500 patents globally. With about 50,000 dedicated colleagues in over 70 countries, we'll continue to innovate and shape the future of healthcare.

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