Point of Care Testing in the Pre-Hospital Setting

Enhancing Patient Care in the Prehospital Environment

Presenter (left): Dr. Justin Northeim, DO, FP-C
Co-Presenter (right): Chris Briggs, MS, LP

Summary and Objectives

- Comprehensively examine EMS workflows, highlighting the use of POCT devices in various emergency scenarios
- Identify and learn how to overcome challenges faced during the implementation and use of the POCT in the pre-hospital setting
- Learn best practices in the pre-hospital setting from seasoned EMS officers

Introduction to Point of Care Testing

Definition

Point of Care (POC) Testing refers to medical diagnostic testing performed at or near the site of patient care.

Importance of POC Testing in EMS

POC testing provides rapid, actionable information, essential for timely decision-making in emergency medical services.

Types of POC Testing in the EMS

- **Blood Glucose Testing**: Monitors blood sugar levels
- **Blood Gas Analysis**: Assesses oxygen, carbon dioxide, bicarbonate and pH levels
- **Lactate Measurement**: Marker of tissue perfusion
- **Infectious Disease Markers**: Tests for diseases like COVID-19 and Flu
- **Cardiac Markers**: Measures troponin levels to identify cardiac injury.

Blood Gas Analysis

Importance:

- Provides critical information on respiratory and metabolic status.

Application:

- Helps manage respiratory and metabolic imbalances by providing essential data for treatment decisions.

Lactate Measurement

Importance:

- Elevated lactate levels can indicate inadequate oxygen delivery to tissues and may signal sepsis or other critical conditions.

Application:

- Helps guide early intervention and treatment decisions, particularly in septic patients and those with shock or severe illness.

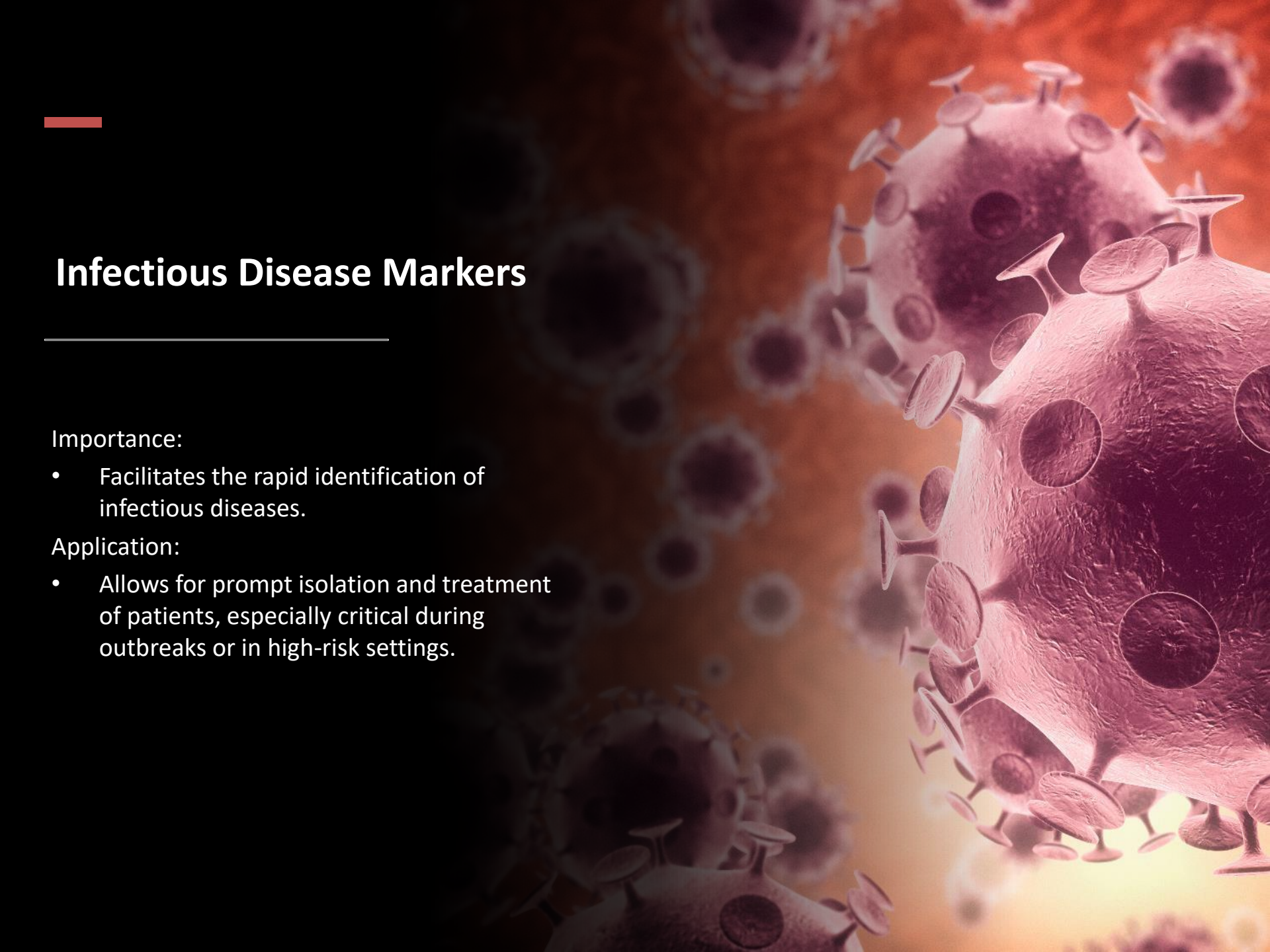
Infectious Disease Markers

Importance:

- Facilitates the rapid identification of infectious diseases.

Application:

- Allows for prompt isolation and treatment of patients, especially critical during outbreaks or in high-risk settings.



Cardiac Markers

Importance:

- Troponin levels are critical for diagnosing and assessing the severity of myocardial injury, including acute myocardial infarction (heart attack). Elevated troponin levels indicate damage to the heart muscle, providing essential information for accurate diagnosis and treatment.

Application:

- Facilitates prompt treatment and swift referral to specialized care, enhancing the effectiveness of intervention.

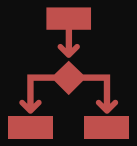
Advantages of POC Testing in EMS

Rapid Results for Early Detection

Provides immediate data to identify conditions sooner and enable timely interventions.

Improved Patient Outcomes

Facilitates early diagnosis and treatment, leading to better prognosis and recovery. [1]

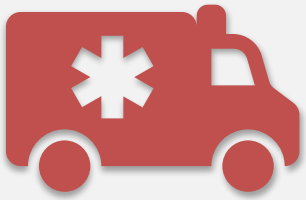


Enhanced Decision-Making

Equips EMS providers with crucial information for informed, on-the-spot decisions.

Mehmood, A., Rowther, A.A., Kobusingye, O. *et al.* Assessment of pre-hospital emergency medical services in low-income settings using a health systems approach. *Int J Emerg Med* **11**, 53 (2018). https://doi.org/10.1186/s12245-018-0207-6

Case Study 1: Early Identification and Treatment of Sepsis



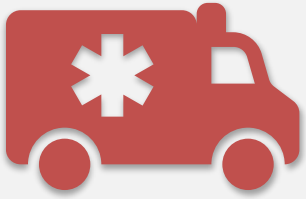
Call Details

In a recent EMS call, a 55-year-old male with a history of diabetes presented with fever, confusion, and rapid breathing. Upon assessment, paramedics identified hypotension (BP: 90/60 mmHg) and tachycardia (HR: 120 bpm). A point-of-care test revealed elevated lactate levels (4.5 mmol/L), suggestive of severe sepsis.

Treatment

Immediate treatment included administering oxygen, establishing IV access, and initiating fluid resuscitation. The patient was given broad-spectrum antibiotics as per protocol and closely monitored during rapid transport to the hospital for further management of sepsis and septic shock.

Case Study 2: Management of Low Hemoglobin and Hematocrit (H&H)



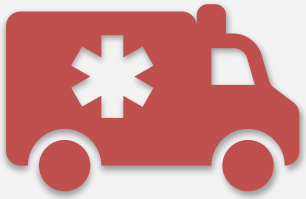
Call Details

In a recent EMS call, a 70-year-old female with a history of chronic anemia presented with severe fatigue, dizziness, and shortness of breath. Upon assessment, paramedics identified pallor and performed a point-of-care test revealing low hemoglobin and hematocrit levels (Hgb: 6.0 g/dL, Hct: 21%).

Treatment

Immediate treatment included administering oxygen and initiating an IV for fluid resuscitation. Due to the severity of the anemia, the patient was prepared for a prehospital blood transfusion. The patient was rapidly transported to the hospital for further management and stabilization.

Case Study 3: Rapid Identification and Treatment of Hyperkalemia



Call Details

In a recent EMS call, a 65-year-old male with a history of chronic kidney disease presented with severe weakness, palpitations, and shortness of breath. Upon assessment, paramedics identified an irregular heart rhythm and performed a point-of-care test revealing elevated potassium levels (6.5 mmol/L).

Treatment

Immediate treatment included administering calcium gluconate, sodium bicarbonate and albuterol to stabilize the patient and lower potassium levels. The patient was rapidly transported to the hospital for further management.

Case Study 4: Differential Diagnosis

Call Details

During an EMS call, a 70-year-old male presented with severe weakness, hypotension (BP: 80/50 mmHg), and a history of gastrointestinal (GI) bleeding. Initial assessment showed the patient was pale and diaphoretic with a weak, rapid pulse.

Point of care testing (POCT) results were as follows:

Lactate: 4.8 mmol/L (suggestive of possible septic shock)
Hemoglobin: 13.5 g/dL (suggests a stable condition)
pH: 7.28
PaO2: 58 mmHg
PaCO2: 32 mmHg
HCO3-: 18 mEq/L (confirming metabolic acidosis)

These POCT results guided the EMS treatment plan

Regulatory Compliance: CLIA

CLIA (Clinical Laboratory Improvement Amendments) Ensures accuracy, reliability, and timeliness of lab testing

Ensures accuracy, reliability, and timeliness of lab testing.

Certification:

Requires qualified personnel (Lab Director, Technical Consultant, Clinical Consultant, Testing Personnel)

Proficiency Testing:

Mandatory participation, 3 times/year for each specialty

Quality Control:

Comprehensive programs, regular calibration, and maintenance

Inspections:

Routine, typically every 2 years

Key Regulations:

42 CFR Part 493 outlines standards for moderate complexity testing

https://www.cms.gov/medicare/health-safety-standards/certification-compliance/clinical-laboratories

https://www.cdc.gov/cliac/docs/addenda/cliac0910/Addendum-S_CMS-PT-Brochure.pdf

https://www.lighthouselabservices.com/how-often-should-you-have-your-labinspected/#:~:text=Laboratories%20must%20have%20their%20operations,Office%20Laboratory%20Accreditation%20(COLA).

Regulatory Compliance: COLA

COLA (Commission on Office Laboratory Accreditation)

Nonprofit organization enhancing lab quality via CLIA compliance and best practices.

Accreditation:

Application, on-site survey, and continuous quality improvement

Quality Systems:

Emphasis on patient safety, lab efficiency, and quality management plans

Education:

Ongoing training and access to resources

Benefits:

Enhanced quality, support, and recognized excellence

Source: https://www.cola.org/accreditation/

Implementation of POC Testing in EMS

Equipment and Supplies

Portable, user-friendly devices

Training Requirements

Proper training ensures accurate use and interpretation of results

Quality Control and Quality Assurance

Comprehensive quality control programs to monitor testing processes

Documentation and Record Keeping

Maintain detailed records of all testing procedures, quality control activities, proficiency testing results, and personnel qualifications

Proficiency Testing

Quality Assurance

Regular proficiency testing helps ensure that POCT devices and procedures provide accurate and reliable results

Regulatory Compliance

Meeting proficiency testing requirements is essential for compliance with regulatory bodies such as CLIA and COLA

Continuous Improvement

Identifies areas for improvement in testing procedures and training, promoting continuous quality enhancement

Blood Transfusions/Moderate Complexity Lab

If your agency performs emergent blood transfusions, your regulatory agency will review your data and policies to ensure compliance.

It is crucial to have well-established policies, thorough record-keeping, and comprehensive training in place. Expect your blood program to be audited by both your blood supplier and CLIA/COLA to ensure everything is up to standard.

Challenges and Considerations

Deployment

Temperature Management

Regulatory Issues

Cost Considerations

Data Management

Ensuring Accuracy

Future Trends and Developments and Considerations

Technological Advancements

New and improved POC devices

New Tests and Biomarkers

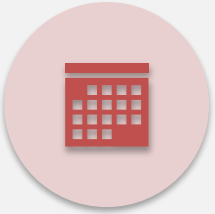
Emerging tests for various conditions

Impact on EMS

Enhanced capabilities and improved patient care

Tips

Establish buy-in from stakeholders early



Plan for 8-12 months to from start to go-live

Buying the device is the easy part. Have a plan!

Understand all the extra expenses that go with being a lab

A good Technical Consultant is a must!!

Q&A

- Open Floor for Questions and Discussion: