Identify the need of antibiotics in Acute Heart Failure patients

B·R·A·H·M·S PCT:
Early infection diagnosis in AHF patients

Procalcitonin (PCT) in CARDIOLOGY
Overlapping clinical picture and radiological findings

Patients with Acute Heart Failure (AHF) or Lower Respiratory Tract Infection (LRTI) usually present to the Emergency Department (ED) with the common complaint of dyspnea.

Even in patients with a history of Congestive Heart Failure (CHF) presenting with acute respiratory symptoms such as cough, sputum production, shortness of breath, tachypnea, or pleuritic pain, differentiating AHF from LRTI is challenging due to the overlapping clinical picture and radiological findings.¹

Diagnostic uncertainty

Heart Failure? Pulmonary infection? Both?

Facts on Heart Failure and Infection

- **Infections** cause 18% of hospitalizations for acute heart failure²
- **Pneumonia** independently associated with higher in-hospital mortality for hospitalized heart failure patients (Odds Ratio 1.60)³
- AHF precipitated by ACS or infection is independently associated with higher 90-day risk of death (Hazard Ratio 1.51)¹¹
Reliable diagnosis with B·R·A·H·M·S PCT

For superior infection management

PCT – the best in early diagnosis of bacterial LRTI and sepsis

Procalcitonin (PCT) is a reliable blood parameter that supports earlier and better diagnosis and clinical decision-making for systemic bacterial infections and therapy control:5

• High sensitivity and specificity for bacterial infection (Figure 1)
• Fast increase after bacterial infection
• Assessment of severity of disease and prognosis

Including PCT in clinical diagnosis increases diagnostic certainty of pneumonia in AHF patients

PCT rises only in cases of pneumonia, thus distinguishing these patients from AHF or identifying concomitant infection in AHF. In cases of diagnostic uncertainty, a PCT value of 0.1 μg/L has a negative predictive value of 96% to rule out pneumonia.7

Rapid and accurate differential diagnosis is of utmost importance. Delayed targeted therapy9 or inadequate therapy8 increases the risk of adverse patient outcomes.
Infection is associated with poor outcome

Elevated levels of B·R·A·H·M·S PCT indicate probable infection in HF patients

In AHF patients, significantly elevated PCT levels indicate probable undiagnosed/untreated bacterial infection.

An analysis of 1781 patients, admitted for AHF, showed 6% of patients had elevated PCT levels >0.2 µg/L. These patients had poorer in-hospital and post-discharge outcomes despite similar severity of heart failure.10

Infection is a major risk factor for mortality in Acute Heart Failure

AHF precipitated by ACS or infection is independently associated with higher 90-day risk of death

![Figure 3](image)

**Figure 3** Association between significantly elevated PCT levels and post-discharge outcomes; 180-day all-cause mortality (n=1781)10

![Figure 4](image)

**Figure 4** Risk of 90-day mortality expressed as hazard ratio (HR) and 95% confidence interval (CI) in the presence of precipitating factors of acute heart failure compared with absence of identified precipitating factors. Adjustment was performed for age, gender, history of heart failure, coronary artery disease, diabetes, systolic blood pressure at admission, heart rate at admission, left ventricular ejection fraction, estimated glomerular filtration rate at admission, and plasma sodium at admission.11
Increase survival probability

B·R·A·H·M·S PCT can quickly identify HF patients who might benefit from antibiotics

Results of the BACH trial

Prospective, observational, international trial; 1641 patients with dyspnea presenting to ED; patient outcomes assessed at 90 days

- **PCT** was the most accurate individual clinical variable in the diagnosis of pneumonia (AUC 72.3%)

- Combining physician estimates of the probability of pneumonia with **PCT** values increased the accuracy of pneumonia diagnosis to >86%

- **AHF** patients with elevated PCT level (>0.21 µg/L) had a worse outcome if not treated with antibiotics (Figure 5A)

- **AHF** patients with low PCT level (<0.05 µg/L) had a better outcome if they did not receive antibiotic therapy (Figure 5C)

![Figure 5](image-url) Survival and antibiotic treatment of heart failure patients with different PCT levels (A. n=113, B. n=335, C. n=112)
PCT-guided antibiotic therapy

Application of B·R·A·H·M·S PCT-guided algorithm could improve outcome

Secondary analysis of 233 patients with a history of CHF, formerly included in a multicenter randomized-controlled trial, to compare antibiotic guidance with and without PCT algorithm.

In 110 patients with low initial PCT value (<0.25 µg/L)

- 30 day adverse outcome was significantly decreased (-16%) in PCT-guided group
- significant reduction of antibiotic exposure in PCT-guided group (-2.8 days)

Figure 6  Time to the first adverse outcome by randomization group in patients with low initial PCT levels (<0.25 µg/L); adverse outcome included all-cause mortality or ICU admission.

B·R·A·H·M·S PCT level >0.25 µg/L is indicative of infection and antibiotic treatment is recommended in patients with dyspnea

Rely on quality PCT results.
Safe clinical decision making with all Thermo Scientific™ B·R·A·H·M·S PCT™ assays
ESC Heart Failure Management Guidelines 2016 recommend PCT

Initial management of a patient with acute heart failure

Patient with suspected AHF

1. Cardiogenic shock?
   - Yes
     - Circulatory support:
       - pharmacological
       - mechanical

   - No
      - No

2. Respiratory failure?
   - No
      - Immediate stabilization and transfer to ICU/CCU
      - Immediate initiation of specific treatment
      - Diagnostic work-up to confirm AHF
        - Clinical evaluation to select optimal management

   - Yes
     - Ventilatory support:
       - oxygen
       - non-invasive positive pressure ventilation (CPAP, BiPAP)
       - mechanical ventilation

Identification of acute aetiology (CHAMP):
- Acute Coronary syndrome
- Hypertension emergency
- Arrhythmia
- Acute Mechanical cause
- Pulmonary embolism

Immediate phase (initial 60-120 minutes)

Urgent phase after first medical contact

Assessment of procalcitonin levels may be considered in patients with AHF with suspected coexisting infection, particularly for the differential diagnosis of pneumonia and to guide antibiotic therapy, if considered.13
Automated sensitive assay  
Point of care test  
* Available in Japan only

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