



Septic Shock

Do you see the whole picture?

PiCCO is the gold standard in advanced hemodynamic monitoring

When each of your decisions has critical consequences...

... you need the complete hemodynamic picture with the PiCCO.

? Clinical Questions and Challenges

! Complications

Septic shock?

Hypotension

The speed and appropriateness of therapy administered in septic shock influences outcome.¹

Hemodynamic status?

Hypovolemia

Lung water?

Impaired cardiac function

Therapeutic options?

Impaired perfusion

Therapeutic conflicts?

Capillary leak

Time pressure!

Multi-organ failure

The guidelines of the 2016 Surviving Sepsis Campaign say:

- Further hemodynamic assessment is recommended (such as assessing cardiac function) to determine the type of shock if the clinical examination does not lead to a clear diagnosis.
- It is suggested that dynamic over static variables be used to predict fluid responsiveness, where available.¹³

The PiCCO Technology provides a dynamic, minimally invasive measurement of cardiac output and its determinants (preload, afterload, contractility) as well as the quantification of pulmonary edema for a targeted treatment. It is a clinically proven tool for hemodynamic assessment and management during septic shock.

Common pitfalls in the management of Septic Shock

Physical examination alone often fails to reflect the hemodynamic status^{5,12}

CVP & PAOP do not reflect fluid status^{2,4}

Fluid overload 50% of ICU patients do not respond to fluid administration^{2,3}

PiCCO features

Continuous Cardiac Index*

CI



Global Enddiastolic Volume Index

GEDI



Fluid Responsiveness

SVV & PPV



Extra-Vascular Lung Water Index

ELWI



Benefits of managing Septic Shock with PiCCO

PiCCO facilitates:

- Adequate fluid resuscitation without fluid overload¹⁰
- Optimal administration of catecholamines & vasoactive agents

CI enables diagnostic interventions including volume challenge and passive leg raising test*

GEDI provides accurate preload measurement^{8,9}

SVV and PPV dynamic parameter to predict the response to fluid administration **7

ELWI quantifies the degree of pulmonary edema better than chest X-ray⁶

CI is the major determinant of DO₂ and reflects the response to therapeutic interventions

PVPI differentiates between cardiogenic and permeability pulmonary edema^{10,11}

ELWI helps to define the need for de-escalation therapy¹⁰

Optional continuous ScvO₂ monitoring

CeVOX Technology



* The high accuracy of the cardiac output value given by the PiCCO Technology is based on calibration via transpulmonary thermodilution
 ** SVV and PPV are only applicable in fully ventilated patients without cardiac arrhythmias

»The complexity and heterogeneity of patients with septic shock implies that individualized approaches for hemodynamic management are mandatory.«

Saugel B., Huber W., Nierhaus A., Kluge S., Reuter D., Wagner J., BioMed Research International 2016



PiCCO provides a number of important parameters including continuous CO at the bedside which can have a significant impact on clinical decisions .

A recent study by Perel et al. demonstrated the limited ability of clinicians to accurately estimate important physiological parameters from clinical assessment and routine hemodynamic monitoring. In 75% of clinical cases in this study, the physicians underestimated the patient's CO and 54% underestimated it by more than 20%.

A significant number of physicians changed their therapeutic decision after reviewing CO information, preload status and volume of lung water provided by PiCCO from the one they originally made based on existing clinical information.¹²

The information provided by PiCCO led to the following changes in therapy:

Therapeutic option	Percentage of changes in therapeutic decisions
Fluids	33 %
Inotropes	22 %
Vasoconstrictors	22 %
Diuretics	13 %

Literature references

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