



# Cost minimization in the Intensive Care Unit: the added value of procalcitonin

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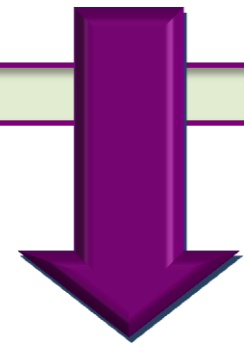
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## Introduction



- Diagnosing patients with **sepsis** remains challenging due to often **nonspecific presentation**.
- Use of **antibiotics** to fight sepsis has led to great reductions in mortality and morbidity rates.
  - Raises the problem of antibiotic **overuse**.



## Implementation of procalcitonin (PCT):



- Laboratory marker to guide initiation and duration of antibiotic therapy in septic ICU patients.
- Potentially reduces duration of hospital stay.
- PCT-guided antibiotic treatment is safe and may improve clinical outcome.
  - High cost of PCT measurement compared to other laboratory assays remains an important barrier.

## Hypothesis:

PCT is not cost-effective in ICU patients with sepsis, compared to current practice.

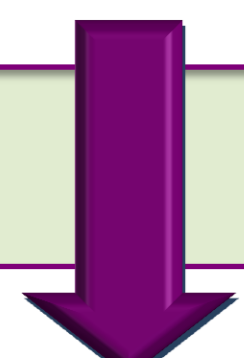


## Methods



### A health economic model was developed, investigating the costs and effects of PCT implementation in ICU patients with sepsis:

- Costs were obtained from published sources, including cost manual by Hakkaart-van Roijen (2010) and Dutch Healthcare Authority (NZA).
- Effectiveness data were obtained from a systematic literature review plus expert opinions and include:
  - Length of hospital stay
  - Duration of dialysis and mechanical ventilation
  - Duration of antibiotics prescription
  - Number of blood cultures, PCT measurements and other laboratory analyses performed.



## Results



Implementation of **PCT can reduce hospital spending by circa € 3,800 per patient**, i.e. savings of 11% (table 1). Input data from a specific Dutch general hospital showed savings of circa € 4,200 per patient (12%, data not shown).



Cost parameter	Without PCT	With PCT	Difference
Stay on regular ward	€ 3,640	€ 3,073	€ -568
Stay on ICU	€ 24,099	€ 22,046	€ -2,053
Antibiotics	€ 1,267	€ 983	€ -284
Mechanical ventilation	€ 2,975	€ 2,559	€ -415
Dialysis	€ 232	€ 232	€ 0
Blood cultures	€ 1,379	€ 863	€ -517
PCT measurements	€ -	€ 75	€ 75
Other laboratory analyses	€ 521	€ 467	€ -55
<b>Total</b>	<b>€ 34,113</b>	<b>€ 30,297</b>	<b>€ -3,816</b>

*Table 1: Effect of implementation of PCT on the cost parameters included in the model.*



### Savings are mainly due to:

- 11% shorter hospital length of stay
- 22% reduced duration of antibiotic treatment
- 37% decrease in blood cultures performed.

Sensitivity analyses confirmed the model outcome to be robust against changes in model inputs.



## Conclusion



Additional **costs brought by PCT measurements are offset by downstream cost savings** in hospitalization days, antibiotic use and costs of blood cultures, without compromising patient outcomes.

This finding is highly important given the increase in antibiotic resistance.