



## **Working Group on Perioperative Goal-Directed Hemodynamic and Volume Therapy**

Dear ESICM members,

We would like to invite you to join our *Working Group on Perioperative Goal-Directed Hemodynamic and Volume Therapy* within the section of *Post Operative Intensive Care (POIC)*.

### **Rationale:**

This Working Group was founded to booster the multidisciplinary international collaboration of dedicated experts in the field of goal-directed hemodynamic therapy and goal-directed volume therapy.

### **Background:**

Hemodynamic monitoring and goal directed therapeutic approaches in perioperative patients can reduce length of intensive care unit treatment, length of hospital stay and improve outcome. As early as 1988 Shoemaker et al. [4], published a positive effect on outcome in non cardiac high risk patients undergoing surgery (EGDT, early goal-directed therapy). An EGDT aiming at PAC derived hemodynamic goals led to a significant reduction of mortality in their protocol group. Another study [5] with 62 non cardiac patients undergoing an EGDT aiming at a oxygen delivery of  $600\text{ml}/\text{min}/\text{m}^2$  led to decreased complications in the protocol group and reduced length of hospital stay. However recent evidence showed no benefit for patients being monitored by the use of a PA catheter. It is clear that this conflicting literature led to great uncertainty in the use of advance hemodynamic monitoring tools. Goal-directed therapy aiming on optimization of stroke volume could improve outcome and reduce length of hospital stay in non-cardiac surgery of various kinds e.g. traumatology, abdominal and

cardiac surgery. Nevertheless the indications for stroke volume optimization has still to be defined more clearly to understand which patients show substantial benefit by this approach.

A regular hydration status and optimized vascular filling are targets of perioperative fluid and volume management and, in parallel, represent precautions for sufficient stroke volume and cardiac output to maintain tissue oxygenation. In the perioperative setting surgical stress induces physiological and hormonal adaptations of the body, which in conjunction with an increased permeability of the vascular endothelial layer influences fluid and volume management. The target of hemodynamic monitoring during surgery and in the ICU is to collect data on haemodynamics and global oxygen transport, which enables the anaesthetist to estimate the filling of the vascular system. In particular in high risk patients, this may improve fluid and volume therapy with regard to maintaining cardiac output. Clinical estimation of the volume status might be possible, but does not allow individual optimization of the vascular filling and the myocardial performance. However, goal directed volume therapy is only possible if modern monitoring tools can offer quantifiable treatment goals. In the past decade most clinicians relied on pressure derived parameters as CVP or PCWP as parameters of the volume load. However, this approach is prone to many systematic and methodical errors. Pressure parameters are influence by cardiac compliance, intraabdominal pressure, airway pressure, pulmonary vascular resistance, cardiac pathologies such as tricuspidal regurgitation and congestive heart failure.

A goal-directed volume management aiming at preventing hypovolaemia may improve the outcome after surgery. Therefore, in critical patients correct estimation of the volume status using static volume parameters and dynamic volume parameters should be the first step prior to volume optimization.

The PAC has been considered as the gold standard of hemodynamic monitoring. No other hemodynamic monitoring tool offers this variety of hemodynamic , however, also no other monitoring tool has been under such heavy debate. As to date only few studies have evaluated in a controlled manner the use of the PAC in non cardiac patients. The most important study was performed by Sandham et al, showing no benefit by guiding a therapy by the use of PAC derived data in ASA III and IV patients. The authors reported identical hospital and 6-month mortality rates, also in their subgroup analysis [63]. Similar results were published previously in a study with patients undergoing orthopaedic surgery [64]. Only one study by Polonen showed in a cardiac patient population a small benefit by guiding the therapy by the use of a PAC. Thus, current evidence does not support the use of a PAC in a general ICU or cardiac surgical patient population. However, as suggested by a recent

Cochrane review, future trials should focus on protocol driven interventions using PAC derived data and identify patients that could benefit from the use of a PAC [65].

As a consequence alternative hemodynamic monitoring tools and parameters were introduced. The oesophageal Doppler could intraoperatively show improvement of clinical outcome and reduced length of stay by optimization of stroke volume. However, in contrast to the great number of validation studies of other hemodynamic tools only few studies could show clinical impact on outcome by the use of these new parameters. Therefore, multidisciplinary efforts are needed to establish guidelines and algorithms that are suitable to improve outcome by goal-directed hemodynamic interventions.

**Focus:**

The working group will focus on the integration of goal-directed therapy to guide volume and fluid therapy and catecholamine therapy into an overall hemodynamic algorithm to established standardized hemodynamic perioperative targets. The indications for hemodynamic monitoring and the use of derived parameters as beneficial targets should be worked out for cardiac and non-cardiac surgery with the focus on the definition of high-risk patients.

**Goal:**

The primary goal of this working group is to establish a European consensus process with the aim to generate international guidelines for the hemodynamic and volume therapy in perioperative patients. This guideline process can be achieved by providing a basis for international experts in the field within this working group helping us to start an integrated effort in designing multicentre trials, collaborative research projects, and international exchange of researchers in the field. Further goals are to connect the activities of this group with national societies (like the DGAI-German society of anaesthesiology and intensive care medicine) and international societies (e.g. EACTA, SCCM, SCA).

**Organisation:**

The *Working Group on Perioperative Goal-Directed Hemodynamic and Volume Therapy* is an official part of the POIC section within the ESICM. The task of this group is to coordinate the specific projects of the POIC section within its scope and address specific issues of Perioperative Goal-Directed Hemodynamic and Volume Therapy. This group will have four meeting per year, whenever possible combine with the ESICM meeting, the ISICEM meeting, and other international meetings dealing with perioperative intensive care.

## Chairs:

- Sander, Michael; ([michael.sander@charite.de](mailto:michael.sander@charite.de))
- Pearse, Rupert; ([r.pearse@gmul.ac.uk](mailto:r.pearse@gmul.ac.uk))

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## Working Group – Agenda and Activities Vienna 2009

### WG - GDT

#### – Joint with other societies / sections

- **Interaction with ESA hemodynamic group for multi center study**
  - Investigation whether goal-directed intraoperative fluid therapy by difference in pulse pressure (dPP) effects outcome in patients undergoing major abdominal surgery
  - Primary Investigators:
    - Klaus Markstaller, M.D., Ph.D.; Gunther J. Pestel, M.D.
- **Interaction with ESICM PACT/Simulation Team**
  - Joint session for the ESICM 2010 with full scale hemodynamic monitoring simulation session

## WG - GDT

### Members

#### – Chairs:

- Sander, Michael; Contact for Working Group ([michael.sander@charite.de](mailto:michael.sander@charite.de))
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## WG - GDT

### – Research activities and applications

- Multinational study „Outcome after high risk surgery“
- Idea – Similar to „Nutrition day“ – „Surviving High Risk Surgery Day“

## WG - GDT

**WG GDT  
2009**

**14.00-16.00**

**BM2 12 October**

### – AGENDA

- 14:00-14.15 **Opening remarks**
- 14:20-14.40 **Interaction with ESA hemodynamic group for multi center study**
  - Investigation whether goal-directed intraoperative fluid therapy by difference in pulse pressure (dPP) effects outcome in patients undergoing major abdominal surgery
- 14.40-14.50 **Members in POIC GDT**
- 14.50-15.20 **Multinational study „Outcome after high risk surgery“**
- 15.20-15.30 **Discussion**
- 15.30-16.30 **Interaction with ESICM PACT/Simulation Team**
  - Concept of a joint session for the ESICM 2010 with full scale hemodynamic monitoring simulation session
  - Hands-on Simulation in Vienna with case presentation

## WG - GDT

- Joint with other societies / sections
- Members
- Research activities
- Research applications