Evidence-based, perioperative Goal-Directed Therapy (GDT) protocols.

Several single centre randomized controlled trials, meta-analysis and quality improvement programs have shown that perioperative GDT decreases postoperative complications and hospital length of stay when compared to standard fluid management.1-5

This summary describes the three main perioperative GDT strategies which have been successfully used to decrease postoperative morbidity and length of stay:

- Stroke Volume (SV) optimization with fluid
- Oxygen Delivery Index (iDO₂) optimization with fluid and inotropes
- Pulse Pressure Variation (PPV) or Stroke Volume Variation (SVV) optimization with fluid

This summary does not recommend the use of any specific medical device, and the choice of the treatment protocol is left at the discretion of the anesthesiologist in charge.
Overview

Using the SV protocol consists in giving successive small (200-250 ml) fluid boluses until the SV reaches a plateau value (the plateau of the Frank-Starling relationship).

Many single centre randomized controlled trials\textsuperscript{6-12} and a multicentre quality improvement program,\textsuperscript{13} showing a decrease in post-operative complications or hospital length of stay in the perioperative GDT group, were based on this protocol.

This protocol is now officially recommended by the National Institute for Clinical Excellence in the UK and by the French Society of Anesthesiology & Intensive Care (SFAR).

From Kuper et al.\textsuperscript{13}

Overview

Using an iDO2 optimization protocol consists first in optimizing SV with fluid, as described in the SV protocol.

Once SV has been optimized with fluid, iDO2 is calculated. If iDO2 is ≤600 ml/min/m² an inotrope (dobutamine or dopexamine) is introduced to achieve the iDO2 goal of 600 ml/min/m².

Inotropes should not be used or must be discontinued (if already introduced) in case of tachycardia, cardiac arrhythmia or ischemia.

Several single centre randomized controlled trials, showing a decrease in post-operative complications or hospital length of stay in the perioperative GDT group, were based on this protocol.14-19

Abbreviations: DO2I: Oxygen Delivery Index; Hb: Hemoglobin; HES: Hydroxyethyl Starch; HR: Heart Rate; MAP: Mean Arterial Pressure; SaO2: Oxygen Saturation; SV: Stroke Volume.

From Cecconi et al.19

See oxygen delivery

\[ \text{DO}_2I \geq 600 \text{ ml/min/m}^2 \]

Check every 10 minutes
If \( \text{DO}_2I \) falls below 600 ml/min/m², restart algorithm

Dobutamine: Increase by 3 mcg/kg/min
Decrease or STOP if
HR >100 bpm or signs of cardiac ischemia

Keep:
- \( \text{SaO}_2 >95\% \)
- Hb >8 mg/dl
- HR <100 bpm
- MAP between 60 and 100 mm Hg

Achieve SV max and then target \( \text{DO}_2I \) to 600 ml/min/m²

250 ml HES bolus

Increase of SV >10% or blood loss >250 ml during fluid challenge

SV stable >20 min

YES

NO

NO

NO

NO

YES

YES

From Cecconi et al.19

Abbreviations: \( \text{DO}_2I \): Oxygen Delivery Index; Hb: Hemoglobin; HES: Hydroxyethyl Starch; HR: Heart Rate; MAP: Mean Arterial Pressure; \( \text{SaO}_2 \): Oxygen Saturation; SV: Stroke Volume.
Using a PPV/SVV optimization protocol consists in giving fluid to maintain these dynamic parameters below a predetermined cutoff value.

Several single centre randomized controlled trials, showing a decrease in post-operative complications or hospital length of stay in the perioperative GDT group, were based on this protocol.\textsuperscript{20-24}

\textbf{Overview}

From Ramsingh et al.\textsuperscript{24}

\textbf{Abbreviations:} ABGs: Arterial Blood Gases; CO: Cardiac Output; P-POSSUM: Portsmouth Physiologic and Operative Severity Score for the Enumeration of Mortality and Morbidity Score; PRBCs: Packed Red Blood Cells; SVV: Stroke Volume Variation.
**REFERENCES**

### Meta-analysis

### SV protocol studies

### iDO2 protocol studies
15. Boyd et al. JAMA 1993

### PPV/SVV protocol studies
22. Ping et al. Hepatogastroenterology 2012