

Edwards Critical Care Education

Perioperative Goal-Directed Therapy Protocol Summary

Issue Date: March 2013



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Evidence-based, Perioperative Goal-Directed Therapy (PGDT) protocols

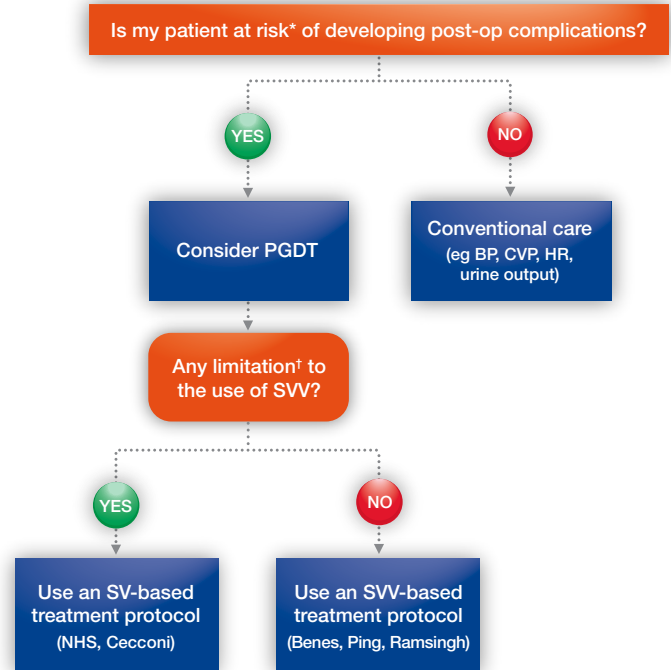
Note: This protocol summary is designed to help inform clinicians of key published protocols used to guide hemodynamic monitoring in high-risk surgery. **It is not intended to recommend a specific protocol, but to guide hemodynamic optimization through Perioperative Goal-Directed Therapy protocols that have been shown to reduce the number of peri- and postoperative complications, and improve patient outcomes.**¹⁻³ These protocols represent individual strategies to help physicians either titrate or tailor fluid therapy in an individual patient or clinical situation. Since every case is different, physicians must weigh the risks and benefits of initiating any specific protocol.

Please refer to Edwards Critical Care Education at Edwards.com/ccEducation for updates and additional information.

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Considering a protocol

The following algorithm is provided to help you select the most appropriate Perioperative Goal-Directed Therapy (PGDT) protocol for your patient. Your selection deserves careful consideration.



*At risk because of comorbidities or the surgical procedure itself.

†Limitations to the use of SVV: Spontaneous breathing, tidal volume <7 ml/kg, open chest, atrial fibrillation, right ventricular failure, and laproscopic surgery.

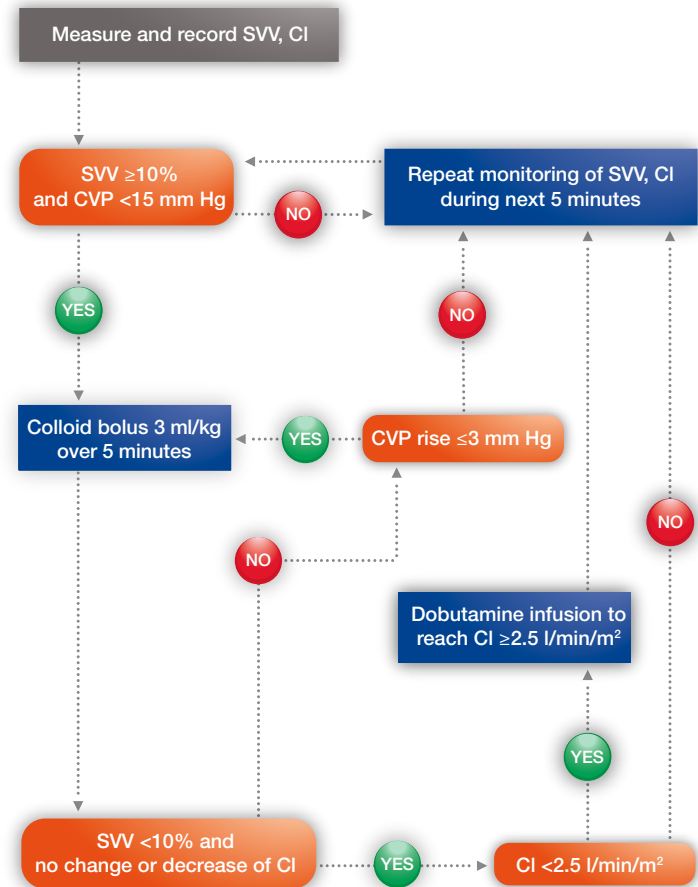
Abbreviations: **BP:** Blood Pressure; **CVP:** Central Venous Pressure; **HR:** Heart Rate; **SV:** Stroke Volume; **SVV:** Stroke Volume Variation.

Benes Protocol¹

OVERVIEW

- Study Design** Randomized controlled trial
- Patient Population** Undergoing elective abdominal surgery >2 h with expected blood loss >1000 ml
- Inclusion Criteria** One or more of the following: Ischemic heart disease or severe heart dysfunction, moderate to severe chronic obstructive pulmonary disease, aged 70+, ASA III or more
- Target Parameters** Central Venous Pressure, Stroke Volume Variation, Cardiac Index
- Intervention** Fluid (Colloid), Dobutamine
- Primary Outcomes** Decrease in 30-day postoperative complications (56%), decrease in hospital length of stay (10%)

Abbreviations: **CI:** Cardiac Index; **CVP:** Central Venous Pressure; **SVV:** Stroke Volume Variation.



Cecconi Protocol²

OVERVIEW

Study Design Randomized controlled trial

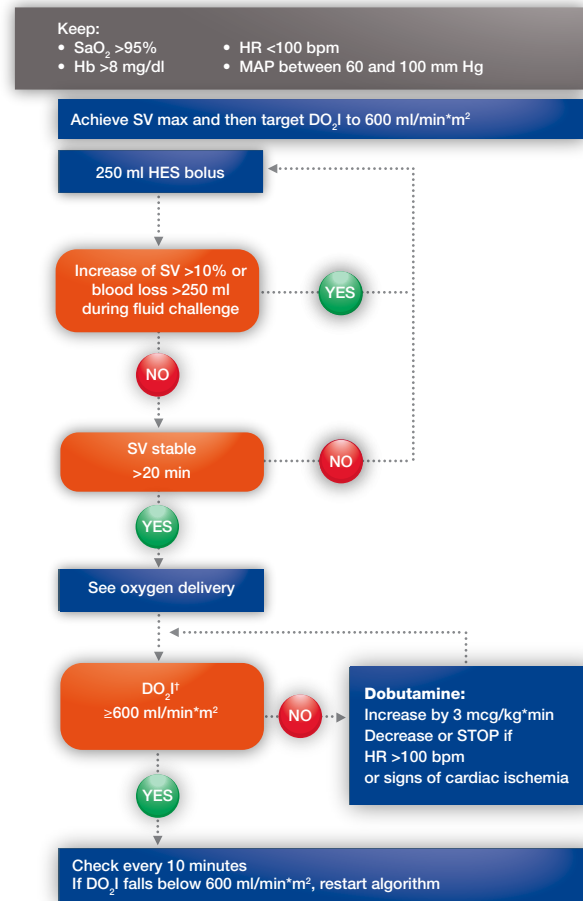
Patient Population Undergoing elective total hip replacement under regional anesthesia

Inclusion Criteria ASA II

Target Parameters Stroke Volume, Oxygen Delivery

Intervention Fluid (Colloid), Dobutamine

Primary Outcomes Decrease in postoperative complications (20%)



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

[†]Resuscitation to achieve a DO₂I value of 600 is presented as a goal and not intended to be a hard target. This protocol is intended as guidance, and healthcare professionals should use sound clinical judgment and individualize therapy to each specific patient care situation.

Modified from Cecconi, et al. *Crit Care*. 2011;15:R132.
Based upon Shoemaker³ protocol.

OVERVIEW

Study Quality improvement program

Design (before-after comparison)

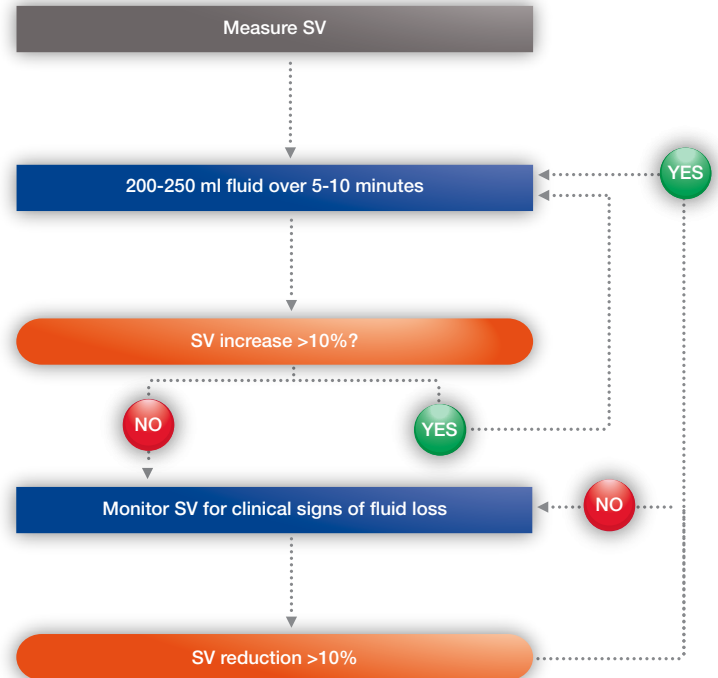
Patient Population Undergoing emergency and elective abdominal, orthopedic, gynecologic, urologic, and vascular surgery

Inclusion Criteria Three cohorts of patients aged ≤ 60 , 61-71, and ≥ 71 years with ASA > 1

Target Parameters Stroke Volume

Intervention Fluid

Primary Outcomes 3.7-day decrease in hospital length of stay (25%)



Ping Protocol¹⁴

OVERVIEW

Study Design Randomized controlled trial

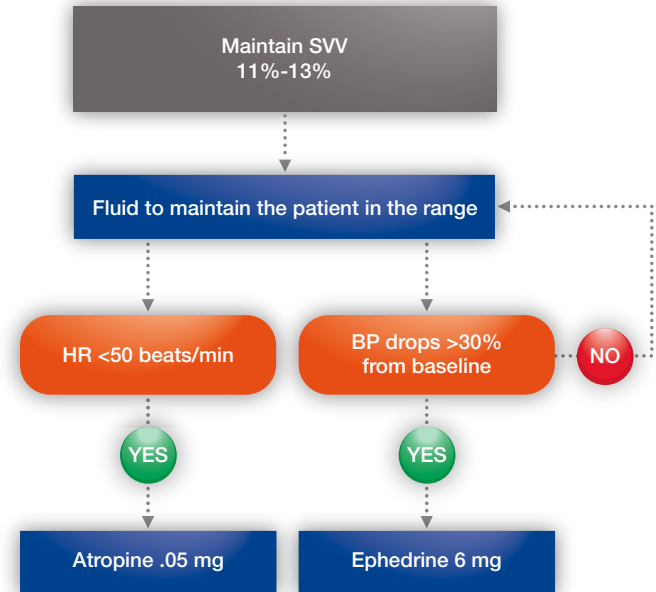
Patient Population Undergoing radical gastrectomy, colon cancer resection, rectal cancer, and Whipple surgery

Inclusion Criteria ASA I or ASA II

Target Parameters Stroke Volume Variation

Intervention Fluid

Primary Outcomes Faster recovery time to normal diet (16%), decrease in hospital length of stay (19%)



Abbreviations: BP: Blood Pressure; HR: Heart Rate; SVV: Stroke Volume Variation.

Ramsingh Protocol¹⁵

OVERVIEW

Study Design Randomized, single-blinded controlled trial

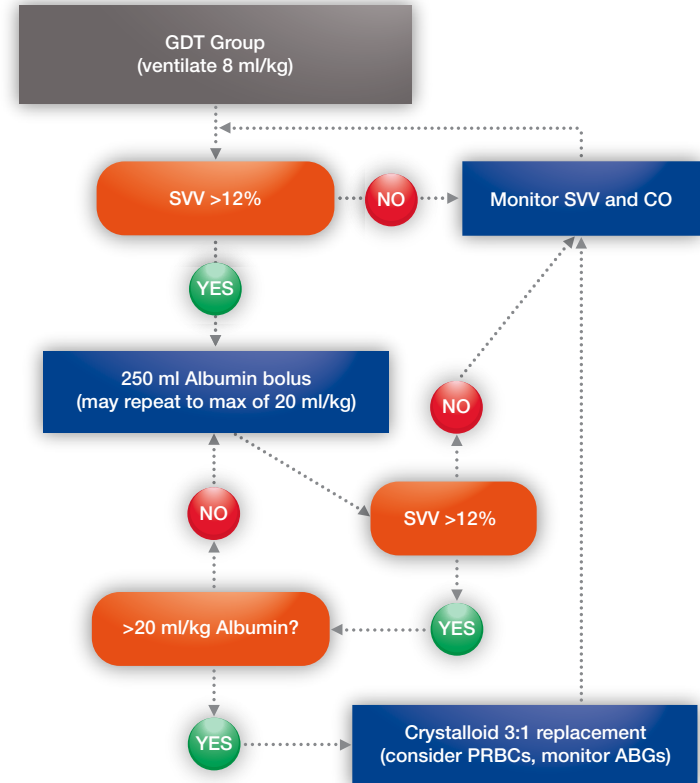
Patient Population Undergoing major abdominal surgery, urologic, gastrointestinal or gynecologic cancer resection, and Whipple surgery

Inclusion Criteria P-POSSUM mean predicted mortality rate of 1.4*

Target Parameters Stroke Volume Variation

Intervention Fluid (Colloid)

Primary Outcomes Faster return of GI function (3 vs 4 days), faster return of PO intake (4 vs 5 days), and a 2.5-day decrease in hospital length of stay (33%)



*No differences other than age were statistically significant. P-POSSUM scores predicted mortality and showed no difference between the groups.

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.

OVERVIEW

Study Design Multicenter randomized controlled trial

Patient Population Undergoing elective abdominal extensive surgery or abdominal aortic surgery

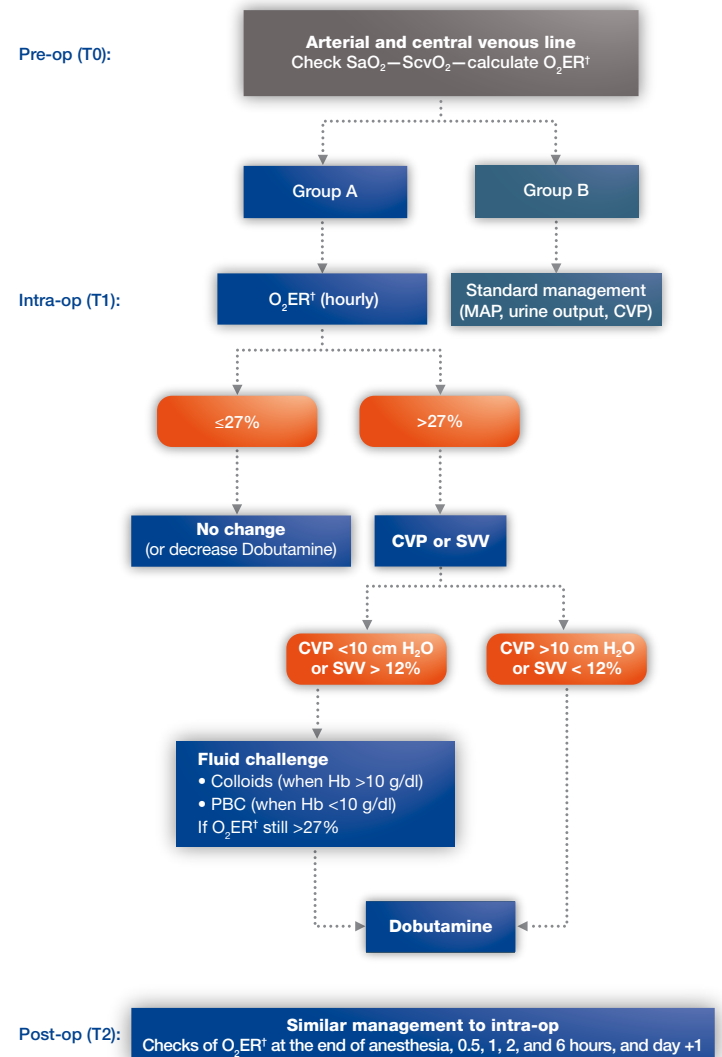
Inclusion Criteria ASA II

Target Parameters Central Venous Pressure, Oxygen Extraction Ratio

Intervention Fluid (Colloid), Dobutamine

Primary Outcomes Decrease in postoperative complications (60%), decrease in hospital length of stay (16%)

Abbreviations: **CVP:** Central Venous Pressure; **Hb:** Hemoglobin; **MAP:** Mean Arterial Pressure; **O₂ER:** Oxygen Extraction Ratio; **SaO₂:** Oxygen Saturation; **ScvO₂:** Central Venous Oxygen Saturation.



Modified Donati Protocol: Donati A, et al. *Chest*. 2007;132:1817-1824.
[†]O₂ER is estimated based on use of ScvO₂.

References

1. Benes J, Chytra I, Altmann P, et al. Intraoperative fluid optimization using stroke volume variation in high risk surgical patients: results of prospective randomized study. *Crit Care*. 2010;14(3):R118.
2. Cecconi M, Fasano N, Langiano N, et al. Goal directed haemodynamic therapy during elective total hip arthroplasty under regional anaesthesia. *Crit Care*. 2011;15(3):R132.
3. Shoemaker WC, Appel PL, Kram HB, Waxman K, Lee TS. Prospective trial of supranormal values of survivors as therapeutic goals in high-risk surgical patients. *Chest*. 1988;94(6):1176-1186.
4. Mythen MG, Webb AR. Perioperative plasma volume expansion reduces the incidence of gut mucosal hyperperfusion during cardiac surgery. *Arch Surg*. 1995;130(4):423-429.
5. Sinclair S, James S, Singer M. Intraoperative intravascular volume optimization and length of hospital stay after repair of proximal femoral fracture: randomised controlled trial. *BMJ*. 1997;315(7113):909-912.
6. Venn R, Steele A, Richardson P, Poloniecki J, Grounds M, Newman P. Randomized controlled trial to investigate influence of the fluid challenge on duration of hospital stay and perioperative morbidity in patients with hip fractures. *Br J Anaesth*. 2002;88(1):65-71.
7. Gan TJ, Soppitt A, Maroof M, et al. Goal-directed intraoperative fluid administration reduces length of hospital stay after major surgery. *Anesthesiology*. 2002;97(4):820-826.
8. Conway D, Mayall R, Abdul-Latif MS, Gilligan S, Tackaberry C. Randomised controlled trial investigating the influence of intravenous fluid titration using oesophageal Doppler monitoring during bowel surgery. *Anaesthesia*. 2002;57(9):845-849.
9. McKendry M, McGloin H, Saberi D, Caudwell L, Brady A, Singer M. Randomised controlled trial assessing the impact of a nurse delivered, flow monitored protocol for optimisation of circulatory status after cardiac surgery. *BMJ*. 2004;329(7460):258.
10. Wakeling HG, McFall MR, Jenkins CS, et al. Intraoperative oesophageal Doppler-guided fluid management shortens postoperative hospital stay after major bowel surgery. *Br J Anaesth*. 2005;95(5):634-642.
11. Noblett SE, Snowden CP, Shenton BK, Horgan AF. Randomized clinical trial assessing the effect of Doppler-optimized fluid management on outcome after elective colorectal resection. *Br J Surg*. 2006;93(9):1069-1076.
12. Chytra I, Pradl R, Bosman R, Peinár P, Kasal E, Zidková A. Esophageal Doppler-guided fluid management decreases blood lactate levels in multiple-trauma patients: a randomized controlled trial. *Crit Care*. 2007;11(1):R24.
13. Kuper M, Gold SJ, Callow C, et al. Intraoperative fluid management guided by oesophageal Doppler monitoring. *BMJ*. 2011;342:d3016.
14. Ping W, Hong-Wei W, Tai-Di Z. Effect of stroke volume variability-guided intraoperative fluid restriction on gastrointestinal functional recovery [published online ahead of print]. *Hepatogastroenterology*. 2012;59(120). doi:10.5754/hge12283.
15. Ramsingh DS, Sanghvi C, Gamboa J, Cannesson M, Applegate RL 2nd. Outcome impact of goal directed fluid therapy during high risk abdominal surgery in low to moderate risk patients: a randomized controlled trial [published December 2012]. *J Clin Monit Comput*. doi: 10.1007/s10877-012-9422-5.
16. Donati A, Loggi S, Preiser JC, et al. Goal-directed intraoperative therapy reduces morbidity and length of hospital stay in high-risk surgical patients. *Chest*. 2007;132(6):1817-1824.

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