

## Individualized Fluid Management Using the Pleth Variability Index: A Randomized Clinical Trial

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### Abstract

**Background:** The present trial was designed to assess whether individualized strategies of fluid administration using a noninvasive plethysmographic variability index could reduce the postoperative hospital length of stay and morbidity after intermediate-risk surgery.

**Methods:** This was a multicenter, randomized, nonblinded parallel-group clinical trial conducted in five hospitals. Adult patients in sinus rhythm having elective orthopedic surgery (knee or hip arthroplasty) under general anesthesia were enrolled. Individualized hemodynamic management aimed to achieve a plethysmographic variability index under 13%, and the standard management strategy aimed to maintain a mean arterial pressure above 65 mmHg during general anesthesia. The primary outcome was the postoperative hospital length of stay decided by surgeons blinded to the group allocation of the patient.

**Results:** In total, 447 patients were randomized, and 438 were included in the analysis. The mean hospital length of stay  $\pm$  SD was  $6 \pm 3$  days for the plethysmographic variability index group and  $6 \pm 3$  days for the control group (adjusted difference, 0.0 days; 95% CI, -0.6 to 0.5;  $P = 0.860$ ); the theoretical postoperative hospital length of stay was  $4 \pm 2$  days for the plethysmographic variability index group and  $4 \pm 1$  days for the control group ( $P = 0.238$ ). In the plethysmographic variability index and control groups, serious postoperative cardiac complications occurred in 3 of 217 (1%) and 2 of 224 (1%) patients ( $P = 0.681$ ), acute postoperative renal failure occurred in 9 (4%) and 8 (4%) patients ( $P = 0.808$ ), the troponin I concentration was more than  $0.06 \mu\text{g/l}$  within 5 days postoperatively for 6 (3%) and 5 (2%) patients ( $P = 0.768$ ), and the postoperative arterial lactate measurements were  $1.44 \pm 1.01$  and  $1.43 \pm 0.95 \text{ mmol/l}$  ( $P = 0.974$ ), respectively.

**Conclusions:** Among intermediate-risk patients having orthopedic surgery with general anesthesia, fluid administration guided by the plethysmographic variability index did not shorten the duration of hospitalization or reduce complications.