

# PVi®

A Noninvasive Dynamic Parameter that Helps Clinicians Monitor Fluid Responsiveness in Mechanically Ventilated Patients

Available with Masimo SET® and rainbow SET™ Pulse Oximetry



$$PVi = \frac{Pi_{max} - Pi_{min}}{Pi_{max}} \times 100$$

The calculation of PVi (Pleth Variability Index) is based on the measured changes in Pi (Perfusion Index).

- > Improper titration of fluid can lead to hypovolemia or hypervolemia that may be associated with negative outcomes.<sup>1</sup>
- > PVi may show changes that reflect physiologic factors such as vascular tone, circulating blood volume, and intrathoracic pressure excursions.

## PVi in Peer-Reviewed Literature

Several peer-reviewed clinical studies have evaluated the utility of PVi as a fluid responsiveness indicator in mechanically ventilated patients.<sup>2-6</sup> For example:

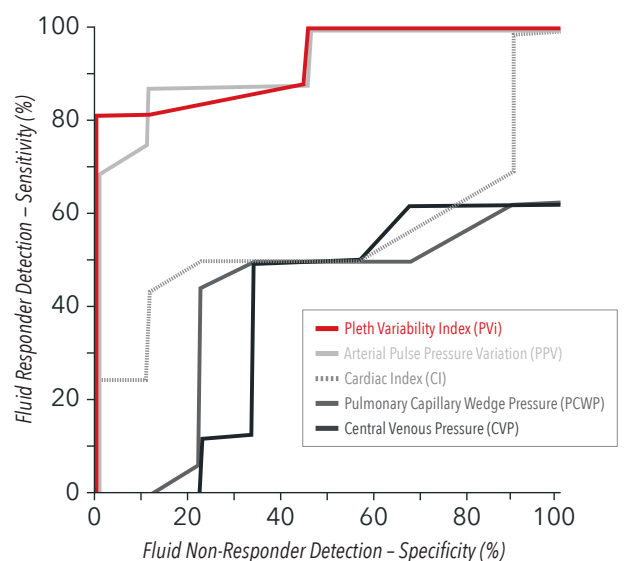
### Operating Room:

- > In a study of 20 patients scheduled for elective major abdominal surgery, researchers found that PVi can serve as a valid indicator of fluid responsiveness in mechanically ventilated patients undergoing major surgery.<sup>2</sup>
- > In a study of 25 patients undergoing general anaesthesia, researchers found that PVi can predict fluid responsiveness noninvasively in mechanically ventilated patients.<sup>3</sup>

### Intensive Care Unit:

- > In a study of 40 patients with circulatory insufficiency, researchers found that PVi can predict fluid responsiveness noninvasively in intensive care unit patients under mechanical ventilation.<sup>4</sup>

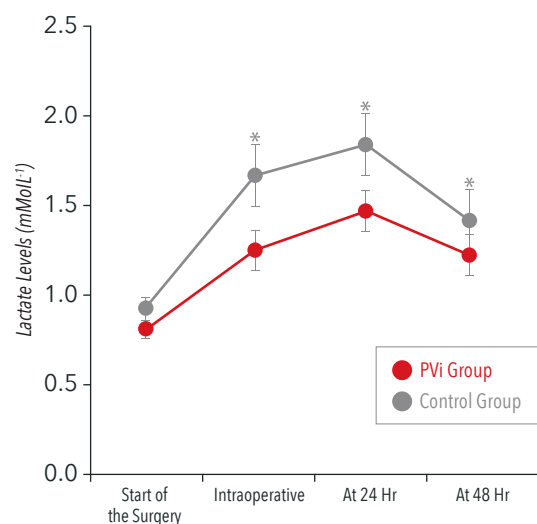
Sensitivity and specificity of various parameters for the prediction of fluid responsiveness<sup>3</sup>



## PVi in Fluid Management Protocols

### Goal-directed Therapy (GDT)

In a study of 82 patients undergoing major abdominal surgery, researchers found that PVi-based goal-directed fluid management reduced the volume of intraoperative fluid infused and reduced intraoperative and post-operative lactate levels.<sup>5</sup>



### Enhanced Recovery After Surgery (ERAS)

In a study of 109 patients undergoing colorectal surgery, researchers found that the implementation of an enhanced recovery protocol which included PVi led to improved patient satisfaction and substantial reductions in lengths of stay, complication rates, and costs for patients undergoing both open and laparoscopic colorectal surgery.<sup>6</sup>

|                         | Pre ERAS Protocol       | Post ERAS Protocol      |
|-------------------------|-------------------------|-------------------------|
| Length of Stay (days)   | 6.8 ± 4.7<br>(Median 5) | 4.6 ± 3.6<br>(Median 3) |
| Mean 30-day direct cost | \$20,435 ± \$12,857     | \$13,306 ± \$9,263      |

Technical and clinical factors that may affect PVi include probe malposition, probe site, patient motion, skin incision, spontaneous breathing activity, lung compliance, open pericardium, use of vasopressors or vasodilators, low perfusion index, subject age, arrhythmias, left or right heart failure, and tidal volume.<sup>7,9</sup>

Numerous studies have evaluated the utility of PVi. For a list of studies, please visit: <http://www.masimo.co.uk/cpub/clinical-pleth-variability-index.htm>

<sup>1</sup> Bellamy et al. *Br J Anaesth*. 2006. <sup>2</sup> Zimmermann M., et al. *Eur J Anaesthesiol*. 2010 Jun;27(6):555-61. <sup>3</sup> Cannesson M., et al. *Br J Anaesth*. 2008 Aug;101(2):200-6. <sup>4</sup> Loupec T., et al. *Crit Care Med*. 2011 Feb;39(2):294-9. <sup>5</sup> Forget P et al. *Anesth Analg*. 2010; 111(4):910-4. <sup>6</sup> Thiele RH et al. *J Am Coll Surg*. 2015;220:430-443. <sup>7</sup> Desgranges F.P., et al. *Br J Anaesth*. 2011 Sep;107(3):329-35. <sup>8</sup> Cannesson M. *J Cardiothorac Vasc Anesth*. 2010 Jun;24(3):487-97. <sup>9</sup> Takeyama M., et al. *J Clin Monit Comput*. 2011 Aug;25(4):215-21.

For professional use. See instructions for use for full prescribing information, including indications, contraindications, warnings, and precautions.

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