

Fluid Challenge Responsiveness

Clinical Education

Fluid Challenge

Administering fluids via intravenous is a routine procedure for many patients. Fluid Challenge is an important dynamic test that is completed by administering fluids while simultaneously testing the preload reserve of the patient. It is used as a method to recognize patients who would benefit from an increase in intravenous volume. By conducting a fluid challenge, it reduces the risks associated with fluid overload which would occur when administering excessive fluid during therapy¹.

Current Common Practice

The current common practice to determine a patient's response to fluid is done by monitoring cardiac output¹. A Fluid Challenge is conducted by administering a fluid bolus, and monitoring whether the patient is responsive by looking for a change in cardiac output. The most common method for monitoring cardiac output is with ultrasound. The limitations with the use of ultrasound is that it is based on imaging, therefore cannot be used as a continuous monitor.

Mespere Solution

Jugular venous oxygen saturation ($SjvO_2$) is the amount of oxygenated blood in the jugular vein. It is affected by four factors; cardiac output, hemoglobin, oxygenation, and oxygen consumption². Based on Fick's Principle, the trending change of oxygen saturation in the external jugular vein is proportional to the trending change of cardiac output.

Mespere LifeSciences has developed the VO 100 Jugular Venous Oximetry which continuously monitors $SjvO_2$ non-invasively. The VO 100 Jugular Venous Oximetry can be used to monitor the cardiac output trend based on Fick's Principle. The advantages of the VO 100 Jugular Venous Oximetry is that it is; continuous, cost effective, highly sensitive, easy to use, and non-invasive.

References

1. Cecconi, M., Parsons, A.K., Rhodes, A. (2011) What is fluid challenge? *Curr Opin Crit Care* 17:290-205 .
2. Frazier, J., Theory and Clinical Application of Continuous Fiberoptic Central Venous Oximetry ($ScVO_2$) Monitoring Edwards LifeScience

Fluid Status Assessment

Clinical Education

Fluid Assessment & Monitoring

Administering fluids via intravenous is routine procedure for many patients. The amount of fluid, composition and the administration rate differs between patients. If one of those factors is incorrect it could have harmful effects on the patient. The assessment and monitoring of fluid status can reduce complications and will improve the patient's wellbeing.

Current Method

Currently guidelines are available to be followed during fluid administration and fluid therapy. Many of these guidelines suggest using central venous pressure (CVP) as a measurement to guide fluid status and management. Surveys have shown that 90% of intensivists use CVP to monitor fluid resuscitation in patients¹.

Central venous pressure (CVP) is the clinical measurement of right atrial pressure. It is used to evaluate the adequacy of circulating blood volume and cardiac preload. Any factor that causes a change in venous return and/or cardiac output can greatly influence CVP. An elevated CVP measurement could be due to fluid overload which would exceed the limit of cardiac accommodation. Low venous return or volume loss of fluids, would result in a decreased CVP measurement²⁻⁵.

The current common practice for attaining CVP is by invasive central venous catheter. There are many risks and complications associated with central venous catheters, therefore it would be an attractive option to have a non-invasive option. Mespere Lifesciences has developed a device to continuously monitor CVP non-invasively.

Mespere Solution

The Mespere VENUS 2000 CVP system is a non-invasive, continuous monitoring tool for the assessment of fluid status. During the administration of fluids the Mespere VENUS 2000 CVP system will provide continuous measurements of CVP. This monitoring could be used to ensure that the patient is being administered fluid at the appropriate rate and quantity. The Mespere VENUS 2000 CVP system is easy to use, and provides continuous, non-invasive monitoring at a low cost.

References

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2. Berlin, D.A., Bakker, J. (2015) Starling curves and central venous pressure. *Critical Care*, 19:55. DOI 10.1186/s13054-015-0776-1
3. Jacobsohn, E., R. Chorn, and M. OConnor, The role of the vasculature in regulating venous return and cardiac output: historical and graphical approach. *Canadian Journal of Anaesthesia-Journal Canadien D Anesthesie*, 1997. 44(8): p. 849-867.
4. Funk, D.J., E. Jacobsohn, and A. Kumar, The role of venous return in critical illness and shock-part I: physiology. *Crit Care Med*, 2013. 41(1): p. 255-62.
5. Kenny, J-E.S., ICU Physiology in 1000 Words: In Defense of the Central Venous Pressure. *Crit Care Med*, 2014.