



Advanced Hemodynamics in Emergency

USCOM 1A is a non-invasive hemodynamic Doppler ultrasound monitor which rapidly identifies haemodynamic derangements associated with hypotension and shock in the Emergency Department allowing early diagnosis and rapid and effective intervention.

“The first step in the haemodynamic management of acutely unwell patients is to determine adequacy of tissue perfusion. At present, assessment of response to therapy..... relies on soft endpoints such as examination, BP or urine output, potentially leading to inadequate resuscitation, or overload.”¹

Clinical Background

- Early haemodynamic resuscitation and appropriate circulatory stabilisation can improve clinical outcomes in many acute presentation scenarios.
- Hypotension has multiple causes, including dehydration and hypovolemia or vasodilatation, hypovolemic shock, cardiogenic shock, or even septic shock.
- Treatment of hypotension varies from watchful observation to emergency resuscitation with fluid, inotropes or vasoactives.²
- Fluid overload is associated with increased morbidity and mortality.³
- In septic shock, the failure of standard monitoring techniques to differentiate between warm (vasodilatory) and cold (vasoconstrictive) shock can lead to treatments which result in suboptimal cellular perfusion.⁴
- Many septic patients are poorly responsive to fluids, and sensitive to volume overload due to myocardial depression.⁵

“This device (USCOM 1A) is saving lives, there are no two ways about it. The early identification of haemodynamic derangements, and appropriate guidance of therapy, whether it be fluid, inotropes or vasoactives, makes our job so much easier.”

Professor Brendan Smith, Consultant Anaesthetist and Intensivist,
Notre Dame University, Bathurst, Australia

Uscom Solution and Evidence

- USCOM 1A provides multiple parameters with which to detect and guide treatment of shock rapidly and non-invasively.⁷
- Emergency evaluation of shock should include assessment of fluid responsiveness, and oxygen delivery, measures which can rapidly and noninvasively be acquired on examination using the USCOM 1A.⁶
- The USCOM 1A can be implemented in time critical cases effecting neonates, children, adults and the elderly, which permits earlier hemodynamic diagnosis and improved therapeutic guidance.⁴
- High CO and low SVR identify distributive shock rather than hypovolemic-haemorrhagic shock.
- Doppler hemodynamic parameters, ‘corrected flow time’ (FTc) and ‘peak velocity’ (VPk), distinguish hypovolemic from cardiogenic shock.⁸
- Smith Madigan Inotropy Index (SMII) is a unique USCOM 1A parameter. SMII values <1.1 W/m² are associated with a poor response to fluid therapy alone.⁹
- Since the introduction of the Bathurst-USCOM protocol in 2007, over 80% of patients were hemodynamically optimised in less than 60 minutes, and mortality in septic shock patients has fallen by 94%.¹⁰

The Measure of Life

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