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Assessing and managing shock

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Hemodynamic instability manifesting as cardiac dysfunction (cardiac failure, arrhythmia), hypovolemia (fluid loss or third spacing) or vascular failure (integrity, vascular tone) is not uncommon in toxicology. The recognition of shock may be challenging in this setting since the traditional windows of assessment of hypoperfusion viz. neurological, cutaneous and renal may be impacted directly by the toxin. Biochemical markers of hypoperfusion (e.g. lactate) may also be abnormal due to the poison per se.

The goal of hemodynamic support is to maintain organ perfusion till cardiovascular failure resolves and the effects of the toxin wears out. Simultaneous assessment of the need for critical interventions such as intubation, mechanical ventilation, or obtaining vascular access is essential to guide treatment.

Conventional hemodynamic support relies on optimizing the preload with adequate fluid resuscitation, modulating afterload with vasoactive agents and augmenting cardiac contractility with inotropes. The extent and type of cardiovascular support and level of monitoring depends on the severity of shock and facilities available on-site. This could range from basic hemodynamic monitoring (clinical examination, heart rate and non-invasive blood pressure monitoring) and support (fluid resuscitation and vasoactive agents) in the primary or secondary care setting, to more advanced monitoring (invasive) and cardiovascular support (advanced cardiac support) in a tertiary care setting. Additionally, use of other agents that exhibit inotropic effects (glucagon, calcium salts, euglycemic insulin therapy) deserve consideration in special situations.

Some patients who fail to respond to conventional therapy would require referral to a higher centre for advanced hemodynamic support. This could be in the form of pacing, intra-aortic balloon pump (IABP), percutaneous ventricular assist devices (VAD) or even more specialized therapy such as veno-arterial extra corporeal membrane oxygenation (VA ECMO). Widespread use of advanced hemodynamic support is precluded by cost, resource, expertise and limited evidence.

In resource limited settings it is important to identify the subset of patients who are likely to require advance cardiovascular support and refer them early so that outcomes may be improved.