

american burn association practice guidelines burn shock

Published: September 19, 2026 | Index ID: #-

Introduction

Burn injuries are a leading cause of morbidity and mortality worldwide, affecting millions of individuals each year. When a burn injury is severe enough to compromise the body's ability to maintain adequate perfusion and oxygenation, the patient may develop **burn shock**. This life-threatening condition requires prompt recognition, aggressive resuscitation, and meticulous ongoing care. The **American Burn Association**(ABA) has developed comprehensive practice guidelines that provide clinicians with evidence based recommendations for preventing, diagnosing, and treating burn shock. These guidelines help standardize care, improve patient outcomes, and reduce the variability that can arise in complex burn management scenarios.

In this article, we will delve into the pathophysiology of burn shock, explore the ABA's practice guidelines, and discuss practical strategies for early recognition, fluid resuscitation, advanced support, and long term follow up. Whether you are a frontline emergency responder, a burn unit nurse, or a seasoned intensivist, understanding the nuances of burn shock management is essential for saving lives and enhancing recovery.

Understanding Burn Shock

What Is Burn Shock?

Burn shock is a form of hypovolemic shock that occurs when the body's fluid compartments are disrupted by extensive burn injuries. The loss of plasma volume, combined with increased capillary permeability, leads to a net shift of fluid from the intravascular space into the interstitial and third spaces. The result is a dramatic decrease in circulating blood volume, impaired tissue perfusion, and a cascade of metabolic derangements.

Types of Shock in Burn Patients

- Hypovolemic Shock: The most common type in burn patients, driven by fluid loss and third spacing.
- Septic Shock: Can develop if burn wounds become infected, leading to systemic inflammatory response syndrome (SIRS).
- Cardiogenic Shock: Rare, but may occur in patients with underlying cardiac disease or when the heart is directly damaged by thermal injury.
- Obstructive Shock: Occurs when a pulmonary embolus or tension pneumothorax develops in the setting of severe burns.

American Burn Association Practice Guidelines

Overview of the Guidelines

The ABA's practice guidelines for burn shock provide a structured framework that covers assessment, fluid resuscitation, and advanced therapies. They are updated regularly to reflect the latest research, expert consensus, and emerging technologies. The guidelines emphasize the importance of early intervention, individualized care plans, and multidisciplinary collaboration.

Key Principles for Managing Burn Shock

1. Early Recognition: Identify signs of shock within minutes of patient arrival.

2. Goal Directed Resuscitation: Use evidence based formulas and monitoring to tailor fluid therapy.
3. Adjunctive Therapies: Incorporate blood products, vasopressors, and mechanical support as needed.
4. Continuous Reassessment: Adjust treatment based on dynamic physiologic changes.
5. Multidisciplinary Coordination: Engage surgeons, intensivists, nurses, and rehabilitation specialists.

Early Recognition and Assessment

Clinical Signs and Symptoms

Patients with burn shock often present with a constellation of findings that can be subtle or dramatic:

- Cool, clammy skin with a mottled appearance.
- Rapid heart rate (tachycardia) and weak peripheral pulses.
- Low blood pressure (hypotension) with a widened pulse pressure.
- Rapid, shallow breathing or respiratory distress.
- Altered mental status or confusion.
- Reduced urine output (

Vital Signs Monitoring

Continuous monitoring of vital signs is essential. In addition to standard parameters, consider the following:

- Central Venous Pressure (CVP): Provides insight into preload and fluid status.
- Urine Output: A reliable marker of renal perfusion.
- ScvO₂ (Central Venous O₂ Saturation): Reflects balance between oxygen delivery and consumption.
- Use of arterial lines for accurate blood pressure measurement and blood gas sampling.

Laboratory and Imaging Tests

Lab tests help quantify the extent of injury and guide therapy:

- Complete Blood Count (CBC): Evaluate for anemia and leukocytosis.
- Basic Metabolic Panel (BMP): Monitor electrolytes, creatinine, and BUN.
- Coagulation Profile: PT/INR, aPTT to assess clotting function.
- Serum Lactate: Elevated levels indicate tissue hypoxia.
- Arterial Blood Gases (ABG): Assess oxygenation and acid–base status.
- Chest X ray or CT scan if respiratory compromise or suspected internal injuries.

Initial Resuscitation Strategies

Fluid Resuscitation: Formulas and Recommendations

Effective fluid resuscitation is the cornerstone of burn shock management. The ABA guidelines recommend using the Parkland formula as a starting point, with adjustments based on patient response and comorbidities:

1. Parkland Formula: $4 \text{ mL} \times \text{body weight (kg)} \times \% \text{ total body surface area (TBSA) burned (full thickness + partial thickness)} = \text{total fluid volume for first 24 hours}$.
2. Half of the calculated volume is given within the first 8 hours; the remaining half over the next 16 hours.
3. Use lactated Ringer's solution as the primary fluid unless contraindicated.

In pediatric patients, the **Schwartz formula** is often preferred due to its age specific adjustments.

Blood Product Considerations

When significant blood loss occurs, or if the patient's hemoglobin falls below 8–9 g/dL, transfusion of packed red blood cells (PRBCs) may be necessary. The guidelines also highlight:

- Use of fresh frozen plasma (FFP) or cryoprecipitate if coagulopathy develops.
- Platelet transfusion when platelet count drops below 50,000/ μ L or if active bleeding is present.
- Goal directed resuscitation using massive transfusion protocols (MTP) in severe cases.

Adjunctive Therapies

- Vasopressors: Norepinephrine is the first line for maintaining mean arterial pressure (MAP) > 65 mmHg when fluid resuscitation alone is insufficient.
- Use of vasodilators (e.g., nitroglycerin) can be considered in specific scenarios like severe compartment syndrome.
- Consider colloids in patients with significant capillary leak, but weigh the risks of increased pulmonary edema.
- Administer antibiotics prophylactically if indicated, to prevent infection related complications.

Advanced Management of Burn Shock

Vasopressors and Inotropes

When hypotension persists despite adequate fluid resuscitation, vasopressors become essential. The ABA practice guidelines recommend a stepwise approach:

1. Norepinephrine: First line agent to increase systemic vascular resistance.
2. Phenylephrine: Alternative if tachycardia is a concern.
3. Dobutamine or Milrinone: Inotropes for patients with myocardial depression.

Mechanical Ventilation Considerations

Respiratory failure is common in severe burns due to inhalation injury, aspiration, or systemic inflammation. Guidelines emphasize:

- Early intubation and protective lung ventilation strategies (low tidal volume, appropriate PEEP).
- Use of high flow nasal cannula or non invasive ventilation as adjuncts in mild cases.
- Monitoring of blood gases to guide ventilation adjustments.

Organ Support

Burn shock can precipitate multi organ dysfunction. The ABA guidelines outline the following supportive measures:

- Renal Support: Initiate continuous renal replacement therapy (CRRT) for refractory fluid overload or acute kidney injury.
- Hepatic Support: Monitor liver function tests; consider plasma exchange in severe hepatic failure.
- Cardiac Support: Use echocardiography to assess ventricular function; consider inotropes or mechanical circulatory support if needed.

Special Populations

Pediatric Patients

Pediatric burn shock requires special attention due to differences in body composition and fluid dynamics. The guidelines recommend:

- Using the Schwartz formula for fluid calculation.
- Close monitoring of weight and body surface area changes during resuscitation.
- Early involvement of pediatric critical care specialists.

Elderly Patients

Elderly patients often have reduced physiological reserve and comorbidities that increase the risk of complications.

Key considerations include:

- Lower fluid resuscitation targets to avoid pulmonary edema.
- Early assessment of cardiac function.
- Monitoring for delirium and other neuropsychiatric changes.

Pregnant Patients

Pregnancy alters cardiovascular physiology and increases the risk of fetal hypoxia. The ABA guidelines advise:

- Maintaining maternal MAP > 70 mmHg to ensure adequate uteroplacental perfusion.
- Using fluids with lower crystalloid volumes and adding colloids if needed.
- Early obstetric consultation for potential delivery decisions.

Prevention of Re bleeding and Complications

Wound Care and

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