

How to Recognize a Failed Burn Resuscitation

Elisha G. Brownson, MD^a, Tam N. Pham, MD^{a,*}, Kevin K. Chung, MD^{b,c}

KEYWORDS

• Burn • Resuscitation • Failed • Difficult • Runaway • Morbidity • Death

KEY POINTS

- Failed resuscitation can be defined as one associated with major complications that do not allow the patient to progress to the next phase in care.
- Triggers and protocols may be used to aid in early identification of threatened failure of resuscitation.
- When failed resuscitation occurs, and futility of care arises, a transition to comfort care measures should be initiated.

INTRODUCTION

Massive burn injury results in a dysregulated host response characterized by widespread capillary leak resulting in volume redistribution, decreased tissue perfusion, and subsequent end-organ failure. There are many factors that may add to the magnitude of this response. The mainstay of therapy in the initial care of these patients includes the initiation of judicious intravenous fluids that are titrated in response to a compilation of various physiologic and laboratory endpoints, anchored on the close monitoring of urine output. Over the years, a lot of attention has been focused on over-resuscitation and the physiologic cost of overzealous fluid management.¹ Recently, the consequences of under-resuscitation have come into question.²

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^a Department of Surgery, Harborview Medical Center, 325 Ninth Avenue, Box 359796, Seattle, WA 98104, USA; ^b United States Army Institute of Surgical Research, 3698 Chambers Pass, JBSA Fort Sam Houston, TX 78234, USA; ^c Department of Surgery, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814, USA

* Corresponding author.

E-mail address: tpham94@uw.edu

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Regardless, successful burn resuscitation is one that enables the patient to survive, with minimal morbidity, to the next phase of care, allowing for surgical intervention. Despite decades of experience with resuscitation, burn providers still encounter a small subset of patients who fare poorly during the resuscitation phase. Thus, a failed resuscitation can be defined as one associated with major complications that do not allow the patient to progress to the next phase in care. This article focuses entirely on this population.

RECOGNIZING A FAILED BURN RESUSCITATION

Perhaps the most important factor in avoiding a failed resuscitation is the early recognition of a difficult or runaway resuscitation by the burn care provider. An early recognition of the signs and symptoms of a threatened failed resuscitation will allow for prompt initiation of rescue therapies and the subsequent delineation of goals of care in nonresponders. The authors suggest 3 critical periods during burn resuscitation when failure can be declared ([Table 1](#)), each with distinct features that providers must recognize promptly. The authors propose early failure as the first 8 hours of hospitalization, in-resuscitation failure as 8 to 24 hours, and late failure as beyond 24 hours.

Category	Admission to First 8 h	Hours 8–24	Beyond 24 h
Resuscitation and hemodynamics	Multiple crystalloid infusion rate increases without adequate response Hypotension Vasopressor requirement	Ongoing fluid administration exceeds 1.5–2 times predicted fluid needs Need to increase crystalloid fluid rate after initial reduction attempt Inadequate or no response to colloid supplementation Hypotension Catecholamine-resistant shock (multiple vasopressors at rising doses)	Crystalloid fluid rate ≥ 300 mL/h Any increase in crystalloid fluid rate Inadequate or no response to colloid supplementation Hypotension Catecholamine resistant shock (multiple vasopressors at high doses)
Clinical impression	Oligouria/anuria	Oligouria/anuria Tight abdomen by physical examination	Oligouria/anuria Difficult to ventilate Deemed too unstable for operative eschar removal
Laboratory markers	Severe lactic acidosis	Hematocrit $>>60\%$ Hematocrit rises on serial checks Creatinine rise Persistent and severe metabolic acidosis, lactic acidosis, coagulopathy	Hematocrit $>>50\%$ Elevated creatinine Unresolved metabolic acidosis, lactic acidosis, coagulopathy

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