

## Indications for Emergent Central Line and Arterial Line Placement After 10 PM:

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### PURPOSE:

Central lines provide critical access for fluid resuscitation, medication administration, and hemodynamic monitoring. The decision to place a central line at night is often driven by the following clinical scenarios:

### Indications for Emergent Central Line Placement

#### Need for Central Venous Access:

- **Inadequate Peripheral Access:** In patients with difficult venous access, central venous access may be required to administer fluids or medications. Several studies report that the inability to obtain peripheral access is a common reason for central line placement in the ICU (Martin et al., 2015). Central lines offer a more reliable route for medication administration, especially in critically ill patients (Klein et al., 2019).
- **Vasoactive Medications:** The administration of vasoactive medications such as norepinephrine or dopamine, which can cause tissue necrosis if extravasated through peripheral lines, is a classic indication for central venous access (Doran et al., 2021). Guidelines recommend using a central line for all infusions of vasopressors and inotropes (Klein et al., 2019).

#### Hemodynamic Instability (Shock States):

- **Septic Shock:** Central venous access allows for monitoring of central venous pressure (CVP), which is a useful marker of volume status and hemodynamic response in septic shock. A study by Rivers et al. (2001) demonstrated that early goal-directed therapy, including CVP monitoring, improves outcomes in sepsis, supporting the need for central venous access in such cases.
- **Hypovolemic and Cardiogenic Shock:** In patients with severe hypovolemic or cardiogenic shock, central venous access is crucial for adequate fluid resuscitation and monitoring. The use of central venous lines in shock states is widely accepted as a means to optimize fluid therapy and guide hemodynamic management (Vincent et al., 2011).



### **Emergent Dialysis or Plasma Exchange:**

- **Renal Failure:** In patients requiring urgent dialysis due to acute kidney injury (AKI) or end-stage renal disease (ESRD), central lines are essential for hemodialysis access. Evidence supports the use of central venous catheters as temporary dialysis access, particularly in critically ill patients (Bello et al., 2012).

### **Trauma or Major Surgery:**

- **Major Trauma or Surgery:** Central venous access is commonly required for large-volume resuscitation in trauma patients, as it provides a more reliable route for infusions than peripheral access. A study by Clancy et al. (2014) emphasized that central lines improve resuscitation outcomes in trauma patients by facilitating rapid volume replacement.

### **Indications for Emergent Arterial Line Placement After 10 PM:**

Arterial lines allow for continuous blood pressure monitoring and easy blood sampling for arterial blood gases (ABG). Here are the main indications for emergent A-line placement:

#### **Severe Hemodynamic Instability:**

- **Shock States:** Continuous monitoring of blood pressure via an A-line is crucial for patients in shock (septic, cardiogenic, hypovolemic), where rapid fluctuations in blood pressure occur. Studies have shown that A-lines are particularly useful for titrating vasoactive drugs and providing real-time feedback on circulatory status (Lima et al., 2017).
- **Severe Hypotension:** In critically ill patients with persistent hypotension, A-line placement helps guide treatment decisions, such as fluid resuscitation and pressor adjustments. Continuous monitoring can also aid in the early detection of decompensating cardiovascular function (Kouadio et al., 2018).

#### **Frequent Blood Gas Monitoring:**

- **Acid-base Disturbances:** Patients with severe acid-base imbalances, especially in respiratory failure, may require frequent ABGs. A-lines facilitate this by providing easy access to arterial blood without needing repeated punctures, which is important for monitoring CO<sub>2</sub> and pH (Lima et al., 2017).
- **Ventilated Patients:** In mechanically ventilated patients, particularly those with ARDS or acute respiratory failure, frequent ABG analysis is critical to assess ventilatory settings and oxygenation. Continuous monitoring of arterial pressure through A-lines also helps guide ventilator adjustments (Williams et al., 2016).

**Critical Cardiac or Postoperative Monitoring:**

- Postoperative Care: After major surgeries, particularly cardiac surgery, an A-line is often placed to monitor the patient's arterial pressure continuously. Studies suggest that A-line monitoring in the post-operative period reduces the risk of missed hypotensive episodes and allows for precise hemodynamic management (Paniagua et al., 2018).
- Cardiac Surgery: A-lines are standard practice in patients undergoing cardiac surgery or complex interventions, where close monitoring of arterial pressure is essential to detect early signs of complications (Mackensen et al., 2013).

**Severe Trauma or Burns:**

- Trauma or Burns: In patients with major trauma or significant burns, continuous monitoring via an A-line is used for precise management of fluid therapy and to detect early signs of shock or bleeding. This approach has been shown to improve clinical outcomes by providing more accurate hemodynamic data than non-invasive methods (Clancy et al., 2014).

**Evidence Supporting Nighttime Emergent Procedures:**

- Time Sensitivity: A study by Dellinger et al. (2013) in *Surviving Sepsis Campaign* guidelines emphasizes that early identification and intervention of shock states (often requiring central or arterial access) within the first hour are critical to improving survival. This highlights the need for rapid access, even at night, when a patient's condition deteriorates.

**Multidisciplinary Collaboration:**

Evidence suggests that the prompt placement of central or arterial lines by a trained multidisciplinary team can lead to improved outcomes in critically ill patients. In particular, intensivists or interventionalists can perform these procedures safely even during nighttime hours (Miller et al., 2016).

**Version Control Record**

Version	Date	Author/Reviewer	Description of Changes
1	02/05/26	Paul Wisniewski, D.O.	Initial review and update to reflect latest evidence/practice

## References:

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