

# Schock

## 1. Pathophysiologie

- Minderversorgung der Gewebe mit Sauerstoff führt zu
  - Hypoxie
  - Anaerober Stoffwechsel
  - Lactatazidose
  - Irreversibler Zellschaden
  - Herzkreislaufversagen

Die frühzeitige Erkennung und Behandlung eines Schocks ist entscheidend für das Outcome!

- Kompensationsmechanismen
  - Tachykardie
  - Vasokonstriktion

## 2. Kategorisierung von Schock

### Kompensierter Schock

- Systolischer BD in der Norm

### Hypotensiver Schock

- Systolischer BD unter der 5. Perzentile
- Grenzen:

Neugeborene	BD syst < 60mmHg
Säuglinge	BD syst < 70mmHg
1-9 jährig	BD syst < 70 + (Alter in Jahren x 2)mmHg
10 jährig	BD syst < 90mmHg

Der Uebergang von einem kompensierten Schock in einen hypotensiven Schock kann unter Umständen Stunden dauern, der Uebergang von einem hypotensiven Schock zum Herzkreislaufversagen kann Minuten betragen!

### Klassifikation nach Typ

- Hypovolämer Schock (nicht hämorrhagisch/ hämorrhagisch)
- Distributiver Schock (septisch/ anaphylaktisch/ neurogen)
- Kardiogener Schock (Herzvitium/ Myokarditis/ Arrhythmie/ Intoxikation/ Trauma)
- Obstruktiver Schock (Herztamponade/ Pneumothorax/ Lungenembolie)

## 3. Erkennen von Kindern mit Schock

### - Allgemeiner Eindruck

Bewusstsein  
Atemarbeit  
Zirkulation

### - Primary Assessment

**Atemwege** (in Schockpatienten meist offen ausser bei verändertem Bewusstsein)

**Breathing** (Tachypnoe, ANS-Zeichen, Pulsoxymetrie)

**Circulation** ( Herzfrequenz, Blutdruck und Blutdruckamplitude, Rekap.zeit, Endorganperfusion: Urinoutput, Hautkolorit, Bewusstsein)

**Disability** (AVPU, GCS, Pupillen)

**Exposure** (komplett ausziehen, Temperatur, Hypothermie vermeiden)

### Recognition of Shock Flowchart

Figure 22 outlines the approach to recognizing the type and severity of shock. At any point during your evaluation, be alert to life-threatening conditions. If you identify one, intervene immediately and activate the ERS.

Clinical Signs		Hypovolemic Shock	Distributive Shock	Cardiogenic Shock	Obstructive Shock
A	Patency	Airway open and maintainable/not maintainable			
	Respiratory rate	Increased			
B	Respiratory effort	Normal to increased		Labored	
	Breath sounds	Normal	Normal (± crackles)	Crackles, grunting	
Systolic blood pressure		<b>Compensated Shock → Hypotensive Shock</b>			
Pulse pressure		Narrow	Wide	Narrow	
Heart rate		Increased			
C	Peripheral pulse quality	Weak	Bounding or weak	Weak	
	Skin	Pale, cool	Warm or cool*	Pale, cool	
	Capillary refill	Delayed	Variable	Delayed	
	Urine output	Decreased			
D	Level of consciousness	Irritable early Lethargic late			
E	Temperature	Variable			

Figure 22. Recognition of Shock Flowchart

## Fundamentals of Shock Management

### Management of Shock Emergencies Flowchart

Figure 23 outlines general management of shock and specific management according to the type of circulatory problem. Please note that this chart does not include all circulatory emergencies; it provides key management strategies for a limited number of conditions.

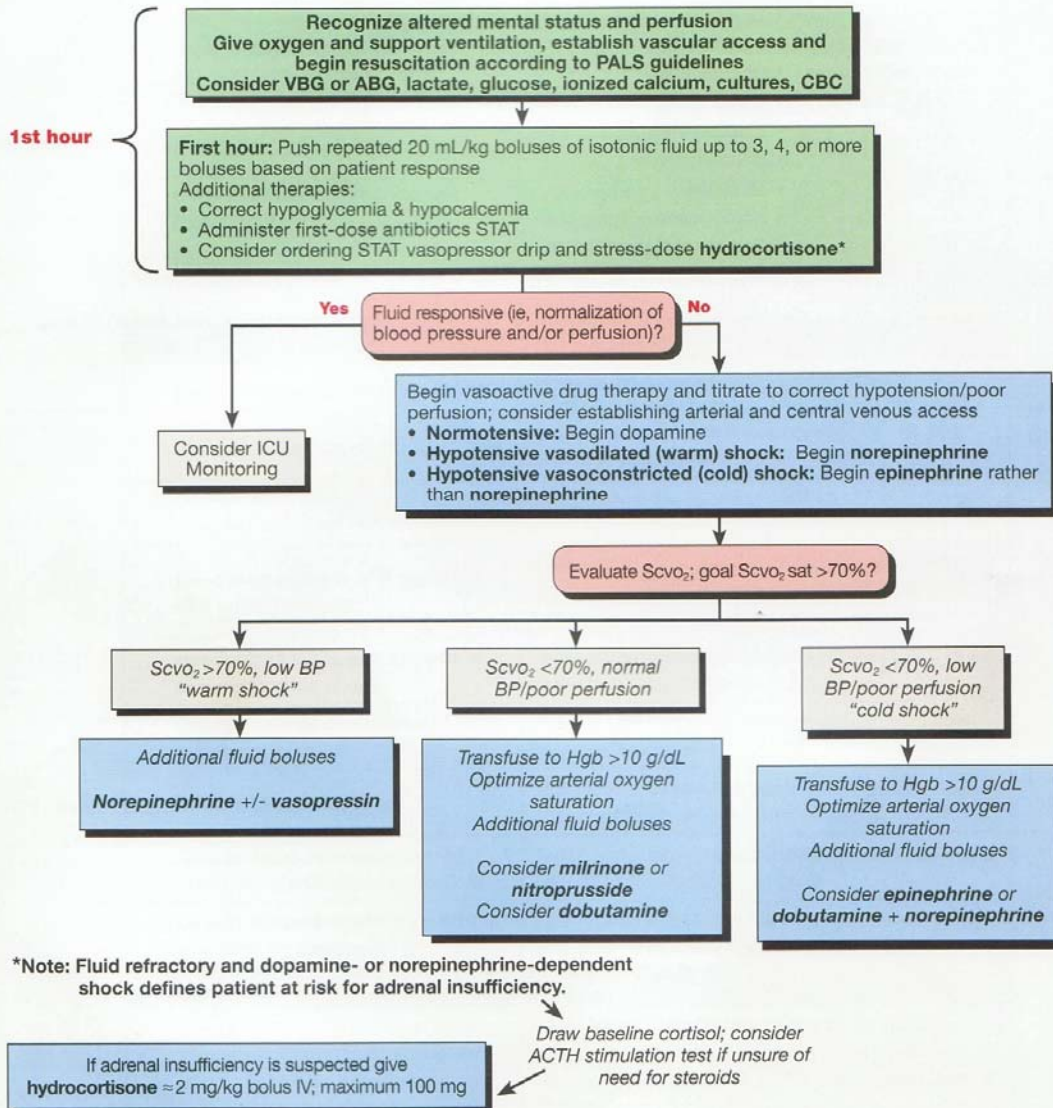
Management of Shock Emergencies Flowchart			
<ul style="list-style-type: none"> <li>• Oxygen</li> <li>• Pulse oximetry</li> <li>• ECG monitor</li> <li>• IV/IO access</li> <li>• BLS as indicated</li> <li>• Bedside glucose</li> </ul>			
Hypovolemic Shock			
Specific Management for Selected Conditions			
Nonhemorrhagic		Hemorrhagic	
<ul style="list-style-type: none"> <li>• 20 mL/kg NS/LR bolus, repeat as needed</li> <li>• Consider colloid after 3rd NS/LR bolus</li> </ul>		<ul style="list-style-type: none"> <li>• Control external bleeding</li> <li>• 20 mL/kg NS/LR bolus repeat 2 or 3x as needed</li> <li>• Transfuse PRBCs as indicated</li> </ul>	
Distributive Shock			
Specific Management for Selected Conditions			
Septic	Anaphylactic	Neurogenic	
Management Algorithm: <ul style="list-style-type: none"> <li>• Septic Shock</li> </ul>	<ul style="list-style-type: none"> <li>• IM epinephrine (or auto-injector)</li> <li>• Antihistamines</li> <li>• Corticosteroids</li> <li>• Epinephrine infusion</li> <li>• Albuterol</li> </ul>	<ul style="list-style-type: none"> <li>• 20 mL/kg NS/LR bolus, repeat PRN</li> <li>• Vasopressor</li> </ul>	
Cardiogenic Shock			
Specific Management for Selected Conditions			
Bradycardia/Tachycardia		Other (eg, CHD, Myocarditis, Cardiomyopathy, Poisoning)	
Management Algorithms: <ul style="list-style-type: none"> <li>• Bradycardia</li> <li>• Tachycardia with poor perfusion</li> </ul>		<ul style="list-style-type: none"> <li>• 5 to 10 mL/kg NS/LR bolus, repeat PRN</li> <li>• Vasoactive infusion</li> <li>• Consider expert consultation</li> </ul>	
Obstructive Shock			
Specific Management for Selected Conditions			
Ductal-Dependent (LV Outflow Obstruction)	Tension Pneumothorax	Cardiac Tamponade	Pulmonary Embolism
<ul style="list-style-type: none"> <li>• Prostaglandin E<sub>1</sub></li> <li>• Expert consultation</li> </ul>	<ul style="list-style-type: none"> <li>• Needle decompression</li> <li>• Tube thoracostomy</li> </ul>	<ul style="list-style-type: none"> <li>• Pericardiocentesis</li> <li>• 20 mL/kg NS/LR bolus</li> </ul>	<ul style="list-style-type: none"> <li>• 20 mL/kg NS/LR bolus, repeat PRN</li> <li>• Consider thrombolytics, anticoagulants</li> <li>• Expert consultation</li> </ul>

Figure 23. Management of Shock Emergencies Flowchart.

## PALS Septic Shock Algorithm



Study the PALS Septic Shock Algorithm (Figure 24) to prepare for the course. You may be presented with a septic shock scenario during the case simulations and core case tests. For a complete explanation of this algorithm, see the Management of Shock chapter in the Provider Manual.



Modified from Parker MM, Hazelzet JA, Garcillo JA. Pediatric considerations. Crit Care Med. 2004;32:S591-S594.

**Figure 24.** PALS Septic Shock Algorithm.