

Water and Electrolytes

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Shock

Hypovolemic

**AGE- DI- DM-
Adrenal insufficiency-
Blood Loss**

Distributive

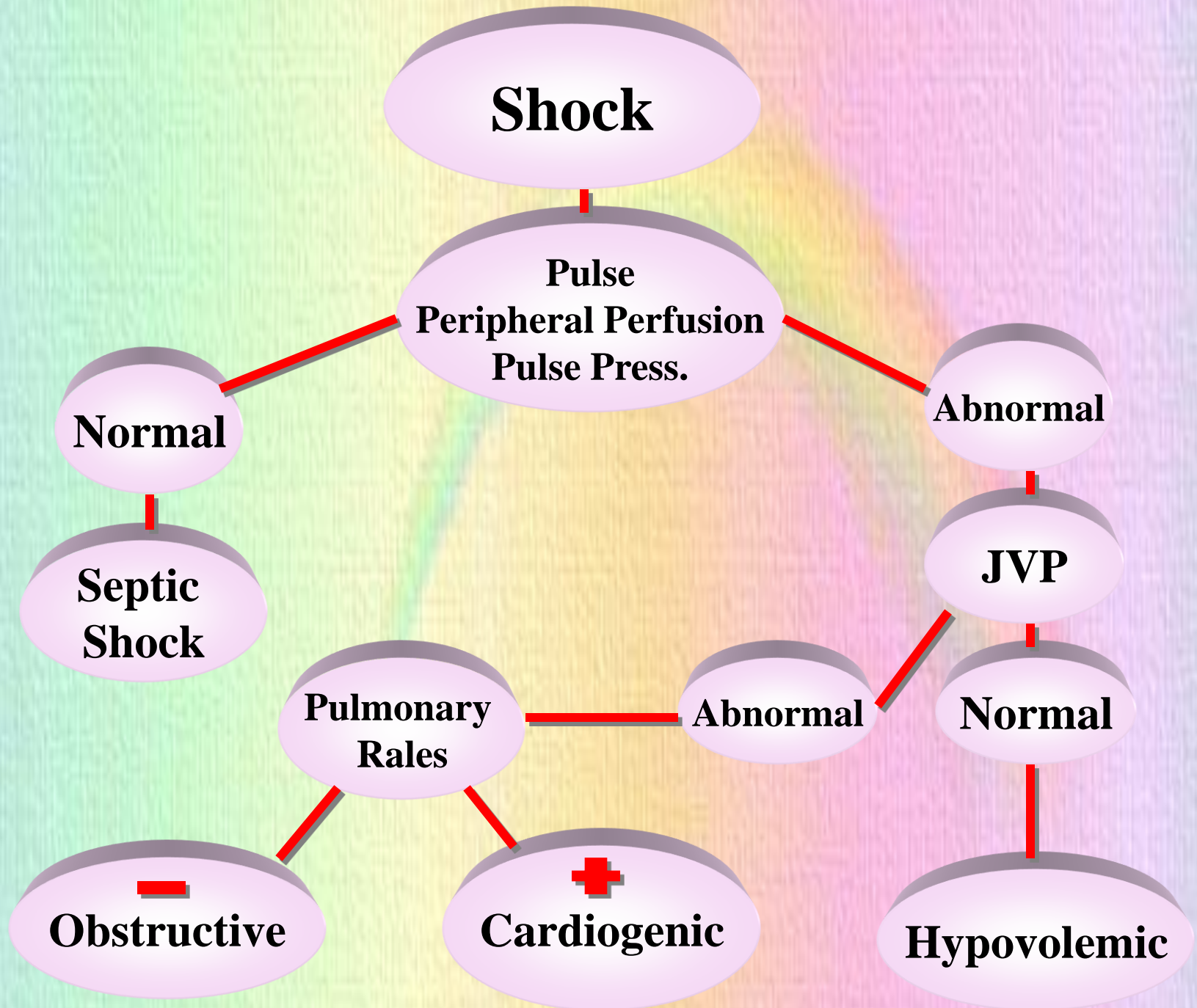
**Sepsis- Drug intoxication-
CNS/ Spinal injury-
Anaphylaxis**

Cardiogenic

**CHF- Arrhythmia-
Myocarditis**

Obstructive

**Tamponad- Pulm. Emboli-
Pneumothorax-
Cardiac Tumor**



Management

Oxygenation (early elective ventilation)

Hypothermia

Electrolyte balance

Acid base balance

Fluid resuscitation

Drugs

Intravenous fluids

HCT < 33%

HCT > 33%

Whole blood

Crystalloids

Crystalloids

- 0.9% Sodium chloride (Hyperchloremic metabolic acidosis)
- Ringer's Lactate
- Hypertonic saline 3% - 7.5% (in head injury and ICP raised)

20 ml/Kg in 10-30 min

Monitoring

- **Capillary refill**
- **Blood pressure**
- **Urine out put**
- **Central venous pressure**



Acid base disturbances

Metabolic Acidosis

Anion Gap

Normal

GI Loss

RTA

Intoxication

Ammonium chloride

acetazolamide

Renal failure

High

Lactic Acidosis

Ketoacidosis

Drugs and Toxins

Uremia

Inborn error of

Metabolism

Metabolic Acidosis

- **History**
- **Physical Examination**
- **Routine Lab Tests**

Bicarbonate Calculation

HCO₃ deficit × Space of Bicarbonate

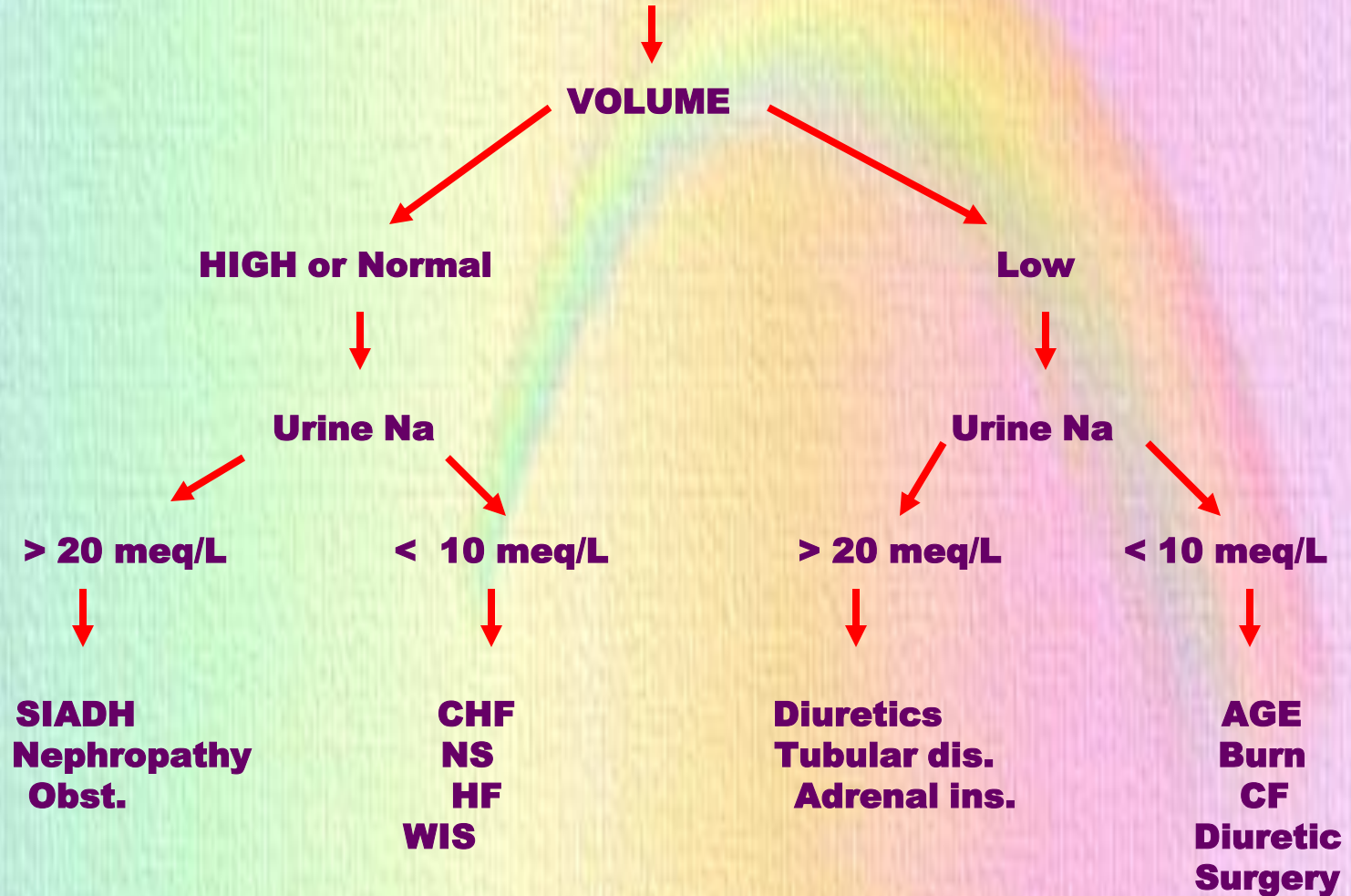
$$\text{(Target HCO}_3\text{ - Actual HCO}_3\text{)} \times \mathbf{K} \times \mathbf{BW}$$

Hyponatremia

Hyponatremia

- **Decreased Volume**
 - Extrarenal Loss**
 - Renal Loss**
- **Increased Volume**

TRUE HYPONATREMIA

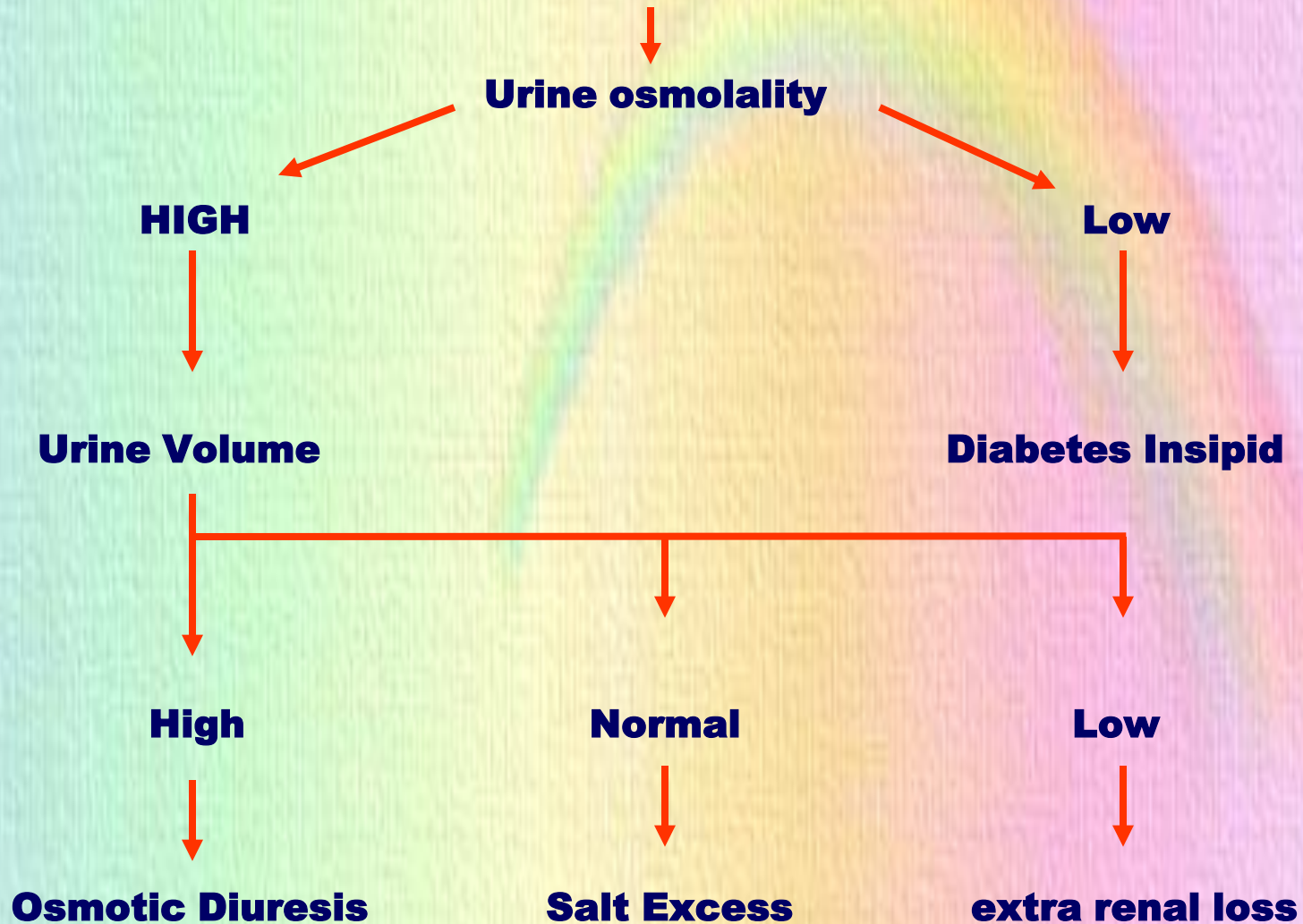


TREATMENT

1. Hyponatremia (Na < 120) & Severe Hypovolemia
2. Hyponatremia “ & Seizure
3. Hyponatremia “ & Neurologic symptoms
4. Hyponatremia “ \bar{S} Symptom
5. Hyponatremia (Na=120 – 130)
6. Hyponatremia & Hypervolemia

Hypernatremia

HYPERNATREMIA



DURATION

$$\text{TIME (hr)} = 2 \times (\text{Na p} - 140)$$

Treatment

- **Na[↑] + Sever Dehydration = Rehydration**
- **Free Water Formula**
- **Salt Excess = Free Water + Diuretics**
- **Control of BS, Ca, K**
- **Start Pb.**