



# **Dopamine versus norepinephrine infusion in management of septic Shock in critically ill patients**

*Thesis*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لسببائك لا علم لنا

إلا ما علمتنا إنك أنت

العليم العظيم

صدقة الله العظيم

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## *List of abbreviations*

<b>ABG</b>	Arterial blood gases
<b>ACCCM</b>	American colleague of critical care medicine
<b>ACLS</b>	Advanced cardiovascular life support
<b>ADHD</b>	Attention- deficit hyperactivity disorders
<b>AKI</b>	Acute kidney injury
<b>ALDH</b>	Aldehyde dehydrogenase
<b>ALI</b>	Acute lung injury
<b>ANC</b>	Absolute neutrophil count
<b>ARDS</b>	Acute respiratory distress syndrome
<b>ARF</b>	Acute renal failure
<b>BP</b>	Blood pressure
<b>CI</b>	Confidence interval
<b>CIRCI</b>	Critical illness related corticosteroids insufficiency
<b>CNS</b>	Central nervous system
<b>CO</b>	Cardiac output
<b>COMT</b>	Catechol-O-methyl transferase
<b>CRRT</b>	Continuous renal replacement therapy
<b>CVP</b>	Central venous pressure
<b>DA</b>	Dopamine
<b>DB</b>	Dobutamine
<b>DBP</b>	Diastolic blood pressure
<b>DIC</b>	Disseminated intravascular coagulation
<b>DM</b>	Diabetes mellitus
<b>DO<sub>2</sub></b>	Oxygen delivery
<b>DOPAC</b>	3,4- Dihydroxyphenylacetic acid
<b>DOPAL</b>	3,4- Dihydroxyphenyllactaldehyde
<b>DX</b>	Dopexamine
<b>ED</b>	Emergency department
<b>EN</b>	Enteral nutrition
<b>EN</b>	Epinephrine
<b>EPIC II</b>	The latest European prevalence of infection in intensive care
<b>GCS</b>	Glasgow coma scale

## *List of abbreviations (cont...)*

<b>H2RA<sub>s</sub></b>	Histamine2 receptor antagonist
<b>HBP</b>	Heparin binding protein
<b>HPA</b>	Hypothalamic – pituitary – adrenal
<b>HR</b>	Heart rate
<b>ICU</b>	Intensive care unit
<b>INR</b>	International normalized ratio
<b>IVO 2</b>	Index of oxygen uptake
<b>LB</b>	Lewy bodies
<b>LBP</b>	Lipopolysaccharide binding protein
<b>LC</b>	Locus coeruleus
<b>LPS</b>	Lipopolysaccharide
<b>MAO</b>	Mono-amine oxidase
<b>MAP</b>	Mean arterial pressure
<b>MDD</b>	Major depressive disorders
<b>MHPG</b>	3-methoxy-4-hydroxyphenylglycol
<b>MODS</b>	Multiple organ dysfunction syndrome
<b>MPAP</b>	Mean pulmonary artery pressure
<b>NE</b>	Norepinephrine
<b>NO</b>	Nitric oxide
<b>NT</b>	Nutritional therapy
<b>PAE</b>	Platelet activating factor
<b>PE</b>	Phenylephrine
<b>PEEP</b>	Positive end expiratory pressure
<b>PIF</b>	Prolactin inhibiting factor
<b>PIH</b>	Prolactin inhibiting hormone
<b>PN</b>	Parenteral nutrition
<b>PPI<sub>s</sub></b>	Proton pump inhibitors
<b>PRBC</b>	Packed of red blood cells
<b>QSOFA</b>	Quick sequential organ failure assessment
<b>RCT<sub>s</sub></b>	Randomize controlled trials
<b>ROSC</b>	Return of spontaneous circulation
<b>RVEF</b>	Right ventricular ejection fraction

## *List of abbreviations (cont...)*

<b>SAFE</b>	Saline versus albumin fluid evaluation
<b>SAM-e</b>	S-adenosyl-L-methionine
<b>SBP</b>	Systolic blood pressure
<b>Scvo2</b>	Central venous oxygen
<b>SD</b>	Standard deviation
<b>Sepsis-3</b>	The third international consensus definition for sepsis
<b>SIRS</b>	Systemic inflammatory response syndrome
<b>SMD</b>	Standard mean difference
<b>SOAP II</b>	Sepsis occurrence in actually ill patients II
<b>SOFA</b>	Total sequential organ failure assessment
<b>Svo2</b>	Mixed venous oxygen saturation
<b>SVR</b>	Systemic vascular resistance
<b>SVRI</b>	Systemic vascular resistance index
<b>TAAR1</b>	Trace amine – associated receptor 1
<b>TP</b>	Terlipressin
<b>UOP</b>	Urinary output
<b>VAP</b>	Ventilator associated pneumonia
<b>VP</b>	Vasopressin
<b>WBC</b>	White blood cells

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**Abstract:** Background: Sepsis is a clinical syndrome of life-threatening organ dysfunction caused by a dysregulated response to infection. In septic shock, there is a critical reduction in tissue perfusion; acute failure of multiple organs, including the lungs, kidneys, and liver. **Aim of the Work:** is to determine the clinical outcome of dopamine versus norepinephrine infusion in management of shock in critically ill patients. **Patients And Methods:** this prospective comparative double-blinded study was conducted at intensive care units of Ain shams university and Mansoura University, from January 2018 to June 2018. After obtaining approval of the study protocol from the local ethical committee, as well as fully informed written consents signed by the patients' closet relatives, 50 patients admitted at ICU with septic shock. **Results:** Norepinephrine infusion is more preferred than dopamine infusion in patients with septic shock in improving tissue perfusion as regarding MAP, HR, UOP. Dopamine is associated with more arrhythmic events. **Conclusion:** norepinephrine was more effective and reliable than dopamine in achieving the goal. Moreover, norepinephrine showed no adverse effects on peripheral blood flow or on renal blood flow, as was evidenced by normalization of urine output in patients on norepinephrine infusion.



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# Introduction

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## **INTRODUCTION**

Sepsis is a clinical syndrome of life-threatening organ dysfunction caused by a dysregulated response to infection. In septic shock, there is a critical reduction in tissue perfusion; acute failure of multiple organs, including the lungs, kidneys, and liver. Common causes include many different species of gram-positive and gram-negative bacteria. Immunocompromised patients may have uncommon bacterial or fungal species as a cause. Signs include fever, hypotension, oliguria, and confusion. Diagnosis is primarily clinical combined with culture results. Early recognition and treatment is critical. Treatment is aggressive fluid resuscitation, antibiotics, surgical excision of infected or necrotic tissue and drainage of pus, and supportive care (*Singer et al., 2016*).

The administration of fluids, which is the first-line therapeutic strategy, is often insufficient to stabilize the patient's condition, and vasopressors agents are frequently required to correct hypotension (*Sakr et al., 2006*). Among the most frequently used agents are dopamine and norepinephrine. Both dopamine and norepinephrine affect the alpha-adrenergic and beta-adrenergic receptors, though to varying degrees. The effects of alpha-adrenergic receptors lead to increased vascular tone. However, it could

decrease the cardiac output as well as the regional flow of blood, particularly in cutaneous, renal, and splanchnic bed (*Finfer et al., 2013*).

Dopamine is an  $\alpha$ - and  $\beta$ -adrenergic agonist that also stimulates dopaminergic receptors DA1 and DA2. DA1 stimulation causes renal and visceral vasodilation in healthy animals and humans; DA2 stimulation inhibits norepinephrine reuptake at the synapse. In healthy humans, the effects of dopamine are dosage dependent. At lower dosages (1 to 3  $\mu\text{g}/\text{kg}/\text{min}$ ), it dominates the dopaminergic, at medium dosages (3 to 10  $\mu\text{g}/\text{kg}/\text{min}$ ), it dominates the  $\beta$ 1-adrenergic, at higher dosages it dominates the  $\alpha$ 1- adrenergic effect (10 to 20  $\mu\text{g}/\text{kg}/\text{min}$ ) (*Tabaee et al., 2003*).

The recommended doses of norepinephrine are 0.10 to 0.15  $\mu\text{g}/\text{kg}/\text{min}$  (*Annane et al., 2007*).



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## **Aim of work**

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## **AIM OF THE WORK**

The aim of this study is to determine the clinical outcome of dopamine versus norepinephrine infusion in management of septic shock in critically ill patients.