

1. Introduction and who guideline applies to

This guidance is intended for use in adult patients in the Emergency Department, with a likely diagnosis of sepsis, and who are hypotensive despite initial fluid resuscitation.

Use of peripheral norepinephrine may help reduce mortality, and is supported by the Surviving Sepsis Campaign. ^[1]

Drug administration is based on guidance from the UK Intensive Care Society. ^[2]

2. Guideline standards and procedures

Staff required:

- ICU consultant (to make initial decision about patient suitability for treatment)
- DART nurse, trained in use of noradrenaline infusions (to set up and oversee infusion therapy)
- ICU or anaesthesia junior medical staff (to support DART nurse as needed)

Suitable Emergency Department patients (ALL criteria must be met):

- Adults with suspicion of sepsis or septic shock
AND
- Hypotensive with SBP \leq 90mmHg despite 30ml/kg fluid resuscitation
AND
- Escalation to an intensive care unit (directly or via an operating theatre) for ongoing organ support has been **approved to be in patient's best interest by a consultant in intensive care medicine**

Intravenous Access:

- 20 gauge or larger non-ported cannula.
- Sited in arm, proximal to wrist, not crossing a joint (wrist or elbow).
- Avoid sites where more than 1 attempt at venepuncture has been made.
- Ensure backflow of blood following insertion.
- Ensure cannula flushes easily with 5-10ml of 0.9% sodium chloride.
- Apply dressing to allow clear view of insertion site.
- Second IV access **must** be available as contingency and for fluid and administration of other drugs.

Preparing and commencing Noradrenaline infusion:

- **Add 4mg Noradrenaline to a 250ml bag of 0.9% sodium chloride** to produce a final concentration of 16 microgram/ml.
- *Due to industry published variance in fill volumes of fluid bags, it is not necessary to withdraw an equivalent volume, before adding noradrenaline.*
- The infusion must be delivered via an **infusion pump**.
- Attach to a **dedicated cannula**, inserted as outlined above.
- Other infusions or boluses **must not** be administered concurrently via a Y-site. This prevents inadvertent bolusing of noradrenaline.
- Start infusion at a rate equivalent to **0.05micrograms/kg/min**.
- A typical 70kg adult will require **13mls/hr to start** with. If obese, use Ideal Body Weight and rapidly titrate to response. Do not delay initiation to weigh the patient.
- *See Appendix 1 for equivalent weight based starting rates.*
- **Titrate infusion rate to target SBP of 100-130mmHg**
- Do not exceed **maximum rate of 30ml/hr** (consult ICU medical team for advice).
- **Maximum duration = 6 hours**. Aim to wean or replace with an infusion via a central venous access device during this time.
- **Caution when transitioning between strengths of infusion.** *See Appendix1 for advice on converting rates.*
- **After discontinuation, the peripheral cannula must be flushed** with 0.9% sodium chloride at a rate equivalent to final infusion rate.

Patient monitoring:

- Continuous ECG, SpO2, and HR monitoring.
- Non-invasive BP should be measured at 5-minute intervals until SBP in target range for 3 successive measurements. Extend interval to 15 minutes thereafter.
- NEWS2 should be recorded at 15-30 minute intervals.
- Cannula insertion site should be monitored at 15-30 minute intervals for signs of extravasation, including: *pain; burning; discomfort; swelling; discoloration/pallor; resistance or absence of free flow*. **See below for management.**
- Observations should be recorded on the anaesthetic observation chart.
- Invasive arterial BP monitoring should be considered at the earliest opportunity.

Managing Extravasation ^[3]:

- **Stop noradrenaline infusion immediately.**
- **Aspirate** the cannula, try to draw back about 3-5ml of blood.
- **Seek ICU medical team advice**
- **Remove** the cannula and **mark** the extravasation area with a pen.
- Apply **cold pack** for 30 minutes and **hydrocortisone** 1% cream.
- Consider topical vasodilator therapy (eg GTN)
- Complete incident report via **Datix**

Abbreviations used:

SBP = systolic blood pressure

HR = heart rate

BP = Blood Pressure

NEWS2 = national early warning score

ECG = electrocardiogram

GTN = glyceryl trinitrate

SpO2 = oxygen saturations

3. Education and Training

IV competencies; DART specific training session on peripheral noradrenaline

4 . Monitoring and Audit Criteria

| What will be measured to monitor compliance | How will compliance be monitored | Monitoring Lead | Frequency | Reporting Arrangements |
|--|---|------------------------|------------------|---|
| Patient outcomes, DATIX reports. | Audit | Dr John Parker | Yearly | Sepsis Working Party ITAPS Q&S Board |

5. Supporting Documents and Key References

1. <https://www.sccm.org/Clinical-Resources/Guidelines/Guidelines/Surviving-Sepsis-Guidelines-2021>
2. https://www.ics.ac.uk/Society/Guidance/PDFs/Vasopressor_Agents_in_Adult_ICU
3. <https://medusa.wales.nhs.uk/Docs/TreatmentSummaryPoster.pdf>

APPENDIX 1:

Starting Rates of PERIPHERAL Noradrenaline According to Weight:

| Weight (Kg) | 0.05 micrograms/kg/min in mL/hr of 16 micrograms/mL (4mg in 250mL sodium chloride 0.9%) |
|--------------------|--|
| 35 | 6.5 |
| 40 | 7.5 |
| 45 | 8 |
| 50 | 9 |
| 55 | 10 |
| 60 | 11 |
| 65 | 12 |
| 70 | 13 |
| 75 | 14 |
| 80 | 15 |
| 85 | 16 |
| 90 | 17 |
| 95 | 18 |
| 100 | 19 |

Calculating equivalent rates, when converting from PERIPHERAL concentration to CENTRAL concentrations:

| From (peripheral) | To (central) | Action |
|--------------------------|----------------------------|------------------------------|
| 16 micrograms/mL | 80 micrograms/mL (SINGLE) | DIVIDE peripheral rate by 5 |
| 16 micrograms/mL | 160 micrograms/mL (DOUBLE) | DIVIDE peripheral rate by 10 |
| 16 micrograms/mL | 320 micrograms/mL (QUAD) | DIVIDE peripheral rate by 20 |