LOCAL CLINICAL GUIDELINE: METARAMINOL

<table>
<thead>
<tr>
<th>CLINICAL GUIDELINE TITLE</th>
<th>Metaraminol peripheral infusion</th>
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</table>

1) SUMMARY
Metaraminol is an intravenous vasopressor used to increase systolic and diastolic blood pressures. This guideline is to allow the use of metaraminol infusions in theatre recovery and on Charles Pannett HDU for the short term management of hypotension secondary to epidural anaesthesia. This will avoid patients, who are otherwise well, requiring a central line in order to be given noradrenaline.

2) INTRODUCTION
Metaraminol is commonly used by anaesthetists to counteract the drop in systemic vascular resistance induced by epidural and spinal anaesthetics and by general anaesthetics. It is given as a peripheral infusion and can be bolused. However if the hypotension persists after theatre the metaraminol is often changed to norepinephrine (noradrenaline) which must be given through a central line. Metaraminol can be given peripherally so removes the need for central access. Metaraminol infusion is only to be prescribed after consultation with an anaesthetic consultant or senior registrar (ST 5-7). It can only be given if the cause of the hypotension is clearly secondary to the epidural anaesthetic.

3) DEFINITIONS
Metaraminol is a synthetic sympathomimetic amine which predominantly acts as an agonist at alpha 1 adrenoceptors. It also has some weak indirect and beta receptor activity which is not noticeable clinically.

Activation of alpha1 receptors results in near-instant peripheral vasoconstriction and consequently a rise in arterial blood pressure. Unlike ephedrine it does not exhibit tachyphylaxis (i.e. dose increase to maintain the same effect).

<table>
<thead>
<tr>
<th>PHARMACODYNAMICS</th>
<th>EFFECTS</th>
<th>CLINICAL SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CIRCULATION</strong></td>
<td>Increases both systolic and diastolic blood pressure&lt;br&gt;Increases pulmonary vascular resistance&lt;br&gt;Reduces heart rate&lt;br&gt;Can reduce cardiac output</td>
<td>Rise in blood pressure&lt;br&gt;Reflex bradycardia especially if bolused&lt;br&gt;Can trigger pulmonary oedema</td>
</tr>
<tr>
<td><strong>DISABILITY</strong></td>
<td>Reduces cerebral bloodflow&lt;brIncreases cerebral perfusion pressure</td>
<td>Negligible&lt;br&gt;Often used safely in neurosurgical operations</td>
</tr>
<tr>
<td><strong>OTHER</strong></td>
<td>Can reduce renal bloodflow&lt;brReduces insulin secretion&lt;brCan increase body temperature</td>
<td>Be careful if renal perfusion is already compromised&lt;brMay increase blood glucose</td>
</tr>
</tbody>
</table>
**Physical characteristics**

Metaraminol is presented as a clear, colourless solution in 1ml ampoules. Each ampoule contains 10mg of metaraminol tartrate. The standard dilution is to produce a final solution containing 0.5mg/ml (i.e. one ampoule in 20mls 0.9% sodium chloride or two ampoules in 40mls of 0.9% sodium chloride). The reconstituted drug is stable for up to 24hrs.

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**Differences with Noradrenaline**

<table>
<thead>
<tr>
<th>METARAMINOL</th>
<th>NORADRENALINE</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="METARAMINOL molecule" /></td>
<td><img src="image" alt="NORADRENALINE molecule" /></td>
</tr>
<tr>
<td>Less potent</td>
<td>More potent</td>
</tr>
<tr>
<td>Can be bolused safely</td>
<td>Cannot be bolused</td>
</tr>
<tr>
<td>May cause vasospasm</td>
<td>No evidence of vasospasm</td>
</tr>
<tr>
<td>Can be given peripherally</td>
<td>Must be given centrally</td>
</tr>
<tr>
<td>Routine syringe change</td>
<td>Must be 'double pumped'</td>
</tr>
</tbody>
</table>

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**4) SCOPE:**

On the St Mary's site this will only be used in the following locations for patients with hypotension secondary to epidural anaesthetic:

- Charles Pannett HDU
- QEQM theatre recovery
- Surgical Innovation Centre (ISIC) theatre recovery
5) QUICK GUIDELINE

**Indication:** for hypotension secondary to epidural infusion if no central line is in situ

**Draw up drug**
Add 2 ampoules of neat metaraminol (20mg) to 38ml of 0.9% sodium chloride
Label syringe and line, attach to pump and dedicated cannula

- Consider ending infusion
  - **YES**
  - **NO**
- Is rate 1-2mls/hr?
  - **NO**
  - Is rate more than 20mls/hr or higher than prescribed maximum?
    - **YES**
    - **NO**
  - **YES**
    - **NO**
    - **YES**
- **YES**
- **NO**

**Start infusion at prescribed rate**

**Assess VIP score and record obs after 10-15min**

- Target BP achieved?
  - **YES**
  - **NO**
  - **YES**
  - **NO**

- Increase or decrease infusion rate by 1-2mls as appropriate

**IF Patient becomes unwell**
Inform doctor on HDU and anaesthetist on bleep 1201

- **YES**
  - Continue current rate
  - Reassess every 30min

- **NO**
  - Continue infusion at current rate
  - Inform doctor on HDU and anaesthetist on bleep 1201
FULL GUIDELINE

Indications: Hypotension secondary to epidural anaesthetic infusion

Contra-indications: If the cause of the hypotension is not clearly due to the epidural.

It is important that the metaraminol infusion does not mask the following:

- Sepsis
- Hypovolaemia
- Cardiogenic shock
- Hypotension secondary to arrhythmias
- Severe ischaemic heart disease or cardiomyopathy
- And other potentially fatal causes of hypotension

Caution: Patient on anti-arrhythmics especially beta blockers and digoxin
Patient on monoamine oxidase inhibitors or tricyclic antidepressants

Contra-indications: Hypersensitivity to metaraminol, including sulphites (more prevalent in patients with asthma). Patient on the antibiotic linezolid which is a reversible MAOI.

Metaraminol infusion should only be prescribed and continued under the instruction of a consultant anaesthetist or senior registrar (ST5-7) either responsible for the patient or on call. The prescription must be reviewed every 24 hours by the consultant anaesthetist on call or the consultant anaesthetist responsible for the patient. At St Mary’s the anaesthetist carrying bleep 1201 will be the point of contact for this. Dr Alison Knaggs, consultant anaesthetist(mobile via switchboard), must be informed that this infusion is being used so that this usage can be audited.

The prescription should include the following details:

- Date
- Drug name and dose
- Diluent and volume
- Target mean arterial or systolic blood pressure
- Starting infusion rate (if not already running)
- Range of acceptable infusion rates

For example:
Metaraminol 20mg in 40mls of sodium chloride 0.9%
Target mean arterial blood pressure of 80mmHg
Start at 6 mls/hr
Maximum infusion rate 20mls/hr
Preparing the infusion

1. Check patient details and prescription
2. Prepare equipment using ANTT: drug, diluent, needles, labels, 50ml syringe, IV extension line, pump
3. Draw up 38mls of 0.9% sodium chloride into the 50ml syringe
4. Add 2 ampoules (20mg) of metaraminol to make a total of 40mls
5. Label the syringe appropriately, connect & prime the line, load onto pump
6. Peripheral cannula:
   a. a dedicated cannula must be used
   b. cannula must not be sited in a very small, threadlike vein.
7. Final check before connecting to patient and starting at prescribed rate
8. Patient must have an arterial line in situ for first 24 hours of infusion or for longer if blood pressure is very labile or the nursing staff request it.

Monitoring a metaraminol infusion

Titration to target blood pressure

The infusion rate of metaraminol can be increased or decreased every 15min by 2-3ml/hr to achieve the target blood pressure specified on the prescription. Changes to the rate should be documented (in mls/hr) on the HDU chart the same as for noradrenaline. Sudden changes to dose requirements should be reported both to the doctor in charge of the patient and to the anaesthetist carrying 1201.

Bolusing metaraminol

Unlike noradrenaline, metaraminol can be bolused by a doctor experienced in its use. Anaesthetists will typically bolus about 1ml (0.5 mg) depending on the patient’s physiology and then increase the infusion rate to maintain the effect. Outside theatres metaraminol must not be bolused by anyone except an anaesthetist or consultant familiar with the drug as it can cause marked hypertension and bradycardia.

Changing the syringe

Metaraminol does not need to be 'double pumped' like noradrenaline - a short period of disconnection will not cause a big drop in blood pressure. The fresh syringe can be prepared in advance, the old one disconnected and the new one replaced within the space of 3-4min with no problems.

Patient monitoring

Blood pressure monitoring must initially be invasive. Patient should have an arterial line in situ for first 24 hours of infusion or for longer if blood pressure is very labile or the nursing staff request it.

ECG, peripheral oxygen saturations and urine output must be monitored as per HDU and recovery protocols.
**Extravasation:**

In most cases the treatment of extravasation is non-pharmacologic in nature; the efficacy of any specific approach has not been demonstrated in controlled studies. The recommended approach to the treatment of extravasation includes the following steps:

1. **Stop the infusion immediately if the patient admits to a burning sensation or complains of pain.**

2. **Call anaesthetist carrying bleep 1201 to review patient within 30 minutes.**

3. The cannula should not be removed immediately, but should be left in place to attempt aspiration of fluid from the extravasated area. Aspiration of the drug and surrounding fluid should be attempted.

4. **Infiltrate the area with phentolamine 5 to 10 mg diluted in 10 to 15 mL of sodium chloride 0.9% with a fine hypodermic syringe. Phentolamine should be given within an hour. There is minimal evidence that phentolamine will help. If it cannot be found infiltrate the area with 10 to 15 mls of Plasmalyte 148 instead.**

5. **Remove the cannula.**

6. **Elevate the affected limb to minimize swelling.**
Discontinuing a metaraminol Infusion

Planned discontinuation

When target blood pressure is consistently achieved with only 1-2mls/hour of metaraminol, the infusion can be safely discontinued. The primed line should be left connected on the pump in case the infusion needs to be restarted in the next hour, after which time the line can be disconnected and the drug discarded. The cannula should then be flushed to remove traces of residual drug.

Unexpected discontinuation

Immediately notify the doctors looking after the patient and anaesthetist carrying bleep 1201 in the event of severe hypotension.

When to change to noradrenaline

Certain situations will necessitate the insertion of a central venous line and starting administration of noradrenaline.

- If the need for vasopressors is going to exceed 48 hours
- If dose requirement is high and increasing, needing frequent syringe changes and high volumes
- If a central line is inserted for other reasons, metaraminol should be switched to noradrenaline

6) IMPLEMENTATION

Training required for staff: Yes

| If yes, who will provide training: Please give name/post | Dr Alison Knaggs, Consultant anaesthetist at St Mary’s  
Dr Daniel Horner, Service Director at Charing Cross  
Dr Philippa Borra, Service Director at Hammersmith |
| When will training be provided? Please give date | On the SMH site at CPA HDU nurse meetings and to recovery staff. Training on the other two sites will be implemented should a need for the infusion be identified. Currently there is no requirement known. |
| Date for implementation of guideline: (after the process of ratification) | |

7) MONITORING / AUDIT

When will this guideline be audited? Please give approximate date

Continually for the first year.

Who will be responsible for auditing this guideline? Please give name/post

Dr Alison Knaggs  
Consultant anaesthetist, St Mary’s Hospital  
Dr Daniel Horner, Service Director at Charing Cross  
Dr Philippa Borra, Service Director at Hammersmith
Are there any other specific recommendations for audit? | All cases must be identified to ensure that guidelines cover all eventualities and that the use of this infusion does not mask ‘sick’ patients.

8) REVIEW

| Frequency of review | Please indicate frequency of review: Every 2 years  
| Person and post responsible for the review: Dr A Knaggs |

9) REFERENCES

- Drugs in Anaesthesia & Intensive Care, 3rd edition, M Sasada & S Smith, OUP 2008
- Pharmacology for Anaesthesia & Intensive Care, 3rd edition, TE Peck et al, CUP 2008

10) GUIDELINE DETAIL

| Start Date: (date of final approval by Division) |
| Approval Dates | Enter name of Divisional group: SCCS PPRM (Q&S Committee)  
| Date of ratification: 3rd December 2014 |
| Enter name of Directorate group: |
| Date of ratification: |
| Have all relevant stakeholders been included in the development of this guideline? (Trust sites, Divisions and Directorates) | Please list all (name and role): |
| Who will you be notifying of the existence of this guidance? | Please give names/depts:  
Nursing staff on Charles Pannett HDU  
Nursing staff in theatre recoveries (QEJM and SIC) |
| Related documents (if applicable) | None |
| Authors | Dr Alison Knaggs (consultant anaesthetist), Dr Pete Williams (anaesthetic senior registrar), Dr Helgi Johannsson (chief of service for anaesthetics and ITU), Ms Depal Patel (Senior Lead Pharmacist, Surgery)  
Division: surgery, cancer and cardiovascular  
Site: St Mary’s Hospital  
Contact: Mobile via switchboard  
Trust email address: Alison.Knaggs@imperial.nhs.uk |
| Document review history (If applicable — version number, dates of previous reviews) | Next review due: December 2016 |
| THIS GUIDELINE REPLACES: (list the title of the replaced guideline, its archive location and previous versions where known) | NA |

11) INTRANET HOUSEKEEPING

| Key words | Metaraminol |
Which Division/Directorate category does this belong to?
Surgery, cancer and cardiovascular division

Which specialty should this belong to when appearing on The Source?
Anaesthetics

12) EQUALITY IMPACT OF GUIDELINE
Is this guideline anticipated to have any significant equality-related impact on patients, carers or staff?
No.

Appendix One: Clinical Guidelines – Guidance Notes for Authors
These guidelines are for staff based within Imperial College Healthcare NHS Trust.

Differences between POLICY and GUIDELINE
POLICY is expected to reflect that the content is mandatory in nature, whereas a GUIDELINE, though evidence based and agreed by peers, is intended as advisory, applicable in most cases but open to deviation should the specifics of a particular clinical situation demand it. If you are writing a Policy document, use the separate Policy template which is available on The Source within the document “Process for the Development and Management of Procedural Documents Policy”.

Model specification for a clinical guideline
The title of the guideline should be succinct and precise, reflecting the content so that title searches on the Intranet have maximum chance of succeeding. Avoid starting titles with ‘Guideline for’ or ‘Management of’ or similar phrases of introduction.
• It is good practice to include an introduction to your guideline. This can also be used to define the target audience (e.g. a junior doctor who needs to deal with a clinical problem for a few hours).
• The applicability of the guideline should be clearly stated in the introduction.
• It should be as concise and easy to use as possible and outline a step-wise approach to management, emphasizing things that are essential.
• If high quality national guidelines on a topic exist, it will generally be appropriate to adopt or adapt these. Material differences from recommendations in national guidelines should be explicitly justified.
• References to drugs should be precise and both clinically and economically optimal.
• A summary should be included if this is likely to help the user.
• The date of the final draft and a scheduled review date should be stated.
• Abbreviations should first be stated in full on their initial usage in the document
• References, if cited, should be in the form:

How to publish a guideline on The Source
Each service is encouraged to develop its own guidelines (and indeed many have already done this). Each Division can work independently on their portfolio of guidelines. Before finalising a guideline authors should seek comments on a draft from any professional group or specialty that may have an interest, e.g.
• Pathology
• Imaging
• Pharmacy
• Therapies (physiotherapy, dietetics, speech, occupational therapy)
• Nursing
• Divisional management
• Other Divisions
• A & E

The guideline should also be approved at Divisional level.

Appendix Two: Equality Impact Assessment Screening Tool

<table>
<thead>
<tr>
<th>Title of Clinical Guideline:</th>
<th>Metaraminol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division and Directorate:</td>
<td>Surgery, cancer and cardiovascular</td>
</tr>
<tr>
<td>Name of Person Responsible for this Equality Impact Assessment:</td>
<td>Dr Alison Knaggs</td>
</tr>
<tr>
<td>Date of Completion:</td>
<td>26th November 2014</td>
</tr>
</tbody>
</table>

Aims and purposes of this Clinical Guideline:
Insert a summary of the available evidence for each strand, including statistical such as percentages, as well as qualitative data, such as survey results, in the blank field in each category row. Indicate whether there is (or is likely to be) any significant impact on anyone or any group in relation to the following Equality Strands, and whether or not it is justified. Select from the following options:

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO – there is no significant impact</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethnicity/Race</th>
<th>Summary:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact:</td>
<td>Justification:</td>
</tr>
<tr>
<td>Disability</td>
<td>Summary:</td>
</tr>
<tr>
<td>Impact:</td>
<td>Justification:</td>
</tr>
<tr>
<td>Gender/Sex</td>
<td>Summary:</td>
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<tr>
<td>Impact:</td>
<td>Justification:</td>
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<tr>
<td>Religion/Belief</td>
<td>Summary:</td>
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<td>Impact:</td>
<td>Justification:</td>
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<tr>
<td>Sexual Orientation</td>
<td>Summary:</td>
</tr>
<tr>
<td>Impact:</td>
<td>Justification:</td>
</tr>
</tbody>
</table>
If further evidence is required to complete this screening tool, take steps to obtain it before proceeding with the assessment. If the review of evidence indicates that there is a significant unjustified impact in at least one category, a Full Equality Impact Assessment must be carried out.