LOCAL CLINICAL GUIDELINE

CLINICAL GUIDELINE TITLE	**Metaraminol Peripheral Infusion, V4.0**

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 units for the short term management of hypotension secondary to epidural or spinal anaesthesia, or secondary to high spinal injury. 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 also 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 will usually be given if the cause of the hypotension is clearly secondary to the epidural or spinal 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.

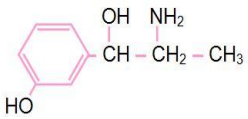
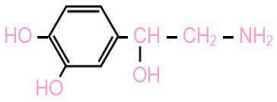
Activation of alpha1 receptors results in near-instant peripheral vasoconstriction and consequently a rise in arterial blood pressure.

PHARMCODYNAMICS	EFFECTS	CLINICAL SIGNIFICANCE
CIRCULATION	Increases both systolic and diastolic blood pressure Increases pulmonary vascular resistance Reduces heart rate Can reduce cardiac output	Rise in blood pressure Reflex bradycardia especially if bolused Rarely can trigger pulmonary oedema
DISABILITY	Reduces cerebral blood flow Increases cerebral perfusion pressure	Negligible Often used safely in neurosurgical operations
OTHER	Can reduce renal blood flow Reduces insulin secretion Can increase body temperature	Be careful if renal perfusion is already compromised May increase blood glucose

Physical characteristics

Metaraminol is presented as a clear, colourless solution in 1ml ampoules.
Each ampoule contains 10mg of metaraminol tartrate.
It must be diluted prior to use.
The standard dilution is to produce a final solution containing 0.5mg/ml.
The reconstituted drug is stable for up to 24hrs.

Differences with Noradrenaline

METARAMINOL	NORADRENALINE
	
Less potent	More potent
Can be bolused safely	Cannot be bolused
May cause vasospasm	No evidence of vasospasm
Can be given peripherally	Must be given centrally
Routine syringe change	Must be 'double pumped'

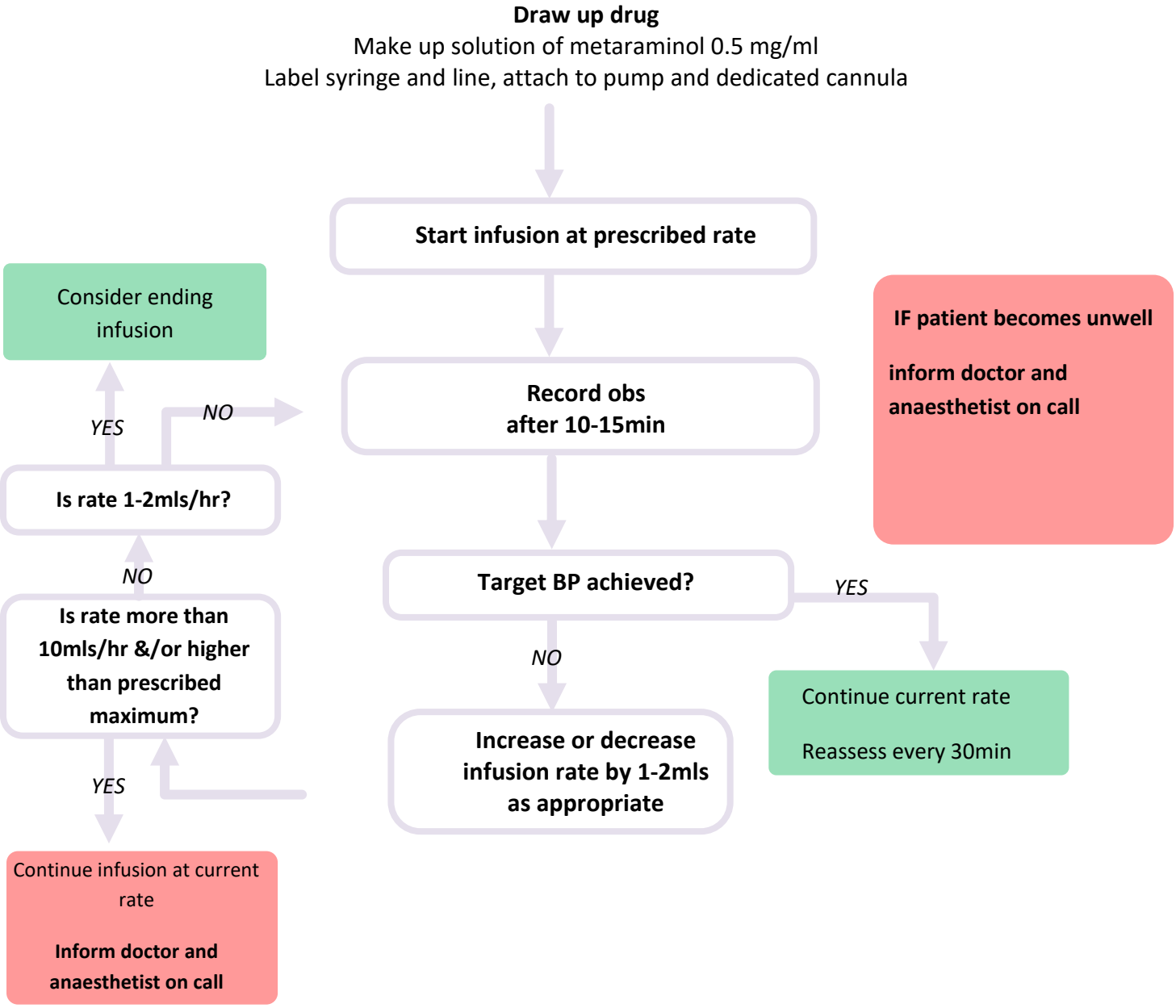
4) SCOPE:

This will only be used in the following locations for patients with hypotension secondary to neuraxial anaesthetic or to a high spinal injury. If used for any other reason these must be discussed with a senior anaesthetist please.

- St Mary's hospital: QEQM and SIC theatre recoveries
- Hammersmith main theatre recovery
- Charing Cross main theatres recovery and Riverside recovery

5) QUICK GUIDELINE

Primary indication: hypotension secondary to epidural infusion if no central line is in situ
Secondary indication: hypotension secondary to a high spinal injury



Any patient on a metaraminol infusion for more than 4 hours must be reviewed by the anaesthetist on call. This review must be conducted every four hours for as long as the patient is on metaraminol.
If the infusion has been running for more than 8 hours patient must be referred to intensive care doctors.

<u>However a judgement must be made by the anaesthetist about referring to intensive care doctors earlier rather than later especially after six o'clock in the evening.</u>

FULL GUIDELINE

Indications: Hypotension secondary to epidural anaesthetic infusion and spinal anaesthetic
Hypotension secondary to high spinal injury

Contra-indications: If the cause of the hypotension is not clearly known

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.

Duration of use: Once the epidural has been discontinued the metaraminol should be stopped also. If the patient still needs inotropic support thereafter they need medical review first.

Metaraminol infusion should only be prescribed and continued under the instruction of a consultant anaesthetist or senior registrar (ST5-7).

Any patient on a metaraminol infusion for more than 4 hours must be reviewed by the anaesthetist on call. This is to avoid missing any life-threatening condition (as listed above). This review must be conducted every four hours and thereafter as it would be extremely unusual for a patient to need this infusion and not have had a HDU bed booked for postoperative care.

If the infusion is required for more than 8 hours serious consideration must be given to transferring this patient to a level 2 environment. The discussion with the ITU must be documented in the notes. The anaesthetist on call will be responsible for the patient while they are on metaraminol or until they are discharged to a level 2 bed. The anaesthetist on call needs to ensure that this patient is reviewed by an anaesthetist every 4 hours.

If the infusion rate is increased above 10 mls/hr the patient must be reviewed within an hour both by the anaesthetist on call and by the surgeons responsible for the patient, again to avoid missing life-threatening conditions. If the patient is under 60 kg, the rate would only need to be 7 mls/hr for such a review to be necessary.

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 may need an arterial line if blood pressure is very labile or if the metaraminol requirements are increasing above 10 mls/hr. Labile means that the blood pressure fluctuates abruptly and repeatedly from low to normal or from normal to high. Fluctuations of 15% or more of the blood pressure would be considered abnormal and labile and thus warrant use of an arterial line rather than relying on frequent non-invasive blood pressure reading.

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 surgeon in charge of the patient and to the anaesthetist on call.

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 a consultant familiar with the drug as it can cause marked hypertension and bradycardia.

Changing the syringe

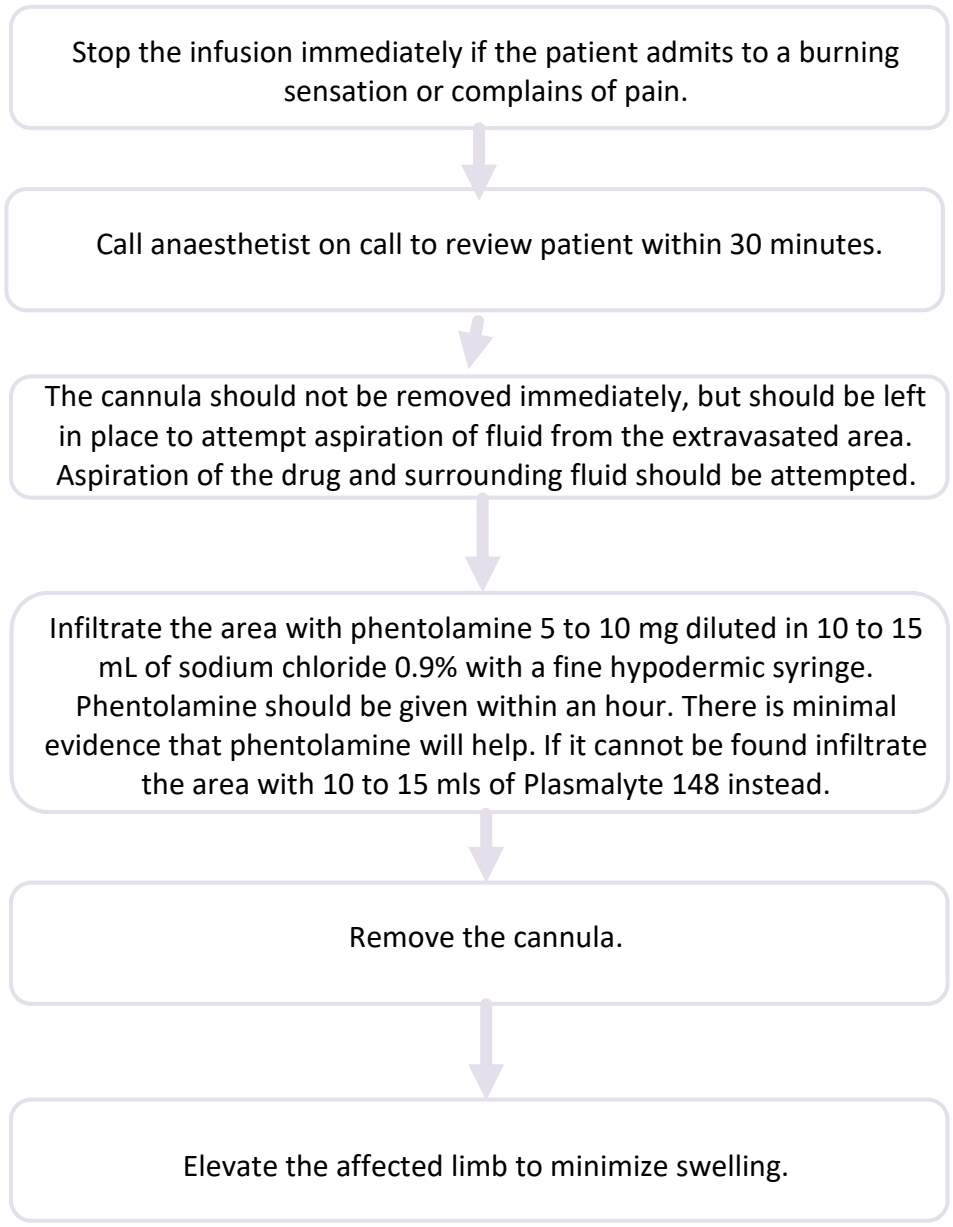
Metaraminol does not need to be 'double pumped' like noradrenaline - a short period of disconnection will not cause a big drop in blood pressure. The fresh syringe can be prepared in advance, the old one disconnected and the new one replaced within the space of 3-4 min with no problems.

Patient monitoring

Blood pressure monitoring must initially be frequent (5 minute cycles).
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:



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 fifteen minutes, after which time the line can be disconnected and the drug discarded. The cannula should then be flushed to remove traces of residual drug.

The patient may be discharged to a level one bed after the metaraminol infusion has been stopped for one hour unless the patient has been on the infusion for more than six hours. In this case the patient will need an anaesthetic review prior to discharge to a level one ward. It is very unusual for a patient to need an infusion for such a long time and not end up in a HDU. So if the infusion has been running for more than six hours it is unlikely that they will be able to be weaned successfully and discharged to a level one bed.

Unexpected discontinuation

Immediately notify the doctors looking after the patient and anaesthetist on call in the event of severe hypotension.

When to change to noradrenaline

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

- If the need for metaraminol is going to exceed 48 hours
- If dose requirement is high and increasing
- If a central line is inserted for other reasons, metaraminol can 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 for St Mary's* Hammersmith hospital: Dr P Borra Clinical Director Charing Cross hospital: Dr C Hopkins Clinical Director
When will training be provided?	On the SMH site at the request of the sister in charge of recovery, Shirlee Rufo Hammersmith hospital: Dr P Borra Clinical Director Charing Cross hospital: Dr C Hopkins Clinical Director
Date for implementation of guideline: *(after the process of ratification)*	V4, 8th August 2020

7) MONITORING / AUDIT

When will this guideline be audited? *Please give approximate date*	Intermittently if problems arise.
Who will be responsible for auditing this guideline? *Please give name/post*	Dr Alison Knaggs, Consultant anaesthetist, SMH Hammersmith hospital: Dr P Borra Clinical Director Charing Cross hospital: Dr C Hopkins Clinical Director
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 5 years* **Person and post responsible for the review:** Dr A Knaggs

9) REFERENCES

Drugs in Anaesthesia & Intensive Care, 5th edition, Edward Scarth and Susan Smith
Pharmacology for Anaesthesia & Intensive Care, 3rd edition, TE Peck et al, CUP 2008

10) GUIDELINE DETAIL

Start Date: *(date of final approval by Division)*	**8th August 2020**
Approval Dates	**Enter name of Divisional group: Surgery, cancer and cardiovascular** **Date of ratification:** 25th August 2020
	Enter name of Directorate group: Theatre and Anaesthetics Q&S Group **Date of ratification:** 8th August 2020
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:** Hammersmith hospital: Dr P Borra Clinical Director Charing Cross hospital: Dr C Hopkins Clinical Director

	Dr Simon Ashworth Clinical Director ITU at St Mary's Hospital **Nursing staff at St Mary's main theatre recovery and in SIC recovery via the Sister in charge, Shirlee Rufo**
Related documents *(if applicable)*	None
Authors	**Dr Alison Knaggs (consultant anaesthetist), Dr Pete Williams (anaesthetic consultant), 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@nhs.net
Document review history *(If applicable – version number, dates of previous reviews)*	**Next review due:** 2025
THIS GUIDELINE REPLACES: *(list the title of the replaced guideline, its archive location and previous versions where known)*	Metarminol guideline V3.0

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:
  Oxman AD et al. Users' guides to the medical literature, VI How to use an overview. JAMA 1994; 272: 1367-71.

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

Title of Clinical Guideline:	Metaraminol
Division and Directorate:	Surgery, cancer and cardiovascular
Name of Person Responsible for this Equality Impact Assessment:	Dr Alison Knaggs
Date of Completion:	26/11/2014 & 18/10/2017 & 26/02/20

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:

IMPACT	**JUSTIFICATION**
NO – there is no significant impact	

Ethnicity/Race	**Summary:**	
	Impact:	**Justification:**
Disability	**Summary:**	
	Impact:	**Justification:**
Gender/Sex	**Summary:**	
	Impact:	**Justification:**
Religion/Belief	**Summary:**	
	Impact:	**Justification:**
Sexual Orientation	**Summary:**	
	Impact:	**Justification:**
Age	**Summary:**	
	Impact:	**Justification:**
Deprivation	**Summary:**	
	Impact:	**Justification:**

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.