Worcestershire Acute Hospitals NHS Trust

Guideline on the administration of Iloprost Intravenous Infusion (For use within the vascular speciality).

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

This guideline is for use by the following staff groups:
All qualified healthcare professionals involved in the management of adult patients with vascular conditions e.g. critical limb ischemia.

Lead Clinician(s)

Rhydian Power	Specialist Pharmacist, Surgery WAHT
Approved by Vascular Governance on:	13th December 2024
Approved by Medicines Safety Committee on:	12th February 2025
Review Date: This is the most current document and should be used until a revised version is in place	12th February 2028

Key amendments to this guideline

Date	Amendment	Approved by:
12th February 2025	New Document	Vascular Governance and Medicines Safety Committee

Guideline on the administration of Iloprost Intravenous Infusion (For use within the vascular speciality).

Introduction

One of the main indications for using Iloprost within vascular is critical limb ischemia. This is a severe complication of peripheral arterial disease (PAD) which can lead to limb amputation and/or death.

Features of critical limb ischaemia/chronic limb-threatening ischaemia include:

- Chronic rest pain, which may be worse at night because of the decrease in blood pressure when asleep and the loss of beneficial gravitational effects on lower limb circulation.
- Dependent rubor (dusky red colouration of the limb), pallor (paleness) on elevation of the extremity, and reduced capillary refill.
- Skin changes including ischaemic ulcers, non-healing foot wounds, and gangrene.
  -
- Tissue loss, usually affecting the toes.
- Absent foot pulses — however, foot pulses may be palpable in distal embolisation.
  -
- A lack of intermittent claudication in the patient's history does not rule out limb ischaemia (This is when diminished circulation leads to pain in the lower limb on walking or exercise that is relieved by rest). This feature may not be apparent for example in patients with limited mobility and/or diabetic neuropathy.
  -
  -

Treatment

Iloprost is a synthetic prostacyclin analogue which inhibits platelet aggregation and produces a potent vasodilator effect. In doing so, Iloprost can facilitate the perfusion of these tissues in the body which are limited by constriction of blood vessels and improve outcomes.

Steady-state plasma levels are achieved at around 10 to 20 minutes after the start of an intravenous infusion. The steady-state plasma levels are linearly related to the infusion rate.

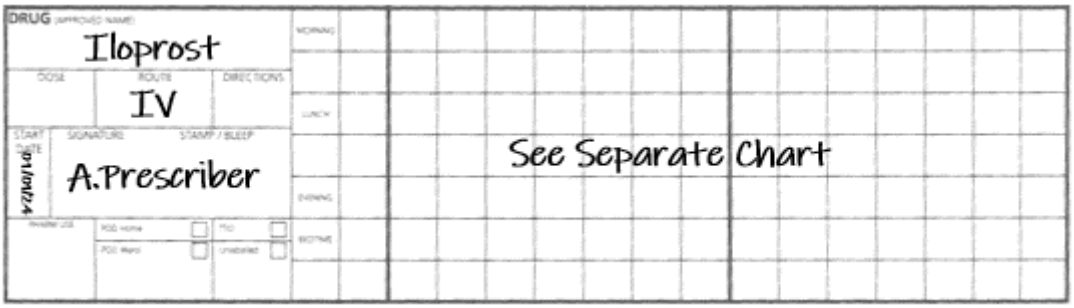
In patients with normal renal and hepatic function, the disposition of Iloprost following intravenous infusion is characterised in most cases by a two-phase profile with mean half-lives of 3 to 5 minutes and 15 to 30 minutes. The total clearance of Iloprost is about 20 mL/kg/min.

Iloprost should only be initiated on the advice of a vascular consultant and preferably administered by those who are competent to do so. This should be a ward based setting with appropriate monitoring capabilities (as discussed below).

Prescribing

Iloprost should only be prescribed for patients who can be monitored in hospital. Iloprost must be administered by a trained registered practitioner / nurse (with current competency in IV medication administration) as a course of daily intravenous infusions, each given over 6 hours, for a total of 5 days *(this duration can be extended at the discretion of the vascular consultant reviewing the patient).*

Iloprost needs to be prescribed in the regular drug section of a trust prescription chart (as demonstrated below), referring to the Intravenous Iloprost Administration and Monitoring Chart for specifics.



The Intravenous Iloprost Administration and Monitoring Charts (Appendix A) also need to be signed and dated by the prescriber (a separate chart will be required for each day of administration).

Dosing

The recommended starting dose is **0.5 nanogram/kg/min**, and can be increased as tolerated in increments of **0.5 nanogram/kg/min** every 30 minutes (*Up to a maximum of **2 nanogram/kg/min***).

The infusion should be administered over a duration of 6 hours and the rate adjusted as per patient tolerance (see Side-effects for further guidance).

In patients with renal insufficiency requiring dialysis or severe hepatic impairment, cautious initial titration with a reduced dose is required (Use HALF the normal dose).

The optimal rate (i.e. the highest tolerated dose) will be identified during the first 3 days and can be utilised for the remainder of the course without the need for further re-titration.

Although the licensing allows for the product to be used for up to 4 weeks, this is rarely undertaken in practice and has been agreed locally by the vascular consultants that a duration of 5 days is usually sufficient.

This duration may be extended beyond 5 days, but at the discretion of the vascular consultant reviewing the patient.

The tables below references doses and infusion rates for different (actual) body weights.

Table 1

Infusion rates (mL/hour) for different doses using a volumetric infusion pump

Actual Body weight (Rounded to the nearest 5kg)	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**
	Dose = 0.5 nanogram/kg/min	***Dose = 1.0 nanogram/kg/min***	***Dose = 1.5 nanogram/kg/min***	***Dose = 2.0 nanogram/kg/min***
	Infusion rate →			
40 kg	6.0 mL/hr	12.0 mL/hr	18.0 mL/hr	24.0 mL/hr
45 kg	6.8 mL/hr	13.5 mL/hr	20.3 mL/hr	27.0 mL/hr
50 kg	7.5 mL/hr	15.0 mL/hr	22.5 mL/hr	30.0 mL/hr
55 kg	8.3 mL/hr	16.5 mL/hr	24.8 mL/hr	33.0 mL/hr
60 kg	9.0 mL/hr	18.0 mL/hr	27.0 mL/hr	36.0 mL/hr
65 kg	9.8 mL/hr	19.5 mL/hr	29.3 mL/hr	39.0 mL/hr
70 kg	10.5 mL/hr	21.0 mL/hr	31.5 mL/hr	41.6 mL/hr
75 kg	11.3 mL/hr	22.5 mL/hr	33.8 mL/hr	45.0 mL/hr
80 kg	12.0 mL/hr	24.0 mL/hr	36.0 mL/hr	48.0 mL/hr
85 kg	12.8 mL/hr	25.5 mL/hr	38.3 mL/hr	51.0 mL/hr
90 kg	13.5 mL/hr	27.0 mL/hr	40.5 mL/hr	54.0 mL/hr
95 kg	14.3 mL/hr	28.5 mL/hr	41.6 mL/hr	57.0 mL/hr
100 kg	15.0 mL/hr	30.0 mL/hr	45.0 mL/hr	60.0 mL/hr
105 kg	15.8 mL/hr	31.5 mL/hr	47.3 mL/hr	63.0 mL/hr
110 kg	16.5 mL/hr	33.0 mL/hr	49.5 mL/hr	66.0 mL/hr
115 kg	17.3 mL/hr	34.5 mL/hr	51.8 mL/hr	69.0 mL/hr
120 kg	18.0 mL/hr	36.0 mL/hr	54.0 mL/hr	72.0 mL/hr

For patients outside of the weight ranges listed above and/or those not tolerating the lowest recommended rate contact your ward pharmacist for dosing advice.

Method of administration

Iloprost 100 micrograms/ml concentrate for solution for infusion is NOT ready to use and requires dilution before administration. This should be undertaken as follows:

- Dilute a 50 microgram (0.5mL) Iloprost ampoule with 250mL Sodium Chloride 0.9% (This will provide a solution with a concentration of 200nanogram/mL).
- The content of the ampoule and the diluent must be mixed thoroughly.
- For sterility and stability purposes, a fresh solution should be prepared each day just prior to administration.
- The medication should be infused via an automatic infusion pump into a peripheral vein or via a central catheter over a period of 6 hours.
- To avoid incompatibility, Iloprost should not be infused with any other medicines.
- Dose titration occurs over days 1,2 and 3, to establish the optimal rate (i.e. the highest tolerated dose).
- If the infusion is not tolerated by the patient the rate can be adjusted (see Side-effects for further guidance)
- This optimal rate will then be used from day 4 onwards until the end of treatment.
- The trusts Intravenous Iloprost Administration and Monitoring Charts (Appendix A) should be completed and the required information recorded throughout the course.
- An additional solution may need to be prepared each day to deliver the required dose (this will likely be required for those patients who receive an hourly rate of 42mL/hour or more for a prolonged period of time).
- Dispose of any unused medicinal product at the end of the infusion as per local requirements.
- Ensure appropriate precautions are in place to avoid the solution making contact with the skin or eyes. If this occurs, rinse immediately with plenty of water.

Monitoring

The patient should be monitored at the start of the infusion and subsequently at every dose adjustment. Once the patient has been established on their highest tolerated dose, hourly monitoring will be sufficient until the end of the infusion.

On day 4 onwards re-titration will not be required and therefore hourly monitoring can be undertaken.

See (Appendix A) for the Intravenous Iloprost Administration and Monitoring Charts which are intended to be used for the duration of treatment.

Side-effects

- The most common side effects include: Headaches, Facial flushing, Sweating, and Nausea/Vomiting.
- Patients may also experience:
- A decreased appetite, Diarrhoea, Abdominal discomfort/pain
- Confusion, Dizziness/Vertigo, Drowsiness, Restlessness, Nervousness, Apathy, Bradypsychia
- Hypotension or Hypertension, Angina pectoris, Tachycardia or Bradycardia, Palpitations
- Myalgia, Arthralgia, A burning sensation, Pain in jaw/Trismus, Hyperaesthesia, A pulsatile sensation, Paraesthesia
- Pyrexia, Chills, Increased Thirst.
- Infusion site reactions may also occur.

(Please see the BNF and the manufacturers SPC for a full list of potential adverse effects)

Many of the side effects listed above will usually disappear promptly with a dose reduction and/or if appropriate, the administration of an analgesic or anti-emetic.

Consider reducing the infusion rate in steps of 0.5 nanogram/kg/min until a tolerable dosage is achieved.

However, if the patient experiences any severe side effects stop the infusion and inform the prescriber.

Contraindications

- Pregnancy (pregnancy should be excluded before the start of treatment)
- Lactation
- Hypersensitivity to Iloprost or any of the excipients
- Conditions where the effects of Iloprost on platelets might increase the risk of haemorrhage e.g. spinal surgery, active peptic ulcer, trauma, intracranial haemorrhage
- Severe coronary heart disease or unstable angina
- ***Myocardial infarction within the last six months***
- Cerebrovascular events (e.g. transient ischeamic, stroke) within the last 3 months
- Decompensated cardiac failure if not under close medical supervision
- Acute or chronic congestive cardiac failure (NYHA type II to IV)
- Severe arrhythmias
- Pulmonary oedema
- Congential or acquired valvular defects with clinically relevant myocardial function disorders not related to pulmonary hypertension.
- Baseline systolic blood pressure <90mmHg

Interactions

Iloprost will potentiate the hypotensive effects of other anti-hypertensive therefore blood pressure should be closely monitored. If significant hypotension occurs, reduce the infusion rate of Iloprost and/or review the continued use of these antihypertensive agents throughout the remainder of the course.
Iloprost may have additive antihypertensive effects in patients also taking (but not limited to):

- B-blockers
- Calcium antagonists
- ACE inhibitors
- Angiotensin II receptor antagonists

There is a theoretical risk that the patient will be at a higher risk of bleeding due to the effect Iloprost has on platelet function. If bleeding occurs, the infusion should be stopped and the patient assessed by their clinician.
An individual risk assessment should be undertaken before initiating Iloprost in patients prescribed any of the following:

- Antiplatelets (e.g. Aspirin, Clopidogrel)
- Heparin and related molecules
- Direct oral anticoagulants (DOACs) (e.g. Apixaban, Dabigatran, Rivaroxaban)
- Coumarin type anticoagulant drugs (e.g. Warfarin)
- Non-steroidal anti-inflammatories
- SSRI Antidepressants

These are not exhaustive lists. The BNF should always be utilised to help identify and determine the nature of any potential interactions.

Appendix A

Affix Patient Label here or record

NAME: . . . . . .

NHS NO:

HOSP NO:

D.O.B: D D / M M / Y Y Y Y MALE ☐ FEMALE ☐

WARD: . . . . . CONS: . . . . . .

DATE: . . . . / . . . . / . . . . WEIGHT: . . . . . KG

(To be used in conjunction with the trusts Iloprost guideline WAHT-VAS-018)

NHS Worcestershire Acute Hospitals NHS Trust

INTRAVENOUS ILOPROST ADMINISTRATION AND MONITORING CHART

ALLERGIES/ADVERSE DRUG REACTIONS		
NONE KNOWN ☐ Signature:		
DATE	DRUG/FOOD/OTHER	REACTION DETAILS

Date:	Infusion number .....

Iloprost should only be prescribed for patients who can be monitored in Hospital. The medication must be administered by a trained registered practitioner / nurse (with current competency in IV medication administration) as a course of intravenous infusions, each given **over 6 hours**.

PRESCRIPTION FOR ILOPROST INFUSION

Dilute a 50 microgram/0.5mL vial of Iloprost with 250mL Sodium Chloride 0.9% and give by intravenous infusion via infusion pump over 6 hours (as directed below)

Prescribed by: (incl. Stamp and bleep)	Date:	Time:

The rate of infusion is determined by patient weight.
With reference to the table below, start at the rate specified in the column of STEP 1 and increase in a stepwise approach every 30 minutes up to STEP 4 (2 nanogram/kg/minute). This will be guided by patient tolerability.
Note: Use HALF the normal dose in renal insufficiency requiring dialysis or severe hepatic impairment.

Actual Body Weight (Rounded to the nearest 5kg)	STEP 1 *Dose = 0.5 nanogram/kg/min*	STEP 2 *Dose = 1.0 nanogram/kg/min*	STEP 3 *Dose = 1.5 nanogram/kg/min*	STEP 4 *Dose = 2.0 nanogram/kg/min*
	Infusion rate →			
40 kg	6.0 mL/hr	12.0 mL/hr	18.0 mL/hr	24.0 mL/hr
45 kg	6.8 mL/hr	13.5 mL/hr	20.3 mL/hr	27.0 mL/hr
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70 kg	10.5 mL/hr	21.0 mL/hr	31.5 mL/hr	41.6 mL/hr
75 kg	11.3 mL/hr	22.5 mL/hr	33.8 mL/hr	45.0 mL/hr
80 kg	12.0 mL/hr	24.0 mL/hr	36.0 mL/hr	48.0 mL/hr
85 kg	12.8 mL/hr	25.5 mL/hr	38.3 mL/hr	51.0 mL/hr
90 kg	13.5 mL/hr	27.0 mL/hr	40.5 mL/hr	54.0 mL/hr
95 kg	14.3 mL/hr	28.5 mL/hr	41.6 mL/hr	57.0 mL/hr
100 kg	15.0 mL/hr	30.0 mL/hr	45.0 mL/hr	60.0 mL/hr
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120 kg	18.0 mL/hr	36.0 mL/hr	54.0 mL/hr	72.0 mL/hr

For patients outside of the weight ranges listed above and / or those not tolerating the lowest recommended rate contact your ward pharmacist for dosing advice.

Proof Only Do Not Scan

PF WR5951 Intravenous Iloprost Administration and Monitoring Chart Version 1 Page 1 of 2

Proof Only Do Not Scan

Affix Patient Label here or record

NAME: . . . . . .

NHS NO:

HOSP NO:

D.O.B: D D / M M / Y Y Y Y MALE ☐ FEMALE ☐

WARD: . . . . . CONS: . . . . . .

MONITORING AND ADMINISTRATION RECORD

- The patient should be monitored at the start of the infusion and subsequently at every dose adjustment.
- Once the patient has been established on their highest tolerated dose, hourly monitoring will be sufficient until the end of the infusion.
- The optimal rate (i.e. highest tolerated dose) will be identified during the first 3 days and can be utilised for the remainder of the course without the need for further re-titration.
- If unacceptable side effects occur at any stage, reduce the rate of infusion to the previous step. Continue this reduction until resolution of side effects.
- If patient experiences any **severe** side effects stop the infusion and inform the prescriber.

An additional solution may need to be prepared each day to deliver the required dose (e.g. those patients who receive an hourly rate of 42ml/hour or more for a prolonged period of time).

Time	Infusion rate mL/hr	Pulse	BP	Adverse effects (Y / N)	Rate Set by / checked by:	Infusion Prepared by / checked by:

Maximum tolerated infusion rate (mL/hr):

Proof Only Do Not Scan

Proof Only Do Not Scan

References:

- NICE CKS: Peripheral Arterial Disease. https://cks.nice.org.uk/topics/peripheral-arterial-disease/
- Colonis Pharma (Iloprost) SPC. https://www.medicines.org.uk/emc/product/10034
- BNF online
- Medusa Monograph (Iloprost) https://www.medusaimg.nhs.uk/IVGuideDisplay.asp

Monitoring

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the Policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: (Responsible for also ensuring actions are developed to address any areas of non-compliance)	Frequency of reporting:
	WHAT?	HOW?	WHEN?	WHO?	WHERE?	WHEN?
	The use of Iloprost within the speciality of vascular is in keeping with the guideline	Audit	Annually	Vascular directorate	Vascular directorate	Annually

Contribution List

This key document has been circulated to the following individuals for consultation:

Name	Designation
Keith Hinton	Lead Specialist Pharmacist - Surgery
Rachel Hodkinson	Specialist Pharmacist - Surgery
Amarjit Atwal	Vascular Consultant
Julien Alshakarchi	Vascular Consultant
Adnan Bajwa	Vascular Consultant
James Cragg	Vascular Consultant
Natasha Charlwood	Vascular Consultant
Richard Downing	Vascular Consultant
Stephen Goodyear	Vascular Consultant
Isaac Nyamekye	Vascular Consultant
Emily Packer	Lead Vascular Nurse
Rebecca Morgan	Vascular Ward Manager

This key document has been circulated to the chair(s) of the following committee's / groups for comments:

Committee
Vascular Governance
Medicines Safety Committee

Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and included as an appendix to key document when submitted to the appropriate committee for consideration and approval.

Please complete assessment form on next page

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust	√	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	**Rhydian Power**

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
	Rhydian Power	**Pharmacist**	**Rhydian.power@nhs.net**
Date assessment completed	**16/12/24**		

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title: Guideline on the administration of Iloprost Intravenous Infusion (For use within the vascular speciality).**			
What is the aim, purpose and/or intended outcomes of this Activity?	To facilitate the administration of Iloprost in adult patients within the vascular speciality			
Who will be affected by the development & implementation of this activity?	❑	Service User	√	Staff
	√	Patient	❑	Communities
	❑	Carers	❑	Other _____
	❑	Visitors	❑	
Is this:	❑ Review of an existing activity √ New activity ❑ Planning to withdraw or reduce a service, activity or presence?			
What information and evidence have you reviewed to help inform this assessment? (Please name sources, eg demographic	The guideline was circulated to staff members of varying equality groups and their feedback was noted.			

information for patients / services / staff groups affected, complaints etc.	
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	As above.
Summary of relevant findings	This guideline was not thought to have a significant impact on any of the equality groups identified below (see under pregnancy & maternity for exception).

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age		√		
Disability		√		
Gender Reassignment		√		
Marriage & Civil Partnerships		√		
Pregnancy & Maternity			√	The administration of Iloprost is contraindicated in pregnancy/breastfeeding.
Race including Traveling Communities		√		
Religion & Belief		√		
Sex		√		
Sexual Orientation		√		
Other Vulnerable and Disadvantaged Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)		√		
Health Inequalities (any				

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)		√		

Section 4

What actions will you take to mitigate any potential negative impacts?	Risk identified	Actions required to reduce / eliminate negative impact	Who will lead on the action?	Timeframe
		.		
How will you monitor these actions?				
When will you review this EIA? (e.g in a service redesign, this EIA should be revisited regularly throughout the design & implementation)				

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9 protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.

1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc, and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	Rhydian Power
Date signed	16/12/2024
Comments:	
Signature of person the Leader Person for this activity	
Date signed	
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval.