Worcestershire Acute Hospitals NHS Trust

Guideline for the treatment of Hypophosphataemia in adults

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.

Introduction

This guideline covers the treatment of hypophosphataemia for adult patients

This guideline is for use by the following staff groups :

All qualified healthcare professionals involved in prescribing or administering phosphate supplements for adult patients.

Lead Clinician(s)

Keith Hinton	Lead Pharmacist Critical Care, Surgery and Theatres WAHT
Approved by Pharmacy Governance Committee on:	1st March 2023
Approved by Medicines Safety Committee on:	8th March 2023
Review Date: This is the most current document and is to be used until a revised version is available:	8th March 2026

Key amendments to this guideline

Date	Amendment	Approved by:
November 2010	Reformatted Replaces WAHT-CRI-012 as applies to all patients not just ITU	Keith Hinton
December 2012	No changes – approved by Nick Hubbard	Keith Hinton
17/12/2012	Approved by medicines safety committee	
25/11/2014	Guideline reviewed with no amendments made to content	Keith Hinton
06/04/2017	Document extended for 12 months as per TMC paper –approved by Keith Hinton	Keith Hinton
05/12/2017	Sentence added in at the request of the Coroner	
March 2018	Document extended for 3 months as approved by TLG	TLG
30/05/2018	Guideline reviewed against current evidence, with no amendments made to content – Rhydian Power	
May 2020	Addition of sodium glycerophosphate injection as a replacement option. Statement of sodium content of the treatment options	Keith Hinton
March 2023	Clarification that mild asymptomatic hypophosphataemia does not usually require treatment Removal of Medicines Information advice Addition of dosing advice for low weight patients	Keith Hinton

Acute treatment of Hypophosphataemia guidelines

Introduction

Phosphates are predominantly an intracellular anion with low tissue levels being associated with muscle weakness which for ventilated patients may be associated with slow weaning. Moderate hypophosphataemia has been reported to occur in 2.5 to 3.1% of hospitalised patients. Severe hypophosphataemia has an incidence of 0.24 to 0.42%.[1] The incidence of hypophosphataemia in critically ill patients may be as high as 28%.[2]

Classification	Serum level (mmol/l)
Normal	0.8-1.5
Mild hypophosphataemia	0.6-0.79
Moderate hypophosphataemia	0.32-0.59
Severe hypophosphataemia	<0.32

Aetiology

There are many causes of hypophosphataemia which include intracellular shifts, increased urinary excretion, impaired intestinal absorption and malnutrition.

The most common cause involves intracellular shift of phosphate. Conditions associated with intracellular shift are sepsis, respiratory/metabolic alkalosis, recovery from diabetic ketoacidosis, increased insulin during glucose administration, and recovery from anorexia nervosa and malnutrition [6,7] (refeeding syndrome - please refer to Trust guideline WAHT-NUT-006).

The average daily dietary requirement of phosphate is 0.3mmol/kg. Modest dietary restriction of phosphate should not lead to a hypophosphataemic state. However, if the reduction is chronic, or if intestinal absorption is inhibited by phosphate-binders (*e.g.* calcium or aluminium salts) over a prolonged period, hypophosphataemia may develop.

The most common risk factors for hypophosphataemia are alcoholism, recovery from diabetic ketoacidosis, phosphate-free total parenteral nutrition and chronic use of phosphate-binding agents. Hyperventilation is also a precipitating factor.[8,9]

Clinical symptoms of hypophosphataemia

Hypophosphataemia is often asymptomatic. However, it may be associated with the following symptoms, which are attributed to tissue hypoxia and impaired cellular energy stores. Symptoms include:

- Muscle weakness and myalgia
- Decreased cardiac contractility
- Parasthesia
- Convulsions
- Tremor
- Haemolysis
- Impaired erythrocyte, leucocyte and thrombocyte function
- Respiratory failure

Chronic hypophosphataemia can be associated with osteomalacia, bone pain, reduced insulin sensitivity, glycosuria, hypercalciuria and hypermagnesaemia.[8,10-11]

Treatment

Both serum phosphate level and the patient's clinical condition guide treatment**.**

Mild asymptomatic hypophosphataemia does not usually require treatment.

In **moderate** hypophosphataemia where the patient is asymptomatic, oral phosphate therapy should be considered if dietary modification is unsuitable. The dose should be reviewed daily and adjusted according to phosphate levels. In severe hypophosphataemia, in symptomatic patients and when the oral route is not appropriate, intravenous phosphate therapy should be used.

Moderate asymptomatic hypophosphataemia
• Phosphate-Sandoz® (16.1mmol/tab) – one or two tablets three times a day adjusted according to response (unlicensed use) NB not at same time as calcium supplements.
• Or intravenously **if** the patient is unable to absorb oral replacement therapy. See table below

Severe and/or Symptomatic hypophosphataemia		
Serum phosphate (mmol/l)	**Phosphate polyfuser dosage**	**Sodium glycerophosphate 21.6% usage 1mmol phosphate per ml**
0.32-0.79	25mmol (250ml) over 12 hours I.V.	20mmol (20ml) added to 250ml glucose 5% Given over 12 hours
<0.32	50mmol (500ml) over 24 hours I.V.	40mmol (40ml) added to 500ml glucose 5% Given over 24 hours

Renal Impairment:
These doses should not be used for patients with renal impairment or hypercalcaemia. Please contact your ward pharmacist or the on call pharmacist if necessary outside of Pharmacy opening hours.

Low body weight patients:
Consider using half the dose stated in the table above for patients weighing <60kg
Doses for intravenous phosphate vary in the literature and suggested regimens have included weight based dosing regimens of 0.2-0.5mmol/kg/day up to a maximum of 50mmol.

Precautions

- Severe hypophosphataemia: Monitor phosphate, calcium, potassium and magnesium every 12 hours.
- Moderate hypophosphataemia: Monitor phosphate, calcium, potassium and magnesium daily until serum phosphate concentration is back in normal range.
- May cause arrhythmias, hypocalcaemia and hypotension
- Do not mix phosphate injections with other injections (lack of compatibility data)
- Avoid administering Phosphate-Sandoz tablets at the same time as calcium tablets (reduced bioavailability and efficacy)
- Patients with renal impairment and in conditions where a restricted sodium intake is desired

Sodium content of phosphate replacement:

Phosphate polyfusor	81mmol in 500ml
Sodium glycerophosphate 21.6%	40mmol in 20ml
Phosphate-Sandoz	16.1mmol per tablet

Treatment may be discontinued once the plasma phosphate level is within the normal range (0.8-1.5mmol/l).

Monitoring Tool

This should include realistic goals, timeframes and measurable outcomes.

How will monitoring be carried out?

Who will monitor compliance with the guideline?

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?**
	Treatment of hypophosphataemia is as per guideline	Audit	Annually	Nutrition and hydration committee	Nutrition and hydration committee	Annually

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Contribution List

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

Designation
Rachael Montgomery – Deputy Chief Pharmacist
Dr Thea Haldane - Consultant Gastroenterologist
Dr Martin Ferring - Consultant Physician
Dr Andy Burtenshaw - Clinical Director, ICCU
Dr Juliet Mills – Consultant Haematologist

This key document has been circulated to the following committee's / groups for comments;

Committee
Pharmacy Governance Committee
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	x	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
	Keith Hinton	**Clinical team lead Pharmacist**	**keith.hinton1@nhs.net**
Date assessment completed	**15.02.2023**		

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:** Guideline for the treatment of Hypophosphataemia in adults			
What is the aim, purpose and/or intended outcomes of this Activity?	As per title			
Who will be affected by the development & implementation of this activity?	X X ❑ ❑	Service User Patient Carers Visitors	X ❑ ❑ ❑	Staff Communities Other _____
Is this:	X 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 information for patients / services / staff groups affected, complaints etc.	See references
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	Via MSC
Summary of relevant findings	

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		X		
Disability		X		
Gender Reassignment		X		
Marriage & Civil Partnerships		X		
Pregnancy & Maternity		X		
Race including Traveling Communities		X		
Religion & Belief		X		
Sex		X		
Sexual Orientation		X		
Other Vulnerable and Disadvantaged		x		

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)				
Health Inequalities (any 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)		X		

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	Keith Hinton
Date signed	15/02/2023
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