NHS Grampian Staff Guideline For The Management Of Acute Hypophosphataemia In Adults

<table>
<thead>
<tr>
<th>Co-ordinators:</th>
<th>Consultation Group:</th>
<th>Approver:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Medicines Information Pharmacist</td>
<td>See Page 5/6</td>
<td>Medicine Guidelines and Policies Group</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Signature]</td>
<td>[Signature]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier:</th>
<th>Review Date:</th>
<th>Date Approved:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHSG_Guid_HypophosA/MGPG981</td>
<td>September 2021</td>
<td>September 2020</td>
</tr>
</tbody>
</table>

Uncontrolled when printed
Version 2

Executive Sign-Off
This document has been endorsed by the Director of Pharmacy and Medicines Management
Signature:
Title: NHS Grampian Staff Guideline For The Management Of Acute Hypophosphataemia In Adults

Unique Identifier: NHSG_Guid_HypophosA_MGPG981

Replaces: NHSG_Guid_HypophosA_MGPG819, Version 1

This controlled document shall not be copied in part or whole without the express permission of the author or the author’s representative.

Lead Author/Co-ordinator: Medicines Information Pharmacist

Subject (as per document registration categories): Clinical Guideline

Key word(s): Guideline acute hypophosphataemia adults phosphate electrolytes

Process Document: Policy, Protocol, Procedure or Guideline

Document application: NHS Grampian

Purpose/description: To guide the treatment of acute hypophosphataemia in adults.

Responsibilities for implementation:

Organisational: Chief Executive and Management Teams
Corporate: Senior Managers
Departmental: Heads of Service/Clinical Leads
Area: Line Managers
Hospital/Interface services: Assistant General Managers and Group Clinical Directors
Operational Management: Unit Operational Managers

Policy statement: It is the responsibility of all staff to ensure that they are working to the most up to date and relevant policies, protocols procedures.

Review: This policy will be reviewed in three years or sooner if current treatment recommendations change.
This document is also available in large print and other formats and languages, upon request. Please call NHS Grampian Corporate Communications on (01224) 551116 or (01224) 552245.

Responsibilities for review of this document: Medicine Information Pharmacist

Responsibilities for ensuring registration of this document on the NHS Grampian Information/Document Silo: Pharmacy and Medicines Directorate

Physical location of the original of this document: Pharmacy and Medicines Directorate

Job/group title of those who have control over this document: Medicine Information Pharmacist

Responsibilities for disseminating document as per distribution list: Medicine Information Pharmacist

Revision History:

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Previous Revision Date</th>
<th>Summary of Changes (Descriptive summary of the changes made)</th>
<th>Changes Marked* (Identify page numbers and section heading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2018</td>
<td>September 2016</td>
<td>Added 'hypophosphataemia' after classification.</td>
<td>Table 1</td>
</tr>
<tr>
<td>June 2018</td>
<td>September 2016</td>
<td>Off-label changed to unlicensed.</td>
<td>P3 oral replacement</td>
</tr>
<tr>
<td>June 2018</td>
<td>September 2016</td>
<td>Additional monitoring added as per Medusa.</td>
<td>P4 intravenous replacement</td>
</tr>
<tr>
<td>October 2018</td>
<td>September 2016</td>
<td>Defined severe renal impairment. Added detail.</td>
<td>P2 Precautions and monitoring</td>
</tr>
<tr>
<td>October 2018</td>
<td>September 2016</td>
<td>Monitoring sentence restructured.</td>
<td>P5 IV phosphate replacement therapy</td>
</tr>
</tbody>
</table>

* Changes marked should detail the section(s) of the document that have been amended, i.e. page number and section heading.
NHS Grampian Staff Guideline for the Management of Acute Hypophosphataemia in Adults

This guideline is for use within Primary or Secondary Care in NHS Grampian. Intravenous phosphate replacement should only be used in an acute setting, as outlined below. Specialist areas may use an alternative replacement regimen (e.g. Gastroenterology) or alternative intravenous phosphate preparations (e.g. ICU, Haematology, Oncology). Alternative intravenous preparations are restricted to these areas due to their high potassium content.

The NHS Grampian reference range for serum phosphate in patients over 16 years of age is 0.8 - 1.5mmol/L.

Table 1 - Serum Phosphate Classification

<table>
<thead>
<tr>
<th>Normal (0.8 - 1.5mmol/L)</th>
<th>Mild hypophosphataemia (0.6 - 0.79mmol/L)</th>
<th>Moderate hypophosphataemia (0.3 - 0.59mmol/L)</th>
<th>Severe hypophosphataemia (&lt;0.3mmol/L)</th>
</tr>
</thead>
</table>

Causes of Hypophosphataemia

Wherever possible, the cause of hypophosphataemia should be identified and corrected and include:

- Inadequate dietary intake
- Refeeding syndrome
- Malnutrition due to malabsorption or persistent vomiting
- Alcoholism
- Vitamin D deficiency
- Severe diabetic ketoacidosis
- Severe respiratory alkalosis
- Medication, e.g. antacids, catecholamines, acetazolamide, theophylline, diuretics
- Primary hyperparathyroidism
- Hepatic failure
- Septicaemia
- Chronic diarrhoea
- Metabolic acidosis.
Signs and Symptoms of Hypophosphataemia

Hypophosphataemia is often asymptomatic but clinical symptoms are more common when the serum phosphate level is below 0.3mmol/L.

Symptoms may include:

- Muscle weakness
- Rhabdomyolysis (more likely in alcoholic patients)
- Seizures
- Haematological abnormalities
- Respiratory failure
- Cardiomyopathy
- Paraesthesiae
- Arrhythmias
- Confusion
- Coma
- Encephalopathy.

Precautions and Monitoring

Phosphate should be used cautiously in patients with severe renal impairment (eGFR < 30mL/min/1.73m²) as phosphate is renally excreted. A dose reduction of at least 50% may be required – discuss with Clinical Pharmacist or Renal Specialists.

Some care is necessary with the interpretation of serum phosphate results as concentration falls transiently after high carbohydrate meals and substantial diurnal variation exists.

The rise in serum phosphate levels from any form of phosphate replacement therapy cannot be predicted. Therefore, monitoring is required.

Phosphate administration may lead to hypocalcaemia.

Consideration should be given to the potassium and sodium content of phosphate replacement therapies (listed under individual replacement therapies below).

Monitor U+Es, phosphate, calcium, potassium and magnesium frequently (e.g. 6-12 hourly) during intravenous administration.

Continue to monitor for several days after phosphate levels have reached the normal range to ensure they remain stable.
Dosage and Administration

Table 2 -Treatment Flowchart

<table>
<thead>
<tr>
<th>Mild hypophosphataemia (0.6 - 0.79mmol/L)</th>
<th>Moderate hypophosphataemia (0.3 - 0.59mmol/L)</th>
<th>Severe hypophosphataemia (&lt;0.3mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>Asymptomatic</td>
<td>Symptomatic</td>
</tr>
<tr>
<td>Oral replacement can be considered</td>
<td>Oral replacement</td>
<td>Intravenous replacement</td>
</tr>
<tr>
<td></td>
<td>Intravenous replacement</td>
<td></td>
</tr>
</tbody>
</table>

**Oral Phosphate Replacement Therapy:**

**Phosphate Sandoz**

Each tablet contains 16.1mmol phosphate, 20.4mmol sodium and 3.1mmol potassium.

- **Dose:** 1-2 tablets up to 3 times a day (maximum 6 tablets per day).
- Monitor serum phosphate daily.
- Adjust dose according to response and discontinue treatment once serum phosphate >0.8mmol/L.

Use of Phosphate Sandoz® to treat hypophosphataemia is unlicensed (except where hypophosphataemia is associated with vitamin D resistant rickets and vitamin D resistant hypophosphataemic osteomalacia), but no other UK licensed oral preparations are available.

Patients with enteral feeding tubes who require enteral phosphate replacement should be discussed with the clinical pharmacist.

**Notes:**

- Do not give at the same time as antacids, as this may reduce absorption of phosphate and therefore reduce efficacy.
- Diarrhoea is a common side-effect – give with plenty water to minimise risk. Reduce the dose if this occurs.
Intravenous Phosphate Replacement Therapy:

Phosphates Polyfusor\(^1, 5, 11, 12\)

500mL Polyfusor\(^\circledast\) contains 50mmol phosphate, 81mmol sodium and 9.5mmol potassium.

Doses below are for patients with normal renal function.

(Table adapted from UKMi, Tayler \(et\) \(al\), and Polyfusor\(^\circledast\) SPC).

**Table 3 - Suggested Doses Of Phosphates Polyfusor\(^\circledast\)**

<table>
<thead>
<tr>
<th>Phosphate Level</th>
<th>Weight 40 - 60kg</th>
<th>Weight 61 - 80kg</th>
<th>Weight 81 - 120kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount of phosphate</td>
<td>Volume of Polyfusor</td>
<td>Amount of phosphate</td>
</tr>
<tr>
<td>&lt; 0.3mmol/L</td>
<td>30mmol</td>
<td>300mL</td>
<td>40mmol</td>
</tr>
<tr>
<td>0.3 – 0.59mmol/L (if oral route not suitable or patient is symptomatic)</td>
<td>20mmol</td>
<td>200mL</td>
<td>30mmol</td>
</tr>
<tr>
<td>0.6 - 0.79mmol/L (if oral route not suitable or patient is symptomatic)</td>
<td>10mmol</td>
<td>100mL</td>
<td>15mmol</td>
</tr>
</tbody>
</table>

Notes:

- **Take care to ensure that only the prescribed volume is delivered from the Polyfusor\(^\circledast\).** Discard the remainder.
- Administer appropriate dose over 6 – 12 hours.
- Max flow rate: 15mmol per hour (150mL per hour).
- Maximum of 50mmol (500mL) per 24 hours.
- Patients with severe hypophosphataemia may require repeat infusions to achieve therapeutic range.
- Phosphates Polyfusors\(^\circledast\) should be administered with caution to patients with cardiac failure, peripheral or pulmonary oedema, or impaired renal function, due to potassium and sodium content.
- Correct hypocalcaemia before replacing phosphate.
• Use a dedicated intravenous lumen for the Polyfusor® as it may cause precipitation if administered with other drugs.
• Phosphates Polyfusor® may be administered peripherally.

Monitor U+Es, phosphate, calcium, potassium and magnesium frequently (e.g. 6-12 hourly) during intravenous administration. Monitor blood pressure and ECG during administration. Monitor fluid balance and acid-base balance.

**Adverse effects of replacement therapy**¹ ² ³ ⁴ ⁷

• Diarrhoea – may require dose reduction
• Hyperphosphataemia (particularly in patients with renal failure)
• Hypocalcaemia
• Hyperkalaemia (due to potassium content of replacement therapy)
• Hypernatraemia
• Metastatic calcification
• Acute renal failure
• Hypotension
• Nausea and vomiting
• Oedema
• Phlebitis
• Dehydration.

**Consultation List**

Dr Prakash Abraham  Consultant
Dr Lee Allen  Consultant
Mark Brown  Clinical Pharmacist
Dr Carol Brunton  Consultant
Dr Gordon Christie  Consultant
Lynne Crichton  Clinical Pharmacist
Dr Laura Clark  Consultant
Dr Andrew Clarkin  Consultant
Dr Jane Dymott  Consultant
Evelyn Finn  Clinical Pharmacist
Dr Stephen Friar  Consultant
Dr Ann Gold  Consultant
Dr Alex Graveling  Consultant
Dr Izhar Khan  Consultant
Dr Dana Kidder  Consultant
Dr Utkarsh Kulkarni  Consultant
Dr James MacBrayne  Consultant
Dr Susan McGeoch  Consultant
Dr Shona Methven  Consultant
Dr Kim Milne  Consultant
Dr Sam Philip  Consultant
Brian Porteous  Clinical Pharmacist
Dr Hannah Robertson  Consultant
Craig Rore  Lead Medicines Information Pharmacist
References


4. Phosphate monograph, Drugdex (accessed online via Micromedex on 02/08/2018).

5. How is acute hypophosphataemia treated in adults? UKMi Q&A. Date prepared: 20/07/2017


