# Formulary Guidance for the Prescribing and Administration of Phosphate

**Phosphate for Hypophosphataemia** (see also SPS Article for a referenced version of this guidance, which has been adapted for local use):

The reference range used locally for phosphate is 0.8 to 1.5mmol/L.

Phosphate deficiency can be caused by:

- Redistribution of phosphate into cells (respiratory alkalosis, drug therapy (e.g. insulin, catecholamines))
- Increased urinary excretion (e.g. metabolic or respiratory acidosis, hyperparathyroidism)
- Decreased intestinal absorption (e.g. antacid abuse, vitamin D deficiency, chronic diarrhoea)

Symptomatic hypophosphataemia is usually observed when plasma phosphate falls below 0.3mmol/L. Symptoms may include:

- Myopathy, rhabdomyolysis, weakness
- Respiratory failure
- Arrhythmias, cardiomyopathy
- Irritability, confusion, hallucinations, somnolence, convulsions, coma

Prescribe phosphate replacement for patients with severe hypophosphataemia (serum phosphate less than 0.3mmol/L).

For patients with moderate hypophosphataemia (serum phosphate between 0.3 and 0.6mmol/L), phosphate replacement can be considered if the patient is symptomatic of following consideration of the clinical risks and benefits.

Phosphate is renally excreted and should be used with caution in patients with severe renal impairment. Phosphate should be used with caution in patients with low serum calcium concentrations as these may further decrease as phosphate is replaced.

Hypophosphataemia may be a symptom of refeeding syndrome. If occurring in the presence of other electrolyte deficiencies consider this diagnosis and do not attempt to reintroduce nutrition without first obtaining guidance from a dietitian. See 'A Practical Guide to Nutritional Support in Adults (PAT/T 43 v2)' for more information.

Adverse effects of phosphate replacement include diarrhoea and gastrointestinal upset with oral phosphate, hyperkalaemia, hypernatraemia and dehydration. Hyperphosphataemia accompanied by hypocalcaemia may occur, particularly after administration by the intravenous route. Patients with hypocalcaemia should have their calcium corrected before replacing phosphate to prevent further hypocalcaemia.

Adapted from SPS Article by Lee Wilson, Consultant Pharmacist
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Monitor serum phosphate concentration regularly – along with, for intravenous phosphate administration: calcium, magnesium, potassium and renal function.

## Oral phosphate replacement

In moderate hypophosphataemia, phosphate supplementation may be given using Phosphate Sandoz effervescent tablets (each containing 16.1mmol sodium 20.4mmol and potassium 3.1mmol). The standard dose used locally for hypophosphataemia is 2 tablets three times daily. Continuing need should be reviewed on a daily basis and initially a three day course should be prescribed.

Tablets should not be taken with aluminium, calcium or magnesium salts as these will bind phosphate and reduce its absorption.

## Parenteral phosphate replacement

Intravenous phosphate replacement is indicated if the patient has severe hypophosphataemia or is symptomatic. It may also be considered for patients who are unable to take or are unlikely to absorb oral agents.

Phosphates Polyfusor is a suitable intravenous preparation (unless the relatively high sodium content of this preparation is not appropriate). Each 500ml polyfusor contains phosphate 50mmol, potassium 9.5mmol and sodium 81mmol.

Suggested doses of **Phosphates Polyfusor:**

| **Serum Phosphate Concentration** | **Weight 40 to 60kg** | | **Weight 61 to 80kg** | | **Weight 81 to 120kg** | |
|---|---|---|---|---|---|---|
| | **Amount of Phosphate** | **Volume of Polyfusor** | **Amount of Phosphate** | **Volume of Polyfusor** | **Amount of Phosphate** | **Volume of Polyfusor** |
| **< 0.3mmol/L** | 25mmol | **250ml** | 35mmol | **350ml** | 50mmol | **500ml** |
| **0.3 to 0.6mmol/L*** | 10mmol | **100ml** | 15mmol | **150ml** | 20mmol | **200ml** |

*= where oral route unsuitable

The appropriate volume (see table above) should be administered over 24 hours, but can be given more quickly (over a minimum of 6 hours) if required, providing this can be safely tolerated by the patient.

Repeated doses may be required on subsequent days after checking of serum phosphate levels. Reduced doses may be necessary in patients with impaired renal function.

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Only where phosphate polyfusors are unavailable, use sodium glycerophophate 21.6% injection. Each 20ml sodium glycerophosphate 21.6% vial contains 20mmol of phosphate and 40mmol of sodium, which **must be diluted prior to administration**. Once diluted, infusions must not contain more than 10mmol phosphate per 100ml of diluent to be safely administered by peripheral IV infusion. **More concentrated solutions must be given centrally.**

The table below indicates the amount of sodium glycerophosphate 21.6% required for replacement according to patient weight and serum phosphate concentration.

Suggested doses of **Sodium Glycerophosphate 21.6%:**

| **Serum Phosphate Concentration** | **Weight 40 to 60kg** | | **Weight 61 to 80kg** | | **Weight 81 to 120kg** | |
|---|---|---|---|---|---|---|
| | **Amount of sodium glycerophosphate** | **Volume of diluent** | **Amount of sodium glycerophosphate** | **Volume of diluent** | **Amount of sodium glycerophosphate** | **Volume of diluent** |
| **< 0.3mmol/L** | 25mmol (**25ml**) | **250ml** | 35mmol (**35ml**) | **500ml** | 50mmol (**50ml**) | **500ml** |
| **0.3 to 0.6mmol/L*** | 10mmol (**10ml**) | **100ml** | 15mmol (**15ml**) | **250ml** | 20mmol (**20ml**) | **250ml** |

* = where oral route unsuitable

**Peripheral administration of sodium glycerophosphate infusion**
For peripheral use, the amount indicated in the table should be added to the corresponding volume of diluent (sodium chloride 0.9% or glucose 5%). The resulting solution should be administered by intravenous infusion, usually over 24 hours, but can be given more quickly (over a minimum of 8 hours) if required, providing this can be safely tolerated by the patient.

**Central administration of sodium glycerophosphate infusion**
For administration via a central venous access device, a more concentrated solution can be used. Such as 20mmol (20ml, 1 vial) in 50ml or 100ml of sodium chloride 0.9% or glucose 5%. It is expected that this would only be used in critical care areas. This is results in a high osmolarity solution, which is extremely likely to cause tissue damage if administered peripherally.

For further details on administration of sodium glycerophosphate or phosphates Polyfusor please access the Injectable Medicines Guide (Medusa) via the desktop Clinical folder.

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