Hypophosphatemia Management in Adults

University Hospitals of Leicester NHS
NHS Trust

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Introduction and who Guideline applies to

There is significant clinical variation in the management of hypophosphatemia because there is no national guideline. This consensus guideline aims to standardise the assessment, work up and management of hypophosphatemia in UHL.

The clinician remains responsible for the application of the guidance in light of individual patient circumstances.

Applies to all clinical staff in UHL.

These guidelines **do NOT** apply in:

1. Critical care settings.
2. Does not cover patients on enteral feeding, or those with refeeding syndrome - these patients require higher levels of phosphate to maintain normal levels and require different management in addition to correction of hypophosphatemia.
3. Patients with eGFR<30ml/min/1.73m^2 or patients in renal/renal transplant settings - given reduced phosphate clearance, treatment should be less aggressive and there should be a low threshold for discussion with a nephrologist (see section 3.4 below).

Guidelines, Standards and Procedures

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UHL Guideline - Hypophosphatemia

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1 BACKGROUND

Phosphate is required for energy metabolism, gene transcription and acid-base buffering. 85% of phosphate is in the bone, where along with calcium, it provides skeletal strength and rigidity. Being predominantly an intracellular ion, only 1% of total body phosphate found in the plasma, and serum phosphate levels do not represent total body phosphate. Low serum phosphate is often an indicator of depleted body stores. Parathyroid hormone (PTH) and vitamin D stimulate the absorption of phosphorus from the small intestine. PTH increases renal phosphate excretion.

About 5% of hospitalised patients have low levels of phosphate. It is more prevalent in the following settings:

- Past medical history of chronic alcohol dependency and malnutrition
- Acute illnesses like sepsis, infection, major trauma and burns
- Post-operative setting following gastrointestinal surgery (hepatectomy, colectomy, gastrectomy and pancreatectomy), patients in surgical intensive care units.

The most common risk factors for hypophosphatemia are:

- Alcoholism and alcohol withdrawal
- Recovery from diabetic ketoacidosis
- Total parenteral nutrition (TPN) without phosphate supplementation
- Chronic ingestion of phosphate–binding antacids

2 CAUSES

A common classification of causes based on underlying mechanism.

Figure 1. Causes of hypophosphatemia based on underlying mechanism

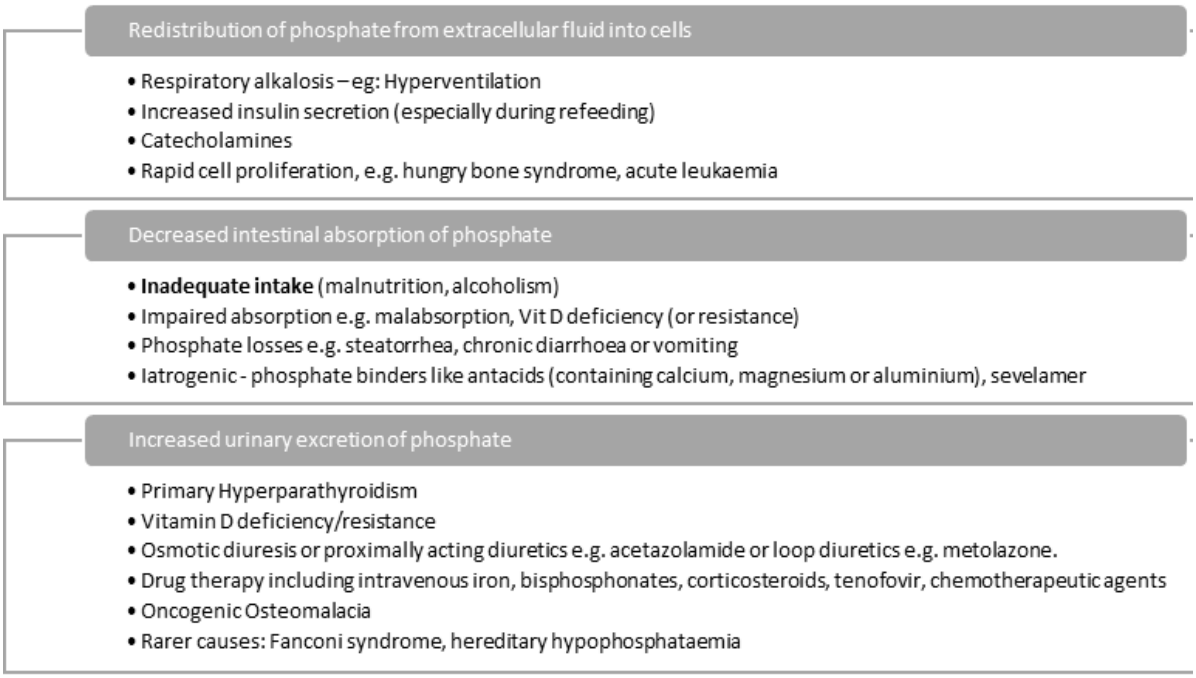
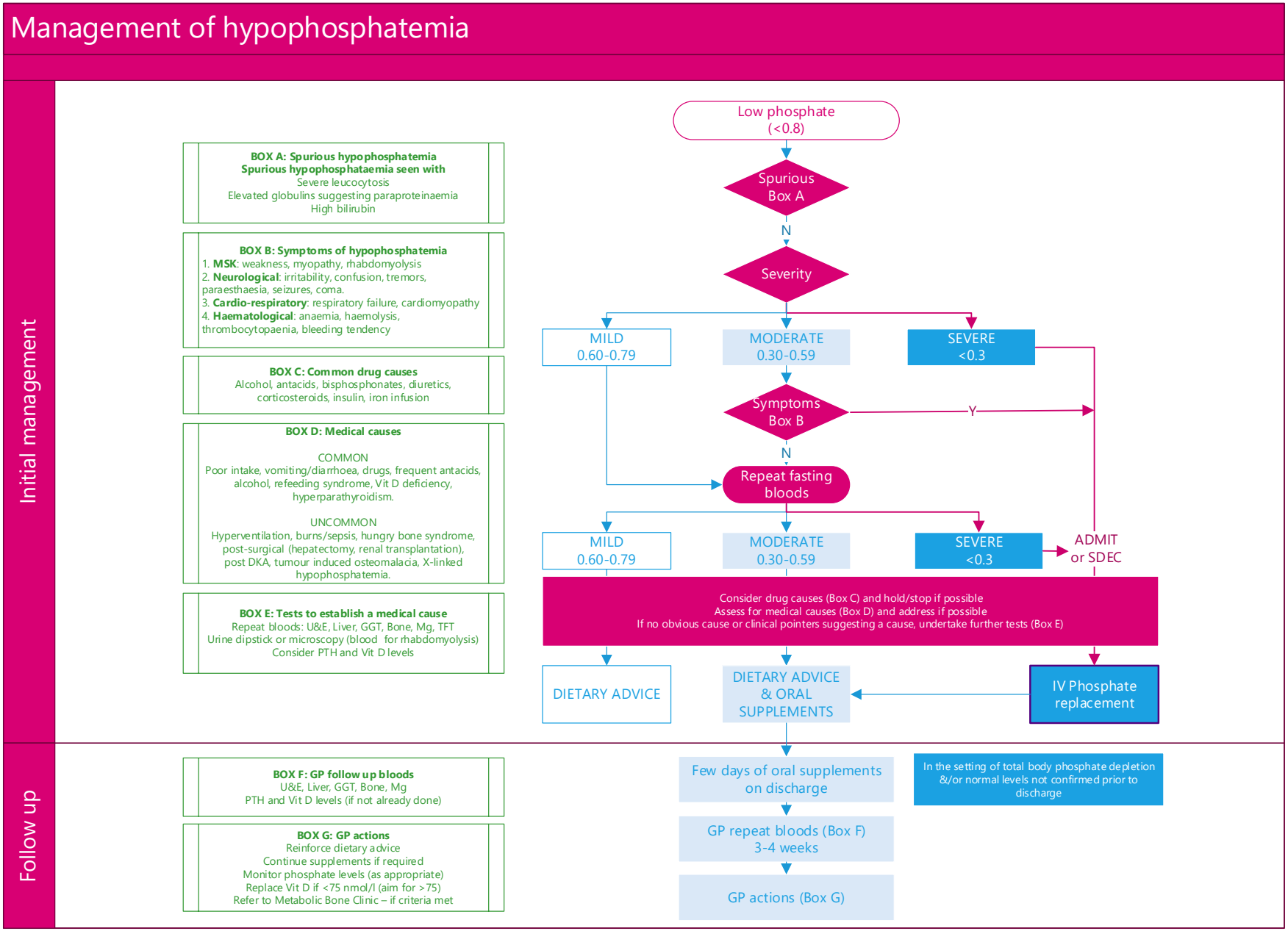


Figure 2. Flowchart summary of hypophosphatemia guideline



3 PHOSPHATE REPLACEMENT OPTIONS

3.1 Dietary advice

Most mixed diets provide an adequate amount of phosphate to prevent depletion and mild hypophosphatemia generally reflects poor nutrition. Typical phosphate rich foods advised include meats, poultry, fish, nuts, beans, and dairy products.

Dietary advice is part of management for all people with hypophosphataemia.

3.2 Oral supplements

- Each Phosphate Sandoz (effervescent) tablet contains **16.1 mmol phosphate**, **20.4 mmol sodium** and **3.1 mmol potassium**.
- Diarrhoea is a common side effect. Phosphate tablets should not be taken with compounds containing calcium, magnesium or aluminium as absorption is impaired.
- **Tablets should be dissolved in a third or half a glass of water and taken orally.**
- Where oral administration is not feasible, a single intravenous infusion may be considered.

Phosphate Sandoz tablets 1 or 2 tablets three times daily

3.3 Intravenous infusion

Consider intravenous infusion for severe or symptomatic hypophosphatemia.

Phosphate Polyfusor

- Preferred first line agent.
- **Each 500ml Phosphate Polyfusor contains 50 mmol phosphate, 81 mmol sodium, and 9.5 mmol potassium.**

Treatment for severe / symptomatic hypophosphataemia (or as an alternative if oral/NG access not available, individualised clinical judgement advised – refer to flowchart and address other causes)

Phosphate Polyfusor 0.5 mmol/kg (see dose table below) infusion over 6-12 hours

IV dosing table

Amount of phosphate required in mmol (corresponding volume of Polyfusor in ml)	Weight (kg)		
	40-60	**61-80**	**81-120**
Severe (<0.3) / symptomatic	25 mmol (250ml)	35 mmol (350ml)	50 mmol (500ml)
Mild (0.6 – 0.79) to moderate (0.3 – 0.59) **(only if diet or oral supplementation not feasible)**	10 mmol (100ml)	15 mmol (150ml)	20 mmol (200ml)

- Serum phosphate levels should be measured post infusion.
- The dose can be repeated once if needed.

Sodium Glycerophosphate (IV)

- Second line agent.
- Each 20mL Ampoule contains 20mmol phosphate and 40mmol sodium.

Sodium glycerophosphate 20mmol (20ml) in 500ml Glucose 5% infusion over 8-12 hours MUST BE DILUTED PRIOR TO USE

3.4 Use in mild renal impairment

- **Caution** in those at risk of hyperkalemia e.g. renal impairment.
- If oral therapy is **not** an option, a lower renal dose (0.2 mmol/kg) may be considered in discussion with the senior clinician &/or specialist opinion.

Phosphate Polyfusor 0.2mmol/kg(weight-based dose in mls)) infusion over 6-12 hours

Notes:

1. If low phosphate level is unexpected, a repeat test should be considered.
2. Note that hyperventilation can reduce phosphate significantly.
3. Phosphate supplementation can result in hypocalcaemia – caution with low calcium levels.
4. Don't forget to consider ongoing oral phosphate supplements for a few days on the TTO, if total body deficit suspected.

4 FOLLOW UP

- Oral supplements should generally be prescribed for a few days only.
- Advise patient and GP of the need to follow up with repeat blood tests in 3-4 weeks, including renal, liver (including GGT), bone profiles, and magnesium.
- Vitamin D and PTH should also be measured if not already done. Vitamin D supplementation is advised if Vitamin D levels are <75 nmol/l.
- Phosphate supplementation may need to be continued, with ongoing monitoring if levels remain below normal.
- Criteria for referral to the Metabolic Bone Clinic
    1. Persistent moderate to severe hypophosphatemia – despite initial management
    2. Recurrent severe hypophosphatemia – despite IV and oral supplementation

5 REFERENCES

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Education and Training

General awareness raising amongst clinicians of this guideline.

4. Monitoring Compliance

Key Performance Indicator	Method of Assessment	Frequency	Lead
IV phosphate replacement audit	Spot Audit	Every 2-3 years	Pharmacy

Equality Analysis Assesment

The Trust recognises the diversity of the staff and local community it serves. Our aim therefore is to provide a safe environment free from discrimination, harassment and victimisation and treat all individuals fairly with dignity and respect and, as far as is reasonably possible, according to their needs.

As part of its development, an Equality Analysis on this policy have been undertaken and its impact on equality has been reviewed and no detriment was identified.

Supporting References

Listed in section 5 of the guideline.

Key Words

Phosphate, hypophosphatemia, hypophosphataemia, low, serum

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