Continued from page 5: Hypophosphatemia

Table 1. Guidance for dosing and administration of phosphate replacement

Serum phosphorus	Route of administration	Dose	When to recheck serum phosphate level
2 to 2.5 mg/dL	IV - or - PO	20 mmol K-Phos or Na-Phos - or - K-Phos neutral tabs PO q4h x 3 doses	With next AM labs
1.6 to 1.9 mg/dL	IV - or – PO	30 mmol K-Phos or Na-Phos - or - K-Phos neutral 2 tabs PO q4h x 4 doses	With next AM labs
< 1.6 mg/dL	IV	40 mmol K-Phos or Na-Phos	6 hours after repletion dose finishes

Additional guidance:
0.2 mmol/kg of phosphorus will increase the level ~ 1 mg/dL.[5]
Reduced eGFR: give half the initial dose.[1,2]
Severe obesity: maximal initial dose or an adjusted dose based upon height and weight.[1,2]

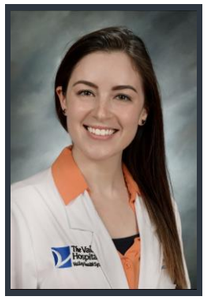
Table 2. Electrolyte components of phosphate replacements

Product	Phosphate	Potassium	Sodium
Phos-NaK Powder Packet (1.5g)	250 mg (8 mmol)	280 mg (7.2 mEq)	160 mg (7 mEq)
K-Phos Neutral Tablet	250 mg (8 mmol)	1.1 mEq	13 mEq
K Phos injection (per mL)	3 mmol	4.4 mEq	--
Na-Phos injection (per mL)	3 mmol	--	4 mEq

Reach out to your pharmacist for more help in product selection and dosing!

Pharmacy Residency Program Preceptors of the Year

Each year, the outgoing pharmacy residents elect two preceptors who went above-and-beyond in teaching and mentoring, and in the practice of pharmacy. We are proud to announce the Pharmacy Residency Program Preceptors of the Year for 2021-2022. Thank you to everyone who works with our residents to make the program a success!



PGY1 Pharmacy Practice
Residency Preceptor of the Year
Veronica Prisco, PharmD, MHS, BCPS
Clinical Pharmacy Specialist

PGY1 Community-Based Pharmacy Practice
Residency Preceptor of the Year
Sasha Falbaum, PharmD
Ambulatory Care Pharmacist

Journal of The Valley Hospital Pharmacy

Pharmacy Focus

Volume 22 Summer

Formulary Addition

Nivolumab/relatlimab-rmbw (Opdualag®)

Nivolumab and relatlimab-rmbw was approved by the FDA for the treatment of **adult and pediatric patients 12 years of age** or older with **unresectable or metastatic melanoma**. Relatlimab is a human IgG4 monoclonal antibody that binds to the lymphocyte activation gene-3 (LAG-3) receptor, blocks interaction with its ligands, including major histocompatibility complex II (MHC II), and reduces LAG-3 pathway-mediated inhibition of the immune response. Antagonism of this pathway promotes T cell proliferation and cytokine secretion. Nivolumab is a human IgG4 monoclonal antibody that binds to the programmed death-1 (PD-1) receptor, blocks interaction with its ligands PD-L1 and PD-L2, and reduces PD-1 pathway mediated inhibition of the immune response, including the anti-tumor immune response. The combination of nivolumab (anti-PD-1) and relatlimab (anti-LAG-3) results in increased T-cell activation compared to the activity of either antibody alone. In murine syngeneic tumor models, LAG-3 blockade potentiates the anti-tumor activity of PD-1 blockage, inhibiting tumor growth and promoting tumor regression. **It is restricted for ambulatory use only**.

Formulary Removal

IV promethazine (Phenergan®)

As an HRO health system, Valley continues to take every opportunity to keep our patients safe. To this end, using ISMP's Targeted Medication Safety Best Practices for Hospitals Checklist, **Valley has eliminated IV promethazine from the formulary** in all areas of Valley Health System. IV promethazine has been removed from all order sets. This action was taken to prevent serious tissue injury associated with IV promethazine. IV promethazine is a known vesicant which is highly caustic to the intima of blood vessels and surrounding tissue. It has been known to cause severe, tragic, local injuries after infiltration. This safety initiative was produced through a multidisciplinary process working with the P&T Committee. **Other forms of promethazine, including rectal and oral forms, remain on formulary. Only the IV form has been eliminated.**

Drug Info Corner

Aarezo Riaz, PharmD
PGY1 Community-Based Pharmacy Resident

Question: *Is "triple therapy" recommended in patients with atrial fibrillation (AF) undergoing percutaneous coronary intervention (PCI)?*

Response: **"Triple therapy"** is the use of an **oral anticoagulant (OAC) in conjunction with aspirin and a P2Y12 inhibitor.** Historically, this combination of three drugs was typically prescribed for patients with AF undergoing PCI to reduce the risk of clotting.

Previous guideline-supported practice suggested that **an oral anticoagulant alone may not be sufficient for those undergoing PCI,** and that **dual antithrombotic therapy may not be sufficient for patients with AF or venous thromboembolism (VTE)**. This led to the practice of "triple therapy."

However, while triple therapy may optimize treatment, there have been **growing concerns with excessive major bleeding**. For patients with long-term indications for both an OAC and antiplatelet therapy (APT), the goal is to reduce clotting risk without increasing bleeding risk. Several studies[1,2,3,4,5] recently have shown **superior safety and no significant difference for ischemic endpoints** in patients with AF and PCI or acute coronary syndrome with **dual antithrombotic therapy in comparison to triple antithrombotic therapy.**

The 2020 ACC Expert Consensus Decision Pathway[6] provides an algorithm of clinical pathways for four potential clinical situations. Table 1 below summarizes the recommendations for each clinical pathway.

Table 1. Summary of current anticoagulant and antiplatelet guideline recommendations

Clinical Situation	Recommendations
Patient with **prior AF** on anticoagulation and **need for PCI**	○ **Discontinue aspirin at discharge** and **continue use of dual antithrombotic therapy** – with OAC taken indefinitely + P2Y12 inhibitor (clopidogrel preferred) for 12 months following stent placement ○ For patients with AF on a direct oral anticoagulant (DOAC), they may **continue their DOAC with the addition of a P2Y12 inhibitor** ○ For patients on warfarin, it is recommended to switch to a DOAC – as it is preferred over warfarin due to its rapid onset of action, simplicity in dosing, and lower risk of major bleeding
Patient **on antiplatelet therapy** with **new onset AF** requiring anticoagulation	○ If patient is on antiplatelet therapy for **primary prevention of ASCVD → switch to OAC** monotherapy ○ If patient is on **antiplatelet therapy for PCI** with stable ischemic heart disease or acute coronary syndrome → **dual antithrombotic therapy** – with OAC taken indefinitely and a P2Y12 inhibitor for 12 months ○ If patient is on **antiplatelet therapy for cerebrovascular disease** without carotid stenting, → **OAC monotherapy** ○ If patient has **carotid stenting or peripheral artery disease → OAC + P2Y12 inhibitor** is recommended, followed by OAC monotherapy
Patient with **prior VTE** on anticoagulation and **need for PCI**	○ If patient is on long term, indefinite OAC for VTE → **OAC + P2Y12 inhibitor**
Patient **on antiplatelet therapy** with **new or recurrent VTE** requiring anticoagulation	○ **OAC + APT is recommended** ○ If patient is on antiplatelet therapy for primary prevention or if >12 months since most recent PCI or acute coronary syndrome → discontinue APT and start OAC monotherapy

OAC = oral anticoagulant; AF = atrial fibrillation; APT = antiplatelet therapy

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Managing Hypophosphatemia

Jennifer Nacion, PharmD
PGY1 Pharmacy Resident

Hypophosphatemia is defined as a **serum phosphorus concentration of less than 3.0 mg/dL.** Although rare in the general population, 2-3% of patients admitted to the hospital and up to 34% of intensive care patients can develop hypophosphatemia.[1,2] It is most common in patients with alcoholism, diabetic ketoacidosis and sepsis.[3]

Most hypophosphatemia cases are **due to:**[1,3]

- Increased insulin secretion (refeeding syndrome)
- Acute respiratory alkalosis
- Inadequate intake
- Inhibition of phosphate absorption (antacids, phosphate binders, niacin)
- Steatorrhea/chronic diarrhea
- Vitamin D deficiency or resistance
- Primary or secondary hyperparathyroidism
- Removal by kidney replacement therapies

Determining the etiology of hypophosphatemia is necessary to appropriately manage patients. Monitoring of phosphorus levels during treatment is essential.
Hypophosphatemia severity is classified as mild, moderate, or severe:[4]

- **Mild:** Phos levels **2 to 2.5 mg/dL**
- **Moderate:** Phos levels **1.6 to 1.9 mg/dL**
- **Severe:** Phos levels **less than 1.6 mg/dL**

Phosphate replacement comes in the form of **potassium phosphate or sodium phosphate**. It is important to look at the serum potassium and sodium levels in conjunction with the phosphate level. **Use K-Phos if $K^+ < 4.0$ mEq/L and Na-Phos if $K^+ \geq 4.0$ mEq/L.**[4,5]

Phosphate **supplementation is administered orally or intravenously depending on the severity.** When enteral administration is contraindicated due to a GI pathology, IV formulary is indicated. Oral repletion is preferred in cases where both PO and IV are recommended **as IV can precipitate with calcium** leading to kidney failure.[1,2]

Table 1 on page 6 offers guidance on route of administration, the appropriate form of phosphate to give, and when to recheck serum potassium levels.[4]

Table 2 on page 6 shows the electrolyte breakdown of common phosphate replacement products.[4,5]

References:
1. Halevy J, Bulvik S. Severe hypophosphatemia in hospitalized patients. Arch Intern Med 1988; 148:153.
2. Sharma S, Hashmi MF, Castro D. Hypophosphatemia. 2022.
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Continued on page 6.....

Managing Acute Hypocalcemia

Timothy Ramos, FDU PharmD Candidate 2022

Hypocalcemia is an electrolyte abnormality when **the serum calcium (Ca) concentration is < 8.5 mg/dL (< 2.12 mmol/L) or an ionized calcium level < 4.2mg/dL.** The normal serum calcium level ranges from 8.5 to 10.2 mg/dL. Hypocalcemia may be an asymptomatic laboratory parameter or a potentially life-threatening metabolic disturbance.

Serum calcium concentration must be interpreted in relation to serum albumin**. If a patient has low albumin levels,** the following formula may be used to approximately correct the calcium level:

Corrected Ca (mg/dL) = measured Ca in mg/dL + [0.8 x (4 – serum albumin in g/dL)]

Clinical manifestations of hypocalcemia typically **occur when ionized levels fall to < 2.5 mg/dL**. These include:

- Parasthesia of face/extremeities
- Muscle spasms or muscle cramps; signs of tetany
- Slow heart rate
- Hyperreflexia
- Stridor

Life-threatening consequences of hypocalcemia include:

- QT prolongation, heart blocks, or ventricular fibrillation
- Dilated cardiomyopathy
- Seizures and neuromuscular irritability
- Heart failure and decreased myocardial contractility

Common causes of hypocalcemia include:

- Renal insufficiency
- Vitamin D deficiency
- Hypoparathyroidism
- Hypo- or hypermagnesemia
- Head, neck, or thyroid surgery
- Drug-induced (e.g.: loop diuretics, phenytoin)

Pharmacotherapy management goal is a serum Ca between 7 to 9 mg/dL. Re-treat if Ca levels fall below 7 mg/dL. Summary of guidance is in Table 1 on Page 4.

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Continued on page 4.....

Continued from page 3: **Hypocalcemia**

Table 1. Guidance on replacement of calcium for hypocalcemia

Lab value	Agent	Dosing	Standard Rate	Notes
Serum Ca level < 1.9 mmol/L or < 7.5 mg/dL or Ionized Ca is < 1 mmol/L or < 4 mg/dL, or Patient has carpopedal spasm, tetany, seizures, or prolonged QT interval.	Calcium **Gluconate** 10% (1 g = 93 mg Ca) (1 g = 4.65 mEq) **FIRST LINE**	Initial IV (bolus): 1 to 2 grams IV (10-20 mL) (93 – 186 mg of elemental Ca^{2+}) diluted in 50 – 100 mL D5W	Infused over 10 minutes (Can be repeated every 60 minutes until symptoms resolve)	Preferred calcium salt; Recheck serum calcium every 4 to 6 hours. Due to its hyperosmolarity, IV calcium is recommended to be administered through central line.
		Continuous IV infusion: 540 – 720 mg (of elemental Ca) in 500-1000 mL D5W	0.5 - 2 mg/kg/hour	
	Calcium **Chloride** 10% (1 g = 273 mg Ca) (1 g = 13.5 mEq)	Initial IV (bolus): 500 mg IV (5 mL) (136.5 mg of elemental Ca)	Given IV push slowly over 5-10 minutes not to exceed 1 mL/min (Can dilute to a pH of 5.5-7.5 using sterile water to make a 5% solution; Can be repeated every 60 minutes until symptoms resolve)	Alternative calcium salt; Preferred central line (due to higher extravasation prevalence); Recheck serum calcium every 4 to 6 hours.
		Continuous IV infusion: 1 gram (36.6 mL) diluted to 1000 mL total volume with D5W or normal saline.	Infused over the next 6 – 12 hours	
Serum Ca 7.5 - 8.0 mg/dL and asymptomatic	Calcium **Carbonate** or Calcium **Citrate**	Oral tablets/capsules: 1500 – 2000 mg of elemental Ca in divided doses	N/A	Calcium carbonate contains 40% elemental calcium. Calcium citrate contains 21% elemental calcium.

Please reach out to your pharmacist for help in product selection and dosing.