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Mississippi Pharmacist is a member of the State Pharmaceutical Editorial Association, recognizing its high journalistic standards in endeavoring to keep its members well informed on all developments relative to the pharmaceutical profession.

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Save the Date

of these upcoming MPhA events!

December 1, 2016
Christmas Party
Drago’s Restaurant
Jackson, MS

February 2, 2017
Capitol Day
State Capitol
Jackson, MS

February 12, 2017
Mid-Winter Meeting
Jackson, MS

February 26, 2017
Mid-Winter Meeting
Oxford, MS

June 10-14, 2017
146th Annual Convention
and Trade Show
Hilton Sandestin Beach Golf Resort and Spa
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Casual.

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Content.

That’s the image that my family and I tried to portray in our picture. If I could’ve gotten them to dress in camo gear with weapons, I would have used that as a split picture comparing the two. Why? Because I believe the first picture is where I perceive our entire profession at this moment. In contrast, the second picture would have shown where I believe our profession should really be.

Quite honestly, most of our practitioners are quite happy with their work and compensation. How many college degrees out there can boast that their graduates will enter the workforce earning in the top 10% of the nation and have a nearly 100% hiring rate? None. And therein lies the problem. So content are many of us that as long as no one “rocks the boat,” we are all fine with the status quo. The problem with our current state is that it is illusionary. Literally, at any moment, the scales could tip and our earning potential could slide 10, 15 or 20%. No one would want to see this including myself.

We must be honest with ourselves – dispensing medication is not our future. Dispensing professional advice and delivering on medication therapy management in all of its forms is our path. We must be paid on our cognitive services and not our technical skills. Our technical skills can be and will be perfected through other avenues; we must own the supervision of those processes whatever they are but must not be defined by them. We must define ourselves independently of them for our clinical acumen.

To date, your Association has partnered with the other pharmacy groups to develop a definition of pharmacists as health care providers with the plan to ask our legislature to support this definition. This is a critical foundation for all pharmacists in our state to be recognized for our cognitive ability to deliver positive outcomes in our shared patients in the state.

We will continue to update all of our members as to the status of this work as it proceeds this winter and spring. There will be times that we will ask you to contact your local legislator to have them support this definition. For those of you with memberships in fellow pharmacy organizations, please encourage them to support the work of the Task Force.

Thank you for working with us to support your chance at a brighter future!

Together,

Chris McLaurin
To paraphrase John Godfrey Saxe; *laws are like sausages, it’s better not to see them being made.* I am not an expert on sausages, but I would disagree with this comment with regards to laws. Even if we don’t get involved in the making of laws, we will be subject to them nonetheless. Pharmacists can ill afford to be impacted by laws drafted by those who know nothing about pharmacy.

Unfortunately for many of us, lobbying is a word with very negative connotations. It projects images of under the table dealings and improper exchanges of cash. So how do we inform lawmakers of the impact of proposed laws on the practice of pharmacy? Through advocacy.
Advocacy is simply the act of supporting a cause, an idea, or a proposed policy. Many state and national associations organize advocacy meetings for their members. While we can all do this individually, a group of concerned citizens visiting the lawmaker’s office together can certainly make a larger impact. The purpose of these visits is to educate the lawmaker and their staff on proposed laws that impact our profession. We might be in favor of a proposal, opposed to it or want to amend the language as presented.

Lawmakers are serving because they want to make a positive difference in our society. However, they are not experts in every field. There is only one pharmacist, Buddy Carter of Georgia, in the 114th Congress. The other Senators and Representatives need pharmacists’ help to understand how proposals will affect pharmacy practice.

I have participated in advocacy meetings on both the state and national level. In my experience, the lawmakers and staffers are eager to hear how proposals will affect constituents in their districts. The meetings usually consist of an introduction, explanation of why you are there, what the real impact in their district will be, and what action you want them to take. For pharmacists, the potential impact is not always direct. The impact may be on our patients; denying access, increasing costs, or creating hurdles to care. Of course, these indirect impacts will have impact on your pharmacy practice. Many times the true impact on patients is not readily apparent. Pharmacists can explain how a particular policy will make it more difficult for patients to get their medications. Don’t expect immediate action. It is always a pleasant surprise to get a commitment, but many times the materials that you provide are circulated in the office before decisions are made.

Not all advocacy has to take place in Washington, D.C. or your state capital. Invite your lawmaker to visit your pharmacy while they are home in the district. Then they will get to see first-hand what you are doing for your patients, their constituents. You can also advise them about how proposed laws will impact your ability to provide these services. First-hand knowledge and stories of real impacts (not just theoretical ones) will have the most influence on the process.

If pharmacists don’t educate lawmakers about the effects of the changes on their practices and their patients, who will? Don’t think of it as lobbying. We are really educating our lawmakers. Joining and participating in professional organizations is a good way to get started. In the end, the profession will benefit and ultimately, our patients will too.

This series, Pharmacy and the Law, is presented by Pharmacists Mutual Insurance Company and your State Pharmacy Association through Pharmacy Marketing Group, Inc., a company dedicated to providing quality products and services to the pharmacy community.

© Don R. McGuire Jr., R.Ph., J.D., is General Counsel, Senior Vice President, Risk Management & Compliance at Pharmacists Mutual Insurance Company.

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District Meetings
Districts 3 & 9
“Choosing LWD as my drug wholesaler was the best business decision I made since opening my independent pharmacy. The fellow LWD pharmacists have given me much support and encouragement. The lower prices, rebates and other services they provide are a great value, but most importantly, they have become family to me and genuinely care how my business is doing.” -Kim Wixson, Cottonport Corner Drug - Cottonport, LA

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Paying Attention To The Wrong Things Becomes All Too Easy

If you ever have the inkling to manage your investments on your own, that inkling is worth reconsidering. Do-it-yourself investment management is generally a bad idea for the retail investor for myriad reasons.

Getting caught up in the moment. When you are watching your investments day to day, you can lose a sense of historical perspective – 2011 begins to seem like ancient history, let alone 2008. This is especially true in longstanding bull markets, in which investors are sometimes lulled into assuming that the big indexes will move in only one direction. Historically speaking, things have been so abnormal for so long that many investors – especially younger investors – cannot personally recall a time when things were different. If you are under 30, it is very possible you have invested without ever seeing the Federal Reserve raise interest rates. The last rate hike happened before there was an iPhone, before there was an Uber or an Airbnb. In addition to our country’s recent, exceptional monetary policy, we just saw a bull market go nearly four years without a correction. In fact, the recent correction disrupted what was shaping up as the most placid year in the history of the Dow Jones Industrial Average.

Listening too closely to talking heads. The noise of Wall Street is never-ending, and can breed a kind of shortsightedness that may lead you to focus on the micro rather than the macro. As an example, the hot issue affecting a particular sector today may pale in comparison to the developments affecting it across the next ten years or the past ten years.

Looking only to make money in the market. Wall Street represents only avenue for potentially building your retirement savings or wealth. When you are caught up in the excitement of a rally, that truth may be obscured. You can build savings by spending less. You can receive “free money” from an employer willing to match your retirement plan contributions to some degree. You can grow a hobby into a business, or switch jobs or careers.

Saving too little. For a DIY investor, the art of investing equals making money in the markets, not necessarily saving the money you have made. Subscribing to that mentality may dissuade you from saving as much as you should for retirement and other goals.

Paying too little attention to taxes. A 10% return is less sweet if federal and state taxes claim 3% of it. This routinely occurs, however, because just as many DIY investors tend to play the market in one direction, they also have a tendency to skimp on playing defense. Tax management is an important factor in wealth retention.

Failing to pay attention to your
emergency fund. On average, an unemployed person stays jobless in the U.S. for more than six months. According to research compiled by the Federal Reserve Bank of St. Louis, the mean duration for U.S. unemployment was 28.4 weeks at the end of August. Consider also that the current U-6 "total" unemployment rate shows more than 10% of the country working less than a 40-hour week or not at all. So you may need more than six months of cash reserves. Most people do not have anywhere near that, and some DIY investors give scant attention to their cash position.2,3

Overreacting to a bad year.
Sometimes the bears appear. Sometimes stocks do not rise 10% annually. Fortunately, you have more than one year in which to plan for retirement (and other goals). Your long-run retirement saving and investing approach – aided by compounding – matters more than what the market does during a particular 12 months. Dramatically altering your investment strategy in reaction to present conditions can backfire.

Equate the economy with the market. They are not one and the same. In fact, there have been periods (think back to 2006-2007) when stocks hit historical peaks even when key indicators flashed recession signals. Moreover, some investments and market sectors can do well or show promise when the economy goes through a rough stretch.

Focusing more on money than on the overall quality of life. Managing investments – or the entirety of a very complex financial life – on your own takes time. More time than many people want to devote, more time than many people initially assume. That kind of time investment can subtract from your quality of life – another reason to turn to other resources for help and insight.

Citations.
1. cnbc.com/2015/09/10/this-market-is-setting-a-wild-volatility-record.html [9/10/15]
**Mississippi’s Pharmacists: Improving People’s Health**

**By 2020 there will be an estimated shortage of 20,400 primary care physicians in the U.S.** Even if nurse practitioners and physician assistants are fully utilized, patient needs will not fully be met.¹

Mississippi has a shortage of 230 physicians.² The 2,740 highly trained Mississippi pharmacists are ready to bridge the gap by providing chronic disease management and wellness and prevention services.²

---

**Meeting Patients' Needs in Mississippi**

- **2.9 Million** people³
- **59%** of the physicians needed to deliver care¹
- **2,740 Pharmacists** ready to help²

---

**Diabetes**

Diabetes is a complex condition that is often managed by multiple medications. Pharmacists can optimize care and help patients understand their medications and their condition in order to improve outcomes and avoid complications.⁶⁹

---

**Cardiovascular Disease (CVD)**

For patients with uncontrolled high blood pressure, waiting even two months to optimize medications increases the risk of complications, including hospitalizations. Pharmacists are highly accessible members of the care team who significantly improve blood pressure control and can provide timely follow-up and monitoring to improve outcomes.¹⁰

---

**45%** of Mississippi residents were vaccinated for the flu¹¹

Smoking causes nearly 1 of every 5 deaths in the U.S. each year.¹² Pharmacists are qualified and capable of providing smoking cessation counseling.

**23%** of people in Mississippi smoke cigarettes¹²

**50% of people with chronic diseases do not take their medicines correctly.¹³**

Medications are critical for the treatment of chronic conditions. Pharmacists can help patients use them safely and effectively to avoid medication related problems.¹⁴
Mississippi spends $2,793,600,000 annually on prescription medications. 

Investing in pharmacists’ services optimizes the use of those prescription medications. Decades of research have proven the value of including pharmacists on healthcare teams. Improved health outcomes, lower costs, and increased access to care could be a reality for Arizona residents if pharmacists were fully empowered to serve as patient care providers.

Healthcare $$ Spent on Chronic Conditions

On average $1,000 per patient per year is saved with pharmacist interventions for patients with chronic conditions. 6-8, 16

Pharmacists’ counseling and adherence programs can save the healthcare system $164 per patient in the 6 months following the start of a new prescription medication. 17

56% of Mississippi hospitals were penalized for high readmission rates. 5

Mississippi spends 6.7% of its General Fund Expenditures on Medicaid. 5

Patients are 3X more likely to stay out of the hospital when pharmacists provide clinical services after discharge. 18

Pharmacists in Ohio delivered a 4.4:1 ROI when providing medication therapy management services to Medicaid patients. Mississippi pharmacists could do this too! 19

$4.40 saved per $1 spent on pharmacists’ services

This information was developed through a collaboration between APhA and NASPA with generous support from the Community Pharmacy Foundation.

References available at www.pharmacistsprovidecare.com
Efforts toward recognition proceed at every level

RACHEL BALICK

The pursuit of provider status recognition is one of the most prominent professional issues for pharmacists around the nation, and efforts to raise awareness of the benefits of pharmacist-delivered health care services are moving forward on Capitol Hill and in state houses.

In Washington
On June 8, the House Ways & Means Subcommittee on Health held a hearing on improving and sustaining Medicare. Reps. Todd Young (R-IN) and Ron Kind (D-WI) submitted comments that recommended passage of the Pharmacy and Medically Underserved Areas Enhancement Act (H.R. 592/S. 314). Young and Kind are original sponsors of the legislation in the House. At press time, the legislation had 291 cosponsors in the House and 49 cosponsors in the Senate.

Young noted that the bill “improves health care access by allowing pharmacists to provide Medicare-covered services to underserved Medicare patients. This legislation would lead not only to reduced overall health care costs, but also to increased access to health care services and improved health care quality.”

Kind echoed these sentiments. “[Pharmacists] conduct health and wellness screenings, manage chronic diseases, provide medication management, facilitate care transitions, and provide immunizations. This legislation would allow the pharmacists serving underserved communities to be reimbursed for the services they provide.”

“APhA greatly appreciates the statements from Representatives Todd Young and Ron Kind in support of H.R. 592,” Michael Spira, former APhA Senior Lobbyist, told Pharmacy Today. “Their leadership in Congress and on the Ways & Means Committee will go a long way in passing this important piece of legislation and providing their constituents access to pharmacists’ patient care services.”

APhA and the Patient Access to Pharmacists’ Care Coalition, of which APhA is a member, also submitted statements for the record.

State action
Advocates of professional recognition for pharmacists also continue to advance efforts at the state level. Students at Albany College of Pharmacy and Health Sciences (ACPHS) helped pass a Vermont opioid law that includes language with implications for provider status in that state. The new law allows health insurers to compensate pharmacists for otherwise-covered services included in a pharmacist’s scope of practice. The statute also acknowledges the important role pharmacists play in curbing opioid abuse.

APhA Academy of Pharmaceutical Research & Science President Robert DiCenzo, PharmD, BCPS, FCCP, dean at Shenandoah University Bernard J. Dunn School of Pharmacy, met recently with a staffer from the office of Sen. Chuck Schumer (D-NY) to thank him for cosponsoring S. 314.

At press time, the legislation had 291 cosponsors in the House and 49 cosponsors in the Senate.
Clackum helps seniors keep living at home, writes letters to Congress

SONYA COLLINS

When “Roy’s” geriatric case manager referred him to Sharon Clackum, PharmD, CGP, Roy was on the verge of moving into a skilled nursing facility. His numbers at dialysis had been consistently off-target, and he just couldn’t manage his numerous medications.

“He was partially blind, so a family member came to the house to set up his medication box for him,” said Clackum. “But if the meds weren’t in the box, he wouldn’t know it.”

Clackum is a board-certified geriatric pharmacist who runs an independent consulting practice. Among her clients are seniors at skilled nursing facilities, patients whose disabilities prevent them from managing their own medications, and seniors like Roy. “They’re older folks on the cusp of moving in to an assisted living facility or nursing home for no other reason than that they can’t handle their medications by themselves.”

Medication box a simple solution

Helping older adults stay in their homes by reviewing and helping them manage their medications improves their quality of life and saves considerable health care dollars. Yet this simple but invaluable clinical pharmacist service is rarely covered by Medicare or the private insurers that follow the government program’s lead. That’s because CMS doesn’t recognize pharmacists as health care providers under Medicare Part B. As a result, these pharmacists’ services are not covered by Medicare and most insurance.

“I give my patients a completed Medicare 1500 billing form and tell them to go ahead and submit it to their insurance. Occasionally they get paid, but generally, they pay me, or their families pay me. If they get reimbursed that’s great, and if not, then it’s another way to introduce the concept of paying the pharmacist for their clinical services and to get our faces in front of the insurance provider,” Clackum said.

Roy had left all his medications out on a countertop for Clackum to review. She immediately identified one source of confusion: Roy got half his prescriptions from a local pharmacy and half by mail. Going through each of the bottles, Clackum compared them with the list she got from the case manager and verified what he should be taking. She reviewed the list with Roy to ensure there had been no changes. “I said, ‘Is there anything else?’ And he said, ‘Renvela’s supposed to be in there, and I didn’t hear you mention that.’” Clackum recalled.

She searched the area for the missing prescription until she found it—or rather, them—on the top shelf of a closet. “There were nine mail-order bags of Renvela in the closet, and there were probably 2,400 in each bag.” Since Roy had been in and out of the hospital, the bags kept coming, but Roy wasn’t taking them. After they were put in a closet out of sight, the family members who were helping him neglected to put the prescriptions in his medication box. With a completed medication list, Clackum set to assembling the morning and bedtime medication container boxes. The bedtime box, however, was already full. “What time do you go to bed?” she recalls asking Roy. “Seven o’clock,” he replied. “Is that when you take your medication?” she asked. “I don’t have any bedtime medications,” he answered. This and the missing Renvela, Clackum realized, were why his numbers were always off at dialysis. She changed the 9:00 p.m. meds to 7:00 p.m. when he normally goes to bed, notified the dialysis center of the change, and got him started on his nighttime dose of medications that day.

Advocating for provider status

Today, Roy is doing better. He takes his medications as directed, his numbers are looking better at dialysis, and he continues to live independently at home. For as Clackum, she writes monthly letters to her state’s U.S. senator, Johnny Isakson (R-GA) and U.S. Rep. Rob Woodall (R-GA), asking them to sign on and support the Pharmacy and Medically Underserved Areas Enhancement Act (H.R. 592/S. 314).

“Sooner or later, I will wear them down,” Clackum said.

Not all older adults have the ability to pay a pharmacist to supervise their complex medication regimen. When medications become too complicated to manage on their own, many seniors end up in skilled nursing facilities, where studies suggest they are likely to die within 1 year. If insurance covered this life-sustaining pharmacists’ service, many more older adults might live out their days, and more of them, at home in their communities—thereby improving their quality of life and saving health care system costs.

Sonya Collins, MA, MFA, contributing writer

Provider status stories

Pharmacists are health care providers. In a series of profiles appearing in Pharmacy Today and on pharmacist.com, pharmacists explain how their patients would benefit from provider status. And as part of our campaign for provider status, APhA has asked pharmacists to share their story of how they provide care to their patients and how provider status will improve health care. These stories are collected on the APhA YouTube channel at https://www.youtube.com/user/aphapharmacists/playlists. If you would like to share your story, please visit PharmacistsProvideCare.com.
Provider status recognition: Looking ahead on federal, state levels

RACHEL BALICK

A PhA urged pharmacists around the country to keep up the push to pass the Pharmacy and Medically Underserved Areas Enhancement Act (H.R. 592/S. 314).

At press time, there were 291 cosponsors in the U.S. House and 49 in the U.S. Senate. More than 65% of the House now supports provider status. Continued persistence is vital to the campaign’s success.

APhA had urged pharmacists to take advantage of Congress’s August recess. “Every Member of Congress has local offices in their district or state. Congressional recesses, like in August, are opportune times for outreach,” APhA Senior Vice President of Pharmacy Practice and Government Affairs Stacie Maass, BSPharm, JD, told Pharmacy Today. “You don’t have to go to Washington to make a difference for provider status.”

Next steps

Congress is in session for only a few weeks in September and won’t be back until after the election. That affects the likelihood that H.B. 592/S. 314 will pass this year because there is limited time in the congressional calendar and focus will be on “must-pass” legislation, such as appropriations. “There is a possibility that the bill could be considered after the election or attached to larger bills that are moving through Congress,” APhA Associate Director of Practice Initiatives Ryan Burke, PharmD, told Today. “But there’s no way for us to know at this point.”

If necessary, the groundwork laid in 2016 will pave the way for success in 2017. “If the legislation needs to be reintroduced, we can gather support similar to what we had in this Congress and move forward quickly,” Burke said.

APhA and other pharmacy organizations are already preparing for the session beginning in January 2017. “While there is still opportunity for progress in 2016, the coalition has already started planning its strategy for the very beginning of 2017 to hit the ground running in the new Congress and the new administration,” Burke added.

Rachel Balick, Assistant Editor

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States on the move

Meanwhile, states are taking action, too. A new law in Colorado amends both the Pharmacy Practice Act and the Colorado Insurance Code to expand practice opportunities for pharmacists. SB 16-135 includes reimbursement opportunities for pharmacists who provide health care services otherwise provided by a physician or advanced practice nurse, a provision that allows insurance plans to include pharmacists in their network of providers, and an expansion of collaborative practice agreements. Gov. John Hickenlooper of Colorado signed the bill in July.

Proposed legislation in California authorizing the state Department of Health Care Services (DHCS) to establish a mechanism to use pharmacists to provide services to Medi-Cal beneficiaries was expected to “undergo a rapid-succession hearings in the Senate and Assembly before the legislature adjourns at the end of August,” according to a California Pharmacists Association (CPhA) news release.

AB 1114 would finally allow DHCS to establish reimbursement for the services pharmacists provide to patients enrolled in the state public insurance program.

“It is exciting to witness the efforts by CPhA, other state pharmacy associations, and pharmacists across the country demonstrating the importance of advocating on behalf of our profession,” Maass said.

“Their success is all of our success.”

Rachel Balick, Assistant Editor
Crystal clear: Pharmacist’s color-coded dosing schedule helps patient stick with drug regimen

SONYA COLLINS

“Norman Seers” was running errands late one afternoon when he had a painful reminder that he hadn’t taken his medication. He had an urgent need to urinate, but when he found a restroom, he couldn’t go.

Seers, 77, takes an alpha-1 blocker for an enlarged prostate, but the nighttime dose—which doesn’t coincide with any of his other meds—was too easy to forget. “You’re out and about, so it’s harder to remember than the ones you take first thing in the morning or at bedtime,” Seers said.

Seers took six medications—three OTCs and three prescriptions—at four different times during the day. The North Carolina native also complained of feeling lethargic and mentally foggy.

A pharmacist friend of his, who knew there had to be a better way, referred Seers to CareKinesis Chief Pharmacotherapy Officer Bob Alesiani, PharmD, CGP, for a consultation. CareKinesis is an organization whose mission includes keeping older patients, who are typically eligible for nursing home admission, safe through technology-enabled products and services for medication risk management.

“We have patients who take 14 or more medications. We try to get those down to eight or nine,” said Alesiani. “We look for medications that might increase fall risk, cause sedation or changes in cognition, or affect their heart rhythm. And we look for drugs competing for the same metabolic pathways.” The organization also uses pharmacogenomic test results and data application to confirm that each patient is on the right drug at the right dose.

Provider status is important

While pharmacists are the best equipped to do the work Alesiani describes, they can’t offer these services to just anyone. Pharmacists are not recognized as health care providers by CMS—nor, consequently, by most other major health plans. As a result, health insurance often doesn’t cover pharmacists’ services, unlike those of physicians, nurses, physician assistants and many others. “Nobody sees the patient as much as the pharmacist does,” Alesiani said. “We have more opportunity to provide personalized care to improve the patient’s quality of life and long-term health outcomes. So it’s important for the pharmacist to be recognized and compensated as a provider.”

He added, “We believe it’s to the payee’s advantage to keep these patients out of hospitals and nursing homes.”

Two groups of meds

Alesiani received an e-mail from Seers describing mental “cloudiness” and the oft-forgotten prostate medication. The pharmacist set to work simplifying his patient’s regimen and investigating the cause of his symptoms.

“What the pharmacist did that helped me most was send a color-coded chart that shows me what medications to take in the morning and at night,” Seers said.

Streamlining a medication regimen requires a pharmacist’s expertise. “Oftentimes, there’s a competition for the metabolic pathway needed to get rid of that drug,” said Alesiani. If a patient takes two drugs at the same time that take the same route through the body, one drug could end up “waiting in line” to clear the system. The drug might be expected to move through the body in, say, 12 hours. But if another drug grabs onto the preferred enzyme first, the other drug waits, builds up in the system, and could cause unintentional overdose.

Alesiani was able to use his company’s technology-enabled products to separate medications that might compete for the same enzyme into two groups. One group can be taken with food at breakfast; the others can be taken on an empty stomach at bedtime. Now Seers receives his medications packaged in two separate groups, and he no longer gets those painful reminders to take his alpha-1 blocker.

“Putting my most critical pharmaceutic at the time of day where I’m least likely to forget it was really significant for me,” Seers said.

Recommending changes

Besides the adjusted dosing schedule, Alesiani sent recommendations to Seers’s physician. The pharmacist suggested changes that might clear Seers’s fog and restore his energy. The physician approved the changes, and Seers will make them when he finishes the prescriptions he currently has on hand.

“The most important takeaway message is that pharmacists—especially those new to the profession—get involved in their patients’ lives and know there is more to this job than dispensing duties,” he said.

Sonya Collins, MA, MFA, contributing writer

Provider status stories

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David Evans, Slidell, LA  
Charmaine Sanders, Olympia, WA
District Meetings
Districts 1 & 7
The goal of this article is to review the balance of phosphorus in the body along with discussing the management of hyperphosphatemia with oral phosphate binders.

OVERVIEW
Phosphorus is the body’s main intracellular anion which exists mainly in the bone and soft tissues. Phosphorus exists primarily as phosphate in the serum and most of the phosphate exists as hydroxyapatite, the main mineral content within bone. Approximately 85% of the body’s phosphorus is stored in bone and teeth. Phosphorus is an integral part of many biological functions. Phosphorus is a structural component of cell membrane phospholipids and is a part of intracellular signal transduction. In addition to phosphorus’ involvement in cellular structural components, the intracellular anion is involved in energy production through the production of adenosine triphosphate (ATP). Phosphorus also maintains neurologic and muscle function and is responsible for activation of many enzymes and hormones.

The body’s normal serum phosphorus range is 2.5-4.5 mg/dL, and phosphorus homeostasis is mainly maintained via regulation through the small intestine, bones/teeth, and kidneys. In healthy individuals, phosphorus balance is maintained by these systems by the body’s regulation of dietary phosphorus intake, bone formation and reabsorption, and renal elimination. The body’s self-regulation of phosphorus is influenced by alterations in parathyroid hormone levels, acid-base status, and renal function. The recommended dietary allowance of phosphorus for healthy adult females and males is 700 mg/day. Renal failure patients who need intensive management of phosphorus should consult with a Registered Dietician who has experience with patients affected by renal disease. Dieticians can play a key role in educating patients on proper dietary phosphorus intake and phosphorus management. Please see Table 1 for examples of food lower and higher in phosphorus content.

PATHOPHYSIOLOGY
Hyperphosphatemia is defined as a serum phosphorus concentration exceeding 4.5 mg/dL. Due to phosphorus’ high amount of renal elimination, one of the most common causes of hyperphosphatemia is renal insufficiency. In patients with normal renal function, roughly 75 to 85% of phosphate is reabsorbed by the proximal renal tubule. Other causes of hyperphosphatemia include exogenous sources of phosphorus (parenteral and enteral nutrition, enemas, laxatives), cellular destruction, or vitamin D overdose. An increased serum phosphorus concentration signals parathyroid hormone release which leads to phosphate excretion.

SIGNS AND SYMPTOMS
Hyperphosphatemia can be asymptomatic, but many signs and symptoms coincide with hypocalcemia and hyperparathyroidism. Some individuals may experience fatigue, shortness of breath, nausea, vomiting, anorexia, and/or sleep disturbances. Signs of hypocalcemia (tetany, muscle cramps, perioral numbness or tingling, positive Trousseau or Chvostek sign) may also be present due to the relationship between phosphorus and calcium. For example, patients with progression of renal dysfunction have a diminishing ability of the kidneys to eliminate phosphorus. As glomerular filtration rate falls, free calcium levels decrease and serum phosphorus increases. As renal disease progresses, the need for dietary interventions and pharmacotherapy becomes increasingly important.

TREATMENT
Pharmacotherapy with oral phosphate binders has been driven by concerns regarding vascular calcification, development of safer therapies, and minimization of bone disease in

Table I

<table>
<thead>
<tr>
<th>High Phosphorus Foods (more than 100 mg per serving)</th>
<th>Milligram of phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheese</td>
<td>150</td>
</tr>
<tr>
<td>Milk</td>
<td>240</td>
</tr>
<tr>
<td>Nuts</td>
<td>100</td>
</tr>
<tr>
<td>Bran cereal</td>
<td>350</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low Phosphorus Foods (less than 50 mg per serving)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh fruits (apples, grapes, peaches, pineapple)</td>
</tr>
<tr>
<td>Fresh vegetables (cauliflower, carrots, cucumber, celery)</td>
</tr>
<tr>
<td>Popcorn</td>
</tr>
<tr>
<td>Coffee, tea, fruit juices</td>
</tr>
<tr>
<td>Light colored sodas</td>
</tr>
<tr>
<td>Dark colored sodas</td>
</tr>
</tbody>
</table>
hemodialysis patients. Until the 1980s, aluminum was predominately used as the main oral phosphate binder, but the use of aluminum was linked to systematic toxicity. Patient compliance with oral phosphate binders is limited due to large pill burden, side effect profile and high cost. Oral phosphate binders lower serum phosphorus by binding to dietary phosphate and decreasing absorption from the gastrointestinal tract.11

**COMPARISON OF PHOSPHATE BINDERS**

Calcium-based phosphate binders are the most widely utilized oral phosphate binders. They have the current lowest out of pocket cost to patients and have been proven to be effective in lowering serum phosphorus. Calcium acetate has shown to have superior phosphate control and less frequent incidences of hypercalcemia when compared to calcium carbonate. Patients must be properly counseled on avoiding calcium supplements (including calcium antacids) when being treated with calcium-based phosphate binders. Serum calcium must be monitored in patients receiving Digoxin® because hypercalcemia can aggravate digitalis toxicity.10

Fosrenol® (lanthanum carbonate) is available as a chewable tablet and oral powder formulation. Lanthanum has been associated with bowel obstruction, ileus, gastrointestinal perforation and fecal impaction. Patients should be counseled to chew tablets completely. Oral quinolone antibiotics must be taken one hour before or four hours after lanthanum. Thyroid hormone replacement therapy should not be taken within two hours of lanthanum, and close monitoring of TSH levels is recommended in patients taking lanthanum and oral thyroid hormone replacement therapy. Radiographs of the abdomen may have a radio-opaque appearance typical of an imagining agent due to lanthanum having radio-opaque properties.5

Currently, Renvela® (sevelamer carbonate) is available as tablet and powder form. Both Renvela® and Renagel® (sevelamer hydrochloride) have the same phosphate binding moiety, but Renvela® offers the potential to buffer acidosis due to the carbonate salt form. Vitamin D, E, K and folic acid levels should be monitored during treatment with sevelamer due to the possibility of reduced vitamin levels. Both ciprofloxacin and mycophenolate mofetil should be taken two hours before either sevelamer salts. Patients with swallowing disorders should take Renvela® suspension because of cases of dysphagia and esophageal tablet retention. Both of these drugs should not be used in patients with bowel obstructions. Sevelamer offers the advantages of no systemic absorption and reduction in total cholesterol and LDL-C (15-31% reduction in clinical trials).6, 7 In a recent meta-analysis including 25 studies with 4770 participants (88% were on hemodialysis), the use of sevelamer compared to calcium-based binders resulted in a lower all-cause mortality.

Velphoro® (sucroferric oxyhydroxide) has no known contraindications, but medication effects and iron hemostasis should be monitored closely in patients with peritonitis, history of hemochromatosis or other iron accumulation diseases, or significant gastric or hepatic disorders, following gastrointestinal surgery. These patient groups were not included in clinical trials. Doxycycline and alendronate should be taken one hour before administration of Velphoro®. Velphoro® should not be taken with Synthroid® or vitamin D analogs due to effect on absorption of these drugs.9

Velphoro® was compared to Renvela® in an open-label Phase III extension study. Hemodialysis and peritoneal dialysis patients were randomized 2:1 to receive Velphoro® or Renvela® for 24 weeks. Eligible patients were able to enroll in a 28-week extension study and continued the same treatment dose they previously received. Change in serum phosphorus from extension study baseline to Week 52 endpoint was 0.02 ± 0.52 mmol/L with Velphoro® and 0.09 ± 0.58 mmol/L with Renvela®. Patient adherence was 86.2% with Velphoro® and 76.9% with Renvela®. This study showed the efficacy of Velphoro® and the possible utility of providing patients with a lower pill

**Table 2**<sup>10</sup>

<table>
<thead>
<tr>
<th>Type of Binder</th>
<th>Name</th>
<th>Dosing Recommendations</th>
<th>Dosage Form</th>
<th>Common Adverse Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium based</td>
<td>PhosLo® (calcium acetate)</td>
<td>Initiate: 2 caps with each meal Max 3-4 caps with each meal Can give smaller dose with snacks</td>
<td>667mg gel cap</td>
<td>Nausea, vomiting, hypercalcemia</td>
</tr>
<tr>
<td>Iron based</td>
<td>Velphoro® (sucroferric oxyhydroxide)</td>
<td>Initiate: 1 tablet with meals Max 2 tablets with meals</td>
<td>500mg chewable tablet</td>
<td>Diarrhea, discolored feces, nausea</td>
</tr>
<tr>
<td>Iron based</td>
<td>Auryxia® (ferrix citrate)</td>
<td>Initiate: 2 tablets TIDAC Titrate in 1-2 tablet/day increments Max 12 tablets per day</td>
<td>210mg ferric iron</td>
<td>Diarrhea, discolored feces, constipation, nausea</td>
</tr>
<tr>
<td>Aluminum and Calcium free</td>
<td>Fosrenol® (Lanthanum carbonate)</td>
<td>Initiate: 1500mg in three divided doses Max dose 4500mg daily</td>
<td>500, 750, 1000 mg chewable tablets 750, 1000 mg oral powder</td>
<td>Nausea, vomiting, abdominal pain</td>
</tr>
<tr>
<td>Aluminum and Calcium free</td>
<td>Renagel® (Sevelamer carbonate)</td>
<td>Initiate: 0.8g or 1.6g TIDAC Switch gram for gram among sevelamer formulations</td>
<td>800mg tablet 0.8g and 2.4g powder</td>
<td>Nausea, vomiting, diarrhea, dyspepsia</td>
</tr>
<tr>
<td>Aluminum and Calcium free</td>
<td>Renagel® (Sevelamer hydrochloride)</td>
<td>Initiate: 1-2 800mg or 2-4 400mg tablets TIDAC</td>
<td>400mg tablet, 800mg tablet</td>
<td>Nausea, constipation, diarrhea</td>
</tr>
</tbody>
</table>
Hyperphosphatemia Overview and Disease Management with Phosphate Binders

**INSTRUCTIONS:** After reading the continuing education article, photocopy or detach this page. Take the quiz below. A grade of 70 percent or better is required to earn 2.0 hours of continuing education credit. This is a free service for MPhA members. Include a self-addressed and stamped envelope. Mail to: Mississippi Pharmacists Association, 341 Edgewood Terrace Drive, Jackson, MS 39206-6299 or fax to 601-981-0451.

**Print name, address and phone number:**

1. What is the body’s normal serum phosphorus range?
   a. 1.0 - 2.5 mg/dL
   b. 2.5 - 4.5 mg/dL
   c. 4.5 - 8 mg/dL
   d. 8.0 - 10.5 mg/dL

2. What are two examples of foods containing high phosphorus levels (more than 100 mg per serving)?
   a. Fresh fruits and cheese
   b. Milk and nuts
   c. Fresh vegetables and nuts
   d. Popcorn and light colored sodas

3. Oral quinolone antibiotics must be taken ______ hour before or ______ hours after lanthanum.
   a. One, four
   b. One, two
   c. Four, one
   d. Two, one

4. Which product offers the potential to buffer acidosis due to the carbonate salt form?
   a. Renvela® (sevelamer carbonate)
   b. Renagel® (sevelamer hydrochloride)
   c. Fosrenol® (lanthanum carbonate)
   d. PhosLo® (calcium acetate)

5. What levels should be monitored when using a sevelamer based product?
   a. Vitamin D
   b. Vitamin E
   c. Vitamin K
   d. Folic acid levels
   e. All of the above

6. Auryxia® (ferric citrate) is contraindicated in patients with ______.
   a. Low iron levels
   b. Iron overload syndromes (hemochromatosis)
   c. Calcium overload syndromes
   d. Low calcium levels

7. Which phosphate binder product is available as a gel capsule?
   a. PhosLo® (calcium acetate)
   b. Renvela® (sevelamer carbonate)
   c. Fosrenol® (lanthanum carbonate)
   d. Auryxia® (ferric citrate)

8. What phosphate binder class has an adverse effect of discolored feces?
   a. Calcium based
   b. Iron based
   c. Aluminum and Calcium free

9. Velphoro® (sucroferric oxyhydroxide) should not be taken with ______ or ______ due to effect on absorption of these drugs.
   a. Synthroid or vitamin C analogs
   b. Doxycycline or vitamin D analogs
   c. Aluminum and Calcium free

10. Which phosphate binder type currently has the lowest out of pocket cost to patients and has been proven to be effective in lowering serum phosphorus.
    a. Calcium based
    b. Iron based
    c. Aluminum and Calcium free

**CONCLUSION**

Phosphate is a major intracellular anion important in bone mineralization, energy production, cell signaling, and acid-base homeostasis. Patients with end stage renal disease are at risk for development of renal bone disease and calcification of soft tissue and vasculature. Treatment of hyperphosphatemia includes dietary reduction, but dietary interventions are often not enough to prevent complications. This leads to the use of oral phosphate binders in over 90% of patients with chronic renal failure. Each different class of phosphate binders offers various benefits but each of them has limitations. The prescriber must decide on which therapy is best for each patient based on clinical benefit, cost, and administration burden.

**REFERENCES:**

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