

Announcements

Going Green and Going Strong

MSHP is excited to introduce the newest step in the MSHP's "Going Green" campaign, the new monthly e-newsletter. MSHP has partnered with ASHP to provide this quality electronic newsletter to our members. The goal of the new format is to allow faster dissemination of information with a reduced impact on the environment.

MSHP will also utilize the new e-newsletter and updated website this year for membership renewals. A link will be created to allow for fast online renewal and to help reduce unnecessary use of copies and postage. The form will also be available on the website to print and mail for our members that would prefer not to renew online. A paper renewal notice will only be mailed to those that do not initially respond.

All of these efforts are to reduce wastage that will affect our environment and our society. We would love any other ideas to help "Going Green" from our membership. We are also sensitive to the concerns of the change of our information sharing process. MSHP is making every attempt to stay in-line with the practices of ASHP and other national societies.

Andy Ostrenga
MSHP President
[email](#)

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September 2009

MSHP is on Twitter and Facebook!

Please join us!

Twitter:

<http://twitter.com/MississippiSHP>

Facebook Group Name:

Mississippi Society of Health-System Pharmacists (MSHP)

ARE YOU CURRENTLY ON THE MSHP LISTSERV?

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About MSHP

The Mississippi Society of Health-System Pharmacists (MSHP) is a professional society of pharmacists and related personnel practicing in organized healthcare settings.

Mississippi Society of Health-System Pharmacists

P.O. Box 48206

H1N1: A Novel Flu and Cause for Concern

Amber Holdiness, PharmD

In April 2009, a novel human influenza A (H1N1) virus was identified in Mexico and the United States.¹ The virus spread rapidly worldwide, with the World Health Organization declaring H1N1 a global pandemic on June 11, 2009.² Widespread infection is a significant threat because of the high risk of susceptibility among a large majority of the population.¹

The seasonal flu and H1N1 are clinically similar, causing "fever, cough, sore throat, body aches, headache, chills and fatigue".² A real-time reverse transcriptase-polymerase chain reaction is required to definitively differentiate and diagnose H1N1 infection. Though clinically similar, H1N1 disproportionately affects the younger population with 37 years being the median age of mortality. In comparison, those at least 65 years old have the highest death rate from the seasonal flu. Additionally, pregnant women with H1N1 were 4 times more likely to be hospitalized compared to the general population acquiring the virus.¹ The United States has the largest number of reported cases of H1N1, and most infected individuals have recovered without medical treatment.²

Like other influenza viruses, H1N1 is transmitted primarily by large-particle respiratory droplets. By coughs and sneezes, the droplets typically travel less than 6 feet. Close contact is required for transmission and is defined as "having cared for or lived with a person who is a confirmed, probable or suspected case of H1N1, or having been in a setting where there was a high likelihood of contact with respiratory droplets and/or body fluids of such a person".³ "Airborne" transmission is another possibility from small-droplet nuclei on contaminated objects.³

Vaccine Recommendations

This year's seasonal flu vaccine will not provide protection from H1N1, nor should H1N1 vaccine be used as a substitute for the seasonal flu vaccine.⁴ All age groups should receive the seasonal vaccine as soon as it is available, with previously unvaccinated children aged 6 months to 8 years receiving 2 doses.¹ Specific vaccines developed for H1N1 are anticipated to be released mid-October.¹ Five target groups have been identified by the Centers for Disease Control and Prevention (CDC) to prioritize initial H1N1 vaccination distribution based on their risk of infection, development of complications, or potential for transmission (Table 1). If vaccine quantities are limited, further priority has been assigned to a subset of the targeted groups that includes populations 1 through 3 in Table 1 plus all children aged 6 months to 4 years and those 5 to 18 years old with medical conditions that increase their risk for complications.¹ Because of their lower risk of acquiring H1N1 infection, vaccination in people 65 years and older should be reserved until after vaccination completion of the younger populations.⁴

Due to the lack of preexisting antibodies, 2 doses of the H1N1 vaccine administered at least 21 days apart were initially thought to be necessary.¹ However, it appears that one dose may be sufficient for protection.⁵ Final guidelines will be released soon. Since there are five manufacturers, it will be difficult to ensure both doses are given from the same manufacturer.^{1,6} Like the seasonal injection, 4 of the vaccines manufactured will be inactivated; whereas, 1 will be live, attenuated like the seasonal nasal inhalation.⁷ H1N1 and the inactivated seasonal vaccination may be co-administered in different sites. However, the live, attenuated (nasal inhalation) seasonal vaccine should not be simultaneously administered with the H1N1 vaccine.¹

The CDC effort of H1N1 vaccination distribution will be the largest public health initiative to date. State health departments will designate local sites for vaccination. McKesson, the sole distributor of the vaccine, anticipates 90,000 sites across the United States. It is anticipated that the federal government will pay for the vaccine and all related supplies.⁶

Jackson, MS 39296
(800) 296-1114

- [e-mail link](#)
- [web link](#)

About ASHP

ASHP is a 35,000-member national professional association that represents pharmacists who practice in hospitals, health maintenance organizations, long-term care facilities, home care, and other components of health care systems. ASHP is the only national organization of hospital and health-system pharmacists and has a long history of improving medication use and enhancing patient safety.

American Society of Health-System Pharmacists

7272 Wisconsin Avenue
Bethesda, MD 20814
301-657-3000

- [e-mail link](#)
- [web link](#)

Calendar/Save the Date!**SSHP Membership Drive**

9/30/09
7:00 - 9:00 PM
Pump It Up
Flowood

UM/MSHP Residency Showcase

10/1/09
UMMC

Ole Miss School of Pharmacy Football Tailgate Parties

10/10/09
Ole Miss vs. Alabama

Immune-Mediated Coagulopathy

10/13/09 at 6:30 pm
Bradley Boucher, Pharm.D
Park Heights Restaurant
Tupelo, MS

This program is approved by the Mississippi Board of Pharmacy for 1.0 contact hours (0.1 CEU) program number 009-010-009-001

2009 National Hospital and Health-System Pharmacy Week

10/18/09 - 10/24/09

H1N1 Treatment and Prophylaxis

Treatment and prophylaxis of H1N1 virus infection should be reserved for individuals at high risk for complications (Table 2). The proper identification of patients for H1N1 prophylaxis and treatment is imperative in order to minimize development of antiviral resistance. Suspected cases presenting with an uncomplicated febrile illness should not receive antiviral therapy because the infection is generally self-limiting. Hospitalized patients with confirmed, probable, or suspected H1N1 should be treated.³

Post-exposure prophylaxis should be considered for high risk populations in close contact with infected individuals. Unprotected healthcare workers in the high risk population particularly should consider prophylaxis. Based on studies with seasonal flu, the H1N1 infectious period is predicted to be 1 day before to 7 days after symptom onset. Therefore, prophylaxis is not necessary for exposure outside of this range. Pre-exposure prophylaxis, limited to circumstances of ongoing occupational risk among those in the high risk population, can be given during the possible period of exposure and for 10 days after exposure to someone in the infectious period of H1N1.³

Zanamivir (Relenza®) and oseltamivir (Tamiflu®) have activity against H1N1 and are currently recommended for both treatment and prophylaxis (Table 3). In appropriate persons, antiviral therapy should optimally be started within 48 hours of symptom onset but may be given later if the illness is severe or for those with a high risk for complications. As with seasonal flu, treatment duration for H1N1 is 5 days. Prophylaxis with either oseltamivir or zanamivir given for 10 days can be initiated after close contact with a H1N1 case (confirmed, probable, or suspected).³

As with the seasonal flu, children and adolescents 18 years and younger with a confirmed or suspected case of H1N1 should not be given aspirin or any aspirin-containing products due to the increased risk of Reye Syndrome. Acetaminophen or an NSAID are recommended for fever relief.³

Conclusions and Future Implications

The American Society of Health-System Pharmacists 2015 Initiative states that pharmacists should assume responsibility for ensuring that eligible patients receive vaccination.⁸ As the H1N1 vaccine becomes available, it will be vital to correctly identify the targeted population and maximize vaccine administration to the most susceptible individuals. In the future, it is anticipated that the H1N1 and the seasonal flu vaccine will be combined, negating this separate process. To achieve this year's goal, the involvement of pharmacists is as crucial as ever. Pharmacists can be instrumental in the identification, education, and administration of the H1N1 vaccine in the upcoming months. Equally important, pharmacists can also ensure that eligible individuals receive the seasonal flu vaccination.

¹ Morse D, Advisory Committee on Immunization Practices. Use of Influenza A (H1N1) 2009 monovalent vaccine. Morbidity and Mortality Weekly Report. 21 Aug 2009.

² Centers for Disease Control and Prevention. Novel H1N1: background on the situation. Available at: <http://www.cdc.gov/h1n1flu/background.htm>. Accessed 22 Aug 2009.

³ Centers for Disease Control and Prevention. Interim guidance on antiviral recommendations for patients with novel Influenza A (H1N1) virus infection and their close contacts. 6 May 2009. Available at: <http://www.cdc.gov/h1n1flu/recommendations.htm>. Accessed 22 Aug 2009.

⁴ Centers for Disease Control and Prevention. Novel H1N1 vaccination recommendations. Available at: <http://www.cdc.gov/h1n1flu/vaccination/acip.htm>. Accessed 22 Aug 2009.

⁵ Greenberg ME, Lai MH, Hartel GF, et al. Response after one dose of a monovalent Influenza A (H1N1) 2009 vaccine – preliminary report. N Engl J Med. 2009;361.

⁶ Roos R. States to designate providers to give H1N1 vaccines. Center for Infectious Disease Research and Policy. 10 Aug 2009. Available at: <http://www.cidrap.umn.edu/cidrap/content/influenza/swineflu/news/aug1009vaccine.html>. Accessed 22 Aug 2009.



[web link](#)

National Pharmacy Technician Day

10/20/09

[web link](#)

Ole Miss School of Pharmacy Football Tailgate Parties

10/24/09

Ole Miss vs. Arkansas

JDRF 2009 Walk to Cure Diabetes

10/24/09

Mayes Lake

LeFleurs Bluff Park

Jackson, MS

9:00 am Registration

10:00 am Walk begins

[web link](#)

American Heart Association Heart Walk

10/25/09

Mississippi State Capitol

Jackson, MS

1:00 pm registration

2:00 pm Walk begins

[web link](#)

Clinical Skills Competition

10/30/09

Jackson Medical Mall

Anyone interested in being a

judge of the written or oral

portion, please contact Katie

McClendon at

kmccclendon@sop.umsmed.edu

edu

2009 Leadership Conference [ASHP]

10/19/09 - 10/20/09

The Westin O'Hare

Chicago, Illinois

Putting Together the Pieces of Cancer Care

11/13/09

North Mississippi Medical Center

Cora Fields Auditorium

Ole Miss School of Pharmacy Football Tailgate Parties

11/14/09

Ole Miss vs. Tennessee

ASHP Midyear Clinical Meeting [ASHP]

12/06/09 - 12/10/09

Venetian Resort and Sands

Expo Center

Las Vegas, Nevada

⁷ Centers for Disease Control and Prevention. Preparing for Vaccination with Novel H1N1 Vaccine. Available at: <http://www.cdc.gov/h1n1flu/vaccination/provider/preparing.htm>. Accessed 13 Sept 2009.

⁸ American Society of Health-System Pharmacists. 2015 ASHP Health-System Pharmacy Initiative. Available at: http://www.ashp.org/s_ashp/docs/files/2015_Goals_Objectives_0508.pdf. Accessed 29 Aug 2009.

⁹ Tamiflu® Prescribing Information. Roche. Foster City, CA. Aug 2008.

¹⁰ Relenza® Prescribing Information. GlaxoSmithKline. Research Triangle Park, NC. Feb 2008.

Table 1: Initial Target Groups for H1N1 Vaccine¹

1. Pregnant women
2. Those that live with or provide care for infants < 6 months old
3. Healthcare and medical service workers
4. Children and young adults (6 months to 24 years)
5. People 25 to 65 years old who have medical conditions that increase their risk for influenza-related complications

Table 2: Populations at Increased Risk of Complications

1. Children < 5 years, especially those < 2 years
2. Adults > 65 years
3. Children and adolescents ≤ 18 years on long-term aspirin therapy (Reye Syndrome)
4. Those with:
 - a. Pulmonary diseases (including asthma)
 - b. Cardiovascular diseases (excluding hypertension)
 - c. Renal and hepatic dysfunction
 - d. Hematological disorders (including sickle cell disease)
 - e. Neurologic and neuromuscular diseases
 - f. Metabolic disorders (including diabetes)
5. Immunosuppressed patients (including HIV or on certain medications)
6. Pregnant women
7. Nursing home or chronic-care facility residents

³for both H1N1 and seasonal flu

Table 3: Antiviral Dosing Recommendations for H1N1

Agent, Group		Treatment (5 days)	Prophylaxis (10 days)
Oseltamivir (Tamiflu®)⁹			
Adults		75 mg BID	75 mg daily
Children	≥ 12 months, ≤ 15 kg	30 mg BID	30 mg daily
	≥ 12 months, 16-23 kg	45 mg BID	45 mg daily
	≥ 12 months, 24-40 kg	60 mg BID	60 mg daily
	≥ 12 months, > 40 kg	75 mg BID	75 mg daily
Zanamivir (Relenza®)¹⁰			
Adults		Two 5-mg inhalations BID	Two 5-mg inhalations daily
Children		Two 5-mg inhalations BID (≥ 7 years)	Two 5-mg inhalations daily (≥ 5 years)

Vitamin D: Highlights of Recent Issues and Developments

Grant Smith, PharmD; Patrick Boler, PharmD Candidate; Carly Blevens, PharmD; Deborah Minor, PharmD

Historically the benefits of vitamin D, or calciferol, were thought to be limited to bone health and involve calcium-dependent mechanisms. The role of this fat-soluble nutrient in preventing “rickets” was recognized even before identification of the vitamin in the 1930s. The presence of vitamin D is necessary for the absorption of calcium in the digestive tract and for maintaining calcium and phosphorus levels in the blood. Vitamin D also influences the synthesis and secretion of parathyroid hormone. Attention has recently turned to the extra-skeletal effects of vitamin D and evidence for calcium-independent activity.

Vitamin D receptor complexes have been identified in many cells throughout the body. The role and importance of these receptors continues to evolve. Vitamin D receptors are found in skeletal and smooth muscle cells, lymphocytes, and cells of colon, breast, and prostate tissue. Recent studies have also identified associations between low serum vitamin D concentrations and increased risk for metabolic and cardiovascular disease (CVD).

[web link](#)

2009 MSHP/UM SOP Reception at ASHP Midyear Clinical Meeting

12/07/09

5:30 - 7:30 pm

Venetian Resort-Hotel

Reception Room TBA

Pharmacy Alumni Weekend

3/26/10 - 3/27/10

Special reunion activities for classes of 1960, 1970, 1980, 1985, 1990, and 2000.

Vitamin D deficiency is not commonly assumed to be a health concern in the United States. However, vitamin D deficiency has actually increased in prevalence and reached epidemic proportions among certain populations even within the United States. This review describes sources and metabolism of vitamin D, populations at risk for deficiency, and current recommendations for adequate intake. Recent advances in our understanding of the influences of vitamin D on overall health are also highlighted.

Sources and Metabolism

Natural vitamin D occurs as two major forms. Vitamin D₂ (ergocalciferol) is found in some plants and vitamin D₃ (cholecalciferol) is found in other foods and synthesized in the human body. Both of these forms can also be synthetically produced and are commercially available for supplementation. Very few foods naturally contain vitamin D, and most are fortified, which are the primary sources of vitamin D in the American diet. The most abundant natural food sources of vitamin D are fatty fish such as salmon, mackerel, and herring. Most other foods including dairy products, juices, and cereals are fortified. For example, one cup of either milk or orange juice contains 100 IU of vitamin D.

Vitamin D supplements are available OTC and by prescription. OTC supplements range in content from 400 to 2000 IU of vitamin D₂ or D₃ (see Table 1). Since OTC dietary supplements are not standardized by the FDA, products carrying the USP label of verification should be selected.

Vitamin D deficiencies can also be treated with prescription vitamin D₂, or ergocalciferol, supplied as 50,000 IU. Doses vary based on the condition being treated. In addition, the active form of vitamin D (1,25-hydroxyvitamin D or calcitriol,) is marketed as Rocaltrol® (0.25 and 0.5 mcg) and may be preferred for patients with chronic kidney disease

For most humans, the major source of vitamin D is casual sun exposure (see Figure 1). The human body synthesizes vitamin D₃ using energy from the sun, supplying 80-90% of the body's requirements. The skin has a large capacity to produce vitamin D, but this is influenced by many factors. For most adults, exposure of the hands, face, and arms to sunlight (without application of sunscreen) for 5 to 15 minutes, two to three times a week is adequate to provide sufficient amounts of vitamin D.

When exposed to the sun, ultraviolet B (UVB) radiation penetrates the skin and 7-dehydrocholesterol in the skin dermis and epidermis is converted to previtamin and then vitamin D₃. Either vitamin D₃ or D₂ from synthesis in the skin or from the diet can then be stored in adipocytes or transported to the liver by a protein carrier. Stored vitamin D can be later released from adipocytes back into circulation. Interestingly, vitamin D toxicity cannot occur from excessive exposure to sunlight. If the fat stores become saturated, the vitamin D will be converted to an inactive compound with increased exposure to UVB rays.

Once transported to the liver, vitamin D is converted to 25-hydroxyvitamin D (25-OHD) – the biologically inactive but main circulating form of vitamin D. Circulating 25-OHD is enzymatically converted in the renal tubular cells to the active form, 1,25-hydroxyvitamin D. A small fraction of 25-OHD is converted to 24,25-Hydroxyvitamin D that may have potential physiological actions but have not yet been fully elucidated. Active vitamin D is essential for promoting calcium absorption and maintaining adequate serum calcium and phosphate concentrations necessary for normal bone growth and remodeling. Vitamin D also modulates neuromuscular and immune function and inflammation through many gene-encoding proteins.

Serum concentrations of vitamin D are monitored by measurement of the inactive form, 25-OHD (see Table 2). Levels of the active form, 1,25-dihydroxyvitamin D, are not a good indicator of vitamin D status because of its short half-life and tight regulation by parathyroid hormone and calcium concentrations. The appropriate and optimal serum concentration of 25-OHD is controversial. Historically, normal serum levels were considered to be 20-60 ng/mL. Now, most experts define vitamin D deficiency as serum concentrations below 20 ng/mL, insufficiency as 21-29 ng/mL, and sufficient

concentrations as 30-60 ng/mL. With these new suggested concentrations, it is estimated that 1 billion people worldwide are vitamin D deficient.

Populations at Risk for Deficiency

Many factors influence vitamin D deficiency and several population groups are at risk. Deficiency can result from inadequate dietary supplies, impaired absorption and use, increased requirements, or increased excretion. Each of these factors may contribute to deficiency and have a varying role among particular population groups.

Darker skin limits the absorption of adequate sunlight to make sufficient vitamin D. Race plays a role in vitamin D insufficiency as African Americans and Hispanics have more melanin in their skin than Caucasians. Melanin acts as a barrier to the UVB rays, so a longer time period is necessary to synthesize vitamin D. The elderly are at risk as well. Because of declining kidney function and a decline in 7-dehydrocholesterol levels, the elderly do not synthesize as much vitamin D as younger populations.

Place of residence influences vitamin D levels. Latitude affects vitamin D production and in areas further from the equator, there is less sunlight available to make vitamin D throughout the year. People who are obese are also at risk for deficiency because fat sequesters vitamin D and alters release. People who are vegetarians have lactose intolerance or nutritional deficiencies, or absorptive disorders such as Crohn's and Celiac disease may also be at risk. Breast milk only contains 25 IU/L of vitamin D; thus breastfed infants are considered at risk for vitamin D deficiency and require supplementation.

Current Recommendations for Adequate Intake

Public health authorities typically recommend a minimum daily consumption of 200 IU of vitamin D. Higher intake is often recommended for those at risk for deficiency, particularly in pregnancy and elderly individuals. The Institute of Medicine (IOM) has provided recommendations for "adequate intake" of vitamin D. "Adequate intake" is the amount thought to be needed by most individuals to maintain calcium absorption and bone health and is independent of cutaneously produced vitamin D. The recommended adequate intake by IOM is 200 IU/day for those 0 to 50 years old, 400 IU/day for those 51-70 years old, and 600 IU for those greater than 70 years old.

Recent recommendations from the American Academy of Pediatrics increase the recommended intake of vitamin D from 200 IU/day to 400 IU/day for all pediatric patients. These guidelines recommend that both breastfed-infants and nonbreastfed-infants should receive vitamin D supplementation until intake of vitamin D fortified milk or formula exceeds 1000 mL/day (about 34 fluid ounces). This amount of fortified milk supplies the needed 400 IU of vitamin D. Vitamin D supplementation is also recommended for all children and adolescents if they do not receive at least 400 IU/day through diet sources.

Vitamin D and Health

The relationship of vitamin D and calcium metabolism is well established, thus its role in preventing fractures is widely accepted. A recent meta-analysis of randomized controlled trials has documented the efficacy of vitamin D in lowering hip and non-vertebral fractures among elderly individuals. While this benefit may largely be attributed to bone health, analysis of other trials have found that both ambulatory and institutionalized older adults receiving vitamin D supplementation show a reduction in fall risk. The reduction of fall risk may in part be attributed to the presence of vitamin D receptors in skeletal muscle tissue, vitamin D status, and the correlation with physical performance. Wichert and colleagues demonstrated that low serum 25-OHD in both men and women aged 65 years and older is associated with a drop in physical performance. Additional data including younger populations is needed before further conclusions can be made regarding vitamin D's role in physical performance.

Vitamin D appears to have effects not only on skeletal muscle but also on arterial smooth muscle. In vitro investigations have focused on the effects of vitamin D analogues on human coronary artery smooth muscle cells. One study demonstrated that these analogues regulate gene expression among cell cultures, particularly among genes that regulate cell proliferation. This

may effect endothelial regeneration, apoptosis, thrombogenicity, and fibrin formation. Other studies have shown that low serum levels of vitamin D and its analogues are associated with an elevated risk of cardiovascular mortality as well as all-cause mortality. Such cardiovascular effects on arterial smooth muscle have been noted in epidemiologic data to have an inverse relationship between 25-OHD and CVD risk factors such as blood pressure, fasting blood glucose levels, obesity, cholesterol, and renal function. Recently, low levels of vitamin D were correlated with an increase in risk for hypertension, independent of other factors such as age, race, and body mass index. The correlation of vitamin D and hypertension may be due to vitamin D effects on the renin-angiotensin system. Others have demonstrated that levels of vitamin D are correlated positively with insulin sensitivity and negatively with beta-cell function, which may implicate low vitamin D levels as a risk factor for the development of type 2 diabetes mellitus and the metabolic syndrome.

Recent attention has been placed on the role of vitamin D for the possible prevention and treatment of cancer. Data from the Nurses' Health Study showed that women aged 60 years and older who had higher circulating levels of 25-OHD seemed to be at lower risk for colorectal cancer. Other cancers such as breast, colon, ovarian, and prostate have been implicated as well in regard to levels of vitamin D. There has been work to develop vitamin D analogues that could be used in the treatment of cancer. Such associations of cancer and vitamin D may be due to its role in the immune system via the regulation of genes and T-lymphocytes. Vitamin D controls the actions of more than 200 genes, either directly or indirectly. Many of these genes are responsible for regulation of cellular proliferation, differentiation, apoptosis, and angiogenesis. Vitamin D has implications not only in cancer but has also evoked attention in multiple sclerosis, inflammatory bowel disease, and other diseases of the immune system.

Conclusions

Appreciation for the complex functions of vitamin D continues to evolve. Some functions of vitamin D are obvious; others are not as well established and possibly controversial. Recognition of non-skeletal effects has stimulated much interest in the study of vitamin D. The current challenge is to understand and identify populations who will benefit the most from supplementation. Further studies will more clearly define optimal recommendations for the use of vitamin D, including its role in extra-skeletal health, methods for adequate supplementation, and appropriate monitoring of outcomes.

Table 1: Examples of OTC Vitamin D Products and Approximate Retail Price

Product	Units (IU)	Dosage Form	Quantity	Price
CVS Brand	400	T	120	\$2.99
	1000	T	240	\$11.49
Walgreen's Brand	1000	G	60	\$4.99
GNC Brand	400	T	100	\$3.99
	1000	T	180	\$9.99
Life Fitness	1000	T	100	\$6.99
Nature Made	1000	T	90-100	\$10.49-\$9.29
	2000	G	90	\$7.55
Nature's Bounty	400	T	100	\$4.79
	1000	T	120	\$6.99

T = Tablets; G = Gelscaps

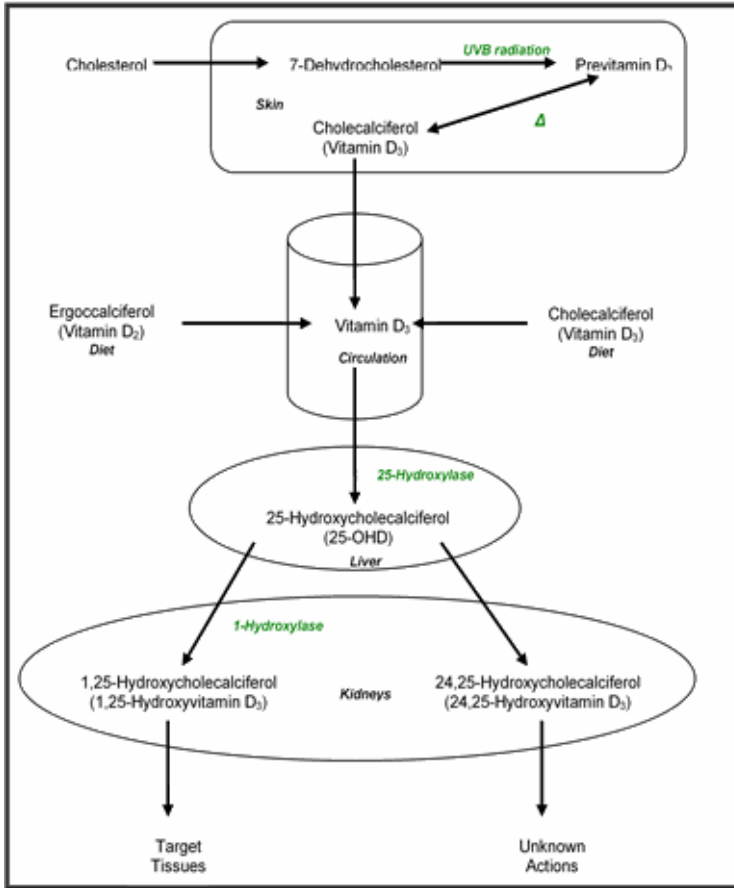


Figure 1: Sources of vitamin D and synthesis of the bioactive forms.

Table 2: Monitoring of Serum Concentrations of Vitamin D

Category	25-OHD Levels (ng/mL)
Deficiency	≤ 20
Insufficiency	21 – 29
Sufficient	> 30
Toxicity	> 150

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Health Literacy and Medication Adherence: the Pharmacist's Role

Karen Freeman, Pharm.D., Debbie Minor, Pharm.D., and Amber Guinn, Pharm.D. Candidate

Pharmacists are one of the most accessible and trusted healthcare providers. We are also usually in a position to help identify individuals with low health literacy and poor medication adherence, very common problems in our society. As leaders in the overall process of medication use, pharmacists are particularly qualified to address these problems and help patients achieve the most benefit from their medications and overall health care.

Health Literacy

As defined in Healthy People 2010, health literacy is "The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."¹ Health literacy includes the ability to understand instructions on a prescription bottle, appointment slips, consent forms, medical education brochures, directions given by healthcare providers, and negotiation in complex health systems. Reading, math, analytical, and decision-making skills and the ability to apply these skills in a healthcare setting are necessary components of health literacy.

According to the 2004 report by the Institute of Medicine, *Health Literacy: A Prescription to End Confusion*, 90 million Americans – nearly half the population – have difficulty understanding and using health information.² The American Medical Association has reported that health literacy is "a stronger predictor of a person's health than age, income, employment status, education level, and race."³

Persons with limited health literacy are more likely to forgo important preventative health services and to have chronic health conditions when compared to individuals with adequate health literacy. They are also less able to manage their illness and are more likely to enter the healthcare system

later, when they are more ill.⁴ Individuals with low health literacy are more likely to report their health as poor and make more medication or treatment errors than persons with adequate health literacy.⁵ Higher rates of hospitalization, increased use of costly emergency services, and higher annual healthcare costs are all associated with low health literacy.⁴

Only 12 % of U.S. adults nationwide have proficient health literacy, according to the National Assessment of Adult Literacy.⁶ Improving health literacy can improve health outcomes and decrease overall healthcare costs. Populations who are at a greater risk of low health literacy include:

- Older adults (> 65 years old)
- Racial and ethnic minorities
- Non-native English speakers
- People with low income levels
- People who have a compromised health status
- People who have less than a high school degree or GED

Medication Adherence

Medication adherence is defined as the extent to which a person takes medications as prescribed by their healthcare provider.⁷ Non-adherence is often referred to as “America’s other drug problem” and frequently leads to disease complications and progression, a decline in functional abilities, a reduced quality of life, and premature death. Non-adherence can include taking a medication incorrectly, taking more or less of a medication than prescribed, not filling or refilling a prescription, and prematurely discontinuing a medication.⁸ In a recent survey commissioned by the National Community Pharmacists Association, 3 out of every 4 American consumers report not always taking their medications as directed.⁹ Non-adherence accounts for more than 10% of hospital admissions, 23% of nursing home admissions, and 20% of preventable adverse drug events.¹⁰ It also leads to an additional \$177 billion annually in healthcare expenditures.⁸

Populations at risk for poor adherence include older adults (>65 years old) with chronic illnesses, persons who do not have health insurance, and persons with low income levels. Reasons a patient may not adhere to a specific regimen include:¹¹

- Lack of medication or disease understanding
- Cost
- Forgetfulness
- Fear of side effects
- Issues with medication regimens (e.g., frequency, complexity)

Relating Health Literacy and Medication Adherence

Limited health literacy can greatly affect a patient’s ability to read, understand, and act on health information about medication use. Although there is limited evidence supporting the causal relationship between health literacy and medication adherence, a few studies suggest that health literacy is an independent predictor of medication adherence. In the treatment of HIV, patients with lower health literacy levels demonstrated poorer adherence when compared to patients with higher health literacy levels. After controlling for other factors, health literacy was found to be an independent predictor of medication adherence.¹² Among individuals with glaucoma, those with low health literacy had lower rates of adherence to their glaucoma medications when compared to individuals with a higher level of health literacy.¹³ In a public hospital survey, 81% of patients over the age of 60 reported that they could not read or understand basic materials, such as prescription labels.² While over 70 % of these survey respondents correctly stated instructions about number of doses per day, only one-third could correctly demonstrate the number of pills to be taken daily.¹⁴ Clearly patients cannot take their medications correctly if they cannot read and/or understand medication labels. The relationship of health literacy and medication adherence appears simple but is obviously complex and influenced by many factors at multiple levels.

The Pharmacist’s Role

Nationwide, almost 9 out of every 10 adults have limited health literacy skills.

With high school graduation rates well below the national average and the second lowest per capita income in the nation, Mississippians are at an even greater risk of limited health literacy and medication non-adherence.¹⁵ Pharmacists are qualified to greatly influence health literacy and are the primary individuals responsible for medication use. A few quick and simple ways to assess health literacy and medication adherence and improve patient understanding in any setting include asking questions, using effective communication techniques, and providing supplemental materials.

A variety of surveys are available to assess health literacy and medication adherence, including the Newest Vital Sign, the Morisky Scale, and the Test of Health Functional Literacy of Adults (TOHFLA). However, these are not routinely used in most settings. One of the easiest ways to assess health literacy skills and medication adherence is by asking basic questions. By asking patients about their medications and disease states, you can then use this information to build upon their knowledge. In addition to specifically asking about medication adherence, refill records, pill counts, and drug levels can be monitored when applicable and appropriate. Patients should also be taught and encouraged to question their healthcare providers. Ask Me 3™ is an effective questioning tool that can be used to improve patient-provider communications and is available free of charge (www.askme3.org).¹⁶ The three Ask Me 3™ questions are:

1. What is my main problem?
2. What do I need to do?
3. Why is it important for me to do this?

Effective communication is essential to improve patient health literacy skills and medication adherence. One of the ways to do this is by using "plain language." This includes presenting the most important points first, using simple language, breaking down complex information, and using the active voice.⁴ Being an active listener and encouraging patients to ask questions and share their concerns throughout the encounter will help identify areas of misunderstanding. The "teach back" method can also be used to assess understanding. Ask the patient to tell you in their own words what they are supposed to do after they leave the setting, then take the opportunity to further clarify misunderstandings and reassess until you are comfortable with their level of understanding.¹⁷

Providing supplemental materials can help to improve patient health literacy skills and medication adherence. Patients forget up to 80% of what they are told as soon as they leave the clinical setting.¹⁷ Printed materials that contain plain language, a large print size, standardized symbols, and are available in multiple languages can supplement verbal instructions and serve as effective reference materials. Drawings, models, devices, schedules, and other aids can also be used to facilitate patient understanding. Auxiliary stickers on prescription bottles can help to improve medication adherence and efficacy by helping patients remember specific instructions. Pill boxes and setting pill timers improve medication adherence for many patients.

Conclusion

Limited health literacy and medication non-adherence are significant and ongoing problems that plague our healthcare system. As pharmacists, we have the opportunity to improve health literacy levels and medication adherence for many patients. Improved health decisions and behaviors can have a positive influence and impact health outcomes for both individuals and our population as a whole.

TABLE

Quick Tips for Improving Health Literacy and Medication Adherence

1. Ask Questions
2. Use Plain Language
3. Be an Active Listener
4. Use Teach Back Method
5. Use Reminder Methods such as Pill Boxes/Timers
6. Provide Supplemental Educational Materials

¹ Healthy people 2010. 2nd ed. With understanding and improving health and objectives for improving health. 2 vols. Washington, DC: U.S. Department of

Health and Human Services, 2000. <http://www.healthypeople.gov/Document/tableofcontents.htm#under> (accessed 2009 Aug 1).

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¹⁴ Adherence to long-term therapies: evidence for action. World Health Organization, 2003. http://www.who.int/chp/knowledge/publications/adherence_report/en/index.html (accessed 2009 Aug 11).

¹⁵ Burd-Sharps S, Lewis K, Martins EB. A portrait of Mississippi. Mississippi human development report 2009. Brooklyn, NY: American Human Development Project, 2009. http://measureofamerica.org/wp-content/uploads/2009/01/a_portrait_of_mississippi.pdf (accessed 2009 Aug 13).

¹⁶ Ask Me 3™. Clear Health Communication Initiative. New York, NY: Pfizer Inc., 2007. <http://www.npsf.org/askme3/PCHC> (accessed 2009 Aug 1).

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Acknowledgements

Pharmacists Recognized with ASHP Foundation Literature Award

Dr. Josh T. Swan (former University of Mississippi student) will receive the Student Research Award at the ASHP Midyear Clinical Meeting during the Literature Awards Breakfast on Wednesday, December 9, 2009 from 7:30 AM to 9:00 AM. The faculty mentor on this award was Dr. Daniel M. Riche (MSHP member) of the University of Mississippi School of Pharmacy. The other co-authors were Dr. Krista D. Riche (MSHP member) and Dr. Vikas Majthia. The authors will be recognized at the ASHP Midyear Clinical Meeting in the Opening Slide Presentation on Wednesday, December 9, 2009 at the Scientific

Session at 10:00 AM.

The Student Research Award is presented annually to a pharmacy student for a published or an unpublished paper or report of a completed research project related to pharmacy practice in a hospitals and health systems. Selection criteria are based on significance, originality, methodology, and validity of conclusions. The manuscript is currently in its second revision at a high impact peer-reviewed journal. [Click here for more information regarding this award.](#)

Dr. Swan is currently a PGY-1 resident at The Methodist Hospital in Houston, Texas.

Minor Recognized for AHA Efforts

Dr. Deborah L. Minor, associate professor of medicine and executive vice chair of the Department of Medicine, received the Volunteer Advocate of the Year Award from the American Heart Association at the 2009 "You're the Cure on the Hill" awards luncheon and "Gold Heat Awards" banquet April 20 in Washington, D.C.

Dr. Minor was recognized for outstanding efforts to assist the association in advocating directly to key lawmakers on heart and stroke issues.

Minor was also the co-chair of the 2009 Go Red for Women luncheon.

Originally published in [UMHC Today](#).

Final Notes

1. Below are links on Healthcare Reform from ASHP. Please consider contacting your legislator.

[Powerpoint presentation](#)
[Audio synced presentation](#)

2. Don't forget to donate to the MSHP-PAC today!
[Donation Form](#)

3. Relive the 2009 MSHP Annual Meeting at the Beau Rivage! [View pictures online here.](#)

ASHP News

Member Advocacy Still Needed during Health Care Reform Debate

In his speech to Congress and the nation, President Obama reiterated his commitment to achieving meaningful health care reform this year. He also outlined key principles and clarified some controversial elements of his vision for health care reform.

This public debate is well timed for pharmacists to weigh in. On Thursday, September 24, nearly a hundred hospital and health-system pharmacists will converge on Capitol Hill as part of ASHP's Legislative Day. During this annual event, ASHP members from across the country meet with their Senators and Congressional representatives to educate them on the vital role of pharmacists in patient care. ASHP's Principles for Health Care Reform and policy advocating for full health coverage is supportive of the approaches under consideration by Congress. This year, participants will be urging Congress to recognize pharmacists as non-physician providers, restore funding for second-year specialty residency programs, and authorize eligibility for the National Health Service Corps.

All ASHP members are urged to [contact](#) their House and Senate members to seek their support on these three issues. Nearly one thousand members contacted their Members of Congress during the August recess. However, we have reached the critical stage of the process and lawmakers still need to hear from hospital and health system pharmacists. President Obama compared this effort to the passage of Social Security in 1935 and Medicare in 1965. This

opportunity does not come very often and the time for pharmacy to act is now.

New Online Tool Focuses On Improving Influenza Immunization Rates For Health Professionals

Grants Available to Study Pharmacists' Roles in Bolstering Use of Flu Vaccine

Recognizing that influenza infection in health care workers can lead to outbreaks with serious consequences for patients, the American Society of Health-System Pharmacists (ASHP) has launched an initiative for pharmacists to improve influenza immunization rates among healthcare workers. Health care workers can acquire influenza and unwittingly transmit the virus to patients, other health care workers, and members of their household and the community a day or two before symptoms appear.

ASHP's new online resource, www.YouCanStopTheFlu.com, was developed by a panel of pharmacist immunization experts to engage pharmacists as advocates to improve seasonal influenza immunization rates of health care workers in their health systems. The initiative is supported by a grant from CSL Biotherapies.

[Read more](#)

Pharmacy News

Cardiometabolic Disorders: The Pharmacist's Role

Modern Medicine (09/04/09) Edlin, Mari; Campbell, Maude L.

Pharmacists are integral to the proper management of cardiometabolic disorders and weight (CMD&W), through education, counseling, and dispensing. They are particularly essential to ensure patient adherence to CD&W treatment regimens. Pharmacists should therefore work with physicians to identify patients who are non-adherent. They may then be able to improve treatment compliance by minimizing daily medication doses, dose frequency, and medication costs. When working with patients to improve treatment compliance, Pennsylvania-based consultant pharmacists Alan Vogenberg RPh recommends that pharmacists "don't use jargon ... use open-ended questions, and ask patients to repeat back information to ensure they understand what has been said." For example, in the case of hypertension, pharmacists can teach patients that, despite a lack of symptoms, the disease damages blood vessels, making regular blood pressure checks extremely important. Pharmacists should also ensure patients are aware of other strategies that can be used in addition to medication to reduce hypertension and other CMD&W problems. These strategies include not smoking, maintaining an appropriate weight, regular exercise, healthy diet, limited sodium and caffeine intake, and stress reduction.

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KCKCC To Offer Medical, Dental, and Pharmacy Programs

Kansas City Kansan (09/09/09) Hoskins, Alan

Kansas City Kansas Community College (KCKCC) is scheduled to begin offering pharmacy technician courses on October 31, 2009. The pharmacy technician program at KCKCC is a comprehensive 50-hour course designed to prepare students for work as a pharmacy technician in hospitals, home infusion pharmacies, and other healthcare settings under the supervision of a registered pharmacist. Students will learn dosage calculations, I.V. flow rates, dose conversions, dispensing of prescriptions, inventory control, and billing and reimbursement. The course will also prepare students to take the national certification exam administered by the Pharmacy Technician Certification Board.

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Effect of Procalcitonin-Based Guidelines vs. Standard Guidelines on Antibiotic Use in Lower Respiratory Tract Infections

Journal of the American Medical Association (09/09/09) Vol. 302, No. 10, P. 1059; Schuetz, Philipp; Christ-Crain, Mirjam; Thomann, Robert

Researchers have found that in the management of lower respiratory tract infections, procalcitonin-based guidelines may lead to lower rates of antibiotic exposure and associated adverse events without increasing other adverse outcomes. A total of 1,359 patients were assigned to receive antibiotics with either a procalcitonin algorithm or to standard guidelines for stopping and starting antibiotics. Compared to the standard guidelines, researchers found that patients who were assigned to the procalcitonin algorithm had an average of 5.7 days of exposure to antibiotics, compared to 8.7 days in those who were assigned the standard algorithm. They also found that 18.9 percent of patients assigned to procalcitonin-based guidelines experienced overall adverse outcomes compared to 15.4 percent of controls. In addition, the procalcitonin-based treatment group reported less frequent antibiotic-related adverse effects than the control group, 19.8 percent compared to 28.1 percent.

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Masks Key Flu Protection for Health Workers: Report

Reuters (09/03/09) Fox, Maggie

The Institute of Medicine (IOM) released on Sept. 3 a report calling for the use of N95 respirators by doctors, nurses, pharmacists, and other healthcare workers caring for patients infected with the new pandemic H1N1 (nH1N1) swine flu virus. Because scientists still do not know much about how this virus is transmitted, healthcare workers should combine the use of these respirators with hand washing, flu vaccines, and other infection-prevention measures. In its report, the IOM stated, "Healthcare organizations and workers need consistent and clear nH1N1 guidelines that can be implemented across all healthcare facilities." The U.S. Centers for Disease Control and Prevention (CDC) also recommends the use of N95 flu masks for healthcare workers treating patients with suspected H1N1. However, the IOM called on the CDC, the National Institutes of Health, and other agencies to conduct more research on flu virus transmission. In addition, the IOM report noted that healthcare workers do not wear masks, respirators, or wash their hands as much as they should, although they know they should, and only about 40 percent are vaccinated against seasonal flu each year.

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A Safer Environment

Advance for Health Information Executives (09/09) Vol. 13, No. 9, P. 33; Ligon, Kim J.

For many hospitals, medication administration is still a hands-on, time-consuming process, and the lack of interaction between nurses and pharmacists persists to the detriment of patients. Before the implementation of its automated barcode medication administration platform, DCH Regional Medical Center, based in Tuscaloosa, Ala., was attempting to transition away from its paper-based medication administration processes. Every night, the nursing staff printed and checked the medication administration record (MAR) for errors, which were communicated via phone or fax. The procedure used to correct errors was not only inefficient, but it provided many more opportunities for errors or breakdowns of communication. With its automated medication administration technology and new workflow processes firmly in place, DCH now has the statistics to prove the platform works. The hospital recorded medication accuracy rates among nursing units pre- and post-implementation. After six months, DCH found rates of accuracy comparable to what they were prior to the barcode medication administration implementation, which was pinned on major cultural changes and adjustment to new processes. After 12 months, however, the medication accuracy rates had improved tremendously, particularly in the ICU and medical/surgical units.

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Lacher To Lead Webinar Sept. 3

US Fed News (08/31/09)

On September 3, Barbara Lacher, assistant program director and associate professor of the pharmacy technician program at the North Dakota State College of Science, co-presented a webinar about the American Society of Health Systems Pharmacists (ASHP) Technician Initiative. The webinar

described the initiative as a partnership between ASHP and individual state affiliates to advocate for state laws that require completion of an ASHP-accredited pharmacy technician training as well as Pharmacy Technician Certification Board certification in order to obtain state pharmacy board registration. The program is designed to ensure patient safety and improve quality of care, and ASHP is hopeful that it will also increase access to patient care services provided by pharmacists.

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Study Urges Action to Get Patients to Follow Prescriptions

Boston Globe (08/14/09) Cooney, Elizabeth

Patients who do not take their medications as prescribed may incur up to \$290 billion annually in increased medical costs, according to a report by the New England Healthcare Institute. People with chronic illnesses, such as diabetes, are less likely to take their intended medications than people who are being treated for an urgent problem. The report cited one study that found that the death rate among patients with diabetes or heart problems was around 7 percent for those who took their medication as prescribed. Among patients who did not follow their prescriptions, however, the death rate was 12 percent, and similar gaps were found among hospitalization rates. Little research has been conducted as to how this should be improved, but some studies have made several suggestions. Simplifying drug regimens may help increase compliance among patients who take multiple medications. Increased patient education regarding their diseases and medications, especially when they leave the hospital, may also help people follow their prescriptions. Lower costs and greater involvement of case managers and pharmacists may also help.

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ISMP Warns That IV Solutions Administered Post-Op Can Cause Low Sodium Levels And Death In Healthy Children

Medical News Today (08/20/09)

The Institute for Safe Medication Practices is urging healthcare workers to learn more about the signs and symptoms of low sodium levels after surgery, after two young children died from the condition. Children are at especially high risk of developing the condition, called severe postoperative hyponatremia, which can be caused by IV fluids which do not contain enough sodium and can result in severe brain swelling and death. One child had a tonsillectomy and was given an IV infusion of plain dextrose in water at too high a rate, and the resulting vomiting and seizures were thought incorrectly to be a reaction to an anti-nausea drug. Lab tests showed extremely low sodium levels and the child developed cerebral edema and died despite treatment. ISMP is recommending that hospitals establish specific procedures for postoperative IV solutions for children which stress the importance of proper saline levels to prevent hyponatremia. There should be protocols for identifying, treating, and monitoring patients with hyponatremia as well as water intoxication and inappropriate antidiuretic hormone. Doctors, nurses, and pharmacists must fully understand the nature of these conditions and of fluid and electrolyte balance in order to be able to catch any problems early enough to treat them, and consider creating a rapid response team that can be summoned by any healthcare worker to the patient's bedside.

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New Health Care Delivery Model Improves Outcomes, Saves Money

MedIndia (08/14/09)

A home-based preventive healthcare program for seniors created by the Indiana University School of Medicine, the Indiana University Center for Aging Research and the Regenstrief Institute helped reduce emergency department visits and hospital admission rates, achieve cost savings and improve the quality of life for patients with chronic conditions, according to a study published in the August issue of the Journal of the American Geriatrics Society. The Geriatric Resources for Assessment and Care of Elders' team approach to preventive care engages a nurse practitioner and social worker to perform initial assessments of a patient's entire home, including medicine and kitchen cabinets. An interdisciplinary team comprised of geriatricians, pharmacists, physical therapists, mental health social workers and

community-based services liaisons develops an individualized care plan. Finally, the nurse practitioner and social worker collaborate with the primary care physician to ensure the healthcare plan meets the patient's goals and help the patient institute the plan.

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