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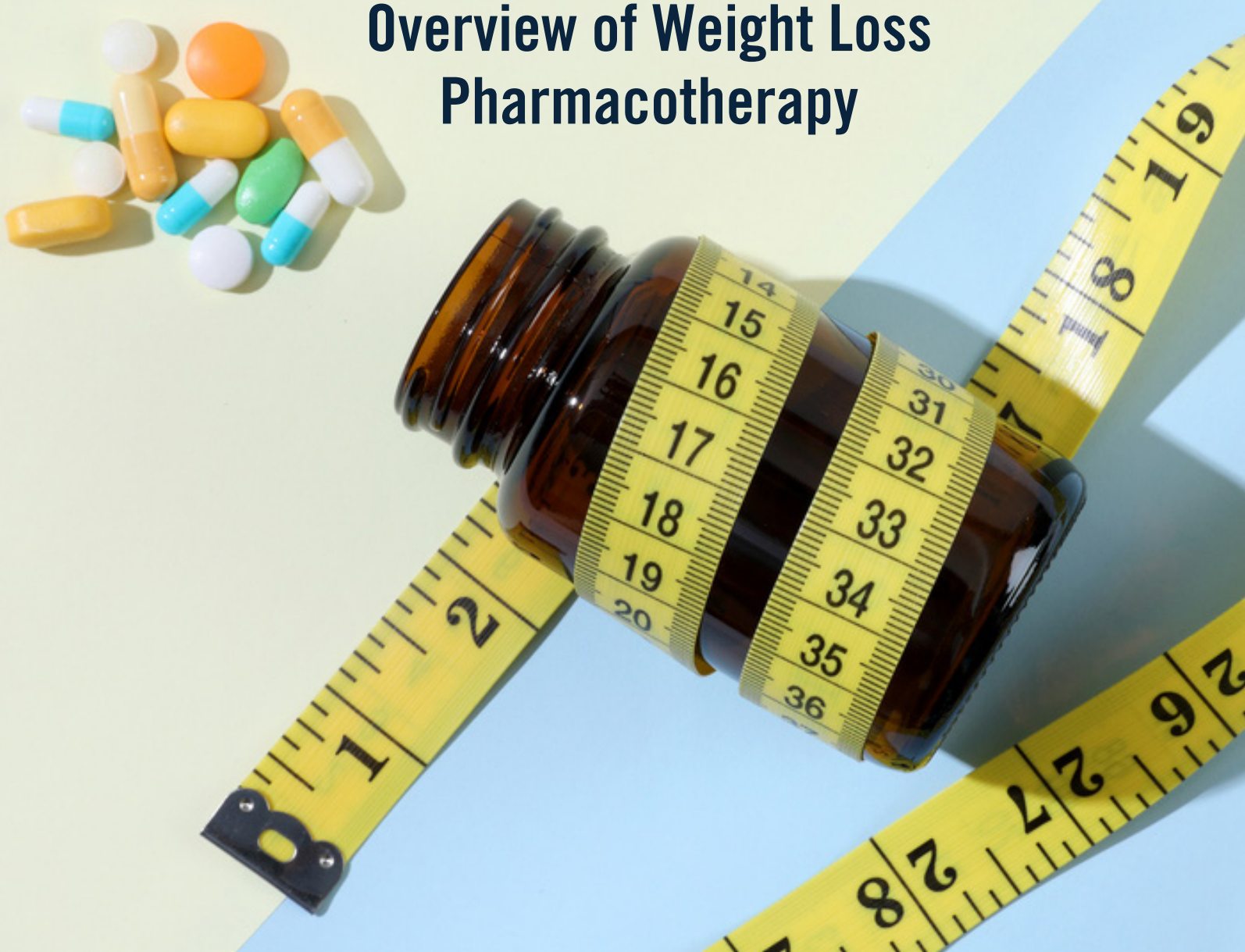
The Journal

of the Pharmacy Society of Wisconsin

Continuing Education

When a Loss Becomes a Win

Overview of Weight Loss Pharmacotherapy



March/April 2024

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The Journal
of the Pharmacy Society of Wisconsin

The Journal of the Pharmacy Society of Wisconsin is a professional publication for original research, review, experience, and opinion articles that link science with contemporary pharmacy practice to improve patient care. Together we can inspire each other to advance our profession with the single purpose of enhancing the lives of our patients.

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Up Front:
With Gratitude

by Amanda Margolis, PharmD, MS, BCACP

I still vividly remember the email inviting me to consider a position as the Pharmacist Editor of *The Journal of the Pharmacy Society of Wisconsin* (*JPSW*) and the initial meeting with Chris Decker. I was absolutely flabbergasted that I was being offered this position at the Pharmacy Society of Wisconsin (PSW). *JPSW* was (and still is) regularly described as the best state pharmacy journal in the country! Despite pursuing a career in academia and working as a lecturer at the University of Wisconsin-Madison School of Pharmacy, being the Pharmacist Editor of *JPSW* was not even on my radar as something to consider much further in my future. To be honest, this was one of my first leadership roles, and I had a lot of anxiety about living up to my predecessors and not letting PSW and the membership down.

This anxiety dissipated as I stepped into the Pharmacist Editor role. The support and welcome that I received from PSW and the membership really facilitated the transition for me. In particular, Megan Grant was a guide for me on the day-to-day management of *JPSW* and journal organization. Additionally, the Editorial Advisory Committee was indispensable. They helped me to focus on what was important and contributed to the innovation and updates *JPSW* has undergone over the last 7 years. Additionally, the support from both the PSW staff and *JPSW* readership continued throughout my tenure as editor.

I have immensely enjoyed the role of Pharmacist Editor. It allowed me to better understand the role of associations, network with pharmacists across the state, and better understand how to support students and emerging writers. As my role at UW-Madison has grown and as I've held the role of Pharmacist Editor for several years, I felt I was maintaining *JPSW* and not pushing it forward as I used to. After much reflection and discussion with Megan Grant and Sarah Sorum, we felt it was time to name an Associate Editor who could eventually step into the Pharmacist Editor role in my place. Mike Nagy was active in PSW and participated in *JPSW* activities even as a student pharmacist! He was an active member of the Editorial Advisory Committee, a peer review coordinator through his role as a faculty advisor for a student writing club, and continued to be a consistent contributor to *JPSW*. He even won the Curtis Johnson Award in 2022! Mike Nagy stepped into the role of Pharmacist Editor in January of 2024, and from his organization and plans so far, I think *JPSW* will be in great hands!!

While I am stepping down as the Pharmacist Editor, I am maintaining active involvement with PSW. I will still be involved with *JPSW* as the UW-Madison School of Pharmacy Student Writing Club Faculty Advisor. And, for now, I will continue to serve as the unofficial PSW photographer (when my husband Matt isn't available).

Thank you to everyone who supported me while I was the editor of *JPSW*. I so appreciate the faith that PSW leadership gave me and the continued participation of the readership. I appreciate the Editorial Advisory Committee, Peer Review Coordinators, and Series Coordinators who served as *JPSW's* super volunteers and focused my direction on where to take The Journal. Thank you to my colleagues at UW-Madison who collaborated with students on articles and supported the time it took to hold this role. Thank you to Megan Grant, Sarah Sorum, Chris Decker, and Matt Margolis, who were my largest supporters during my tenure as editor.

With gratitude,
Amanda Margolis

Amanda Margolis is the previous Pharmacist Editor of *The Journal of the Pharmacy Society of Wisconsin*.

Embracing a New Chapter: A Warm Welcome from the Editor of *The Journal of the Pharmacy Society of Wisconsin*

by Michael W. Nagy, PharmD, BCACP

In the ever-evolving landscape of pharmacy practice, I am honored to step into the role of Editor for *The Journal of the Pharmacy Society of Wisconsin*. As we embark on this journey together, I am excited about the opportunities to contribute to the advancement of pharmacy knowledge, foster collaboration, and provide a platform for insightful discourse within our vibrant community.

Allow me to provide a brief background about myself. I graduated from the University of Wisconsin-Madison School of Pharmacy and completed two years of ambulatory care residency training at the William S. Middleton Memorial Veterans Hospital in Madison, WI. After residency, I started as an Assistant Professor at the Medical College of Wisconsin School of Pharmacy. While there, I taught topics focused on clinical geriatrics, endocrinology, and population health management. During that time, I held a practice site in primary care at the Zablocki VA Medical Center in Milwaukee, WI. In 2024, I transitioned to the Tomah VA Medical Center to start up an interdisciplinary endocrine clinic.

As I assume the mantle of Editor, my vision for *The Journal of the Pharmacy Society of Wisconsin* is rooted in three key pillars: innovation, inclusivity, and impact.

Innovation

I am committed to fostering an environment that encourages innovative research and progressive thinking. The pharmacy landscape is dynamic, and our journal should reflect the advancements in the field and capture the history of pharmacy practice in Wisconsin. We will actively seek out projects from Wisconsin's health systems across the entire state, our hundreds of community pharmacy practices, as well as all other unique practice settings. We encourage partnership with learners through our student writing clubs at Concordia, the Medical College of Wisconsin, Rosalind Franklin, and UW Madison. Furthermore, we will collaborate with pharmacy residency programs throughout the state to highlight the year-long projects being conducted.

Inclusivity

Recognizing the diverse voices within our community, I am dedicated to promoting inclusivity in *The Journal*. Our editorial team will actively seek contributions from the Wisconsin pharmacy community from various backgrounds, ensuring a rich tapestry of perspectives. By embracing diversity, we aim to provide a platform where all voices can be heard, fostering an environment where every pharmacist and technician feels represented and valued.

Impact

A successful journal is one that has a tangible impact on its readership and the broader field. I am committed to ensuring that the work published in *The Journal of the Pharmacy Society of Wisconsin* meets a high standard and translates into real-world applications. Through insightful articles, thought-provoking spotlights, and locally produced original research studies, we will strive to contribute to the advancement of pharmacy practice and positively influence healthcare outcomes.

The heart of any successful journal lies in its community, and I am eager to strengthen the bond between *The Journal of the Pharmacy Society of Wisconsi*n and our pharmacy technicians, students, residents, and pharmacists within the state. Regular communication, collaboration, and feedback from our readers, authors, and peer reviewers will be essential in shaping the future direction of *The Journal*.

Call for Submissions

I invite all members of our pharmacy community to contribute their work to *The Journal*. Whether it is an innovative research study, a comprehensive review article, or an opinion piece on a pressing issue in pharmacy practice, I welcome diverse perspectives and contributions. You are always welcome to email me if you have questions, to find collaborators, or want to troubleshoot a manuscript topic. Together, we can build a repository of knowledge that elevates the standards of pharmacy practice and contributes to the betterment of Wisconsin healthcare.

In taking on the role of Editor for *The Journal of the Pharmacy Society of Wisconsin*, I am filled with gratitude and enthusiasm. Together with the support from the editorial advisory committee and PSW staff, I am confident that we can maintain the excellence of *The Journal* by fostering innovation, inclusivity, and impact. I look forward to the exciting journey ahead. Thank you for your trust and support, and I am excited to collaborate with every one of you in this endeavor.

Michael Nagy is the Pharmacist Editor of *The Journal of the Pharmacy Society of Wisconsin*.

PHARMACIST & TECHNICIAN CE:

When a Loss Becomes a Win - Overview of Weight Loss Pharmacotherapy

by Jordan Stellflue, MHA, 2024 PharmD Candidate, Jessica Schwartzwald, 2024 PharmD Candidate, Sneha Srivastava, PharmD, BCACP, CDCES, DipACLM, FADCES, Khyati Patel, PharmD, BCACP

Obesity is a complex chronic disease that presents variably across patient populations. The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health.[1] Obesity screening tools include body mass index (BMI) and waist circumference, but each has its own limitations based on patient-specific factors.[2] While obesity is a widely used term, the condition is sometimes referred to as adiposity-based chronic disease. In the United States, obesity has steadily increased in prevalence since 1999.[3] Data in figure 1 shows that about 70.7% of Wisconsin residents are impacted by overweightness or obesity.[4] Looking back half a century, the average BMI in the United States was 25.7 kg/m^2, just barely passing the Centers for Disease Control and Preventions (CDC) overweight threshold of 25.0 kg/m^2 in 1971.[5,6] By 2020, the average BMI in the US had grown to 30.0 kg/m^2, which is the threshold for Class I obesity according to the CDC.

CE FOR **PHARMACISTS & TECHNICIANS**

COMPLETE ARTICLE AND CE EXAM AVAILABLE ONLINE: **WWW.PSWI.ORG**

Learning Objectives

- Define obesity and classify obesity and risk of obesity related comorbidities.
- Describe the pathophysiology and impact of obesity.
- List comprehensive lifestyle interventions recommended for weight loss.
- Identify the general treatment approach and the role of weight loss pharmacotherapy in obesity management.
- Discuss the mechanism, efficacy, safety, monitoring, and place in therapy of pharmacologic agents for the treatment of obesity.
- Describe the role of the pharmacy team in optimizing obesity management.

Abstract

Obesity is a complex metabolic condition that needs chronic management. Incidences of obesity are increasing in the United States, leading to an increase in many obesity-related comorbidities that result in poor health outcomes. Obesity originates from multiple factors, both intrinsic and extrinsic to a person. A holistic approach, including comprehensive lifestyle interventions, pharmacological agents, and metabolic surgery or devices should be considered for the chronic management of obesity. Recognizing the chronic nature of this disease, a growing number of new pharmacologic agents are now approved by the Food and Drug Administration or in the pipeline. Along with the classification, risk stratification, pathophysiology, etiology, and lifestyle interventions, this article aims to provide a detailed overview of the approved pharmacotherapy for weight loss.

Impact of Obesity

Alongside this marked growth in obesity prevalence, the US has seen similarly increasing rates in comorbid conditions associated with obesity.[7,8] Health conditions with notable growth on par with average BMI include asthma, coronary artery disease, chronic kidney disease, diabetes mellitus, hypertension, heart failure, major depressive disorder, and metabolic dysfunction-associated steatotic liver disease. Additionally, several forms of cancer have been linked to increases in obesity, as well as an increased risk of cancer-related mortality.[9] Cancers most frequently linked to obesity in the US include breast, colorectal, esophageal, kidney, gallbladder, uterine, pancreatic, and liver cancers.

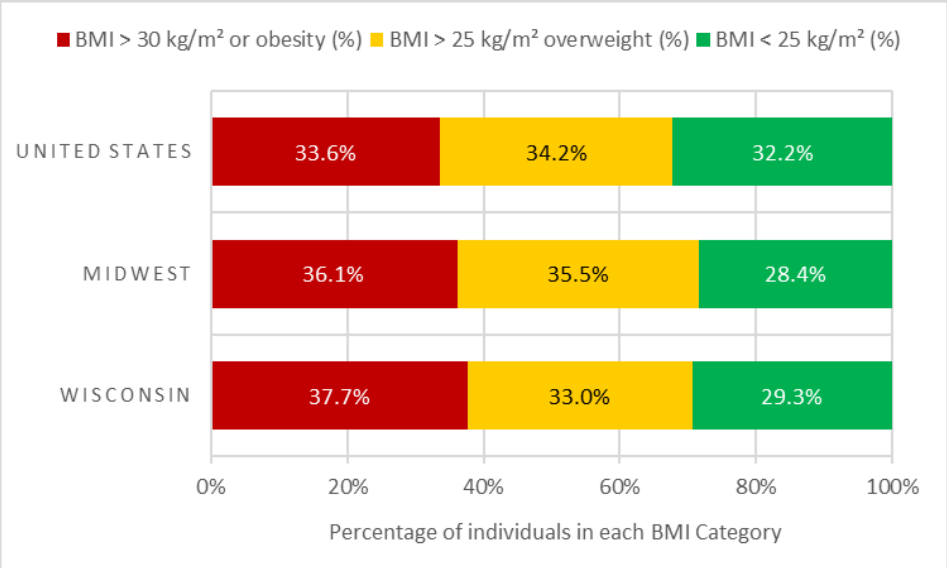
Obesity has a multifactorial etiology, with a significant impact on physiologic functions including those that are immunologic, inflammatory, and hormonal.[10] Due to its complex etiology and health consequences, obesity should be treated as a chronic disease.[11] Although healthcare payers are slow to accept obesity as a chronic disease, the scientific and medical communities largely consider obesity a chronic condition. Recently, there has been an increased number of pharmacotherapeutic agents approved by the Food and Drug Administration (FDA) for chronic obesity management, as well as increased utilization of these agents for the treatment of obesity. This article aims to provide an overview of obesity classification, risk stratification, pathophysiology, etiology, and lifestyle interventions, as well as an assessment of safety, efficacy, and place in therapy of the pharmacotherapeutic options available for weight loss.

Pathophysiology and Etiology

Obesity features an excess of adiposity, a physiologic state contributing to metabolic dysfunction in lipids, glucose, cardiac, endocrine, hepatic, immunologic, intestinal, pulmonary, and reproductive systems.[12] In an abundance of food, the body enhances its ability to store fat, leading to enhanced lipolysis and the release of excessive fatty acids. This induces lipotoxicity, increasing oxidative stress and inflammation in both adipose tissue and surrounding organs.[11] An excess of stored fat may not seem inherently harmful, but its debilitating effects on metabolic functions make obesity a significant threat to one's overall health.

Causes of obesity are multifold. There are genetic conditions that may cause hyperphagia and extreme obesity; examples include leptin receptor and proopiomelanocortin deficiencies.[13] Health conditions such as Cushing's syndrome and various psychiatric conditions like depression, eating disorders, and schizophrenia can lead to weight gain. Environmental factors such as abundance of food supply, Western civilization, advances in technology and automation, pervasive food advertising, etc. are external factors contributing to obesity. Additionally, many medications from drug classes such as antipsychotics, antidepressants, glucocorticoids, injectable progestins, anticonvulsants, and anticholinergics can increase the risk of weight gain.[14] Aside from fluid retention and related weight gain, the main etiology of obesity is the imbalance in the hunger and satiety hormones.[15] Increase in hunger hormones such as ghrelin and decrease in satiety hormones such as amylin, leptin, peptide YY, glucose-dependent insulinotropic polypeptide, glucagon like peptide-1 (GLP-1), and cholecystokinin can lead to increased weight.

FIGURE 1. Body Mass Index (BMI) Distribution in the United States, Midwest, and Wisconsin[4,7]



Obesity Classification and Comorbitity Risks

Obesity screening tools include BMI and waist circumference, but each when used alone has its own limitations.[2] Body mass index is solely used by the WHO to classify obesity. Various disease states or body composition variance may affect and lead to misclassification of individuals' BMI, including those with higher muscle mass, frailty, and heart failure. Therefore, it is recommended to assess both BMI and waist circumference (in inches) together to determine a patient's obesity-related comorbidity risk.[13] Table 1 describes the risk of obesity-related comorbidities for various BMI and waist circumference levels. While not an exhaustive list, some of the obesity-related comorbidities include prediabetes, diabetes, hypertension, dyslipidemia, cardiovascular disease, non-alcoholic fatty liver disease, polycystic ovarian syndrome, female infertility, male hypogonadism, obstructive sleep apnea, asthma or other reactive airway disease, osteoarthritis, gastroesophageal reflux disease, urinary stress incontinence, and depression.

Guidelines and Treatment Approach

The recommendations for how to manage obesity as a chronic condition are published by the American College of Cardiology/American Heart Association/ The Obesity Society, the American Association of Clinical Endocrinologists/ American College of Endocrinology, American Diabetes Association (ADA), and most recently by the American Gastroenterology Association (AGA).[13,16-18]

These guidelines recommend the use of pharmacologic agents as an adjunct to comprehensive lifestyle interventions when BMI is ≥ 30 kg/m^2 with or without risk factors or when BMI is ≥ 27 kg/m^2 with at least one comorbidity such as hypertension or diabetes. Selection of pharmacotherapy is generally recommended based on the weight loss efficacy, contraindications, tolerance, presence of comorbidities, administration route and frequency, cost, and patient preference via shared decision making. Concomitant medications that increase weight should also be addressed. Patients with BMI of ≥ 35 kg/m^2 regardless of comorbidities can be recommended for bariatric surgery or placement of weight loss devices.[19] These interventions can also be considered for patients with BMI 30-34 kg/m^2 with metabolic diseases.

Generally, the goal of treatment is to achieve 5-10% of total body weight loss, but depending on the obesity-related comorbidities, additional clinical goals can be set and achieved.[13,16-18] Examples of such goals include prevention of type 2 diabetes, lowering blood pressure or hemoglobin A1c, decreasing the number of medications used for management of a chronic condition, and improvement in general well-being.[18]

Comprehensive Lifestyle Interventions

Comprehensive lifestyle interventions (CLI) are a very important aspect of obesity management at all stages. These interventions include healthy diet, adequate physical activity, and consistent sleep routine, as well as behavioral modifications.[13,16,18] No specific diet is recommended over others; however, it is recommended that dietary changes should consider patient preference, health status, and ability to consistently adhere to a diet. The ADA guidelines for management of obesity in patients with diabetes recommend prioritizing adequate intake of protein and healthy fats, while limiting intake of rapidly digested carbohydrates.[18] Aiming for 200-300 minutes of moderate to high intensity aerobic activity along with resistance training 2-3 times per week is recommended for promotion of weight loss.[13,16] Behavioral modification strategies include collaborative goal setting, accountability, cognitive restructuring, problem solving, stimulus control, self-monitoring of diet, weight, and activity level, motivational interviewing, and relapse prevention.[20] While there is no consensus on a set number of hours of sleep per day bringing health benefits, circadian desynchrony has been associated with an increased risk of metabolic syndrome and cardiovascular diseases.[21] Therefore, it is important to prioritize a consistent, restful sleep schedule. With overwhelming data demonstrating how nonoptimal diet, sedentary lifestyle, and chronic sleep disturbances increase the risk of obesity, interventions in these areas are necessary for all patients at risk to reduce health complications and improve clinical outcomes.

TABLE 1. Obesity Classification and Risk of Obesity-related Comorbidities[3,5,6]

Classification	BMI (kg/m²)	Comorbidity Risk	Waist Circumference	
			Men ≤ 40 inches Women ≤ 35 inches	Men > 40 inches Women > 35 inches
Underweight	< 18.5	Low		
Normal	18.5 - 24.9	Average		
Overweight	25.0 - 29.9	Increased	Increased	High
Class I	30.0 - 34.9	Moderate	High	Very High
Class II	35.0 - 39.9	Severe	Very High	Very High
Class III	≥ 40	Very severe	**Extremely High**	**Extremely High**

Pharmacotherapeutic Options and Clinical Evidence

Pharmacotherapy for weight loss includes short-term (≤ 12 weeks) options, such as phentermine, and long-term options, such as orlistat, phentermine-topiramate, bupropion-naltrexone, liraglutide, semaglutide, and tirzepatide.[17,22] All of the long-term agents except for tirzepatide are approved for patients ≥ 12 years of age, providing treatment options for management of pediatric obesity. These agents are contraindicated in pregnancy and not recommended for use during breastfeeding. Efficacy of these agents has been established when compared with placebo in clinical trials. Additionally, the use of multiple anti-obesity pharmacotherapy agents or use with bariatric surgery and weight loss devices is not supported by evidence. Table 2 summarizes available agents, dosing, contraindication, common adverse events, and monitoring for the FDA-approved weight loss drugs. Table 3 details efficacy of these agents in comparison to placebo. Although not seen or used commonly, metreleptin and setmelanotide are approved for very specific patient populations suffering from obesity. Metreleptin is approved for use in patients with leptin deficiency in congenital or acquired generalized lipodystrophy.[23] Setmelanotide is approved for use in patients ≥ 6 years with obesity with suspected pathogenic proopiomelanocortin, proprotein convertase 1, or leptin receptor deficiencies.[24]

Amphetamine Derivatives

Agents like phentermine and diethylpropion are sympathomimetic amines approved by the FDA for short-term (≤ 12 weeks) use for obesity treatment. They work by increasing levels of norepinephrine in CNS, increasing sympathetic tone which results in anorexigenic effects.[25] While approved for short-term use, practitioners prescribe these medications off-label for longer terms to treat obesity.[17] The more commonly used agent out of the two is phentermine, which is available in two different formulations: capsules in 15 mg, 30 mg, and 37.5 mg and tablets in 8 mg and 37.5 mg.[25,26] Taken before meals, the maximum daily dose for phentermine is 37.5 mg. Severe renal dysfunction prohibits use and eGFR between 15-29 would limit

the daily dose to 15 mg per day.

The evidence for phentermine comes from eight short-term randomized controlled trials (RCTs) ranging from 12 to 28 weeks in duration.[17] Patients in these studies were 34-46 years of age, with a BMI of 29-38 kg/m^2 with no or controlled comorbidities. The meta-analysis of three studies reporting percent total body weight loss (TBWL) showed that patients taking phentermine had a mean difference (MD) in TBWL of 3.63% compared to placebo (95% CI, 2.97-4.29%), equaling 4.74 kg weight loss from baseline. In clinical trials, the common reasons for discontinuation of the drug were side effects such as elevated blood pressure and heart rate, palpitations, irritability, insomnia, headache, dry mouth, nausea, and constipation. The observational data, however, do not show significant increase in blood pressure or heart rate.[27] The general recommendation is to avoid use of phentermine in patients with a history of cardiovascular disease and uncontrolled hypertension and periodically monitor blood pressure and heart rate.[17] Phentermine should also be avoided in patients with concerns of arrhythmias, seizures, and untreated hyperthyroidism. It should be separated from use of monoamine oxidase inhibitors by 14 days. While it is prescribed as a chronic medication for weight loss, due to the lack of long-term studies assessing its safety and efficacy, the AGA guidelines recommends phentermine use for weight loss with low certainty evidence.

Lipase Inhibitor

Orlistat is a lipase inhibitor that works by inhibiting absorption of dietary fats when taken within one hour of eating a meal containing fat.[28] The prescription version of the product is 120 mg capsules while the over-the-counter version is available in 60 mg capsules. No renal or

TABLE 2. FDA-Approved Pharmacotherapeutic Options for Weight Loss

Class	*Medication*	*Dosing*	*Contraindications*	*Common Adverse Effects*	*Monitoring Parameters*
Amphetamine Derivatives[25]	**Phentermine** Adipex-P® Lomaira®	15-37.5 mg PO daily in the morning 8 mg PO TID 30 minutes before meals	CV disease, HTN, hyperthyroidism, history of drug abuse, glaucoma, use within 14 days of MAOI	Dizziness, constipation, xerostomia, tremor, palpitations, tachycardia, psychosis, insomnia, irritability, anxiety	Weight and waist circumference every month, CNS effects, HR, BP
Lipase Inhibitor[28]	**Orlistat** Xenical® Alli® (OTC)	120 mg (Rx) or 60 mg (OTC) PO TID with meals containing fat	Chronic malabsorption syndrome, cholestasis	Oily spotting, flatus with discharge, fecal urgency, increased defecation, fecal incontinence	Weight
Combination Agents	**Phentermine-topiramate**[29] Qsymia®	3.75/23 mg PO daily for 14 days then 7.5/46 mg PO daily	Use within 14 days of MAOI, glaucoma, hyperthyroidism	Tachycardia, decreased serum bicarbonate, constipation, xerostomia, headache, paresthesia	Weight, serum bicarbonate, serum creatinine, potassium, glucose, BP, mood disturbances, symptoms of glaucoma and acidosis
	Naltrexone-bupropion[30] Contrave®	8/90 mg PO daily for 7 days, 8/90 mg PO BID for 7 days, 16/180 mg PO QAM and 8/90 mg PO QPM for 7 days, then 16/180 mg PO BID thereafter	Chronic opioid use, acute opioid withdrawal, hypertension, seizure disorder, eating disorder, discontinuation of alcohol, use within 14 days of MAOI	Headache, insomnia, nausea, constipation, vomiting	Weight, BP, HR, blood glucose, renal and liver function; mental status assessment for depression, suicidal ideation, anxiety, mania
GLP-1 Receptor Agonists	**Liraglutide**[31] Saxenda®	0.6 mg SC daily for 1 week, then increase by 0.6 mg every week to the target dose of 3 mg SC daily	History of MTC, MEN2	Diarrhea, nausea, vomiting, constipation, abdominal pain, hypoglycemia (in type 2 diabetes patients taking other anti-hyperglycemics)	Weight, serum creatinine, triglycerides, signs and symptoms of pancreatitis and gallbladder disease, mood/behavior, HR; in patients with diabetes - A1c, blood glucose, and diabetic retinopathy screening
	Semaglutide[32] Wegovy®	0.25 mg SC weekly for 4 weeks, 0.5 mg SC weekly for 4 weeks, 1 mg SC weekly for 4 weeks, 1.7 mg SC weekly for 4 weeks, 2.4 mg SC weekly thereafter			
GLP-1/GIP Receptor Agonists	**Tirzepatide**[22] Zepbound®	2.5 mg SC weekly for 4 weeks, increase dose by 2.5 mg SC every 4 weeks; recommended maintenance dose: 5 mg, 10 mg, or 15 mg weekly			

Abbreviations: MD - mean difference, % TBWL - percent total body weight loss, PO - by mouth, TID - three times per day, BID - two times per day, CV - cardiovascular, HTN - hypertension, MAOI- monoamine oxidase inhibitor, HR - heart rate, BP - blood pressure, CM - centimeters, SC - subcutaneous, MTC - medullary thyroid carcinoma, MEN2 - multiple endocrine neoplasia type 2, A1c - hemoglobin A1c

hepatic dose adjustments are recommended.

Twenty-eight RCTs ranging from 48 weeks to four years have evaluated the outcomes of the 120 mg orlistat.[17] Patients in these trials were 42 to 58 years of age with a BMI range of 33-36 kg/m^2. Sixteen of these 28 trials assessed data for percent TBWL. A meta-analysis of these trials showed that orlistat 120 mg regimen resulted in an MD in TBWL of 2.78% when compared with placebo (95% CI, 2.36-3.20%). Compared to placebo, significant number of patients achieved ≥ 5% and ≥ 10% TBWL. Of note, 60 mg orlistat was not evaluated in these studies. Benefits of this drug come with sizable side effects including flatulence, oily stools and spotting, fecal urgency, fecal incontinence, and risk of cholelithiasis.[28] Taking a fiber supplement can help decrease these side effects. Because it inhibits absorption of fats, it is recommended that patients on this treatment take multivitamins containing fat soluble vitamins A, D, E, and K, two hours apart from orlistat. This is also the reason why patients with chronic malabsorption, inflammatory bowel disease, celiac disease, and history of bariatric surgery should avoid using orlistat. Contrasting the weight loss achieved with orlistat with its gastrointestinal (GI) side effects, the AGA guidelines recommend against use of orlistat for weight loss with the caveat that it can be considered in patients who determine the benefit/risk ratio by placing high value on the potential weight loss and low value on the GI side effects.[17]

Phentermine-topiramate

Phentermine's anorexigenic effects are augmented when combined with topiramate.[29] Topiramate was first approved as an anti-epileptic, but anorexia was recognized to be a common side effect of the drug. This was due to topiramate's effects on appetite suppression and satiety enhancement. The extended-release oral capsule, available as 3.75 mg/23 mg, 7.5 mg/46 mg, 11.25 mg/69 mg, and 15 mg/92 mg strengths, is taken once daily. Use in severe renal or hepatic dysfunction is not recommended, but in moderate dysfunction, daily dose is limited to 7.5 mg/46 mg.

Evidence for phentermine-topiramate 15 mg/92 mg comes from three RCTs.[17] Ranging from 52 to 56 weeks in length, the studies included patients 42-51 years of age with BMI 27-45 kg/m^2 with one or more comorbidities including diabetes. Compared to placebo, phentermine-topiramate resulted in an MD in TBWL of 8.45% (95% CI, 7.98-9.01%). About 68% of patients taking the 15 mg/92 mg dose achieved ≥ 5% and ≥ 10% of weight loss compared to 19.4% of patients taking placebo. In one of the three trials, 31.5% of patients taking the 15 mg/92 mg dose were able to lose ≥ 15% of total body weight compared to 3.3% of patients who took placebo. Patients of childbearing age should be advised to use appropriate contraception while taking this drug due to topiramate's teratogenicity.[29] Additionally, due to inhibition of carbonic anhydrase, it can cause metabolic acidosis and hypercalciuria resulting in increased risk of nephrolithiasis. The AGA guidelines recommend phentermine-topiramate alongside lifestyle modifications, with it being a preferred treatment option in people who have comorbid migraines.[17] With the phentermine entity, this combination should be avoided in patients with uncontrolled hypertension, existing cardiovascular disease, and untreated hyperthyroidism. Blood pressure and heart rate should be monitored in patients taking this drug combination. While not FDA-approved, the AGA guidelines state that some physicians may use topiramate monotherapy or another antiepileptic, zonisamide, off-label as anti-obesity medications.

Naltrexone-bupropion

Exact mechanism of how naltrexone—an opioid antagonist—and bupropion—a weak inhibitor of dopamine and norepinephrine—assist with weight loss is not fully understood.[30] Impact on satiety centers in the hypothalamus and on the dopamine reward pathway is believed to regulate one's food intake. Available as an extended release tablet, it follows a weekly titration schedule to reach to the maximum of 32 mg/360 mg daily dose. In severe renal and hepatic dysfunction, use is not recommended while the maximum daily dose is 8 mg/90 mg in patients with moderate renal or hepatic dysfunction.

Five RCTs assessed naltrexone-bupropion efficacy against placebo for 56 weeks.[17] Patients were on average 43-61 years of age with a mean BMI of 36 kg/m^2. Meta-analysis of the five studies show that naltrexone-bupropion resulted in an MD in TBWL of 3.01% (95% CI, 2.47-3.54%), equivalent to 3.01 kg weight loss. Significantly more patients achieved ≥ 5% and ≥ 10% TBWL in the naltrexone-bupropion group compared to placebo. One study reported that significantly more patients taking naltrexone-bupropion achieved ≥ 15% TBWL. Most commonly reported side effects were constipation, nausea, vomiting, headache and insomnia. Taking the second dose of the day a little earlier may minimize insomnia. It should not be used in patients with active opioid treatment, seizure disorders, and history of eating disorders.[17,30] Especially in the first 12 weeks of treatment, there should be periodic measurement of blood pressure and heart rate. The AGA recommends considering naltrexone-bupropion in patients who are also attempting smoking cessation and/or in patient with depression.

Glucagon Like Peptide-1 Receptor Agonist

Liraglutide and semaglutide are glucagon-like peptide-1 receptor agonists (GLP-1 RAs).[31,32] They induce glucose dependent insulin release, delay gastric emptying, and improve satiety. These mechanisms result in decreased caloric intake and weight loss. Both are administered via subcutaneous injection using a pen. Liraglutide's starting dose is 0.6 mg daily, titrated to a maintenance dose of 3.0 mg daily over four weeks based on tolerance. Semaglutide's starting dose is 0.25 mg weekly, titrated to a maintenance dose of 2.4 mg weekly over 16 weeks. More than two missed doses may require lowering the next dose due to increased risk of GI side effects. Dose adjustments for renal or hepatic dysfunctions are not provided; however, patients with renal dysfunction may experience more GI side effects needing to reassess dosing.

Eleven RCTs evaluated the efficacy of liraglutide against placebo when used for 52 weeks.[17] These studies included patients with a mean age of 43-59 years and a BMI range of 31.3-40.1 kg/m^2 with comorbidities like type 2 diabetes. Out of 11, eight studies provided percent TBWL data. The meta-analysis showed that liraglutide resulted in an MD in TBWL of 4.81% (95% CI, 4.23-5.39%) when

compared with placebo. Significantly more patients taking liraglutide demonstrated ≥ 5%, ≥ 10%, and ≥ 15% weight loss. Semaglutide was assessed against placebo in eight RCTs from 52 to 72 weeks. Patients in these trials were 46-59.5 years of age with a BMI range of 32-39.9 kg/m^2. Patients taking semaglutide resulted in an MD in TBWL of 10.76% (95% CI, 8.73–12.80%) when compared with placebo. A pooled analysis showed that significantly more patients taking semaglutide had ≥ 5%, ≥ 10%, and ≥ 15% TBWL compared to placebo. The GLP-1 RAs are associated with common GI adverse events such as nausea, vomiting, abdominal pain, flatulence, dyspepsia, eructation, diarrhea, and constipation as well as headache, fatigue, and dizziness.[31,32] Breaking down meals in small quantities only until just full and eating more frequently throughout the day can help decrease some of these GI adverse effects. They are contraindicated in patients with personal or family history of medullary thyroid carcinoma or multiple endocrine neoplasia type 2 syndrome and should be used cautiously in patients with acute pancreatitis or gallbladder disease. Cases of acute kidney injury and increased heart rate are reported with the use of GLP-1 RAs. The package inserts for these GLP-1 RAs include warning for increased risk of suicidal behavior and ideation; however, FDA issued an update of the ongoing evaluation in January 2024.[33] The preliminary evaluation does not link this risk to GLP-1 RAs, but results from a large meta-analysis and postmarketing data analysis remain pending. Both of these agents are studied in patients with diabetes, but when used along with other anti-hyperglycemic agents, due to risk of hypoglycemia, dose adjustment and necessary blood glucose monitoring should be exercised. Due to the magnitude of weight loss, the AGA recommends prioritizing semaglutide 2.4 mg over other approved weight loss medications.[17] The AGA guidelines also recommend liraglutide for weight loss with moderate certainty evidence. These medications should not be used with other GLP-1 RAs or with dipeptidyl peptidase-4 inhibitors.

Tirzepatide

Tirzepatide is a dual GLP-1 and glucose-dependent insulinotropic polypeptide (GIP) receptor agonist first approved for the treatment of type 2 diabetes mellitus.[22] It gained an additional FDA-approved indication for obesity management in late 2023 following the results of SURMOUNT-2 trial.[34] It is available as subcutaneous injection pen in four different strengths.[22] The starting dose is 2.5 mg weekly for four weeks then increasing to 5 mg thereafter. Per patient response, the dose can be increased by 5 mg to a maximum of 15 mg per week.

The evidence for tirzepatide is available from four SURMOUNT trials ranging from 72 to 88 weeks.[35-38] Patients in these trials were 32 to 65 years old with or without comorbidities and with BMI range of 29.5-45 kg/m^2. The mean difference in TBWL when compared to placebo was 11.9-17.8% (p< 0.001) in SURMOUNT-1, 9.6-11.6% (p<0.0001) in SURMOUNT-2, 20.8% (p<0.001) in SURMOUNT-3, and 19.4% (p<0.001) in SURMOUNT-4 trial. Significantly more patients in all tirzepatide groups achieved TBWL of ≥ 5%, ≥ 10%, ≥ 15%, and ≥ 20%. The safety profile of tirzepatide is similar to the GLP-1 RAs. Additionally, it decreases serum concentration of hormonal contraceptives, needing to use non-oral contraceptives or a barrier method for four weeks after initiation and four weeks after each dose escalation.[22] While these weight loss drugs are not compared head to head, tirzepatide's weight loss magnitude from the SURMOUNT trials seems to be higher than that from other weight loss drugs. At the

TABLE 3. Efficacy of Weight Loss Medications in Comparison to Placebo[17,35-38]

Medication	*MD % TBWL[a]*	*Mean weight loss (kg)*	*≥ 5% TBWL[b]*	*≥ 10% TBWL[b]*	*≥ 15% TBWL[b,c]*	*≥ 20% TBWL[b,c]*
Phentermine	3.63% (2.97-4.29)	4.74	4.12 (3.04-5.59)	5.10 (3.02-8.61)	Not available	Not available
Orlistat	2.78% (2.36-3.2)	2.81	1.71 (1.55-1.88)	1.94 (1.70-2.22)	Not available	Not available
Phentermine-topiramate	8.45% (7.89-9.01)	7.73	3.48 (3.13-3.87)	6.33 (5.26-7.61)	9.51 (5.86-15.44)	Not available
Naltrexone-bupropion	3.01% (2.47-3.54)	3.01	2.18 (1.41-3.37)	3.04 (1.80-5.14)	3.88 (2.13-7.08)	Not available
Liraglutide	4.81% (4.23-5.39)	5.30	2.09 (1.80-2.42)	2.67 (2.14-3.34)	3.04 (2.25-4.12)	Not available
Semaglutide	10.76% (8.73-12.8)	10.81	2.74 (2.21-3.40)	5.25 (3.61-7.64)	7.82 (5.19-11.76)	Not available
Tirzepatide	9.6 - 20.8% (p<0.001)[d-g]	9.7-25[d-g]	34.6 (19.2-62.6)[h]	34.7 (17.6-68.3)[h]	48.2 (19.2-121.0)[h]	40.4 (12.2-133.8)[h]

Abbreviations: MD - mean difference, TBWL - total body weight loss, kg - kilogram
[a] Mean difference (MD) in percent total body weight loss (TBWL) (95% CI)
[b] Risk ratio (95% CI)
[c] Studies of certain drugs did not evaluate ≥ 15% or ≥ 20% TBWL
[d] SURMOUNT-1: MD % TBWL 11.9-17.8% (p<0.001); mean weight loss 10.1 kg
[e] SURMOUNT-2: MD% TBWL 9.6-11.6% (p<0.0001); mean weight loss 9.7-11.6 kg
[f] SURMOUNT-3: MD% TBWL 20.8% (p<0.0001); mean weight loss 25 kg
[g] SURMOUNT-4: MD% TBWL 19.4% (p<0.0001); mean weight loss 15.8 kg
[h] SURMOUNT-3 results; ≥5 to ≥20% results reported as odds ratio (95% CI)

time the AGA guidelines were published, tirzepatide only had an FDA-approved indication for type 2 diabetes and therefore it has not been given a recommendation as weight loss medication; however, the guidelines do discuss the impact of this medication on weight loss per the clinical trials analyzed.[17]

Current Studies and Future Developments

Oral semaglutide is approved for treatment of type 2 diabetes, but not for weight management. A phase 3 randomized, double blinded, placebo-controlled trial, OASIS-1, evaluated oral semaglutide 50 mg daily against placebo in patients without type 2 diabetes.[39] Patients taking oral semaglutide showed an MD in TBWL of 12.7% compared to placebo (95% CI, 11.3-14.2%). Significantly more patients also achieved ≥ 5%, ≥ 10%, ≥ 15%, and ≥ 20% TBWL compared to placebo.

Oforglipron is an oral nonpeptide GLP-1 receptor agonist that was evaluated for weight loss against placebo in the GZGI trial.[40] The primary endpoint was percent change in total body weight at 26 weeks with four different oforglipron doses. All four doses showed significant reduction in body weight compared to placebo at 26 weeks. Oforglipron is not currently approved for weight loss.

In addition to these two agents, several other drug classes such as amylin receptor agonists, sodium-glucose transport protein 2 inhibitors, a glabridine analogue, leptin sensitizers, oxytocin, botulinum toxin type A, methylphenidate, taste receptor activators, and GIP/GLP-1/glucagon triple agonists are being investigated for the possible use as weight loss agents.[41]

Inappropriate Medication Use for Weight Loss

There are a handful of pharmacologic and herbal and complementary agents that people may use to achieve weight loss. Most commonly, these are sympathomimetics other than phentermine, levothyroxine, metformin, laxatives, and over the counter supplements for weight loss.[42] Some medications even have a warning against the use for weight loss; for example, levothyroxine includes a boxed warning against the use for the treatment of obesity or weight loss.[43] An evaluation of emergency department (ED) visits in the United States from 2004 through 2013 showed that herbal and complementary products for weight loss resulted in estimated 25.5% of ED visits (95% CI, 23.1-27.9%).[44] Patients might be using certain herbal supplements and complementary medications with weight loss benefits or claims; therefore, obtaining a full medication history, reviewing the risks/benefits of these agents, and providing patient education is imperative. Being familiar with these agents and recognizing when they are being prescribed or used for weight loss is critical to reducing harmful misuse.

Role of the Pharmacy Teams

Pharmacists can affect outcomes for patients through management of anti-obesity as well as concurrent medications. Implementation of a clinical pharmacist in an interdisciplinary weight loss service has been shown to significantly improve the magnitude of weight loss in comparison to primary care-driven care.[45] Anti-obesity medications have various safety concerns and contraindications; pharmacist-led interventions can address these safety concerns by assessing appropriateness of drug, monitoring and managing side effects, and avoiding drug interactions. For example, orlistat may decrease absorption of fat-soluble vitamins A, D, E, and K and patients should be advised to take a multivitamin containing these vitamins, administered at least two hours apart. Naltrexone-bupropion may enhance seizure potentiating medications and may also result in acute opioid withdrawal if used with chronic opioid therapy. The GLP-1 RA medications can lower blood sugar when taken with other glucose lowering therapies which may increase the likelihood for hypoglycemia. Such nuances can be recognized as part of full medication evaluation by the pharmacist and appropriate interventions can be recommended to providers and patients to assure increased benefits while reducing harm from anti-obesity medications. Additionally, many of these medications require a patient to learn how to use them with a variety of patient education techniques, including demonstration and teach-back.

Furthermore, patients may face coverage issues when prescribed anti-obesity medications because payers have not completely accepted the fact that obesity is a chronic condition. Facing the high demand of GLP-1 RAs, there has been a prolonged shortage of these agents.[46] These reasons may divert patients to source their medications from non-FDA-approved agencies, risking use of counterfeit or illegal products. Pharmacy teams can educate patients to source medications safely, assist with insurance coverage or financial assistance when available, advise to avoid use of non-approved medication or supplement use in lieu of approved medications, and suggest approved therapeutic alternatives that are safe and effective. Pharmacy teams can additionally play a role in positive reinforcement, motivation, medication adherence, as well as proper dosing and monitoring of these agents. With the knowledge, trust, and relationships the pharmacy teams have with their patients, they are able to optimize care in a patient taking weight loss medications.

Conclusion

Rates of obesity are on a constant rise and so are the rates of obesity-related comorbidities. Treating overweightness and obesity as a chronic disease has been shown to reduce the onset or complications from obesity-related comorbidities. Various pharmacotherapy agents are FDA-approved for the management of obesity in conjunction with comprehensive lifestyle interventions. In clinical trials, these agents have demonstrated a varying magnitude of weight loss when compared with placebo. There are considerable safety concerns that are specific to each drug and therefore the recommendation is to select an appropriate medication not only based on efficacy, but also based on contraindications and safety concerns. Pharmacists and pharmacy teams can play a significant role in safe and optimal use of anti-obesity medications, assuring more benefits over potential harm.

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Assessment Questions

1. Which of the following parameters is included in the current classification of obesity?
   a. Body mass index
   b. Muscle mass
   c. Body fat
   d. Waist circumference

2. Which of the following are considered to be obesity-related comorbidities?
   a. Cancer
   b. Depression
   c. Diabetes
   d. All of the above

3. In obesity, the hunger hormone, _____ may be increased and the satiety hormone, _____ may be decreased.
   a. peptide YY, dopamine
   b. ghrelin, leptin
   c. amylin, GLP-1
   d. serotonin, cholecystokinin

4. JK is a 54-year-old patient with a past medical history of diabetes, hypertension, depression, and recent UTI. She is taking metformin 1000 mg PO BID, lisinopril 20 mg PO daily, paroxetine 40 mg PO daily, and cephalexin 250 mg PO Q6H. She presents for the first evaluation visit for obesity management. Reviewing her current medications, which medication has higher potential for causing weight gain?
   a. Metformin
   b. Lisinopril
   c. Paroxetine
   d. Cephalexin

5. Which should be included in the comprehensive approach to obesity?
   a. A low-calorie diet between 600 to 800 calories per day
   b. Moderate intensity exercise for 150 minutes per week
   c. Incorporate eating behavior change
   d. At least 6 hours of sleep per night

6. SA is a 44-year-old patient presenting with obesity. She was recently diagnosed with hypertension, which is managed with 2 anti-hypertensive agents. Her body mass index is 31 kg/m^2. Which of the following is an optimal nonpharmacologic recommendation to achieve health outcomes?
   a. Decrease fat intake by 10% daily.
   b. Increase physical activity to 450 minutes per week.
   c. Reduce carbohydrate intake to 60 grams per meal.
   d. Lose 5% of body weight.

7. According to guidelines and FDA-approved indications, which of the following patients is recommended to initiate a weight loss medication alongside lifestyle interventions?
   a. A 34-year-old with BMI of 28 kg/m^2 and depression
   b. A 25-year-old with BMI of 29 kg/m^2 and no other chronic conditions
   c. A 54-year-old with BMI of 25 kg/m^2 and hypertension
   d. A 48-year-old with BMI of 28 kg/m^2 and diabetes

8. Which medication is FDA-approved for short-term treatment of obesity?
   a. Phentermine
   b. High-dose semaglutide
   c. High-dose liraglutide
   d. Orlistat

9. According to the available clinical data, which medication is considered to promote the most weight loss against placebo?
   a. Orlistat
   b. Tirzepatide
   c. Liraglutide
   d. Phentermine

10. A pharmacy team member may do the following to optimize care for a patient presenting with obesity:
   a. Recommend that a patient prescribed liraglutide should take a multivitamin tablet 2 hours apart to reduce the risk of fat soluble vitamin deficiency.
   b. Discuss importing semaglutide from another country due to shortages to decrease gaps in therapy
   c. Suggest a patient start high intensity interval training to maximize weight loss
   d. Identify that sitagliptin, a DPP-4 inhibitor, needs to be discontinued before starting weight loss therapy with tirzepatide.

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ID CORNER
If The Gut Works… Use It!

Oral Step-down Therapy for Bloodstream Infections

by Amolee R. Patel, PharmD, BCPS, BCIDP

With an estimated incidence of over 600,000 cases annually, bloodstream infections (BSIs) pose a significant challenge to patients and healthcare providers.[1,2] Even with advances in the diagnosis and management of infectious diseases, BSIs consistently rank among the top ten causes of mortality in the United States with rates nearing 20% depending upon the pathogen and burden of infection.[2] BSIs are also an important cause of community-onset sepsis, metastatic complications, and recurrent infections, leaving little room for error when managing these infections in clinical practice.[2-4]

Recommendations for the early management of BSIs are clear: administer empiric intravenous (IV) antibiotic therapy and identify and eradicate the source of infection. There is a clear survival benefit to the early administration of IV antibiotic therapy in critically ill patients. IV therapy provides rapid and reliable attainment of serum drug levels in patients with a variable volume of distribution or questionable oral absorption.[5] Because BSIs are such a heterogeneous disease state, management often diverges there as determined by the pathogen, suspected or documented source of infection, and patient-specific risk factors.[6-9] Much of the currently available guidance consists of outdated or archived guidelines informed by historical literature, in which IV antibiotic therapy demonstrated superiority over older oral agents in the treatment of invasive infections such as bacteremia, infective endocarditis (IE) and osteomyelitis.[10] However, contemporary literature and landmark trials such as POET and OVIVA have suggested that oral step-down therapy can be utilized on a case-by-case basis in such infections.[11,12] Continued IV therapy requires long-term venous access, which puts patients at risk for thromboembolism, phlebitis, and secondary infection while incurring significant costs to the patient.[13] In an appropriate patient, oral step-down therapy can maintain comparable clinical outcomes to complete IV courses of therapy while reducing healthcare costs, length of hospital stay, and rates of antibiotic-associated adverse drug events (ADEs).[10,13,14]

There are certainly nuances to interpreting the literature and identifying appropriate patients for oral step-down therapy

TABLE 1. Definitions of Uncomplicated BSIs

IDSA Guidelines for the Treatment of MRSA Infections[7]	*Management of Uncomplicated Gram-negative BSIs*[9]
• Rule out recurrent BSI and/or failure of source control • Clearance of bacteremia • Lack of systemic symptoms of infection within 72 hours of initiating active therapy • No IE or metastases • No implanted prostheses	• Source: UTI, IAI, CLABSI, pneumonia, SSTI • Source control • No immunocompromise or risk factors for opportunistic infections • Clinical improvement within 72 hours of effective antibiotic treatment

BSI: bloodstream infection; CLABSI: central-line associated bloodstream infection; IAI: intra-abdominal infection, IDSA: Infectious Diseases Society of America; IE: infective endocarditis; MRSA: methicillin-resistant Staphylococcus aureus; SSTI: skin and soft tissue infection; UTI: urinary tract infection.

in BSIs. A seemingly simple starting point would be to classify a BSI as "complicated" or "uncomplicated," but a clear distinction exists between gram-negative and gram-positive bacteremia. Although gram-negative organisms can cause severe and rapid onset illness, they are typically more readily eradicated than gram-positive organisms as they do not tend to metastasize to prosthetic material or other secondary foci of infection.[3,4] This leads to confusion in defining a "complicated" BSI, but Table 1 delineates some recommended considerations for an uncomplicated BSI in both groups of pathogens.

The early data for oral step-down therapy in BSIs indicated the preferential selection of fluoroquinolones and trimethoprim-sulfamethoxazole (TMP-SMX) over β-lactams largely because of their high bioavailability. In observational studies, patients receiving β-lactams experienced a non-significant trend toward increased rates of recurrent infection. There is, however, a lack of clear evidence demonstrating the superiority of fluoroquinolones and overall rates of recurrence were very low.[16-19] The use of fluoroquinolones raises concerns for drug resistance and serious ADEs when compared to the tolerability profile of β-lactams.[14] The use of TMP-SMX may also be limited by a lack of well-defined dosing targets. β-lactams are often dismissed because of a generalized perception of poor absorption and disadvantage of frequent administration. They are not without ADEs and resistance concerns but may be an effective and safe option for step-down therapy for BSIs in select patient cases, though the data do suggest significant opportunity to dose optimize these agents.[17-19]

Gram-negative Bloodstream Infections

Gram-negative BSIs, especially those caused by *Enterobacterales*, are most widely represented in the literature for oral step-down therapy. When compared with IV-only therapy, patients experienced similar rates of mortality and recurrent bacteremia, and length of hospital stay was significantly decreased.[16] Although *Enterobacterales* can cause a wide range of illnesses, most patients received oral step-down treatment for BSIs secondary to a

TABLE 2. Summary of Select Pieces of Literature Supporting Oral Step-Down Therapy for Gram-Negative BSIs

Association of 30-Day Mortality with Oral Step-Down vs Continued Intravenous Therapy in Patients Hospitalized with *Enterobacteriaceae* Bacteremia[16]		
Design	Retrospective cohort study	
Inclusion Criteria	• Adults hospitalized with monomicrobial *Enterobacterales* bacteremia • Source control measures as applicable • Appropriate clinical response	
Exclusion Criteria	• Patients transitioned to oral antibiotics after day five of IV therapy • <7 OR >16 days of total antibiotic therapy	
Treatment	• Median total duration of antibiotic therapy: 14 days • Median duration of IV therapy prior to oral step-down: 3 days	
	Antibiotic Regimen	***Patients, No. (%)***
	Amoxicillin-clavulanate 500-1000 mg q8-12h	38 (5.1)
	Cefdinir 300 mg q12h	30 (4.1)
	Cephalexin 500 mg q6h	16 (2.2)
	Ciprofloxacin 500-750 mg q12h	337 (45.6)
	Levofloxacin 500-750 mg q24h	171 (23.1)
	TMP-SMX 160-320 mg q6-12h	99 (13.4)
Patient Population Oral step-down vs IV	Propensity score-matched cohort (N=1478) • Source: urinary tract (40%), GI tract (20%), CLABSI (18%), biliary (14%) • *Escherichia coli* (43%), *Klebsiella pneumoniae* (34%), *Enterobacter spp* (12%)	
Results Oral step-down vs IV	• 30-day mortality: 13.1% vs 13.4%, NS • 30-day recurrent bacteremia: 0.8% vs 0.5%, NS • Time from day 1 bacteremia to hospital discharge: 5 days vs 7 days **(P < 0.001)**	
Conclusions	Early oral step-down therapy may be effective for patients with *Enterobacterales* BSIs who have achieved source control and demonstrated an appropriate clinical response. Early oral step-down therapy may also be associated with a decrease in the duration of hospital stay.	
Oral β-Lactam Antibiotics vs Fluoroquinolones or Trimethoprim-Sulfamethoxazole for Definitive Treatment of *Enterobacterales* Bacteremia from a Urine Source[17]		
Design	Retrospective cohort study	
Inclusion Criteria	Hospitalized adult patients with matching blood and urine cultures positive for *Escherichia coli*, *Klebsiella spp*, or *Proteus spp*	
Exclusion Criteria	• Polymicrobial bacteremia • Urologic abscess or chronic prostatitis • *Escherichia coli, Klebsiella spp,* or *Proteus spp* bacteremia in the prior 365 days	
Treatment	• Median duration of total therapy: 14 days • Median duration of oral therapy: 10 days	
	Antibiotic Regimen	***Patients, No.***
	Amoxicillin-clavulanate 500-875 mg BID	251
	Cephalexin 500mg BID-QID	245
	Ciprofloxacin 250-750 mg BID	2447
	TMP-SMX 800/160mg daily-BID	259

genitourinary source or an uncomplicated intra-abdominal source, such as cholecystitis or appendicitis where adequate source control was achieved.[16-18] It is important to note that patients with complicated infections and/or structural abnormalities (indwelling devices, obstructions, abscesses, etc.) were often excluded in aforementioned studies or were observed in subgroup analyses to have higher rates of treatment failure. The duration of IV therapy prior to oral step-down ranged from 3 to 5 days, with a total duration of 10-14 days. More recent data have demonstrated even shorter total durations of 7 days to be adequate for uncomplicated *Enterobacterales* BSIs.[9] Table 2 provides a detailed summary of select literature supporting oral step-down therapy in gram-negative BSIs. Of note, *Pseudomonas aeruginosa* and other non-fermenters are almost entirely unrepresented in the literature. These organisms also have very few (if any) oral options available for step-down therapy. Contemporary guidance does suggest that oral step-down therapy can be considered if a suitable agent is available, and the patient is immunocompetent and has achieved an appropriate clinical response and adequate source control.[9,19]

TABLE 2. Summary of Select Pieces of Literature Supporting Oral Step-Down Therapy for Gram-Negative BSIs Cont.

Patient Population FQs, TMP-SMX vs β-lactams	N=4089 • Median CrCl: 60mL/min • Urinary retention, obstruction, other structural abnormality: 23.1% vs 30.2%
Results FQs, TMP-SMX vs β-lactams	• 30-day mortality and recurrent bacteremia: 3.0% vs 4.4%, NS • 90-day mortality and recurrent bacteremia: 7.6% vs 10.1%, NS • 30-day re-hospitalization with UTI: 0.7% vs 1.5%, NS
Conclusion	Oral β-lactam antibiotics are a reasonable oral step-down option on an individual patient basis, primarily when alternative options are limited by resistance or ADEs.
Oral Beta-Lactams, Fluoroquinolones, or Trimethoprim-Sulfamethoxazole for Definitive Treatment of Uncomplicated *Escherichia coli* or *Klebsiella* species Bacteremia from a Urinary Source[18]	
Design	Multicenter observational cohort study
Inclusion Criteria	Adult patients with matching blood and urine cultures positive for *Escherichia coli* or *Klebsiella spp*
Exclusion Criteria	• Polymicrobial BSI • Complicated UTI • Concomitant non-urinary infections
Treatment	• Median duration of total therapy: 11 days (IQR 10-14) • Median duration of oral therapy: 10 days (IQR 7-10)
	Antibiotic Class — ***Patients, No.***
	FQs (ciprofloxacin or levofloxacin) — 248
	TMP-SMX — 99
	High-bioavailability β-lactam — 201
	Low-bioavailability β-lactam — 100
Patient Population	N=648 • Chronic Kidney Disease: 24% • Received recommended dosing: 32%
Results	60-day recurrence (UTI only) • Fluoroquinolones: 4.8% (4.4%) • TMP/SMX: 8.1% (5.1%) • High-bioavailability β-lactams: 8.0% (6.0%) • Low-bioavailability β-lactams: 9.0% (7.0%)
Conclusions	Fluoroquinolones and TMP-SMX had similar effectiveness in this real-world dataset. High bioavailability β-lactams were associated with higher recurrence rates, but suboptimal dosing may have contributed. Further studies are needed to define optimal β-lactam dosing and duration to mitigate treatment failures.

ADE: adverse drug event; BSI: bloodstream infection; CLABSI: central-line associated bloodstream infection; FQ: fluoroquinolone; GI: gastrointestinal; IQR: interquartile range; IV: intravenous; NS: not statistically significant; TMP-SMX: trimethoprim/sulfamethoxazole; UTI: urinary tract infection

Gram-positive Bloodstream Infections

The data to support oral step-down therapy in gram-positive BSIs indicate high clinical success rates in *Streptococcus* and *Enterococcus spp* infections of uncomplicated sources, including skin and soft tissue, pulmonary, and genitourinary.[19] Table 3 summarizes select literature supporting oral step-down therapy in gram-positive BSIs. In the SABATO trial, Kaasch et al. noted similar rates of infection-related complications when using oral step-down therapy in *Staphylococcus aureus* bacteremia (SAB), with key limitations. SAB is associated with a high incidence of metastatic complications and mortality. Prolonged durations of therapy are typically recommended to clear infection and reduce the risk of complications.[7,20] Although we have highly bioavailable agents that have activity against *S. aureus*, including methicillin-resistant *S. aureus* (MRSA), the practice of oral step-down is rarely considered. Streptococcus and *Enterococcus spp* are also associated with metastatic complications, albeit to a lesser extent, which makes oral step-down a more viable option in uncomplicated infections. A crucial element in managing gram-positive BSIs is the exclusion of metastases and the documented clearance with negative repeat blood cultures. The observed duration of IV therapy prior to oral step-down in gram-positive BSIs was 5-7 days with a minimum total duration of 14 days.[19,21] MRSA is incredibly underrepresented (~10%) in the literature. Although most infections were caused by methicillin-susceptible isolates virtually no patients received oral step-down therapy with oral β-lactams.[21,22] This, along with the small sample size and incredibly low-risk SAB patients, limits the generalizability of these data and highlights

the scarcity of truly "uncomplicated" cases of SAB.

Optimizing Oral Antimicrobial Therapy

Choosing an antibiotic regimen for any infection requires consideration of the organism minimal inhibitory concentration (MIC) and drug exposure target relative to the MIC to determine whether an agent can be adequately dosed to meet the pharmacokinetic and pharmacodynamic targets at the source of infection.[23] For example, β-lactams exert their microbiological effect in a time-dependent manner, with a general target of 40-70% of time above the MIC. Although bioavailability often factors heavily in these conversations, it is only part of the equation. Considering drug properties, such as serum concentration, tissue distribution and protein binding, as well as patient specific factors, such as organ function, age and weight, will help to determine the probability of target attainment.[23] Heil, et al. provide dosing recommendations of select oral antibiotics with a high probability of target attainment when used for step-down therapy in BSIs.[9] It is, of course, important to consider whether aggressive doses and/or longer durations of antibiotic therapy will be tolerated by patients.

Pharmacists in a variety of healthcare settings play a vital role in antimicrobial stewardship by optimizing antibiotic agents, dosing and durations of therapy, to name a few important interventions.[24] As the roles and responsibilities of pharmacists evolve to meet the increasing demands of healthcare services, we are well poised to collaborate with other members of the healthcare team to optimize the treatment of patients with BSIs. This can involve recommending initial empiric treatment, monitoring the patient's clinical response, and designing a regimen for oral step-down. Pharmacists can also thereby facilitate transitions of care by ensuring the completion of safe and effective therapy.[25]

Current literature has demonstrated that oral step-down therapy for BSIs can maintain efficacy while decreasing costs, reducing adverse events, and providing ease of administration for patients. This is typically best applied to an immunocompetent patient who

TABLE 3. Summary of Select Pieces of Literature Supporting Oral Step-Down Therapy for Gram-Positive BSIs

Fluoroquinolone versus β-Lactam Oral Step-Down Therapy for Uncomplicated Streptococcal Bloodstream Infections[19]		
Design	Multicenter retrospective cohort study	
Inclusion Criteria	Adult hospitalized patients with ≥1 positive blood culture for *Streptococcus spp*	
Exclusion Criteria	• Polymicrobial bacteremia • Infective endocarditis or central nervous system infection	
Treatment	• Median time to oral step-down 5.3 (FQ) vs 5.8 (β-lactam) days • Median durational of total therapy: 14 days • High vs low dose therapy	
	Antibiotic Class	***Patients, No.***
	Fluoroquinolones	87
	β-lactams	133
Patient Population FQs vs β-lactams	N=220 • >95% community-acquired infections • Source of infection: SSTI (21.8% vs 45.1%), respiratory (62.1% vs 24.1%), urinary, intra-abdominal, surgical site	
Results FQs vs β-lactams	• Clinical success: 92% vs 93.2% Multivariate analysis – risk factors for treatment failure • Oral step-down at <3 days (OR=5.18; **95% CI, 1.21 to 22.16**) • Low-dose oral step-down therapy (OR=2.74; NS)	
Conclusions	Oral step-down therapy may be reasonable for patients with uncomplicated Streptococcal BSIs. A β-lactam may be noninferior to a fluoroquinolone.	
Efficacy and Safety of an Early Oral Switch in Low-risk *Staphylococcus aureus* Bloodstream Infection (SABATO): An International, Open-label, Parallel-group, Randomised, Controlled, Non-inferiority Trial[21]		
Design	International, open label, randomized, controlled, non-inferiority trial	
Inclusion Criteria	Adult patients with low-risk *S. aureus* BSIs	
Exclusion Criteria	• Signs/symptoms of complicated BSI • Non-removable foreign device • Severe comorbidity	
Treatment	• Median duration of total therapy: 14 days • Median duration of step-down therapy: 8 days	
	Antibiotic agent	***Patients, No. (%)***
	Cotrimoxazole	63 (58%)
	Clindamycin	35 (32%)
	Linezolid	9 (8%)
Patient Population Oral vs IV	N=213 • Source: peripheral venous catheter (44% vs 44%), central venous catheter (22% vs 24%), SSTI (24% vs 21%) • Methicillin-resistance: 6% vs 10%	
Results Oral vs IV	• SAB-related complication within 90 days: 13% vs 12% • 90-day survival: 83.6% vs 89.0%, NS	
Conclusion	Oral step-down therapy was non-inferior to standard IV therapy in patients with low-risk *S. aureus* bacteremia. However, patients must be carefully assessed for signs and symptoms of complicated BSIs before considering early oral step-down.	

BSI: bloodstream infection; FQ: fluoroquinolone; IV: intravenous; NS: not statistically significant; SSTI: skin and soft tissue infection

has achieved adequate source control, responded to initial treatment and is able to tolerate oral therapy. Certain gaps do remain in the literature as to the optimal timing for oral step-down and the most effective antimicrobial agent(s) and dose, but the current body of evidence provides a solid framework upon which to build this practice. Observational data continue to emerge in light of recent literature and the resource constraints of long-term IV therapy.[26] Future studies and practice experience will no doubt elucidate the place of oral step-down therapy in the treatment of BSIs and other invasive infections as we continue the challenge the dogma of IV-only therapy for all.

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Upskilling & Reskilling in Pharmacy: Expansion into Innovative Pharmacist Roles

by Jeffrey Clark, PharmD, MS, Olivia Crabtree, PharmD, MBA, Blake Hicks, PharmD, MBA, Aaron Klysen, PharmD, Robert Lolcoma, PharmD, Sarah LeMay, PharmD

The Practice Advancement Leadership Team (PALT) is a group comprised of Health-System Pharmacy Administration and Leadership residents and program directors across Wisconsin. Each year, PALT supports PSW's vision to transform pharmacy practice across Wisconsin. As pharmacy is a rapidly changing and evolving profession, upskilling and reskilling offer important opportunities for members to expand into innovative pharmacy practice areas. "Upskilling" is the process of expanding an existing skillset. "Reskilling" is the process of learning new skills to build competency for a different job or skillset. Interested in expanding your current role? Looking to move into a different position in the future? The following stories showcase several pathways for pharmacists to expand into innovative areas within pharmacy.

Dalton Fabian

Dalton Fabian is a data scientist for Wellmark Blue Cross Blue Shield. In his role as a data scientist, his main responsibilities include coding, programming, data visualization, and project management. In his current role, Fabian utilizes data to help improve preventative medicine and the financial impact for Wellmark patients.

Fabian first developed a passion for programming while taking computer science classes in high school. As he progressed through his career, Fabian found that many of the skills that he gained while exploring his interests in programming translated to the field of pharmacy. While in pharmacy school, he had the opportunity to shadow a data scientist during his rotation at Unity Point. After his shadowing experience, Fabian felt he had discovered a way to combine his love for data science and pharmacy and that many of his skills as a pharmacist would provide him with a distinct advantage as a data scientist. He also obtained a minor in data analytics while in pharmacy school to help bolster his skills. With these experiences as well as guidance from mentors, Fabian made the decision to pursue a career as a data scientist after graduating from pharmacy school.

Below: *Dalton Fabian, PharmD*

Throughout his career, Fabian has encountered several challenges. He said the biggest challenge was the high level of technical proficiency required to be a data scientist. To help improve his proficiency, he attended additional classes and completed a lot of self-learning. When asked what advice he would provide to those seeking to upskill or reskill into a new position, he recommended leaning on mentors for guidance, and building a solid network to help open new opportunities. He also recommends shadowing people who are currently in the career that you would like to pursue and diagramming out the steps needed to obtain your goals in order to streamline the process.

Jim LaTourette

Jim LaTourette is an investigational drug services (IDS) pharmacist at Froedtert & the Medical College of Wisconsin located in Milwaukee, WI. LaTourette's early career involved staffing morning, evening, and overnight shifts in a variety of acute care hospital pharmacy roles. These robust clinical experiences provided LaTourette with the strong foundation to explore

Above: *Jim LaTourette, PharmD, DPLA*

reskilling in his pharmacy career. Some of the key factors that inspired LaTourette's decision to reskill include his passion for critical thinking, overcoming operational challenges, and seeing process improvement realized. LaTourette's current role as an IDS pharmacist combines his drive for workflow development and quality improvement to support the skills behind study management in his role.

The road to reskilling is not without challenges and learning opportunities. In his current role, LaTourette found that his inexperience in oncology and research practices served as the largest challenge to overcome. The IDS team at Froedtert has been crucial in helping LaTourette understand how to successfully manage the pharmacy operations of investigational medication use. This on-the-job experience was coupled with dedicated time to read literature and learn from his oncology pharmacist peers. Additionally, the informatics team was incredibly supportive in navigating medication record build-outs for investigational medications, as well as treatment plan development consistent with clinical trial protocols. There have been several didactic tools that have assisted LaTourette in his growth. These include:

- Obtaining Collaborative Intitutional

Training Initiative (CITI) certification in Biomedical Research and Good Clinical Practices
- Learning about new oncology regimens
- Understanding how inpatient and outpatient services overlap
- Collaborating with pharmacy informatics teams
- Navigating investigational medication regulation and Institutional Review Board (IRB) approval processes
- Leading change in multi-disciplinary workflows

With all of these experiences to draw from, LaTourette has actionable advice to offer pharmacy professionals looking to reskill their own careers. First, take an honest assessment of your strengths and weaknesses. Allowing yourself to be vulnerable and seeking honest feedback can be the first step in taking action to bridge gaps within your knowledge or skillset. Second, be willing to ask for help. Identify the individuals who have the skills you wish to acquire and ask them about their road to obtaining this expertise. Consider establishing a mentorship with these individuals. Third, stay curious and say yes more often. Building new skills comes with opportunity, and the more you can put yourself in those unique experiences, the better. The final key reflection looks at what LaTourette would do differently based on his current knowledge. Residency training has become a significant component of preparing for a career in hospital pharmacy. LaTourette concludes that completion of a pharmacy residency and developing his emotional intelligence at an earlier stage of his career would have made success easier to attain.

Below: *Elizabeth Laubach PharmD, BCPS, DABAT*

Liz Laubach

Liz Laubach is an Assistant Professor of Pharmacology and Toxicology at the Concordia University School of Pharmacy (CUWSOP) with a practice site at the Wisconsin Poison Center. Liz also continues working as a hospital pharmacist at Ascension Columbia St. Mary's Hospital - Ozaukee Campus (ACSMO). Prior to joining the faculty at CUWSOP, Laubach held several leadership positions within Ascension, including as a Regional Director of Pharmacy.

During her time as regional director, she thoroughly enjoyed the operational aspects of the role that allowed the implementation of change. Rolling out new initiatives and empowering front-line staff to successfully tackle new operational endeavors brought her tremendous job satisfaction.

One consistent element Liz has relied on in her professional journey is utilizing mentors. When first taking on the role as director, she felt that one of her biggest challenges was inexperience at this level of leadership, given that she was a relatively new leader at the time. To help her navigate this transition, she sought guidance from existing Ascension pharmacy leaders as well as the other non-pharmacy leaders in the organization that she saw as individuals she'd want to emulate. When the opportunity to pursue toxicology became a possibility, she relied on the long-time mentorship of a former professor to help her plan and assess what resources and education would be needed to move this new role.

When asked what advice she would give to those contemplating a career change that requires significant upskilling or reskilling, she recommends seeking mentorship, remaining adaptable and pursuing opportunities that you are passionate about. In addition to your passion bringing an energy and engagement to your work, this also fosters new relationships and opportunities for you in the future.

Steve Rebne

Steve Rebne is a pharmacy technical supervisor in the central pharmacy at UW Health's University Hospital in Madison, WI. With previous experience in business

Above: *Steve Rebne,*

management, Rebne sought a career change into the world of pharmacy due to friends and family members being in the field. Shortly into his new career, he found the operations aspect of pharmacy to be interesting, and he wanted to apply his prior skills and knowledge base to a new industry. Accordingly, he pursued his new role as a pharmacy technical supervisor.

Rebne feels that the biggest challenges were gaining pharmacy-specific skills, understanding the new operational standards he encountered, and filtering his previous experiences to match the new organizational culture. While he had to completely reskill and refine his repertoire, no additional certifications were required at the time of his transition.

Rebne's advice to individuals looking to upskill in their current career path or reskill entirely is to keep an open mind, be adaptable, and commit oneself to learning and self-improvement. Overall, he has enjoyed the journey along with the challenges and problem-solving aspects he has faced in the process.

Aaron Steffenhagen

Aaron Steffenhagen is a clinical pharmacy manager at UW Health's University Hospital in Madison, WI. He oversees the clinical services and pharmacists across the areas of emergency medicine, critical care, and neurosciences. After 10 years as a clinical pharmacist in the areas he now oversees, Steffenhagen desired to take a leap into a new position with new and challenging experiences where he could be more involved and have larger impacts across the organization.

To make the jump into his new role, he used mentorship and guidance from his assistant director of pharmacy

and successfully refined the skills he needed to navigate his transition into management. One of the biggest challenges for Steffenhagen in this process was the changing relationship dynamics associated with his new role and the reporting structures. Where many individuals were previously his peers, with whom he interacted professionally and socially (some even being his preceptors at one point in time), these people now became his direct reports for whom he was leading performance evaluations. Time helped maintain peer-professional relationships while respecting the reporting structure. Steffenhagen was able to set expectations up front with his team to mitigate these challenges. These issues coincided with Steffenhagen's need for additional human resource (HR) training while upskilling into his new role, which he addressed via organizational learning and development center courses to improve his competence in these areas.

Steffenhagen's advice for anyone looking to upskill or reskill aligns well with what he wishes he would have done differently: Prepare earlier. By performing ongoing self-assessment and enhancing the skills needed for advancement earlier, individuals may transition more easily. Steffenhagen's recommendation to accomplish this is to read early, read often, and learn from others. There are a vast number of resources available, both as published works and advice from others, to help build skills pertaining to staff development, difficult conversations, HR topics, and more. Garnering this knowledge early in one's career allows for refining essential skills for new roles.

Below: *Aaron Steffenhagen, PharmD, BCPS, FASHP*

Anna Avera

Anna Avera, an IDS pharmacy technician specialist team lead at Advocate Health, has committed to reskilling and upskilling throughout her career. Avera's career path has been one of longitudinal and incremental change, starting as a technician in a small compounding pharmacy, then working as an inpatient pharmacy technician, lead technician trainer, IDS technician specialist, and now IDS technician team lead. In her current role, Avera coordinates the distribution of drugs for approximately 300 clinical studies across nearly 40 Wisconsin- and Illinois-based clinics.

Avera's first exposure to the IDS team came through her time working as a central pharmacy technician at Aurora St. Luke's Medical Center in Milwaukee, WI, where she had the opportunity to fill in for IDS technicians as needed. The fluidity of the workflow and support demonstrated by the IDS team inspired her to accept an IDS pharmacy technician specialist position at St. Luke's Medical Center when provided the opportunity, where reskilling and upskilling were employed. Avera used her existing knowledge as a lead technician trainer to navigate new learning opportunities and used her strong communication skills for seamless integration into the IDS team. Avera also upskilled in this new position by acquiring time and meeting management skills with the help of organizational calendars. Formal training also helped with this transition, with both on-site and clinic-based learning experiences offered through the healthcare organization. The dedication to reskilling and upskilling demonstrated by Avera has not gone unnoticed and has helped promote her to her current role as IDS pharmacy technician specialist team lead.

From these experiences, Avera's advice to others moving into a position requiring reskilling or upskilling is to be patient, have an open mind, use experts around you, and be willing to work with other personalities. The continued assessment of her skillset, review of baseline knowledge, and careful attention to a purposeful pace of change are themes that Avera will carry with her as she advances in her career.

In summary, as pharmacy is a rapidly evolving profession, upskilling and reskilling

Above: *Anna Avera, CPhT*

are important opportunities to continue professional development. These examples showcase how pharmacy professionals have leaned into upskilling and reskilling to further both their careers and profession.

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Original Work

Evaluation of a Focused Intervention on Patient Reported Outcomes in Patients Taking Capecitabine in a Specialty Pharmacy Setting

by Georgina N Masoud, BS Pharm, MS, Katherine G. Zimny, PharmD, BCOP, Kyle R. Miller, PharmD, CSP, Robert Topp, PhD, RN

Abstract

Objective: To evaluate the effect of patient support kits, including loperamide and an emollient cream, on incidences of diarrhea, hand-foot syndrome (HFS), and therapy satisfaction scores among patients prescribed capecitabine through an outpatient specialty pharmacy.

Methods: This retrospective cohort study included patients who were prescribed capecitabine during the designated study period between August and November of 2022. The two study arms were the intervention group, including patients who received a capecitabine support kit, and the control group, including patients who did not. Outcomes, including incidences of diarrhea and/or HFS and average patient therapy satisfaction scores, were compared between both groups.

Results: Chi-squared analyses indicated no differences ($\chi 2 = 2.84$, p=0.09) in the incidences of diarrhea between the intervention and control groups. However, a significant difference in the incidences of HFS was detected ($\chi 2 = 7.70$, p=0.01) between the intervention (20.6%) and control (40.7%) groups. There were no differences in patient therapy satisfaction scores between the two groups.

Conclusions: Pharmacy-provided capecitabine patient support kits, including adverse drug events (ADEs) management tools, may serve as an effective method for patients to recognize and manage serious toxicities, avoiding ADEs-related sequelae. Further prospective studies are in progress to better understand the impact of this intervention.

Capecitabine is a widely prescribed oral cytotoxic chemotherapy agent, which has shown promising results either as monotherapy or in combination with other chemotherapeutic agents in the curative and palliative management of several metastatic solid tumors.[1-2] This medication is also an efficient and safe treatment option in all line settings in patients with advanced gastric cancer and locally advanced or metastatic breast cancer. In addition to the well-established efficacy of capecitabine, it fulfills the need for a convenient and cost-effective oral anticancer therapy for patients who prefer oral medication with proven clinical efficacy.[3-5] While capecitabine continues to be a mainstay in clinical practice, the frequent side effects associated with its use may impair patients' quality of life and treatment retention, and consequently deteriorate disease-related outcomes.[6]

The most frequently reported side effect of capecitabine is palmar-plantar erythrodysesthesia, commonly known as hand-foot syndrome (HFS), which has been reported in 53-77% of patients treated with capecitabine.[7] The first presentation of this skin reaction, in most of the patients, is dysesthesia, often accompanied with a tingling sensation in the palms and soles of the hands and feet, with the hands being more commonly affected. The median onset of symptoms is estimated to be around 21 days (13.0–42.0) days.[8] Symptoms can progress in 3-4 days to sharply demarcated erythema with or without edema, cracking, or desquamation.[9] In advanced stages, painful blistering and ulceration may occur. While mild HFS, in early stages, can be managed with topical emollients[10-12], if ignored it can contribute to poor patient compliance and significantly impair normal daily living activities, thereby resulting in dose reduction and, in some cases, early discontinuation of therapy.[8]

Diarrhea is another common dose-limiting systemic toxicity associated with capecitabine. In patients undergoing treatment for metastatic breast cancer with capecitabine monotherapy, diarrhea was reported in 53% of the patients.[13] Capecitabine-associated diarrhea has been reported to negatively impact patients' self-care and is a major cause for perioperative treatment interruption or cessation. Furthermore, agents used in combination with capecitabine and concomitant radiation therapy can both increase the risk of severe and potentially life-threatening dehydration from diarrhea.[14] Historically, mild to moderate cases of chemotherapy-induced diarrhea have been managed using loperamide, an anti-diarrheal agent, sparing the need for dosage reductions or interruptions in most patients.[15]

Many patients receive their prescribed capecitabine therapy from an outpatient specialty pharmacy setting. This point of contact provides an opportunity to introduce interventions to mitigate the side effects associated with capecitabine use. Although several studies have documented

capecitabine-associated patient-reported side effects, there are limited studies addressing the impact of approaches in the prophylaxis and treatment of capecitabine-associated HFS and diarrhea.

In our specialty pharmacy setting, capecitabine patient support kits were introduced at no additional cost to patients, which included loperamide and an emollient cream as potential effective measures for prevention and management of diarrhea and HFS, respectively. An educational handout, lip balm, a thermometer, and a pill box were also included in the kits. As a part of our patient management program, all patients are provided with individualized therapy education on side effects at the initial fill, subsequent first three refills, and at regular intervals thereafter, discussing potential benefits of the effective and timely use of kit contents. Utilizing a standardized scripting, patients were each offered a capecitabine therapy kit at the initiation of therapy.

To our knowledge, no study has yet examined the effect of providing patient care kits curated with items to support patients receiving capecitabine therapy on the incidence of diarrhea, HFS, and patient therapy satisfaction scores. Therefore, the aim of this study was to evaluate the pharmacist-led interventions for the management of capecitabine-associated diarrhea and HFS in an outpatient-based specialty pharmacy model.

TABLE 1. Patients Baseline Characteristics (N=215)

Characteristic	*Intervention Group (n= 63)*	*Control Group (n= 152)*
Gender (n, %)		
Female patients	37 (59%)	99 (65%)
Male patients	26 (41%)	53 (35%)
Average age (years) ± SD*		
Female patients	59± 11.4	59± 11.89
Male patients	56± 11.1	59± 10.73
Indication (n, %)		
Breast cancer	15 (23.8%)	53 (34.9%)
Hepatobiliary cancers	3 (4.8%)	6 (3.9%)
Lower gastrointestinal tract cancers *1. Colon cancer* *2. Colorectal* *3. Rectal cancer*	35 (55.6%) *17 (48.5.%)* *5 (14.3%)* *13 (37.1%)*	66 (43.4%) *43 (65.2%)* *2 (3.0%)* *21 (31.8%)*
Pancreatic cancer	5 (7.9%)	6 (3.9%)
Upper gastrointestinal tract cancers*	4 (6.3%)	4 (2.6%)
Other	1 (1.6%)	17 (11.2%)
Treatment Regimen (n, %)		
Capecitabine monotherapy	24 (38.1%)	126 (82.9%)
Combination systemic therapy	27 (42.9%)	20 (13.2%)
Radiotherapy	10 (15.9%)	6 (3.9%)
Radiation + combination systemic therapy	2 (3.2%)	-

**SD: standard deviation*

Methods

Study Design

A retrospective chart review was initially conducted on 215 patient records (aged ≥ 18 years) who had received capecitabine over a two-month period of August to November 2022 across a multisite, integrated delivery network specialty pharmacy. Patients who had a capecitabine prescription filled at least twice during this timeframe, whether they were initiating or continuing therapy, were eligible for inclusion in the study. Capecitabine patient support kits were created by the clinical services team in August 2022 and included an emollient and loperamide to help patients manage the capecitabine-associated HFS and diarrhea, respectively. Since the inception of the kits, they have been offered universally to all patients at no out-of-pocket cost as a standard part of the capecitabine patient management program.

Of the 215 patients, 198 (92.1%) had all outcome variables documented on their charts and thereby were included in the final analysis with 63 (31.8%) patients being given the patient support kits with their filled prescription of capecitabine; these patients were defined as the intervention group. The remaining 135 (68.2%) patients did not receive the support kit and were considered the control group.

In addition to identifying patients who were eligible for the study, baseline patient characteristics, including age, gender, international classification of diseases (ICD-10) diagnosis codes, and adjunct therapy were either collected using internal analytic tools linked to the pharmacy software or pulled from patients' profiles and then de-identified. Study outcomes, including the percentage of patients who experienced diarrhea and/or HFS in both groups based on patient-reported outcomes during the last patient-clinician encounter in the study period, were documented for all patients. Additionally, average scores of patient satisfaction with therapy (on a scale of 1-10, with 10 representing the highest satisfaction), as reported by patients during the study period, were collected. These collected patient-reported outcomes are routinely discussed and assessed with patients as part of our in-house patient management program. As a standard expectation for all patients participating in the pharmacy patient management program, clinicians are advised to probe patients further for additional information about barriers or challenges with their medication therapy when responding with a satisfaction score of equal to or less than 6 to determine if additional intervention should be made. This study received an IRB review exemption.

Statistical Methods

Statistical analysis took place in three steps. First, the data of all eligible patients

were transcribed from the patients' profiles to an SPSS v28.0 database. This database was spot checked for accuracy in transcription and found to be validly transcribed. The next step of the analysis involved calculating descriptive statistics of all the variables extracted to assess the assumptions of the statistical tests being employed to address the aim of the study. Independent t-tests were used to compare the continuous variables, and Chi Square analysis was used to compare the discrete patient characteristics between the two study groups. These descriptive statistics also provided a description of the sample to support external validity of the study and comparisons of the patient characteristics between the two study groups to support the internal validity of the study. Finally, the intervention and control groups were compared using Chi Square for whether they reported any adverse event, diarrhea, HFS, or both adverse events. Using the nonparametric Mann-Whitney U statistics, patient therapy satisfaction scores were compared between the study groups. G*Power analysis indicated that comparing groups of 63 and 135 individuals using the Mann-Whitney U statistic, anticipating a small effect size of 0.3016, at an alpha level of 0.05 would yield an acceptable level of statistical power (1-β >.80).[17]

Results

A total of 215 retrospective chart reviews were performed across a multisite integrated delivery network specialty pharmacy for adult patients who had received at least two capecitabine prescriptions between August and November 2022. A total of 198 patients had all outcome variables documented on their charts. Of these, 135 (68.2%) were in the control group and 63 (31.8%) were in the intervention group.

Table 1 compares the baseline characteristics of the 215 patients across the control and intervention groups. It was noted that there is no difference in gender distribution [2:1 ratio of females to males ($\chi 2 = 1.18$, $p = 0.278$)] or the mean age [59 years (SD± 11.4) for females, 56 years (SD± 11.1) for males in the intervention group; 59 years (SD± 11.89) for females, 59 years (SD± 10.73) for males in the control group] between the groups. However, the percentage of patients receiving adjunct therapy during the study was significantly higher in the intervention group (42.9%) than the control group (13.2%). As for capecitabine indications, lower gastrointestinal tract cancers (55.6% in the intervention group and 43.4% in the control group) and breast cancer (23.8% in the intervention group and 34.9% in the control group) were found to be the most prevalent in both groups (Table 1).

TABLE 2. Patient-reported Outcomes and Therapy Satisfaction Scores

*Patient-reported ADEs**		
	Intervention Group (n= 63, 31.8%)	***Control Group (n= 135, 68.2%)***
Diarrhea (n, %)	12 (19.0%)	14 (10.4%)
HFS* (n, %)	13 (20.6%)	55 (40.7%)
HFS+ Diarrhea	2 (3.2%)	6 (4.4%)
Patient-reported Therapy Satisfaction		
	Intervention Group (n= 63)	***Control Group (n= 134)***
Therapy satisfaction score = 10	18 (28.6%)	53 (39.6%)
Therapy satisfaction score = 6-9	25 (39.7%)	53 (39.6%)
Therapy satisfaction score < 6	3 (4.8%)	8 (5.9%)
Unknown therapy satisfaction	17 (26.9%)	20 (14.9%)

ADEs: Adverse Drug Events; HFS: Hand-foot Syndrome

Table 2 presents the comparison of the study outcomes for the 198 patients who had their outcome variables documented within their charts. The percentage of patients experiencing diarrhea was similar (p=0.09) in the intervention (12 patients, 19.0%) and control (14 patients, 10.4%) groups. The groups did report significant differences in HFS (p<0.01) with 17 patients (20.6%) of intervention group and 55 patients (40.7%) of the control group reporting this adverse event. The percentage of individuals who reported experiencing both diarrhea and HFS during the study were similar (p=0.67) among the intervention group (2 patients, 3.2%) and control group (6 patients, 4.4%), (Table 2).

Finally, the patient therapy satisfaction scores exhibited a ceiling effect and negative skew, and the data were not normally distributed in both study groups. These characteristics of the patient therapy satisfaction scores indicated that the groups should be compared on this variable using the nonparametric Mann-Whitney U. This statistic indicates no significant differences (p=0.28) between the intervention (8.46 + 1.85) and control (8.65 + 1.68) groups on their levels of patient therapy satisfaction (Figure 2). Further segmentation of therapy satisfaction ratings is noted in Table 2.

An additional factor not specifically noted in Table 2 was the prevalence of lower gastrointestinal (GI) cancer diagnosis among all reported diarrhea incidences in both groups. It was found that 67.0% and 57.0% of the patients had lower gastrointestinal cancer diagnosis in the intervention and control groups, respectively, regardless of HFS existence.

Discussion

In this study, patient-reported incidences of HFS and diarrhea, as well as therapy satisfaction scores, were compared among patients who received a capecitabine support kit (intervention group) and those who did not (control group). The results indicate that the incidences of HFS were lower among patients who received capecitabine patient support kits that included an emollient cream to manage HFS events. The incidences of HFS in the intervention group were clinically and statistically lower when compared to the control group. This observation aligns with a previous study that demonstrated the prophylactic benefits of urea-based cream in reducing chemotherapy-associated HFS rates and delaying onset of first episode.[18] Since HFS is the most common capecitabine dose-limiting toxicity, this demonstration of clinical benefit has important implications

for patients' ability to adhere to therapeutic dosing and potentially achieve better long-term outcomes in palliative and curative settings.[19-20]

Although the observed difference in diarrhea incidences between the two study groups does not represent a statistically meaningful difference, it is worth mentioning that diarrhea incidences might be confounded by the uneven distribution of concomitant systemic therapies and cancer type between the compared groups. A higher proportion of the diarrhea-reported cases were for patients suffering from lower GI cancers. Thus, it is hard to identify whether diarrhea is a treatment-related adverse drug events (ADE) from capecitabine or a consequence of the disease location and severity.

The study revealed no statistical differences in patient-reported therapy satisfaction scores between the two groups. In fact, oncology patients' satisfaction with therapy is usually based on their subjective experiences with treatment that entails multiple factors.[21-22] This limits the utility of the therapy satisfaction score alone to accurately represent the true benefit of capecitabine balanced against ADEs associated with therapy. Forthcoming quality of life outcomes from an ongoing prospective trial may better elucidate the benefits of this intervention.

Limitations

The findings of this study should be interpreted cautiously due to several limitations. First, the study has a retrospective design and is limited in duration. A second limitation was the disproportionality of some of the baseline characteristics across the two study groups, which might have impacted the patient-reported outcomes. For example, more patients in the intervention group were receiving additional systemic therapy (42.9%) compared to the control group (13.2%). This could partially explain the high incidences of diarrhea in the intervention group and may underestimate the overall benefit of patient support kits.

Third, patients who were initiating therapy and continuing therapy were both included in the study, which may have impacted the timing of developing ADEs and therapy satisfaction. Also, the duration of therapy and capecitabine doses were screened by clinical pharmacists to be appropriate for the patient's body surface area and treatment plan, but not included in baseline characteristics, which is a confounding variable contributing to ADE development.

Finally, utilization of the kits the effect of capecitabine therapy on quality of life, due to its adverse effects, was not examined in this analysis which is a crucial outcome to consider especially in the metastatic setting, when goals of therapy are not curative. Given these limitations, there is a need for future prospective studies to further investigate the impact of this intervention.

Conclusions

The introduction of capecitabine patient support kits in a specialty pharmacy setting that included loperamide and an emollient cream into the routine care of patients receiving capecitabine may confer a potential benefit in the management of capecitabine-associated HFS. Further prospective studies are in progress to support wider adoption of this intervention and its applicability to general pharmacy practice.

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PR *This article has been peer-reviewed. The contribution in reviewing is greatly appreciated!*

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Original Work

Health Professional Financial Planning Workshop: An Interprofessional Event to Expand Student Financial Literacy

by Hope E. Schier, 2024 Doctor of Pharmacy Candidate, Taylor J. Lueder, 2024 Doctor of Pharmacy Candidate, Molly A. O'Connell, 2024 Doctor of Pharmacy Candidate, Mara N. Gosch, 2025 Doctor of Pharmacy Candidate, Nora Pecha, 2025 Doctor of Pharmacy Candidate, Madeline R. Szubert, 2025 Doctor of Pharmacy Candidate, James H. Ford II, PhD, FACHE, LFHIMSS

Abstract

Background: Create an innovative program to support economic success post-graduation for interprofessional health students at the University of Wisconsin-Madison. The workshop was designed by members of Phi Lambda Sigma and operated by student volunteers with support from faculty advisors and the University of Wisconsin-Madison Center for Interprofessional Practice and Education (CIPE).

Methods: Eligible participants were current health professional program students at the University of Wisconsin-Madison. Students participated in a 4-hour workshop consisting of a keynote address, their choice of 3 out of 6 breakout session topics, and a budgeting simulation. Participants rated their knowledge and confidence related to various financial planning skills before and after attending the workshop.

Results: Over 65% of respondents were pharmacy (PharmD) students. Before the workshop began, 56 of 61 pre-survey respondents (91.8%) had not attended a financial planning workshop. Both knowledge and confidence in all 6 breakout session topics significantly increased after attending the financial planning workshop (p-values ≤ 0.0001). Participants also expressed interest in having longer breakout sessions to dive deeper into subtopics of the respective breakout sessions to allow more time for specific and individualized questions.

Conclusion: Students demonstrated a significant increase in knowledge and confidence following participation in the workshop. Greater emphasis on financial literacy is warranted for health professional students. The success of the Health Professional Financial Planning Workshop is not the result of one workshop element, but it is the combination of building foundational knowledge, applying concepts through active learning, and collaborating interprofessionally on a mutually important topic.

Many aspiring healthcare professionals often resort to taking out loans or applying for scholarships to cover the costs of their education. In Wisconsin, the average PharmD tuition for in-state and out-of-state students was $38,242 and $44,189, respectively, for the 2022-23 academic year.[1] According to the American Association of Colleges of Pharmacy (AACP) 2022 Graduating Student Survey, 83.8% of graduating students borrowed money to pay for expenses while pursuing a Doctor of Pharmacy degree (PharmD).[2] The average amount borrowed among graduating student pharmacists from public and private institutions averaged $170,444, resulting in significant student loan debt. Student pharmacists are not the only health professionals who would benefit from additional financial knowledge. A study at the University of Nebraska Medical Center (UNMC) found that "92.3% of student health professionals surveyed identified at least one area of concern regarding their financial future, and 98.2% believed they had room for growth in their knowledge and understanding of personal finance."[3]

Understanding financial concepts and practices is crucial for managing personal finances, making informed decisions about student loans and debt, and developing long-term financial stability. With the substantial costs of graduate-level education and student loan burden, financial literacy can help health professional students avoid overwhelming debt, strategize loan repayment plans, budget effectively, and invest wisely. At the University of Wisconsin-Madison (UW-Madison) School of Pharmacy (SOP), personal finance is not formally integrated within the PharmD curriculum as an academic course. Additionally at UW-Madison, the School of Medicine and Public Health, School of Veterinary Medicine, and School of Nursing do not indicate personal finance or financial literacy as part of the curriculum or as a program requirement for MD, MPH, DVM, or BSN programs. The 2022-2023 Phi Lambda Sigma (PLS), Beta Alpha Chapter, aimed to supplement this education gap while assessing students' interest and response to various financial topics for all health professional students.

PLS is a national student organization with local chapters at pharmacy schools. The mission of PLS, emphasizing the importance of recognizing leadership

through peer acknowledgment, connects with the financial planning workshop's goal of building a supportive community where individuals can share insights and strategies for financial success. This article highlights how the PLS Beta Alpha Chapter at the UW-Madison SOP created a successful financial planning workshop that hosted health students across multiple professions and measured student outcomes related to financial knowledge and confidence. The event's success demonstrated a desire among UW-Madison students for financial education and the feasibility of implementing student-driven interprofessional events.

Methods

Support and Funding

The Health Professional Financial Planning Workshop, hosted by the PLS, Beta Alpha Chapter, of the UW-Madison SOP, occurred at Rennebohm Hall on April 14, 2023. Beta Alpha Chapter members designed the workshop through collaboration with the Beta Xi Chapter at the University of Nebraska Medical Center (UNMC), who hosts an annual financial planning workshop for student pharmacists. The Beta Alpha Chapter members then expanded this audience to include all health professional students at UW-Madison and added a budgeting simulation. The Beta Alpha Chapter was the 2022 Charles C. Thomas Leadership Challenge winner and received a $1,000 grant to create an innovative program that increased student financial literacy supporting economic success post-graduation. Grant funds were utilized to cover food expenses, budgeting simulation materials, speaker appreciation gifts, and printing supplies.

Planning Committees and Workshop Design

The workshop was operated by student volunteers from the included health professional programs with support from various faculty advisors and the UW-Madison Center for Interprofessional Practice and Education (CIPE). Members of the Beta Alpha Chapter were surveyed via Google Forms to gauge interest in joining the workshop planning team. Members ranked the committees by interest before Beta Alpha Chapter officers assigned members to their respective workshop committee. The membership and responsibilities of the workshop planning committees are detailed in Table 1. The student volunteers designed a 4-hour workshop consisting of a keynote address from a financial expert, participants' choice of 3 out of 6 total financial topic breakout sessions, and a budgeting simulation (Table 2).

TABLE 1. Event Committee Breakdown Including Specific Roles and Responsibilities of Committee Members

Committee	*Roles and Responsibilities*
Interprofessional Committee (6 members: 3 PharmD, 2 MPH, 1 nursing)	• Advertised via emails, social media, flyers, and posters • Recruited leaders from other health professional programs to assist in workshop advertising and promotion • Organized student registration and distributed surveys
Financial Planning Committee (5 members)	• Organized and coordinated speaker series • Collected learning objectives according to respective financial topic
Game of Life Committee (8 members)	• Randomized participants to one month of income, student loan debt, and marital/family status • Created budgeting worksheets for tracking expenses • Assembled simulation booths and determined cost items
Analysis, Data, and Survey (ADS) Committee (5 members)	• Created the pre- and post-event surveys and analyzed survey data via Qualtrics • Presented the event and data at the 2023 PLS House of Delegates Awards Meeting and 2023 Pharmacy Society of Wisconsin (PSW) Annual Meeting • Prepared manuscript for publication

Promotion

The Interprofessional Committee was responsible for creating printed and electronic promotional materials for the workshop. Flyers were printed and displayed around the professional schools and posted on social media platforms including Facebook and Instagram. Information about the event, including date, time, place, dress code, pre-survey QR code, and workshop agenda, was also published on the UW-Madison SOP website. Emails were distributed to students within the various health professional programs one month prior to the workshop by associated faculty advisors and through the UW-Madison CIPE database.

Keynote Address and Breakout Sessions

Students attended a keynote speech by Michelle Chui, PharmD, PhD, Professor and Chair of Social & Administrative Sciences, Hammel-Sanders Distinguished Chair in Pharmacy Administration, and Director of the Sonderegger Research Center for Improved Medication Outcomes.

TABLE 2. Day-of-the-Event Timeline

Time	*Activity*
4:30-5:00 pm	Registration & Check In
5:00-5:10 pm	Event Introduction
5:10-5:40 pm	Keynote Speaker Address
5 minute break	
5:45-6:05 pm	Breakout Session #1
5 minute break	
6:10-6:30 pm	Breakout Session #2
5 minute break	
6:35-6:55 pm	Breakout Session #3
6:55-7:15 pm	Food & Social Break
7:15-8:15 pm	Game of Life Simulation
8:15-8:50 pm	Event Debrief

Dr. Chui was recruited by organizers of the event, as she is an esteemed and knowledgeable financial expert and leader in the UW-Madison SOP community. In her previous role at Midwestern University College of Pharmacy, she addressed concerns of professional students by developing a course in personal finance. She has since led various projects, research,

courses, and lectures on personal finance for student pharmacists. During the keynote speech, Chui presented various statements related to financial wellness as "myth" or "fact" and asked attendees to raise colored paper slips labeling their vote to encourage participants to identify and fill current gaps in their financial knowledge.

The workshop offered 6 breakout sessions featuring different financial topics, and participating students could attend 3 of the 6 sessions. Breakout session topics were determined based on committee member interest related to various financial topics. The Financial Planning Committee recruited breakout session speakers within their personal and professional networks in addition to university faculty. Session speakers were volunteers without commercial interests and were not compensated for their time at the workshop. Breakout session speakers were given the freedom to create session learning objectives related to their expertise and assigned topics approved by the Financial Planning Committee. Content of the presentations was limited to financial information only; no personal branding, marketing, or other affiliations were permitted. In order to assign each student to a breakout session, students ranked all 6 breakout sessions from most to least interested via the registration form. A maximum of 20 students were allowed in each breakout session. The Interprofessional Committee then individualized each participant's event schedule based on their breakout session interest rankings. A customized workshop schedule was provided to each participant at check-in on the day of the workshop. Breakout session topics, their respective qualified speakers, and proposed learning objectives are outlined in Table 3.

Game of Life Simulation

Following the speaker series, participants completed a budgeting simulation designed by the Game of Life Committee. The simulation incorporated common financial responsibilities encountered by persons of various income levels within the general population. This ranged from the average salaries of medical professionals to persons below the poverty level. Participants were randomly assigned a monthly income and family size prior to starting the simulation. Booths included the Bank, Store, Transportation, Clinic, Real Estate, Entertainment, and Surprise, along with an optional help desk. The Game of Life Committee researched national average monthly costs of necessities like groceries, rent, and childcare. Using these average costs, each booth had associated prices for required and optional material goods or life events that students needed to budget for within one month. After completing the simulation, participants were asked to reflect upon successes, restrictions, or frustrations they encountered with their given income and how this might have reflected their own financial situations or those of their future patients.

Data Collection

Pre-post surveys were designed by the Analysis, Data, and Survey (ADS) Committee and administered via the UW-Madison Qualtrics system. The goal of these surveys was to understand participant knowledge and confidence related to different financial topics. For the knowledge assessment, participants were asked in the pre-survey to answer the following question: "Prior to attending this event, please rate your knowledge..." for 6 financial topics. The post-knowledge survey asked participants to identify the 3 breakout sessions attended and rate their knowledge in response to the following question: "After attending this event, please rate your knowledge of your [first/second/third] breakout session topic..." using a five-point Likert scale (Figure 2). Participant confidence was assessed using 7 questions and a five-point Likert scale (Table 4). Participant demographics (e.g., age, gender, race/ethnicity, and health profession) were included in both surveys as optional prompts.

In order to collect the most relevant and accurate perspectives from the workshop participants, the ADS Committee shared the pre- and post-survey links with the Interprofessional Committee to send in the event registration email and to print onto flyers. During the event debrief, the ADS Committee also projected a QR code for the participants to scan and complete the post-survey before leaving the workshop.

TABLE 3. Financial Planning Topic Discussions Led By Qualified Speakers with Affiliations with UW-Madison

Breakout Session Topics		
Budgeting Basics *Jim Shovein, MBA* Lecturer, Finance Department at UW-Madison • Developing a personal financial plan • Smart investing practices	**Investments & Retirement Planning** *Michael McKersie, CFP* Registered Investment Advisor Representative, Wealth Advisor for Level Four Financial, LLC • Investment types overview • Retirement income sources	**Student Loan Management** *Emma Crawford* Director of Financial Wellness and Financial Aid Advising, UW-Madison School of Medicine and Public Health • Student loan types overview • Accessing student loan history • Loan repayment programs
Life Planning & Home Ownership *Dr. Michelle Chui, PharmD, PhD* Chair of Social & Administrative Sciences Division at UW-Madison School of Pharmacy • Financing a home and navigating mortgages • Selecting a real estate agent • Advantages and disadvantages of home ownership vs renting	**Making the Most of Your Workplace Benefits** *Stacy Martin, MBA* Director of Human Resources at Grant Regional Health Center • Navigating job applications and interviews • Selecting an employer • Employee benefits overview	**Starting Your Own Business** *Dr. Matt McGowan, PharmD* Owner and Lead Pharmacist at Mt. Horeb Family Pharmacy • Determining equitable selling and purchasing prices of a pharmacy or clinic • Accountant involvement in the new business or acquisition process

Data Analysis

The primary question assessed the mean change in healthcare professional students' knowledge of and confidence in financial topics following participation in the Health Professional Financial Planning Workshop. Utilizing the UW-Madison Qualtrics system and MedCalc statistical software, the ADS Committee conducted programming analysis to determine the number of participants for each breakout session, and their knowledge and confidence prior to and following the workshop. Descriptive statistics were calculated for the knowledge and confidence questions through the comparison of means calculator and determined significant pre-post differences using a 95% confidence interval. Statistical significance was considered any p-value less than 0.05.

The post-survey asked participants to complete optional short-answer responses regarding their biggest take-aways from the workshop, remaining financial questions, and recommendations for future finance education events. The ADS Committee read and identified major themes from participant statements.

Results

A total of 111 students registered for the event and 78 students attended. Of the students in attendance, pre- and post-surveys were received from 61 and 56 students, respectively. As surveys had different numbers of respondents, the ADS Committee defaulted to the post-survey results for information regarding participantt demographics and healthcare disciplines. Post-survey data showed participants were mainly Doctor of Pharmacy (PharmD) students who identified as white. The top financial breakout sessions attended by healthcare professional students were life planning (home ownership), investment and retirement planning, and student loans (Figure 1). All breakout sessions demonstrated a statistically significant increase in financial knowledge (Figure 2). Similarly, a statistically significant increase in participant confidence was found across all statements (Table 4).

Post-survey responses were sorted based on major takeaways, remaining questions, and feedback, where several themes were identified to categorize the responses. The primary themes were early financial planning, workplace benefits & negotiations, self-advocacy, budgeting tips, retirement, and seeking financial help (Table 5). Participants had remaining questions on topics including debt payments, saving and budgeting money, investing, workplace benefits, retirement, and seeking financial help (Table 6). Lastly, the recommendations provided by the healthcare professional students focused on having more time for content during the breakout sessions, better representation from all healthcare programs, and better concordance between the advertised title of a breakout session and its content (Table 7).

FIGURE 1. Number of Total Students Per Breakout Session Topic From Post-Survey Responses

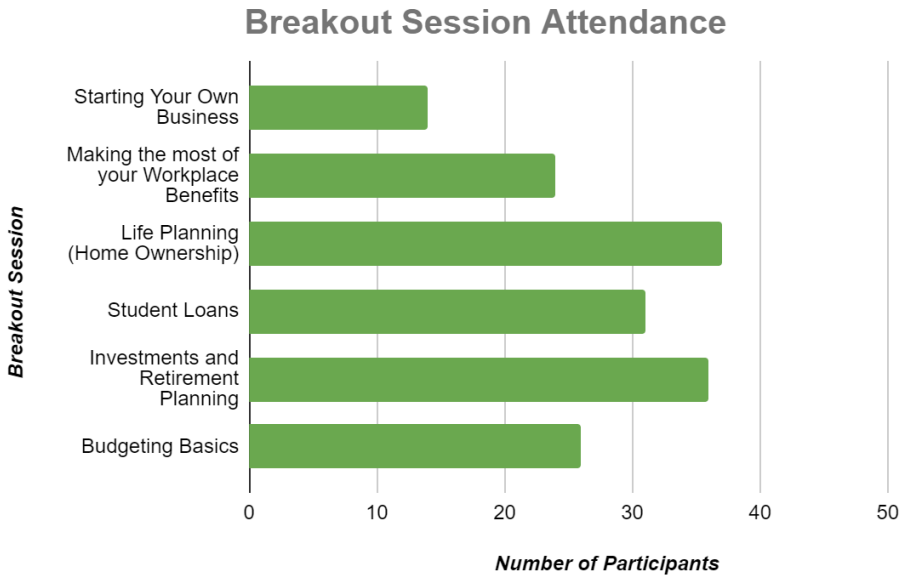
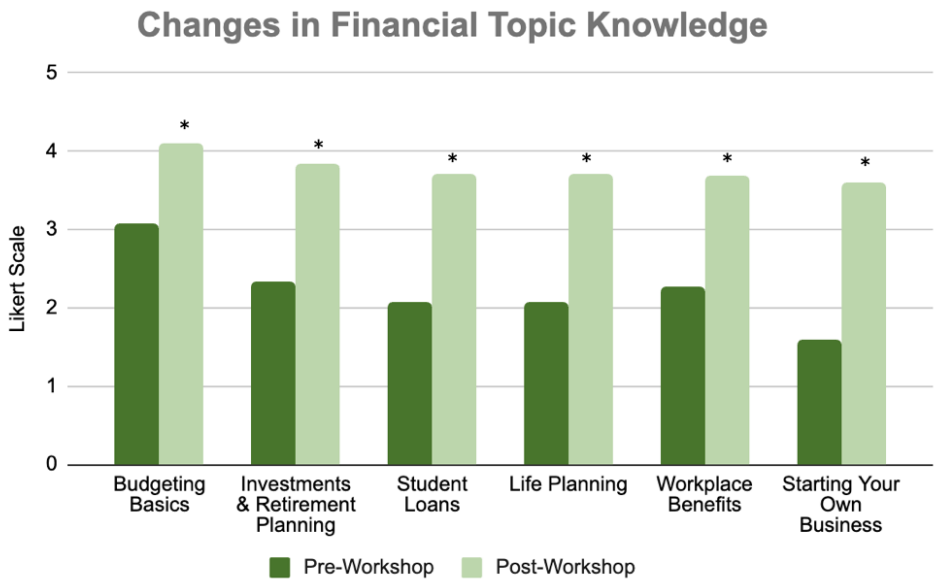


FIGURE 2. Mean Knowledge Check Results Pre- and Post-Workshop on a Scale of 1 to 5



**Knowledge Likert Scale: 1=Not at all knowledgeable, 2=Slightly knowledgeable, 3=Somewhat knowledgeable, 4=Moderately knowledgeable, 5=Very knowledgeable.*

Discussion

The Health Professional Financial Planning Workshop improved participant knowledge and confidence, supporting the event objective of increasing the financial

literacy of health professional students. The flexibility participants were given for choosing which sessions to attend provided opportunities for more personalized financial knowledge and confidence growth. However, time restrictions and certain simulation scenarios prevented some participants from expanding their financial understanding on a more individual level. Overall, the significant improvements seen in participant knowledge and confidence exemplify the impact of this workshop.

This workshop provided graduate students from various programs and backgrounds with foundational knowledge and skills in basic financial principles that are applicable to everyday life. To start the workshop, the keynote address engaged students in an exercise that provoked critical thinking and self-awareness, and helped address previously held misconceptions about financial topics. All breakout sessions successfully improved students' knowledge and confidence, with the most successful session being the topic of starting your own business. Reasons for this session's impact include participants having a lower baseline level of knowledge, variability in speaker ability and competence, and materials used during the session (i.e. interactive slideshow, handouts, etc). While this session showed the greatest change in average participant scores, it is evident that all breakout session topics are valuable and should be presented to graduate students. There is a gap in baseline knowledge of financial principles, and currently, no formal education in most professional programs exists to address it. We believe similar workshops can bridge this gap until financial education is added to curriculums.

Active learning was incorporated into the workshop to enhance knowledge and confidence through the application of knowledge and skills gained during the keynote address and breakout session series. During the budgeting simulation, participants were challenged to remain mindful of emergent and unforeseen circumstances that may arise, develop a future financial plan, create and edit a budget while itemizing expenses, and advocate for themselves and individual financial success. At one of the simulation booths, participants were faced with an unexpected life event that financially impacted them either positively or negatively. This required the direct application of financial skills learned during the workshop to appropriately navigate the random situation. Though participants expressed preference for a simulated income similar to one following graduation from their professional program, participants felt more comfortable and confident in their financial skills and knowledge following the workshop compared to their baseline financial skills.

The Health Professional Financial Planning Workshop demonstrated that it is feasible to create a collaborative interprofessional workshop that focuses on a mutually important topic like personal finance. Interprofessional aspects were included in event planning, with the Beta

TABLE 4. Confidence statement comparison from pre- and post-event survey data (N=56)

Confidence Statements	*Mean confidence prior to workshop (standard deviation)*	*Mean confidence after workshop (standard deviation)*	*P-Value*
I am confident in my ability to budget for insurance for myself and/ or my family.	2.70 (0.98)	3.52 (0.87)	<0.0001
I am confident about making a budget for myself.	3.20 (1.04)	3.89 (0.79)	= 0.0001
I am confident in my understanding of the options I have for student loan repayment.	2.63 (0.99)	3.38 (0.94)	= 0.0001
I am confident about investing my money.	2.61 (0.99)	3.52 (0.96)	<0.0001
I am confident in my ability to start planning for retirement and/or develop a savings plan.	2.61 (1.01)	3.64 (0.89)	<0.0001
I am confident I know where to go if I have questions regarding financial planning.	2.75 (1.12)	3.98 (0.95)	<0.0001
I am confident I will be able to achieve my major financial goals post-graduation.	3.05 (0.89)	3.98 (0.81)	<0.0001

**Confidence Likert Scale: 1=Not at all confident, 2=Slightly confident, 3=Somewhat confident, 4=Moderately confident, 5=Very confident.*

TABLE 5. Major Student Takeaways from the Workshop, Broken Down By Overarching Themes with Examples of Statements

Major Takeaway Themes	*Example Statements from Post-Survey Data*
Early Financial Planning	"It's never too early to start investing and being financially knowledgeable because it can benefit you in the long term."
Workplace Benefits & Negotiations	"One of my most useful lessons was learning the importance of and the right way to negotiate with HR for not only salary, but benefits too."
Self-Advocacy	"I learned that I need to be looking out for myself financially. I can take a lot of people's advice and experience to heart but at the end of the day, I learned that I need to be an advocate for myself first."
Budgeting Tips	"Writing a budget and itemizing expenses is key to accomplishing my financial goals."
Retirement	"For retirement planning, I can roll-over my IRA/Roth if I move jobs or work at two different places."
Seeking Financial Help	"Networking and reaching out to people who may be able to give me advice and asking professionals as well"

Some Statements May Cross Over Multiple Themes

Alpha Chapter extending an invitation to students from other health professional programs to join a workshop planning committee. Three non-PharmD students volunteered to help in the creation, promotion, and execution of the workshop. Skewed attendance could be related to the workshop's location at the UW-Madison SOP and/or the event's creation and verbal promotion by a PharmD student organization with little interprofessional diversity in the planning committees. As demonstrated by subjective feedback, many students would have valued greater representation from other health professional programs. More diverse student engagement in workshop planning may have supported the recruitment of different speakers. Additionally, diverse student attendance may have stimulated more broad discussion in sessions with speakers who adapted content based on questions from attendees.

Limitations of the workshop are related to aspects of the Game of Life simulation, time restrictions, and participant breakdown by healthcare professional program. The randomly assigned monthly incomes and family sizes led to many participants being unable to simulate budgeting situations they believed to be most similar to their future state. A consideration for this type of simulation would be to allow participants to choose an income that more accurately reflects what they are projected to earn in their future profession to individualize their learning experience. Additionally, each breakout session was restricted to 20 minutes to keep the workshop within a 4-hour timeframe. Participants reported difficulty in having all their questions answered and gaining a full understanding of the financial topics discussed due to time constraints. Variability in breakout session content based on participant questions led to contradicting knowledge, confidence, and free-response answers following the workshop. Since the financial advice presented was dependent on the time, speakers adapted content to what participants in each group wanted to learn most. For student consideration when ranking discussion topics, it may be reasonable to create presentation requirements for speakers, including a structured agenda, which must be submitted for planning committee approval prior to the event. Event outcomes may be limited by discrepancies in student engagement with pre- and post-surveys which can contribute to bias and inflation of results. Students who perceived greater benefit in knowledge and/or confidence may have been more inclined to complete the post-survey.

Although representation of the various health professional programs was skewed toward PharmD attendance, 16 non-PharmD students across 7 different non-pharmacy programs completed the post-survey. This confirmed promotional materials reached students outside the SOP. Inclusion of more interprofessional students in event planning may support better workshop promotion across multiple programs. Additionally, more information is needed to best promote and invite students to interprofessional events and increase engagement when the event is hosted by a single student organization associated with one health profession. These limitations demonstrate opportunities for workshop adaptation and improvement.

TABLE 6. Remaining Student Questions Regarding Financial Planning After Graduation from Their Program, Broken Down by Overarching Themes

Question Themes	*Example Statements from Post-Survey Data*
Debt Payments	"How advantageous is it to refinance and aggressively pay off loan debt?"
Saving Money & Budgeting	"How do you incorporate living in a high cost city when it comes to budgeting and you cannot realistically dedicate only 50% to all necessity cost (rent, utilities, etc.)?"
Investing	"What makeup of a [investment] portfolio makes sense as a young professional?"
Workplace Benefits & Retirement Planning	"How to understand a benefits package and choose a good one"
Seeking Financial Help	"I am unsure how to establish a relationship with a financial advisor."

TABLE 7. Student Suggestions on How to Improve the Financial Workshop, Broken Down by Overarching Themes with Specific Example Statements

Improvement Themes	*Example Statements from Post-Survey Data*
More Time and Content during Breakout Sessions	"I would love to see longer breakout sessions. I feel like I was more able to just get a glimpse of what the sessions highlighted vs build a solid foundation of knowledge."
Better Representation of All Healthcare Professions	"Because it was offered as an interprofessional event, it might be good to have offerings geared towards students of different programs. 2 of the 3 events I attended were geared towards students of the pharmacy program, assuming a higher salary for participants post-graduation. Not all participants were pharmacy students, and not all participants will be making $90K+ after graduation."
Congruity Between Breakout Session Titles and Content	"Some sessions were not focused - making the most of your workplace benefits spent the majority of the session discussing job interviewing skills. Workplace benefits were only briefly mentioned and I do not have a clear understanding of how to optimize workplace benefits."

Conclusion

The outcomes of the workshop demonstrated the commitment and enthusiasm that health professional students have to gain knowledge and develop skills related to financial wellness. Reflecting on the efforts put into preparing for and hosting this interprofessional workshop, the entirety of the process was feasible for the organizers and can be replicated. Post-event feedback showed the advantages of educating future health professionals on an important topic that impacts all disciplines. In addition, organizing the workshop

in a manner where participants learned and applied their newfound knowledge produced positive outcomes in knowledge and confidence regarding fundamental financial skills. The success of this workshop structure is reflected in the significant improvement in participant knowledge and confidence from baseline in all financial topics presented. This indicated that the goal of improving the financial knowledge of graduate students was accomplished.

Organizations like PLS are well suited to offer similar experiences to graduate students given their dedication to student professional development, access to various resources (e.g. faculty, funding, etc.), and motivated student members. The Beta Alpha Chapter plans to re-host this workshop in the future based on the event's success and participant feedback. To improve the quality of the workshop, the Beta Alpha Chapter will consider including a broader range of student experiences with respect to each degree program's postgraduate training expectations; this may provide additional insight to a more inclusive workshop structure and discussion content.

The success of the Health Professional Financial Planning Workshop is not the result of one workshop element, but it is the combination of building foundational knowledge, applying concepts through active learning, and collaborating interprofessionally on a mutually important topic.

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Review Article

MEDICAL COLLEGE OF WISCONSIN SCHOOL OF PHARMACY STUDENT WRITING CLUB:

Review of Recent Asthma Treatment Guideline Updates

by Louis Austin, 2024 PharmD Candidate, Sonu Baru, 2024 PharmD Candidate, Nina Novic, 2024 PharmD Candidate

Abstract

Asthma affects an estimated 262 million people globally and caused 455,000 deaths in 2019 alone. There have been significant changes to asthma treatment guidelines in response to new clinical trial data in recent years. The Global Initiative for Asthma (GINA) Science Committee conducts an asthma-related scientific literature review biannually to evaluate published research on asthma management and prevention and was most recently updated in 2023. The Expert Panel Report 3 (EPR-3) published an update to their guideline in 2020. This review highlights important changes in asthma treatment recommendations, primarily focused on rescue inhaler use and maintenance and reliever therapy (MART).

Asthma is a respiratory disease characterized by chronic airway inflammation, which may present as wheezing, shortness of breath, chest tightness, and/or cough due to airflow limitations. The most common clinical phenotypes of asthma include allergic, non-allergic, adult-onset, asthma with persistent airflow limitation, and asthma with obesity.[1]

Asthma treatment is centered on rescue and maintenance inhaler therapies. Rescue inhaler therapy is used as needed (PRN) to address acute symptoms, and maintenance inhaler therapy is used on a scheduled basis to prevent symptoms. Asthma treatments can be escalated and deescalated to meet a patient's treatment needs. There are two primary asthma treatment guidelines: the Expert Panel Report 3 (EPR-3) and the Global Initiative for Asthma (GINA) Report.

The National Heart, Lung, and Blood Institute (NHLBI) created the National Asthma Education and Prevention Program (NAEPP) in 1989 with the goal of enhancing the quality of life for patients with asthma and reducing asthma-related morbidity and mortality.[2] This organization puts forth the Expert Panel Report, first published in 1991, to address the diagnosis and management of asthma. Subsequent reports include the EPR-2 published in1997 and EPR-3 published in 2007, with notable updates added in 2020.

In 1993, the NHLBI, in collaboration with the World Health Organization (WHO), also established the Global Initiative for Asthma (GINA), which aims to broaden asthma awareness as well as improve prevention and management. With updates made on an annual basis, supported by twice-yearly comprehensive literature review, the GINA report serves as a useful resource to guide clinical practice. The GINA report holds a strong level of validity with over 70 publications, from clinical trials to systematic reviews, all meticulously analyzed for clinical applicability by at least two committee members.

Recent Asthma Guideline Changes

Rescue Inhaler Use

Previous iterations of the GINA Report endorsed the utilization of PRN SABA frequency as the cornerstone of assessment, separating based on whether the patient required the SABA reliever < 2 days per week or ≥ 2 days per week to manage symptoms. Patients requiring their reliever inhaler two or more days per week would ultimately require either an increased dose or the addition of controller therapy. The largest change in recent guidelines is the recommendation to avoid using short-acting bronchodilators without concurrent ICS use. Historically, SABA alone has served as a go-to reliever therapy. Rescue inhaler treatment options now include PRN ICS-formoterol, ICS-SABA, or SABA alone. The use of SABA alone for rescue therapy is now recommended only when the patient is on an ICS inhaler for maintenance.

Starting in 2019, the GINA Report no longer recommends SABA-only treatment, as evidence has shown increased incidence of asthma-related death and requirement of urgent intervention. Three main theories persist related to the desensitization of beta-2-adrenergic receptors (β_2AR):

phosphorylation of internalized receptors, adenylate cyclase uncoupling from the receptors, and internalization of uncoupled receptors.[3] These adverse effects are amplified when patients are not on an ICS.

The GINA members sought funding for randomized controlled trials to investigate the use of ICS-formoterol as a potentially safer but effective alternative to SABA. Formoterol was chosen as it has the fastest onset of action of all long-acting beta agonists (LABA). This funding led to the completion of the Symbicort Given as Needed in Mild Asthma (SYGMA) trials, which evaluated the safety and efficacy of ICS-formoterol in patients whose asthma was poorly controlled on PRN SABA (subgroup 1) or controlled on ICS or leukotriene receptor antagonists (subgroup 2). The SYGMA studies utilized a double-blind, randomized parallel-group study design, in which 6,735 patients were randomly assigned to either PRN ICS-formoterol, low-dose ICS plus PRN SABA, or PRN SABA monotherapy. The PRN ICS-formoterol treatment was non-inferior to low-dose ICS plus PRN SABA for reducing the rate of severe exacerbations while being exposed to less ICS. ICS-formoterol PRN was inferior to low-dose ICS plus PRN SABA for controlling asthma symptoms, but ICS-formoterol PRN was superior to PRN SABA for controlling asthma symptoms and reducing rate of severe exacerbations.[4]

Selection of an appropriate asthma treatment regimen is highly dependent on the severity of a patient's asthma symptoms, and adherence to medications. For patients with infrequent exacerbations who are adherent to their inhaler regimens, maintenance use of an ICS-containing inhaler along with rescue use of a SABA may continue to be most appropriate, as previously utilized in practice. However, it should be noted that the overuse of rescue SABA inhalers presents some risk, especially when patients are not adherent to their maintenance ICS therapy. The use of PRN ICS-formoterol or ICS taken every time a SABA is taken provides both adequate asthma symptom control and reduces the risk of severe asthma exacerbations while avoiding the need for urgent intervention and asthma-related death associated with PRN SABA monotherapy.[5]

Maintenance and Reliever Therapy

Additionally, the GINA Report recently introduced the idea of using the same ICS-formoterol inhaler as both the maintenance and reliever therapy (MART). Utilization of MART has been noted to reduce the time to first asthma exacerbation when compared to ICS-LABA maintenance plus SABA reliever. In a systematic review and meta-analysis conducted with 5 RCTs (n = 4863), researchers assessed patients with ill-controlled asthma status between two comparators: MART vs. same step maintenance with ICS-LABA plus SABA. Patients undergoing MART therapy showed a prolonged time to first severe exacerbation and a 30% reduced risk for severe exacerbations HR 0.70 (95% CI, 0.58-0.85). Within this same group, the MART regimen offered a 40% severe exacerbation reduction RR 0.60 (95% CI, 0.48-0.74) when compared to same step maintenance with ICS-LABA plus SABA.[6] Additionally, consolidation to MART therapy can improve adherence-related concerns as it eliminates the previous requirement of a separate reliever inhaler.

The addition of a single maintenance and reliever therapy such as ICS-formoterol to replace a SABA such as albuterol reduces the risk for severe asthma exacerbations with an overall lower ICS exposure.[7] While the safety and efficacy of budesonide-formoterol and beclomethasone-formoterol have been established, further research is needed on other combinations.

An important consideration related to execution of these recommendations is patient cost and insurance coverage. Updates in prescription insurance formularies and coverage algorithms are needed to match current guidelines and literature recommendations. While many current insurance plans cover only a 30-day supply of ICS-formoterol inhalers, PRN use in replacement of a SABA may result in the need for more frequent refills. The cost of SABA inhalers is often more affordable than ICS-containing inhalers. Educating patients on the financial implications of a treatment change is important. For example, explaining that the ICS-formoterol combination inhaler has a longer duration of action and could result in a less frequent need and net use of rescue inhalations could be persuasive for a patient to be agreeable to a switch. The extra investment in dual therapy for specific patients may be offset by savings from the reduction in emergency room visits and additional exacerbation treatment costs. Proper education, effective communication, and shared decision-making to create individualized plans will result in increased patient adherence, satisfaction, and improved health outcomes.

GINA (2023 Update)

In previous years, the GINA Report has detailed a two-track treatment system that provided guidance on treatment decisions. Track 1 involves using PRN low dose ICS-formoterol as rescue therapy. This treatment is referred to as anti-inflammatory reliever (AIR) and is useful in symptom relief and reduction of inflammation. This regimen gives rise to improvement in lung function, reduction of exacerbation risk and promotion of proper adherence. Track 2 offers the option of a low-dose ICS taken whenever a PRN SABA is used or using PRN SABA alone for rescue therapy as long as the patient is on an ICS-containing maintenance inhaler. In both tracks escalation and supplementation with a controller is warranted on various levels relative to the frequency of symptom presentation. The recommendation to include PRN low-dose ICS-formoterol as part of Step 1 is due to the potential for patients with even intermittent asthma symptoms to experience severe exacerbations.

The GINA update, following the Track 1 treatment algorithm, recommends that for patients utilizing PRN ICS-formoterol greater than 2 days per week, this inhaler is inherently serving as controller therapy; therefore, escalation is not warranted. When compared to increased use of PRN SABA, the ICS-formoterol reliever allows for maintained relief with lower risk for severe exacerbation of symptoms. For this reason, the arbitrary 2 days/week and < 2 days per week frequency categorization has been forgone, and recommendations support the assessment of average frequency of PRN ICS-formoterol usage over a four-week period. Beyond this assessment, clinicians should determine whether the patient has any other risk factors for poor asthma outcomes (i.e., exposure to tobacco, FEV1 <60%, obesity, major psychological problems, socioeconomic problems, sputum eosinophilia, or ≥ 1 sever exacerbation in

last year).

Difficult-to-treat or severe asthma describes a category of asthma defined as uncontrolled despite proper use of medium- to high-dose ICS-LABA. Roughly 3-10% of all asthma patients fall into the category of severe asthma and its diagnosis is often preceded by several comorbidities. Patients with severe or difficult-to-treat asthma carry a large burden from their disease as it impedes their daily life in several ways, including but not limited to the following: physical activities, mental capacity, emotional endurance, social life, and economic status. The GINA Report breaks down the treatment of severe/difficult-to-treat asthma in a 10-step algorithm. Generally, this algorithm prioritizes accurate diagnosis, non-pharmacologic/inhaler technique therapies, directing therapy towards patient specific symptoms, and use of biologic therapy as last line (discontinuing if no response after 4 months). Specific therapy changes would include attempting to change controller inhaler to ICS-formoterol whenever available.[8]

The 2020 update strongly discourages long-acting muscarinic antagonist (LAMA) or LABA monotherapy. A JAMA randomized controlled trial, Salmeterol or Corticosteroids (SOCS), conducted in 2001 examined the effectiveness of salmeterol (LABA) as replacement therapy for patients maintained on low-dose triamcinolone (ICS) monotherapy. A total of 164 patients were randomly assigned to receive either LABA, continue ICS therapy or placebo medication. Changes in peak expiratory flow (PEF), forced expiratory volume (FEV1), self-reports, reliever usage, asthma exacerbations, and markers of airway inflammation were compared between the three comparators. Results showed that patients receiving LABA as monotherapy experienced more treatment failures (24% vs 6%; P = 0.004), and asthma exacerbations (20% vs 7%; P= 0.04) when compared to the ICS treatment group. The SOCS trial concluded that a switch from ICS to LABA monotherapy poses the threat of clinically significant loss of asthma control.[9]

Biologic Add-On Therapy

In patients with severe asthma, evidence has showcased the potential of biologics as add-on therapy. This therapy is appropriate for patients with allergic (elevated IgE), eosinophilic (elevated blood eosinophils), or severe asthma. The GINA Report recommends biologic add-on therapy, which includes anti-immunoglobulin (omalizumab), anti-interleukin-5-5R (mepolizumab, reslizumab or benralizumab), anti-interleukin-4R (dupilumab), and anti-thymic stromal lymphopoietin (tezepelumab) agents, for patients with severe, uncontrolled asthma on maximal inhaled therapy.

The most recent biologic, tezepelumab, was approved in 2021. Tezepelumab may be suitable for patients experiencing severe exacerbations whose lab work does not reflect elevations in IgE or eosinophils. Notoriety for this biologic option came from a randomized controlled trial published in *New England Journal of Medicine (NEJM)*. The primary endpoint assessed the rate of asthma exacerbations between patients receiving subcutaneous tezepelumab and placebo drug every four weeks over a one-year treatment period. Tezepelumab was stratified into three dose categories: 70 mg as low-dose, 210mg as medium-dose, and 280mg as high-dose. The annualized asthma exacerbation rates within the treatment group were 0.27, 0.20, and 0.23, with respect to the dose categories. This same outcome when measured in the placebo group yielded a rate of 0.72 exacerbation events per patient-year. This translates to a 72%, 71%, and 66% lower rate of exacerbation vs the placebo group ($P < 0.001$).[10] The phase III continuation of this trial narrowed its focus onto the 210 mg tezepulumab dose against placebo administered every 4 weeks for another one-year treatment period. A total of 1,061 participants were randomly assigned to either comparator. Within the tezepulumab group the rate of exacerbation was determined to be 0.93 (95% CI, 0.80 to 1.07), and in the placebo group it was 2.10 (95% CI, 1.84-2.39), RR, 0.44 (95% CI, 0.37 to 0.53; $P < 0.001$).[11] While there are no definitive criteria to assess a good response to medication, biologic therapy aims to reduce frequency of asthma exacerbations and decrease need for systemic corticosteroids. Biologic therapy can take several months to start adding benefit.

Expert Panel Report – 3

The EPR-3 Guideline was updated in 2020. One notable difference between this guideline and the GINA Report is that it allows PRN SABA monotherapy to be used for patients with intermittent asthma (i.e., when the amount of SABA the patient will need is presumed to be very minimal). Otherwise, the stepwise therapy is very similar to the GINA report with options for a variety of different rescue therapies.

When comparing the harms and benefits of ICS + placebo against ICS-LAMA, a series of five randomized controlled trials (RCTs) (n = 3,036) were reviewed. The ICS-LAMA comparator yielded a smaller rate of exacerbation, 4.2 percent lower than the control group. The results did not conclude a significant improvement in asthma control. However, in the Blacks and Exacerbations on LABA vs. Tiotropium (BELT) study, it was determined that there was a 2.6-fold higher rate of asthma-related hospitalizations in the group treated with ICS-LAMA when compared to the ICS-LABA group. Given that this study only assessed the comparators within a sample of Black participants, the Expert Panel (EP) could not generalize these conclusions to other populations.[12] Additionally, outcomes from two RCTs (n = 1,982) indicated no differences in asthma-control when comparing patients treated with LAMA vs. LABA.[13-15]

The studies included regarding LAMA utilization focus primarily on efficacy, broader conclusions regarding clinical applications and implications cannot be drawn from this data alone. It is understood that the addition of a LAMA may have potential to improve asthma-control, but minimal impact on asthma exacerbations.

The 2020 EPR-3 update altered its previous recommendations for step 3 (with similar conditional recommendations for step 4) treatment in their algorithm for the management of moderate persistent asthma in patients ≥ 12 years of age. This recommendation has changed to highlight the superiority of ICS-formoterol used as both daily controller and reliever therapies. Previous recommendations illustrated ICS use as daily controller with SABA PRN for symptom exacerbations; however, research has continued to illustrate the importance of utilizing these to medication classes in tandem.

Future Direction

In January of 2023 the FDA approved the first and only as-needed ICS-SABA rescue inhaler for individuals older than 18. This is the first medication containing an ICS that has been FDA approved as reliever treatment rather than controller. Approval was made after results of the MANDALA study, conducted in 2021, which is a multinational, phase 3, double-blind, randomized controlled trial that compared the safety and efficacy of albuterol-budesonide (Airsupra™) PRN in patients with moderate-to-severe asthma compared to albuterol alone in 3,132 patients. Patients were stratified into three groups: high-dose combination receiving 2 actuations of 90 µg albuterol and 80 µg budesonide per dose, low-dose combination receiving 2 actuations of 90 µg albuterol and 40 µg budesonide per dose, and the albuterol-alone group receiving 2 actuations of 90 µg albuterol per dose. The risk of severe asthma exacerbation was significantly lower in the high dose combination group compared to ICS alone (hazard ratio, 0.74; 95% confidence interval [CI], 0.62 to 0.89; P=0.001). Adverse events amongst the three groups were comparable and not statistically significant. Research on the safety and efficacy of PRN ICS-SABA in children needs to be further evaluated. While the MANDALA study did include a population of 37 children in the treatment and evaluation phase, no children received high-dose ICS-SABA.[16] A larger population will also be needed for potential approval in this population. Further research is needed to compare superiority between PRN ICS-formoterol and ICS-SABA in regard to safety and efficacy.

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"MORTAR & PESTLE" CONCORDIA UNIVERSITY WISCONSIN SCHOOL OF PHARMACY STUDENT WRITING CLUB:

Business Member Spotlight: North Shore Pharmacy

by Gracie A. Wilson, 2026 PharmD Candidate

Kyle Beyer, PharmD, BCACP is the owner of North Shore Pharmacy, which has two independent pharmacy locations in Shorewood and Cedarburg, Wisconsin. He first became the owner of North Shore Pharmacy in Shorewood in March of 2020 and went on to purchase the Cedarburg location in March of 2022. Though a newer owner, Beyer has had a strong passion for independent pharmacy throughout his career. His interest really developed after an advanced pharmacy practice experience rotation at Boscobel Pharmacy with Michelle Farrell, PharmD, a past President of the Pharmacy Society of Wisconsin (PSW). There, Beyer discovered what independent pharmacy has to offer patients and walked away from the experience wanting to own an independent pharmacy one day. After earning his doctor of pharmacy degree from the University of Iowa in 2010, Beyer moved to Wisconsin and worked for 10 years at various large chain pharmacies. However, it became clear to him that his desire to serve patients in a unique and creative way through independent pharmacy remained.

Day to Day Practice

During a typical day, Beyer will visit both stores, starting in Shorewood. There, he assists with the daily workflow to help get through the first busy hour or two. Once things start to get settled, Beyer will spend some time in the office working on administrative tasks, catching up on emails, working on insurance contracts, following up with vendors, and checking in with staff. He will then travel to the Cedarburg location to cover lunch breaks and assist throughout the daily workflow as needed, while also continuing administrative responsibilities.

At each practice site, the pharmacy has two full-time pharmacists who focus on direct patient care. Whether it is checking prescriptions, counseling patients, talking to physicians, administering vaccinations, or other community pharmacy tasks, the primary motivation is providing exceptional patient care. North Shore Pharmacy's Shorewood location is a stand-alone building located in one of the densest residential communities in Wisconsin and is more of a traditional community retail pharmacy. North Shore Pharmacy & Compounding Center in Cedarburg has a leading compounding laboratory that is capable of providing personalized medications for patients and pets; it serves both locations. The compounding pharmacist often works on checking compounded medications, creating new formulas, and talking to doctors and veterinarians about what can be compounded. These medications are customized to the needs of the patient or pet and will often require effective communication with providers and research

Bottom-left: *(left to right) Maureen, RPh.; Kyle Beyer, PharmD.; Rachel, PharmD.* ***Bottom-right:*** *North Shore Pharmacy interior.*

into what compounds can be made and how to effectively compound the product. In addition to compounding medications, the Cedarburg location is further involved with assisted living and long-term care pharmacy tasks, including bubble packing medications and setting up pillboxes for patients. The pharmacists work closely with nursing directors and care managers to communicate patients' new orders and discontinued medications, and to provide updated bubble packs and pillboxes.

North Shore Pharmacy strives to provide care that is simple and local. The pharmacy team has incredible camaraderie and focuses on a patient-centered approach to pharmaceutical care. North Shore's work environment allows pharmacists to have more time to answer questions and phone calls from patients or providers. To simplify prescription filling services for patients, North Shore has invested in user-friendly scheduling software that allows patients to easily schedule appointments. As technology continues to expand, being accessible for patients via technology will also grow. North Shore Pharmacy has recognized this and offers patients the ability to directly text the pharmacy. This level of communication as a healthcare provider enables better communication about what prescription refills are needed, what prescriptions are ready for pick-up, and whether the patient needs another physician visit before getting more refills. It also improves the daily workflow by saving patients an unnecessary trip to the pharmacy. North Shore Pharmacy has shown that it is possible to advance the integration of technology while continuing to foster patient relationships through being personable, friendly, attentive, and kind. Along with keeping things simple, Beyer also focuses on keeping things local and wants to ensure that the pharmacy gives back to the communities that support it. The pharmacy is actively engaged through frequent donations to nonprofit organizations in the community.

Below: *(left to right) Kyle, PharmD; Tabitha, PharmD; Jerry, Technician; Adrianna, CPT; Ashlee, Technician*

Whether supporting the local school play or partnering with a local organization like the River West Food Pantry, North Shore Pharmacy looks to be involved within the community to show that if people choose them, some of that support will come back into their community.

Raising the Bar

North Shore Pharmacy has implemented innovative practices from the beginning and continues to offer a variety of unique services and products that set them apart from other pharmacies. Over the last three years, they have worked to have an efficient vaccination workflow. From the ease of appointment set up with their scheduling software to the administration of the vaccine, the process of receiving vaccines remains smooth and seamless for patients. North Shore Pharmacy is also able to provide vaccinations for children as young as 6 months of age, compared to the typical 6 years at other community pharmacies, because they hired a registered nurse to assist them through the busy vaccination season. Other unique services include medical at home, delivery of bubble packs and pillboxes, durable medical equipment (DME), diabetes shoes, and compression stocking fittings. For patients who do not live in a facility but need assistance with their medication, the pharmacy is able to use medication synchronization, manage their day-to-day medications, and deliver to these patients to ensure the patient is getting the correct drug therapy. Often, patients can be on a multitude of medications that are constantly changing, making it extremely difficult for patients to keep track of what they should be taking. North Shore Pharmacy is able to assist these patients at home or in long-term care facilities by filling and delivering new bubble packs and picking up the changed bubble packs.

One of Beyer's largest achievements was the successful transitioning of two independent pharmacies from one owner to another. This success is attributed to the staff's teamwork and cultural approach to problem-solving through exploring solutions rather than saying no to any new challenges. Not only is the staff extremely friendly, they are able to provide high-quality community pharmacy care by being proactive in reaching out to patients—for example, to ensure they were expecting a change in dose,

to keep them updated if there is a delay due to insurance, or to save them time by letting the patient know they need an additional follow-up appointment before getting more refills. With such a wide range of products and services, staff members are trained to become product experts. North Shore Pharmacy supplies patients with DME including walkers, grabbers, raised toilet seats, grab bars, and much more. Patients or family members will often come in to pick up products following procedures, but they do not always know what they need. North Shore Pharmacy can show them the various products, explain the differences, and make recommendations based on the patient's specific needs to ensure they walk out of the pharmacy with everything they need.

Bumps in the Road

Beyer's success with North Shore Pharmacy does not come without challenges. The number one challenge currently facing his pharmacy is reimbursement from insurance. The company that determines how his pharmacy is reimbursed directly owns one of his competitors. This lack of a level playing field can be frustrating for independent pharmacies because competitors are getting paid more for the same product at the same level of efficiency, even though the level of service may be different between pharmacies. One of the viable solutions that recently came out was a proposed Wisconsin Pharmacy Benefit Manager reform. This new bill could help level the playing field for independent pharmacies. According to the Pharmacy Society of Wisconsin's Pharmacy Legislative Action Network, some key components would include a ban on differential copays or incentives/penalties for specific in-network pharmacies, and the prohibition of reimbursing affiliated pharmacies more than unaffiliated pharmacies.[1] Although this bill has yet to be implemented, it is important to continue advocacy at the pharmacy level for regulations like this to create that level playing field and keep independent pharmacies relevant in comparison to large chains.

Moving Forward

As Beyer and North Shore Pharmacy look to the future, maintaining a stable, friendly, and convenient location for patients is essential. Their biggest referral comes from current customers, making patient-centered care all the more important. As a large part of the population continues to age, Beyer believes that medical at-home care is going to expand rapidly, and assisted living or long-term care facilities will likely be unable to handle the sizeable influx of patients. Providing care for these patients in their home is a unique skill that many pharmacies will have to learn, but for North Shore Pharmacy, it is already something that they do extremely well. The pharmacy will be able to provide medications, DME services, and continued delivery with other complimentary services. Increased responsibilities of medical at-home care will create an incredible opportunity, but it will also require an increased workload for pharmacists. This workload may provide the opportunity for pharmacy technicians to acquire an elevated role through the implementation of tech-check-tech. This is a process that would allow pharmacy technicians to perform final checks of medications prepared by other technicians. Additionally, automation of prescription filling and labeling would provide more opportunities for pharmacists to work directly with patients.

When asked what advice he has for individuals interested in independent pharmacy, Beyer recommended reaching out to an independent pharmacy owner and starting research. The best place to start research is the National Community Pharmacists Association (NCPA).[2] The NCPA provides many resources on its website and hosts conventions that allow you to learn about pharmacy ownership and get you in touch with a mentor. Beyer says, "The next best thing to do is reach out to an independent owner and talk about what we do. We are happy to share successes and challenges and put you in contact with somebody else we know that does the type of thing that you are really interested in. We only succeed if there is a vibrant network of successful independent pharmacies, so all of us are rooting for that!"

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UNIVERSITY OF WISCONSIN-MADISON SCHOOL OF PHARMACY STUDENT WRITING CLUB:

PSW Leadership Spotlight: Jeff Fish

by Hope Schier, 2024 PharmD Candidate

For Jeff Fish, PharmD, FCCM, BCCCP, it's the simpler things in life that define success, things like being a team player and making positive impacts on patient care while being a loving husband and father. Fish admits he has never viewed himself as the stereotypical "big L" leader, and he has never sought administrative titles. However, it is undeniable that within the pharmacy profession, Jeff Fish is a significant clinical leader and mentor for the next generation of pharmacists.

Fish is a critical care pharmacist at University of Wisconsin (UW) Health Hospitals and Clinics combined medical/surgical intensive care unit (ICU), also known as the Trauma Life Center (TLC). His first exposure to UW Health's TLC was during his undergraduate studies at the University of Wisconsin-Madison School of Pharmacy, and he has been providing exceptional patient care in the TLC for the last 28 years. Fish received a Bachelor of Pharmacy degree in 1991 at the University of Wisconsin-Madison School of Pharmacy before moving to Minnesota and completing his Doctor of Pharmacy degree in 1993 at University of Minnesota College of Pharmacy. Fish then completed a cardiology fellowship at University of Minnesota-Regions Medical Center before receiving a job offer at UW Health in the TLC. Fish earned his board certification in pharmacotherapy in 1997 and board certification in critical care in 2015. In 2017, he was recognized as a fellow in the Society of Critical Care Medicine. When asked if he would change anything from the early part of his career, Fish said, "Nothing."

Mentor

Fish first believed he was going to be a community pharmacist after meeting his first pharmacist mentor, James Lombard, at Lombard's Clinic-Pharmacy with Medical Associates where his mother worked as a technician in Baraboo, Wis. However, once in pharmacy school, Fish knew acute care was his calling. He loved the atmosphere of acute care pharmacy, and it was his first exposure at UW Health in the TLC that made him want to become an ICU pharmacist. Fish credits George Classic, Rich Christopherson, and Cindy Gaston with providing exceptional guidance and mentorship when he started his UW Health career.

Fish says that mentoring students is a significant highlight of his job; he has been a preceptor for multiple IPPE and APPE students during his 28 years of practice. Fish shares that spending time with learners helps him to better understand medicine and literature. In 1999, Fish launched the PGY2- Critical Care Residency Program at UW Health and continues to be the residency program director. This PGY2 program has trained over 20 residents. He is proud to co-coordinate a critical care elective course at the University of Wisconsin-Madison School of Pharmacy with Melissa Ha, PharmD, BCCCP. In 2017, Fish was recognized as a master preceptor by the American Association of Colleges of Pharmacy for his dedication and commitment to training and mentoring future pharmacists.

Team Leader

What Fish enjoys most in his day-to-day is the team atmosphere during rounds. The UW Health TLC interdisciplinary team consists of attending physicians, fellows, residents, nurses, and often various learners, and they round on each patient on the service for that day. Fish endorses an atmosphere that promotes collaboration and welcomes questions. He appreciates that his desk is physically located in the middle of the TLC unit, where he is truly integrated into the team. With 28-plus years of experience, Fish draws confidence from the trusting relationships he has developed with other ICU health professionals and values their partnership in patient care.

In being an active pharmacist ICU team member, Fish is the co-chair of the Trauma and Life Support Center QA committee. He is also a member of the UW Health system-wide Critical Care Committee. Fish finds it rewarding to participate in work that directly impacts UW Health protocols and guidelines, improving overall patient care. He is particularly proud of his work analyzing sedation and ventilation practices within the medical/surgical ICU at UW Health. Fish and his team submitted a research abstract, which was recognized by the Society of Critical Care Medicine as a Gold Medal Recipient in 2019, demonstrating novel patient treatment practices. This work impacted practice at UW Health and is recognized nationally. Optimizing sedation standards, reducing health system expenses, and improving patient outcomes has brought Fish great pride.

Concerns Today

Just like technology, healthcare is ever evolving. Fish shares his uncertainty regarding the impact of artificial intelligence (AI) and its role in the provision of care. He wonders if AI will take away some roles historically managed by the pharmacist, like monitoring vitals, as exploration of AI providing real-time data is explored. Alternatively, he ponders if AI may complement pharmacists and enhance their efficiency if utilized as a tool in data analysis, drug interaction checking, inventory management, and more.

Regarding the recent boom of new

monoclonal antibodies and increasing specialty medications, Fish shares his concerns related to the costs of these medications. He notes that health-system pharmacy cost is shifting to outpatient and ambulatory care specialty medications. He wonders how this may impact health-system pharmacy budgets considering the cost burden shifting away from inpatient pharmacy. In the next 10 years, Fish believes we will continue to treat more patients from the comfort of their homes and in ambulatory care settings. Less general care will be provided in hospitals, as home infusion and the utilization of visiting nurse services continues to grow.

Advice for Future Leaders

To future clinical leaders, Fish says, "Try to get involved as much as possible." He emphasizes that you don't have to hold a leadership title to make a difference. He encourages our future leaders to be involved in committees that change practice, as he reflects on his team's impact on sedation protocols. Fish says to be open and encourage questions that spark collaboration. In creating a welcoming environment, staying involved, and giving back to learners, Fish says you too can be viewed as a leader whom people trust and feel comfortable confiding in and seeking feedback from. He says the best advice he has received during his career is, "Don't be afraid to say, 'I don't know.'" Fish believes honesty, and a promise to find the requested information and get back to the requestor, is much more valuable and respectable than guessing an answer which may or may not be wrong. Additionally, this has taught him how to retrieve information quickly and made him an asset to efficiently answering questions in UW Health's TLC.

Although Fish says he was surprised to receive the 2023 Pharmacy Society of Wisconsin Pharmacist of the Year Award, his humble leadership and commitment to patient care truly set him apart, making the recognition well-deserved. He reflects on this award and the nomination from his peers as one of his greatest personal achievements. Fish will continue to lead at the UW Health TLC and serve as a leader and mentor within the pharmacy profession. A final piece of wisdom from Fish is to find happiness doing what you love as success is hard to define.

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Practice Transformation: Stories from the Field

compiled by Helene McDowell, MS, Megan Grant

PSW continues our pharmacy-led, public health programming that focuses on facilitating connections between pharmacies, primary care, and community-based organizations to improve chronic disease management, health care access, and health equity. All of which affect patient quality of life and pharmacists' ability to provide the highest standard of care for all their patients. Your commitment to sustain and advance these initiatives is essential to the success of this work. To highlight this dedication and the significant impact it has on patient health outcomes and pharmacy practice, PSW is committed to sharing your work through storytelling. The stories you share are in your voice and are intended to showcase the incredible care pharmacists and technicians are providing to change the lives of their patients and to highlight the critical role pharmacy practice has in patient care.

Going forward, these success stories will be a continuing series in JPSW with each issue focusing on a different topic and highlighting perspectives from pharmacists, technicians, patients, and community partners. This issue focuses on stories supporting cardiovascular patients.

If you would like to submit your story to an upcoming issue of *JPSW*, please email PSW at info@pswi.org.

Gretchen Kunze

A 55-year-old African American woman with a history of type II diabetes, hypertension, hyperlipidemia, and depression presented as a new patient to the pharmacy. She fled an unsafe home situation in Milwaukee and jumped on a bus, which ended up in La Crosse. After leaving everything behind, she found herself without any support in a new city. The patient was unable to read and write, had low health literacy, and was reluctant to trust healthcare professionals. She walked into the pharmacy with a social worker from the Salvation Army, who identified she needed to be restarted on medications after being without them for some time.

CMR/A

The patient was unaware of what medications she took (name, strength, frequency). The pharmacist sat down with the patient to hear her story and start building a trusting relationship. The pharmacist was still able to figure out which pharmacy the patient used previously and transferred the prescriptions over. Upon assessing the active prescriptions, the pharmacist determined that there were gaps in therapy for her chronic conditions, with some likely expiring off the list. The pharmacist helped coordinate with a local provider to write prescriptions for additional necessary medications. One of the transferred medications was a combination tablet of olmesartan/hydrochlorothiazide/amlodipine to assist with adherence, however, this was not going to be covered by insurance. Subsequently, the pharmacist had it changed to individual medications for coverage.

The pharmacist identified that the patient would benefit from weekly medication bubble packing. While it normally takes multiple weeks to transition a new patient into bubble packing, the pharmacist worked to coordinate with the whole staff to urgently provide bubble packed medications the same day. The pharmacist condensed the regimen into taking medications only twice daily. Since she could not read, the pharmacist adapted the bubble packaging to show suns and moons that represented times of day to take it. Thorough medication counseling was provided to the patient so that she was comfortable with taking them. To address other social determinants of health barriers, the pharmacist referred her to other community programs and a charitable managed care organization. This helped the patient find stable housing and consistent medical follow up. Due to transportation barriers, the pharmacy directly delivered the bubble packs to her each week.

Outcome

A couple years later, the patient continues to receive the weekly bubble packed medications and has better control of her chronic conditions. This patient taught the pharmacist that their pharmacy could rise to the challenge to meet urgent patient care needs from coordinating with all staff members. It exemplified the importance of active listening and empathy with patients to build trusting relationships. As a result, the pharmacist was able to be creative with tailoring the bubble packaging to meet the needs of this patient. Lastly, this case demonstrated the importance of pharmacy collaborating with community organizations to address social determinants of health. The pharmacists here have strong relationships with community partners to provide comprehensive care.

Abbie Linde

The patient is a 57-year-old white male with a 20-year history of type 2 diabetes. Following a ketogenic diet in the past, he had achieved control of his diabetes reducing his A1c to within goal at 5%. At the time of the initial visit, he had not been following a ketogenic diet for 2 or 3 years. The patient used self-monitored blood glucose (SMBG) to monitor his blood sugar and was not taking any diabetes medications. He spent most of his free time as a caretaker for his mother and mother-in-law.

June 2022

The pharmacist met with the patient to conduct an initial intake for diabetes nutrition management. During the visit, the patient's diabetes was uncontrolled with both his A1c and SMBG readings above goal at 7.2% and 200 mg/dL respectively. The patient reported worsening vision and some tingling in his feet, likely consequences of his uncontrolled diabetes, and that he wanted to return to a ketogenic diet to regain control. The pharmacist identified his biggest barrier to successfully managing his diabetes as being lack of time due to his caregiving duties. The pharmacist

reviewed the patient's diet, exercise habits, social habits, and medication/supplement use. Using this information, the pharmacist developed a plan to re-engage the patient with a ketogenic diet and incorporate resistance training into his exercise plan. To address the time barrier, the pharmacist recommended using intermittent fasting which would compress his eating window and allow more time for meal prep and exercise. The pharmacist also coached the patient to not feel guilty for taking time for himself. The patient was responsive to this guidance. For monitoring purposes, the pharmacist recommended switching to continuous glucose monitoring (CGM) as well as to ketone tracking. The patient agreed to implement CGM, but was unwilling to track ketones. The pharmacist planned to follow-up with the patient 7-days later to assess CGM use.

July 2022

The patient had started using CGM and the pharmacist reviewed the initial numbers that showed largely uncontrolled blood glucose values over 200 mg/dL. The patient's amount of time spent within his target blood glucose range (70-180 mg/dL) was low at 43% with the estimated average blood glucose during this time being 198 mg/dL. Since the patient has just begun his diet and exercise plan earlier that week, limited improvements were expected, so the diet, exercise and monitoring plans were continued. The pharmacist would follow up in a month to re-assess.

August 2022

The patient returned stating he had been following the plan and was still using CGM to track his blood glucose. This time, his time in blood glucose range had jumped to 81% with an estimated average blood glucose of 161 mg/dL, which was a significant improvement compared to just a few weeks prior.

Outcome

The patient was re-engaged to a ketogenic diet with intermittent fasting and began to incorporate resistance training into his exercise plan. The intermittent fasting allowed the patient to spend more time meal prepping and exercising, which improved his diabetes control. Following implementation of CGM, the patient was shocked at how much the numbers were improving. The patient reported that the pharmacist's recommendation to use CGM had been his biggest motivating factors in his diabetes management as it allowed him to track his progress in real time and identify foods that significantly impacted his blood sugar control. Understanding these food choices allowed him to make smarter choices and continue to improve his blood sugar control. The patient has since reported having increased energy levels, which has motivated him to incorporate even more resistance training into his exercise routine. The pharmacist continues to follow up with this patient regarding his diabetes management.

Taylor Millar

The patient is a 59-year-old African American woman who recently moved out of a homeless shelter to stay with a family member. She has a history of type 2 diabetes, hypertension, and a previous stroke in 2021 that had left her with intense neuropathic pain in her legs. The pain caused her to be bedridden most days, only getting up for medical appointment, pharmacy visits, and other necessities. She had previously enjoyed being an active member of her church, but was no longer able to participate due to the pain. For the pain, the patient was taking the maximum dose of gabapentin, which did not have any reported effect. For her diabetes, she was on a long-acting insulin and Pioglitazone. The patient also had a history of "drug abuse" as noted by the pharmacy system, which she described was because she had been prescribed an opioid and was trading it for free transportation. At the time of the initial visit, the patient was utilizing transportation through WI Medicaid to get to the pharmacy.

March 2022

The patient came in for an initial CMR/A which was intended to focus on blood pressure, but her blood pressure was at goal (< 130/80 mmHg). However, her diabetes was very uncontrolled with an A1c over 14%, so the pharmacist shifted the focus of the CMR/A to diabetes management. Upon reviewing the patient's medication list, the pharmacist

noted she was not taking Metformin, a first line therapy for type 2 diabetes. The pharmacist contacted the patient's doctor to recommend starting her on Metformin to help manage her diabetes.

May 2022

The patient had started Metformin, but was found to only be taking it once a day instead of the prescribed twice a day because she was afraid of dangerously low blood sugar. Knowing that Metformin is not a medication that can cause low blood sugar on its own, the pharmacist educated the patient on this low risk compared to the huge benefits from taking the medication as prescribed. The pharmacist also discovered that the patient had not been consistently testing her blood glucose because she kept her testing supplies downstairs from the bedroom where she spent most of her time due to her mobility and pain problems. The pharmacist suggested the patient keeps her testing supplies next to the bed so that she would have reliable access to these supplies and the patient agreed.

July 2022

The patient presented for a follow-up CMR/A that was again planned to be tailored to her hypertension, but her blood pressure was still controlled, so focus shifted again to her diabetes. During the CMR, the pharmacist noticed the patient was in a lot of pain as she was very slow moving and expressed how much it hurt to get out of bed. The patient reported her pain level to be at an 8 out of 10, which was a good day for her. In general, the patient noted that the pain was often so bad she contemplated suicide or doing "street drugs" to deal with the pain. She was convinced she needed an amputation. After reinforcing the patient to stay compliant to her diabetes management, as uncontrolled diabetes could be contributing to the neuropathic pain, the pharmacist reached out the patient's provider to explain everything that was going on. During the call the pharmacist discovered the hospital had her old address on file and had been sending everything to the wrong address. The pharmacist helped them update the address, expressed the patient's interest in getting an amputation, and requested that someone reach out to her to set up a consultation. In the meantime, the pharmacist also suggested that the patient try Duloxetine, a medication that is typically used to improve mood but has also been shown to be effective for neuropathic pain as well. After the pharmacist got off the phone, the patient began to cry exclaiming that someone had finally listened to her concerns. The patient agreed to take Duloxetine and was counseled to try it for at least 4 weeks. They ended the visit in prayer during which she thanked God for bringing the pharmacist into her life. A prescription for Duloxetine was received by the pharmacy, and the patient began taking it on the following day.

July 2022 – October 2022

The pharmacist frequently called the patient to see how she was doing and whether the Duloxetine was being effective. During the first few phone calls, the patient reported that the Duloxetine had not helped much with her pain, however she began to see drastic improvements in her mood. However, in the October check-in, the patient noted that her pain had gotten much better since starting Duloxetine and that her mood had continued to improve.

Outcome

The patient was able to better manager her diabetes through the addition of Metformin and more frequent blood glucose monitoring. Additionally, she was able to get in contact with the hospital to set up an appointment with her endocrinologist to further improve her diabetes control. The Duloxetine that the pharmacist had recommended was proven to be effective in improving both her pain and mood, two major barriers that stood in the way of the patient doing the things she enjoyed, such as going to church. The patient has not reported any suicidal thoughts or desire to seek out street drugs since she began taking Duloxetine. The patient's quality of life was significantly improved.

Helene McDowell is the Director of Health Equity Programs & Outreach and Megan Grant is the Director of Marketing, Communication & Design at the Pharmacy Society of Wisconsin in Madison, WI.

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