MSHP Pharmascript

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What's Inside This Issue?

Attached Supplement:

2017 Pharmacy Resident Abstracts

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President's Address

Rachel Kruer, PharmD, BCPS, CNSC
MSHP President

It is an honor and privilege to have been elected to serve as a leader for this dynamic and impressive organization. It's an exciting time to be a pharmacist in Maryland! MSHP, under Celia Proctor's exemplary leadership, is leading the effort to advance the practice of pharmacy technicians in the state. Over the past year, three task forces were formed, and each is focused on a target workforce development or practice advancement issue: 1.) accreditation of technician training programs, 2.) developing a tech-check-tech model in Maryland, and 3.) leveraging automation and technology. These efforts, coupled with continued advocacy from our legislative committee and colleagues within the Maryland Pharmacists Coalition, skillfully led this past year by our esteemed Immediate Past President, Meghan Swarthout, will open the door for expansion and advancement of clinical pharmacy services. I am looking forward to working with the leaders of each Task Force as well as our Pharmacy Leadership Group as we continue to strive for optimal pharmacotherapy and outcomes for the patients we serve.

At the recent Spring Seminar we celebrated the good work that has been accomplished over the last year through the efforts of our members, committee chairs, and board members. We were inspired by the presentations delivered and the research presented. In the coming year, I am certain we will continue these strong efforts, while aiming to continually move the bar. This year we will strive to increase MSHP member engagement through strong, contemporary programming, networking opportunities, grassroots advocacy and leadership, and enhanced virtual connectivity. We will also support pharmacist-driven outcomes research, including fostering collaboration among practice sites and professional organizations.

I am looking forward to a very productive year ahead, one in which we, together, improve medication use outcomes through education, research and advocacy.

I hope to see you all soon at upcoming MSHP events!

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Medication Safety Corner

The expanding role of the pharmacist in naloxone dispensing and education

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Opioid misuse has created a public health crisis. In recent years, the misuse of prescription opioids has risen substantially, leading to what is now commonly referred to as the opioid epidemic. Since 2000, the rate of fatal drug overdoses has increased 137% overall, and the rate in overdose deaths involving opioids has increased by 200%.[1] According to the Agency for Healthcare Research and Quality (AHRQ), opioid-related overdoses kill 90 people in the United States each day and cost the nation over $20 billion annually in emergency department and hospital care expenditures.[2]

Healthcare providers in the United States are discussing the opioid epidemic in many forums. Conversations range from over-prescribing awareness and prevention strategies to treatment options to reverse overdoses. Reinforcing provider awareness of pain treatment options, such as, appropriate opioid medication prescribing, non-opioid analgesics, and physical therapy/rehabilitation treatment options, is a national effort to decrease opioid-related deaths.[3] In our state, the Maryland General Assembly adopted the Heroin and Opioid Prevention Effort and Treatment Act of 2017 (HOPE Act) earlier this year. This act requires the establishment of a health crisis hotline and network of crisis treatment centers to provide 24/7 access for patients experiencing a mental health or substance use disorder crisis. The HOPE Act also requires that Maryland hospitals establish a protocol for discharging individuals treated for overdose or substance use disorder and to have at least one provider who can prescribe medication-assisted treatment (MAT).[4] MAT has been shown to increase treatment retention rates, reduce opioid use, and reduce mortality rates. Naloxone, an opiate antagonist used to reverse opioid overdoses, plays a critical role in the effectiveness of MAT.

Recent legislation expanded access to naloxone within the state. Previously, naloxone was available only to persons receiving training and certification through the Overdose Response Program (ORP) via a naloxone standing order. On June 1, 2017, Dr. Howard Haft, Deputy Secretary for Public Health Services with the Maryland Department of Mental Health and Hygiene, issued a statewide standing order allowing all Maryland-licensed pharmacists to dispense naloxone to anyone who may be at risk for an opioid overdose or in a position to assist someone believed to be experiencing an opioid overdose.[5] No prescription is necessary for such dispensing. As a result, pharmacists now serve as the primary educators on opioid overdose and naloxone administration.

Pharmacists need to ensure that patients can recognize the symptoms of an opioid overdose and understand how to administer naloxone properly. We have listed several important counseling points for two formulations of naloxone covered by Maryland Medicaid, the 0.4mg/1ml vial for intramuscular (IM) administration and the 2mg/2ml needleless syringe with atomizer for intranasal administration.

- Common signs and symptoms of opioid overdose include extreme sleepiness, confusion, slurred speech, shallow or no breathing, and difficulty arousing the patient.
- The IM injection should be administered in a muscle such as the thigh or shoulder
- The intranasal dose should be given by administering half of the syringe volume, 1ml, in each nostril.
- With either dosage form, a subsequent dose should be administered if no response is seen within two to three minutes.
- Naloxone has a short half-life. While it can be lifesaving, the reversal effect is temporary and requires immediate medical attention. The person administering naloxone should call 911 and stay with the patient until medical help arrives.
- The Maryland Good Samaritan Law provides protection to those assisting in an overdose situation. If someone calls 911 for help, he or she will not be arrested, charged, or prosecuted for possession of a controlled dangerous substance or drug paraphernalia.

The opioid epidemic and its associated problems has led to changes in medical practice. As a profession, pharmacists have an opportunity to lead the effort in reducing overdose-related deaths. We are now at the forefront in educating patients regarding the use of naloxone to treat opioid overdoses. Our clinical expertise in these situations can save many lives.

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Call for Articles

The editors of *Pharmascript* are seeking articles related to ASHP recommended Practice Advancement Initiatives, student or resident research, MSHP committee updates, new drug updates and clinical reviews. Interested writers are encouraged to submit articles as a clinical review (1,000 words), a research project manuscript (2,000 words), or a new drug update (250 words). Other article topics will be considered. Articles should be submitted to Michael Armahizer (michaelarmahizer@umm.edu) or Vicki Leiman (victorialeiman@umm.edu) by September 15, 2017 to be published in the October 2017 edition of MSHP's *Pharmascript*. See the newsletter deadlines listed below for subsequent issues.

Deadlines for Upcoming Pharmascript Editions

September 15, 2017 for publication in the October 2017 edition
December 15, 2017 for publication in the January 2018 edition
March 16, 2018 for publication in the April 2018 edition
June 15, 2018 for publication in the July 2018 edition

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Technician Corner

Improving the Process of Restocking Automated Dispensing Cabinets

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University of Maryland Medical Center (UMMC) is a large academic hospital in Baltimore. We care for a diverse patient population. Our hospital utilizes automated dispensing cabinets (ADCs) for medication distribution. We currently have over two hundred automated dispensing cabinets, sixty of them devoted to anesthesia users in the operating rooms (OR). Our centralized inventory management for ADC replenishment consists of three carousels, storage shelves for bulkier items and refrigerators. The storeroom staff is assigned to restock the cabinets on a regular schedule. As our hospital increased ADC utilization for medication distribution, the restock process was not evaluated and adjusted to accommodate the rise in workload. As a result, the process of pulling, checking, sorting and delivering medications was disorganized and overwhelming. Technicians made some adjustments as needed, but this resulted in a lack of standardization. Oftentimes, they were not able to take their meal breaks. Consequently, our staff was frustrated and morale was low.

Prior to the performance improvement (PI) event, the morning restock required multiple steps, seven or eight technicians, and up to five pharmacists. The first step was to stage the Storeroom. Since space was not designed appropriately, this step had to be completed for each restock. Work was divided according to where the medications were stored. As each item was pulled, it was separated and bagged based on amount needed to replenish the ADCs. Bags were then sorted into large bins according to tower locations of the ADCs. Next, a team of pharmacists checked each restock bag individually. Since the items had already been separated and bagged, the pharmacists had to check each item multiple times. Due to space and design constraints, it was difficult to separate the checked and unchecked items, and this caused confusion. After the pharmacist check was complete, the technicians bagged and sorted yet again to separate the restock according to the individual ADCs.

It was clear we needed a new process, especially as our department planned to further increase the utilization of the ADCs. When asked to participate in a PI event for the restock process, we readily accepted.

PI Process

The Storeroom's PI team comprised of technicians and pharmacists who routinely participated in the ADC restock process. A project leader, facilitator and an executive sponsor supported our team. We worked under the guidance of our hospital's PI team, utilizing Lean concepts and methods. We focused on the restock of non-controlled medications only. The group met weekly.

We mapped the process and analyzed each step to identify which ones were unnecessary or wasteful, and those that were necessary or brought value to the overall process. We conducted time studies of the process and identified the steps where mistakes were most likely to occur. Data collection included time needed to pull the restock from all locations, time needed for technicians to sort and bag the individual items, time needed for pharmacists to check the restock, and time needed for technicians to sort the restock for delivery.

We then agreed on changes to the process and piloted them with the entire staff. Throughout the process, huddles were conducted to share information with our colleagues. We also provided a conversation board and suggestion box for staff input and feedback. By engaging our colleagues, we were able to improve our process as a unified team.

With each pilot, we repeated the steps of mapping the process, collecting data and tracking errors to continually make changes and improvements, until we finally came up with a process that was organized, efficient, and minimized errors. At the same time, we recognized that our current workspace needed some attention. Our Storeroom was cluttered and unorganized. We addressed this by applying the "5-S" method of organizing: sort, straighten, shine, standardize and sustain. We relocated and discarded items as needed and arranged items so they were easily accessible when needed. Finally, the entire workplace was clean and organized.

Our current process evenly divides the work amongst the technicians and requires only two pharmacists to check. We have pre-labeled bins for each unit ADC, so we no longer have to stage the Storeroom before each pull. One team of technicians pulls all items from the storage locations. Our pharmacists check the items immediately after they have been pulled. Technicians then divide and bag them according to what is needed for each ADC, and a technician sorts them into the pre-labeled bins. Together, these changes to the process

allow for each medication to be "touched" only once for pulling, checking, and bagging. Baskets are utilized to keep the medications separate, thereby reducing the potential for errors. Since each task has a scheduled time to complete, we are able to take our meal breaks on time.

As a result of our pilots and "5-S" event, we now have a restock process that is organized, standardized and efficient. From start to finish, we have reduced the time it takes to complete the morning restock by over ninety minutes. As a group, we are amazed to see how our new process allows us to save time and resources, which can be better utilized for direct patient care. We have also seen a sizable decrease in the number of errors we made during the process, thereby improving patient safety. Last but not least, staff morale has greatly improved.

Next Steps

While we are extremely satisfied with our results, our work is not done! Looking ahead, we plan to implement our new restock process to the overnight pull. We are reviewing usage data, so that we can maintain sufficient inventory while minimizing waste. We are also working with our narcotic and OR technician teams to optimize the restocking of our controlled substances and anesthesia cabinets. With these additional enhancements and implementations, we hope to continue our goals of reducing medication errors in the restock process and better utilizing our time and resources toward patient care.

Renewal Reminder

Individual members of MSHP are reminded to renew their memberships. Membership includes weekly updates, *Pharmascript* subscription (4 issues / year), discounts on MSHP programming, access to the MSHP online community, opportunities to volunteer on MSHP committees and more!

Call for Editors

The editors of *Pharmascript* are seeking content reviewers for upcoming editions. Interested Pharmacists, Residents and Students should contact Michael Armahizer (michaelarmahizer@umm.edu) or Vicki Leiman (victorialeiman@umm.edu). Reviewers should note specific areas of expertise or interest in their communications.

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Cost Burden of Chronic Obstructive Pulmonary Disease

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Background

Chronic obstructive pulmonary disease (COPD) is a progressive disease, which can be defined by an obstruction or limitation of airflow, which is not fully reversible. COPD is the third leading cause of death in the US, and presents as an important public health issue that can both be prevented and managed. COPD is associated with significant morbidity and mortality throughout the world. As of 2014 4.8% of the US population or 12.1 million people carried a diagnosis of COPD. [7]

The treatment and management of stable COPD is designed to prevent and control symptoms as well as decrease the frequency and severity of exacerbations. Recommendations for COPD medications are based on the severity and stage of the disease. The most common staging system uses spirometric classifications of COPD. Although staging based on symptoms is becoming much more widespread through utilization of the Modified British Medical Research Questionnaire (mMRC), and the COPD Assessment Test (CAT™).[6] Based on mMRC and CAT scores, as well as the number of past exacerbations requiring hospitalization, patients can be assigned to one of four categories: A, B, C, and D. the 2017 Global Obstructive Lung Disease Guidelines recommend a distinct treatment algorithm for each of these categories. [6] Medications used to manage stable COPD include short and long acting bronchodilators (beta-agonists and antimuscarinic agents) as well as inhaled corticosteroids. Available agents vary greatly in cost as well as insurance coverage (*figure 1*). Improper selection of bronchodilators could impose great economic burden on the patient, and may lead to adverse outcomes through reducing medication adherence[13]. "Financial Toxicity" is a term used to characterize the objective financial consequences as well as the subjective financial concerns related to a medical condition. Most commonly used to discuss cancer treatments, this concept can be applied to many high-cost conditions including COPD.

Cost Burden

In 2010 the average medical cost per person per year was $9,800 for patients with COPD, compared to $3,770 for patients without COPD.[5] The total medical cost spent by patients with COPD that year was over $32.1 billion dollars.[5] Within the state of Maryland the total medical treatment for patients with COPD was $1.1 billion, with 206,200 patients treated. Of the patients treated, 68.5% had either Medicare or Medicaid.[5] With eleven new FDA approvals for COPD medications since 2010, both the number of options for treatment of this disease state and the cost of many of these treatment options has increased.

The average cost of a COPD exacerbation requiring a hospital admission was estimated to be around $71,009. With regards to treatment, the cost of medications is around 31% of the total cost of medical care in patients with stage I COPD with a median at around $512 per year. For patients with stage II COPD the cost of medications is 14% or $720 per year, and for patients with stage III COPD the cost of medications is only 7%, or $766 per year.[8] While the cost of medication for COPD plateaus with the progression of the disease, the non-medication cost increases. For stage I, II and III the non-medication costs are $1,169, $4,317, and $10,046 respectively, driven by the high cost of hospitalization in the later stages of COPD II and III. [8]

It is projected that in the next 10 years there will be a 53% increase in the cost of COPD within the US from $32.1 billion to $49.0 billion.[8] In addition to the economic cost of COPD it also has a social burden due to the debilitating nature of the disease. In a study conducted in Italy, COPD was found to have a disability adjusted life year reduction of between 2.1-3.4 years in men and 1.0-2.3 years in women.[1]. The cost due to loss of productivity was estimated to be around an average of 3.2 days per year per person with COPD. This equates to around $3.9 billion lost due to decrease in productivity.[5]

The economic burden was amplified in 2014 due to the US centers for Medicare and Medicaid Service's (CMS) Hospital Readmissions Reduction Program (HRRP), which penalizes hospitals for excessive admissions of patients indexed with HRRP indications, which includes COPD. The readmission rates for COPD were around 22.6% or one in every 5 patients.[1] While multiple studies have been conducted targeting methods of decreasing COPD readmissions through non-pharmacological changes, none have demonstrated a link between quality of care and readmission rates.[1] A majority of studies have failed to show that interventions like smoking cessation counseling, screening for gastroesophageal reflux disease, standard inhaler teaching, depression and anxiety scoring, and 48 hour post-discharge phone calls were able to decrease readmission rates based on the CMS criteria.[11]

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Despite failed attempts at decreasing readmission rates through implementation of health system based policies, pharmacologic therapies have been shown to decrease the rates of COPD exacerbations as well as hospital readmissions.[12] Evidence has shown that appropriate pharmacologic management of COPD can decrease COPD related hospitalizations. With COPD being a CMS targeted disease state with regards to reimbursement, healthcare practitioners should carefully evaluate patient regimens and evaluate the financial implications involved with the cost of inhalers (*figure 2*). With almost 80% of COPD patients being unemployed, and 42% living at poverty levels, a patient's out of pocket expense needs to be taken into consideration[7]. Financial toxicity is a concept gaining increased attention, most often related to chemotherapy. [23]. Pharmacist researchers should also consider the financial toxicity of COPD treatment regimens. Pharmacists working in community settings, with managed care organizations, and/or on clinical health care teams are also uniquely positioned to recognize the financial implications of COPD treatment regimens and offer more affordable alternatives when appropriate. Further study and investigation into the cost benefit of bronchodilators needs to be conducted to better minimize the financial toxicity for patients.

Characteristic	%
Sex	
Male	41
Female	59
Education Level	
No GED	34
No College	61
Employment	
Currently don't work	79
Never Worked	34
Insurance	
Uninsured	15
Medicaid	36
Income	
Near Poor (100%-200% poverty)	39.4
Poor (Less than poverty threshold)	42

Figure 2: Demographics of Patients with COPD in the United States[7]

Figure 1: Examples of Co-Payments for Common COPD Medications Based on Insurance Carrier

COPD Medications			Insurance Company (co-payment, $)		
Brand Name	Generic Name	Medication Class	Blue Cross[26]	Maryland Physician Care[25]	Average Wholesale Cost ($)[24]
ProAir	Albuterol Sulfate	SABA	45	0	63
Xopenex	Levalbuterol Hydrochloride	SABA	55	81	81
Arcapta	Indacaterol Maleate	LABA	55	0	253
Striverdi	Olodaterol	LABA	80	0	217
Atrovent	Ipratropium Bromide	SAMA	45	0	313
Incruse Ellipta	Umeclidinium	LAMA	80	0	388
Spiriva Handihaler	Tiotropium Brominde	LAMA	45	0	340
Tudorza	Aclidinium Bromide	LAMA	55	0	301
Seebri	Glycopyrrolate	LAMA	473	473	473
Stiolto	Tiotropium Bromide/ Olodaterol Hydrochloride	LAMA	55	315	315
Advair Diskus	Fluticasone Propionate/ Salmeterol Xinafoate	Combined ICS / LABA	45	0	334
Breo Ellipta	Fluticasone/vilanterol	Combined ICS / LABA	55	386	386
Dulera	Mometasone Furoate/ Formoterol Fumarate	Combined ICS / LABA	45	0	274
Anoro Ellipta	Umeclidinium/Vilanterol	Combined ICS / LABA	80	0	409
Symbicort	Budesonide/Formoterol Fumarate	Combined ICS / LABA	45	0	349
Bevespi	Glcopyrronium Bromide/ Formoterol Fumarate	Combined LAMA / LABA	55	315	315
Utibron	Glycopyrronium Bromide/ Indacaterol Maleate	Combined LAMA / LABA	80	357	357

Abbreviations: SABA = Short-Acting Beta Agonist, LABA = Long-Acting Beta Agonist, SAMA = Short-Acting Antimuscarinic Agent, LAMA = Long-Acting Antimuscarinic Agent, ICS = Inhaled Corticosteroid,

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New Drug Update: Pembrolizumab (Keytruda™) for NSCLC

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Pembrolizumab, an anti-PD-1 antibody, originally approved in 2014 for metastatic melanoma, and subsequently approved for non-small cell lung cancer (NSCLC): as a first-line treatment for metastatic NSCLC with expression of PD-L1 on at least 50% of tumor cells, and as a second-line treatment for patients with metastatic NSCLC that has progressed after platinum-based chemotherapy (with PD-L1 expression on at least 1% of tumor cells[1]), has been granted a new FDA approved indication for NSCLC. In May 2017, after review of results from a phase 2 cohort of the open-label KEYNOTE-021 study[2], the FDA approved pembrolizumab in combination with pemetrexed and carboplatin (PC) for the treatment of patients with previously untreated metastatic non-squamous non-small cell lung cancer (NSCLC).[3] This new approval for NSCLC is unique in that it does not require a specified level of PD-L1 expression of cancer cells prior to treatment.

One hundred twenty three patients with locally advanced or metastatic non-squamous NSCLC and no prior systemic treatment for metastatic disease were enrolled in KEYNOTE-021. Participants received either 4 cycles of pembrolizumab 200 mg plus carboplatin area under curve 5 mg/mL per min and pemetrexed 500 mg/m2 every 3 weeks followed by pembrolizumab for 24 months and indefinite pemetrexed maintenance therapy or 4 cycles of carboplatin and pemetrexed alone followed by indefinite pemetrexed maintenance therapy. The primary outcome of objective response rate was higher for patients who received pembrolizumab plus chemotherapy compared to patients who received chemotherapy alone (55% vs 29%; p = 0.0032), and the risk of progression was reduced for patients who received pembrolizumab (HR for PFS 0.53, 95% CI: 0.31, 0.91, p=0.0205, and median PFS of 13.0 months vs 8.9 months.[2]

Adverse events were more common in patients who received pembrolizumab, and serious events occurred in 41% of the patients in the pembrolizumab plus PC arm compared with 28% in the PC alone arm. The common adverse reactions in patients who received pembrolizumab, reported in ≥20% of patients, were fatigue, pruritus, diarrhea, decreased appetite, rash, pyrexia, cough, dyspnea, musculoskeletal pain, constipation, and nausea[4], and the number of severe immune- mediated adverse events (IAE) is low. However, IAE's, including pneumonitis, colitis, hepatitis, hyperthyroidism, hypothyroidism, thyroiditis, and nephritis have occurred in clinical trials of pembrolizumab and may require the delay or discontinuation of treatment with pembrolizumab.[4]

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