MSHP JULY/AUGUST NEWSLETTER

Diane's Musings – Diane McClaskey, RPh, BCPS

Happy summer! The garden is starting to take off, so if any of you are in need of zucchini, I think I can supply the whole state of Missouri! Tomatoes are slowly coming on, the sage and basil are ready to be harvested and I've never seen so many cucumber blooms!

While I was picking green beans the other day, I was thinking about how a good plan for the garden is essential in getting the most out of your harvest. I like to begin planning in the winter, with all of the seed catalogs and a blank sheet of paper to begin my design.

Strategic planning for MSHP can be thought of the same way – having a good plan will make the most out of the organization and provide value to our members. We held our annual session on Saturday, June 21, with about 20 participants. We started out by reviewing our annual membership survey, which this year included a gap analysis. The gap analysis included an assessment of our value and performance to our members. Next we reviewed other state initiatives and goals that remained from last year.

The three strategic priorities will remain the same as last year: Patient Care, Membership and Organization and Performance. Key objectives for each area included:

Patient Care:

- Legislative Performance
- Professional Development
- Communication

Membership:

- Growth
- Increase Membership Diversity
- Engagement of Members

Organization and Performance:

- Board of Directors Performance
- Financial Performance
- External Collaborations/Relationships
- Internal Operations

From these objectives, 30 measurable tasks were identified as key to accomplishing these strategic priorities tied to our mission: provide education, leadership and advocacy to support our members in helping people make the best use of medications.

It was a very successful planning session, and I thank everyone who came to Springfield to be a part of the process. Stay tuned for the final product - we have a little bit of tidying up to do. I encourage each of you to take a moment to review the plan when published – remember, this is your plan, too!

Talk to you soon,

Diane

Hospital Pharmacy Regulatory Update – Bert McClary, RPh

At the end of the legislative session two bills were sent to the Governor that contain the proposed hospital pharmacy legislation language, SB 808 and SB 754. The Governor signed both bills on July 10 and they will become effective August 28. This is landmark legislation for hospital pharmacy, as it gives clear authority for the Board of Pharmacy to participate in the regulation of inpatient pharmacy practice. It provides a mechanism to clarify numerous questions and the confusion that has existed since a court decision in 1987 determined that BOP did not have authority over inpatient practice but did have authority over a hospital pharmacist's license.

MSHP participation was critical in developing the language which will provide benefits for health system practices. Summaries and discussions of specific provisions are in the January, March and May MSHP Newsletters. Briefly, the bills contain the following provisions:

- Joint rulemaking by BOP/DHSS on hospital medication management rules
- A single Class B Hospital Pharmacy license (inpatient and outpatient)
- Revise medication labeling requirements
- Authorize MTS based on medical staff committee (P&T) protocols
- Authorize medication transfer between facilities without a drug distributor license
- Establish a BOP Hospital Advisory Committee for hospital practice rules
- Authorize outpatient prescription dispensing based on a medication order
- Exempt from BOP license if only services provided are under DHSS jurisdiction

MSHP will be an active participant, along with the Board of Pharmacy, DHSS and other interested organizations in determining how and when the new provisions will be implemented. Some provisions will probably require procedural rulemaking by BOP and some will require joint rulemaking by BOP and DHSS.

The annual MSHP Strategic Planning meeting was held in June and recommendations were made regarding regulatory issues. The Public Policy Committee and others will determine specific tasks to implement the recommended Goals and Objectives.

The annual BOP strategic planning meeting will be held during the BOP open meeting on July 15 and 16. MSHP will participate and encourage BOP to make implementation of the new legislation a priority. Since the Newsletter deadline for this article occurs prior to the BOP meeting, brief results may have already been published by the time you read this.

There are a number of regulatory issues that are important to MSHP, BOP, DHSS, other regulatory agencies, and other private organizations such as MHA and MPA, and the new legislation will have an effect on most of them. The following topics will likely be discussed by the MSHP Public Policy Committee and the BOP Hospital Working Group during the coming year:

Pharmacist Scope of Practice

There are regulatory implications for different types of physican/pharmacist MTS protocol relationships, and there are questions pending to BOP related to MTS certificates and protocol orders initiated by an APN or PA. CMS and Congress are reviewing pharmacist reimbursement for clinical services. Recommendations for revising the BOP rule for pharmacists administering medications have been provided to BOP through the Missouri Pharmacy Coalition. Hospital MTS practices have potential for expansion through hospital medical staff privileges and medical staff membership for

pharmacists. Formal prescribing authority consistent with APRNs and PAs is a logical outcome when current allowed practices are fully implemented and the patient care benefits are successfully demonstrated to professional colleagues and regulatory agencies.

Technician Scope of Practice

Requests continue for expansion of technician activities in the areas of tech-check-tech, automation-check-tech, remote monitoring and medication reconciliation. A BOP rule that will include a list of prohibited activities is pending. An MSHP task force is collecting and summarizing current training standards, and a scope of practice document and recommendations are anticipated.

Class B Pharmacy License

This legislative provision will require rules and/or policies to determine the application process and locations eligible. Provisions relate to distribution between facilities, labeling and dispensing.

BOP/DHSS Rules

Some provisions of the legislation will require rulemaking by BOP and/or joint rulemaking by BOP and DHSS. DHSS hospital licensing rule changes are still pending, and additional minor changes may be required due to the new legislation. The BOP sterile compounding rule is being revised to merge USP 797 and BOP preferences. The pending BOP technician rule will include a list of prohibited activities.

Hospital Working Group/Hospital Pharmacy Advisory Committee

We have recommended that the BOP Hospital Working Group be re-convened immediately to address all hospital practice issues and the process of implementing the new legislation. The appointment process for the new BOP Hospital Pharmacy Advisory Committee should begin soon so the group can assume its new responsibilities.

Sterile Compounding Outsourcing Facilities

FDA has just published guidance documents relating to the Drug Quality and Security Act of 2013, including draft interim guidance for CGMPs for the new Outsourcing Facility category. BOP and DHSS are discussing FDA's request relating to state oversight of Outsourcing Facilities.

USP 800 Hazardous Drugs

This new USP General Chapter will address receiving, storage, compounding, distribution, administering, clean up and disposal of both sterile and non-sterile hazardous medications in both inpatient and outpatient settings.

Legislative Activities

MSHP played an important role in obtaining support for the hospital pharmacy legislation that was passed. The reasons and methods for this success, and other potential beneficial activities, will be evaluated for application to future legislative needs.

Other Health System Entities

MSHP is heavily focused on hospital-associated activities, but health systems are involved in other health care entities including home health agencies, hospice agencies, hospice inpatient facilities, ambulatory surgery centers and long term care facilities. There are state and federal regulations for these facilities, and health system pharmacists should develop

expertise in those that are operated by their health system. Practice development should be coordinated with other professional organizations and regulatory agencies to ensure that regulatory oversight does not occur without health system pharmacist participation. Licensing and certification rules for medication acquisition, storage, distribution and administration should be as consistent as possible between different types of facilities. While on-site pharmacist activities are not widely developed in these facilities, rules should recognize and encourage on-site pharmacist clinical and dispensing practices similar to hospitals. Some DHSS licensing rules language is written to allow greater pharmacist on-site involvement.

DHSS and BOP Staff Hospital Pharmacists

DHSS needs a full-time pharmacist but funds only a part-time position, and the incumbent will be resigning as of August 31. The facilities discussed in the previous paragraph are all licensed by DHSS. Also, BNDD, the Strategic National Stockpile and other public health entities under DHSS jurisdiction could benefit greatly from a full-time pharmacist. Joint funding of a pharmacist with BOP was explored during the past year, but personnel procedures prevented this from occurring. MSHP should encourage BOP and DHSS to pursue this arrangement, and encourage BOP to also directly hire a staff hospital pharmacist.

MSHP R&E Foundation – Paul Juang, PharmD, BCPS

Welcome MSHP R&E Foundation New Board Members!

The MSHP R&E Foundation is starting off a new year welcoming new Board of Directors members. Heather Pace is a new member to the R&E Board of Directors. She is currently an Assistant Director of University of Missouri Kansas City's Drug Information Center as well as a Clinical Associate Professor within the Pharmacy Practice Division at University of Missouri Kanas City School of Pharmacy. She graduated from University of Missouri Kansas City and completed a Drug Information Specialty Residency at University of Missouri Kansas City Drug Information Center. She has been extensively involved in MSHP serving as both the chair of the Newsletter Committee and as a member of the Board of Directors.

Jennifer Catlin is also a new member to the R&E Board of Directors. She is currently a Critical Care Pharmacy Specialist at CoxHealth South. She graduated from Creighton University and completed her PGY-1 Residency and Critical Care Specialty Residency at Avera McKennan Hospital and University Health Center. She is currently heavily involved with teaching and precepting PGY-1 and PGY-2 residents as well as developing pharmacist education.

Thomas Zlatic joins the R&E Board of Directors as the new public at-large member. He is currently a Professor of English at the St. Louis College of Pharmacy. He graduated from University of Missouri – St. Louis and received his Ph.D. from St. Louis University. He has maintained an ongoing scholarly research agenda in the fields of Media Ecology, American Literature and Pharmacy Education and has been heavily involved in ACPE where he became very interested in the area of professionalism and professionalization within the pharmacy education.

As we welcome these new members to the R&E team, we must take a minute to thank those who have graciously served the R&E Board. Andy Crannage, Kristin Repp and Mark Patterson have completed their 3-year term to the R&E Board of Directors. Thank you for your commitment, insight and hours served working to advance the practice of pharmacy within the state.

MSHP R&E Foundation Research Corner –
Andrew Smith, PharmD, BCPS (AQ Cardiology)

"Guiding Residents through Research Project Planning"

July is an exciting and busy month for health-system pharmacy. It is the month when a new crop of pharmacy residents begin their training. One of the key standards ASHP has for PGY1 residents is completion of a practice-based research project. This can be a daunting task for residents since that is usually not a strong focus of most pharmacy school curriculums. Residents will typically turn to seasoned preceptors for guidance in all aspects of their project from topic, design, implementation, data analysis, and dissemination. Depending on the experience of the preceptor this could be overwhelming. This edition of the MSHP R&E Foundation Research Corner will hopefully provide some resources to guide residents and preceptors in all aspects of project planning. While the focus of the resources are residency projects, I would suggest that many clinicians considering taking on a project within their health-system would benefit from these tips.

There are two main pieces of literature I would direct your attention too. The first was published in 2008 by Dr. Barletta in the *American Journal of Pharmaceutical Education*.[1] Dr. Barletta described the key steps for conducting a research project in great detail.

Steps for Conducting a Pharmacy Residency Research Project*	
1.	Idea generation
2.	Background literature search related to the idea
3.	Consideration of study design, objectives and feasibility
4.	Department/Residency Advisory Committee review
5.	Presentation of project list to residents
6.	Project selection
7.	Timeline development
8.	Protocol development
9.	Data collection tool development
10.	IRB submission and approval
11.	Data collection
12.	Data entry into computerized database
13.	Data analysis
14.	Presentation development

*adapted from reference #1

If you are a resident starting a project or a preceptor regularly asked to assist with project planning, this would be a great reference to have handy. I would like to comment on a couple steps and highlight some of my personal experiences.

Step 3- Consideration of study design, objectives and feasibility. It is imperative that preceptors use their experience to guide residents as they design their projects. Residents are typically very eager and "bite off more than they can chew". Preceptors need to be realistic and ensure the project is feasible for the timeframe. The GKCSHP affiliate has developed a novel program entitled Resident Research Day. This program affords residents feedback from preceptors from different institutions. Look for additional information regarding this program in a separate article in this newsletter and a letter to the editor in an upcoming edition of AJHP.

Step 10- IRB submission and approval- I have seen this step derail many resident projects. It is usually the rate limiting step. I have also seen residents grow significantly through this process and feel it is vital that the residents take the lead on obtaining IRB approval for their project. The MSHP R&E Foundation Research Corner article in the July-August 2013 newsletter provides insights from current and former residents for navigating the IRB process.

Step 11- Data collection- It is somewhat a rite of passage for residents to dig in and review stacks and stacks of charts (nowadays maybe just screens and screens). There is certainly value in that experience. However, if available, there is also value in residents supervising pharmacy students performing data collection for their project. This teaches project management skills as well.

Step 13- Data analysis- This is frequently the most anxiety-inducing step to mentor over for preceptors. I usually try to keep the statistical analysis very basic for residency projects. It is important to consider your analysis before data is collected and entered into the database. A few minutes of thought at the beginning may save residents hours of coding data later. If your institution is associated with a university you may be able to partner with a faculty member to provide data analysis support. The ASHP Foundation has a resource entitled Research Tips for Pharmacy Residents. It is quite detailed and covers statistical testing.

Step 14- Presentation development- Residents should be proud of their work and share their findings both within and outside the institution. Many projects get presented at Regional Residency Conference in May or June. Residents should be encouraged to write a manuscript describing their project. It is often difficult to get resident research published because these projects are limited by small sample size and lack of power in most cases. Regardless it is still valuable for residents to undergo the manuscript writing process. Recently a new peer-reviewed journal (Journal of Health-System Pharmacy Residents) was started with the expressed purpose to publish high quality residency project manuscripts.

In the second resource, Dr. Weber shares his experience guiding pharmacy residents through the research project process in a publication in *Hospital Pharmacy* in 2012.[2] Dr. Weber also discussed the importance of selecting an appropriate project idea and writing good specific aims. Additionally, there is a detailed discussion of an acceptable residency research timeline for completion within one year. While all dates can be flexible it certainly provides guideposts to start from.

In conclusion, mentoring residents through a research project should be a rewarding experience. Research skills are key components residents need to learn during residency. Project planning should be a joint effort between the

resident and the preceptors. Finally after you apply these tools, strongly encourage your residents to submit their abstracts for the poster session at the MSHP Spring Meeting. The R&E foundation sponsors a best poster competition; it is really exciting to see all the interesting research being completed in Missouri.

If you have any questions, comments or concerns please contact me at smithandr@umkc.edu.

References:
Barletta, JF. Conducting a Successful Residency Project. *American Journal of Pharmaceutical Education* 2008; 72 (4) Article 92. link

Weber, RJ. Pharmacy Residency Research Projects: Tips to Complete the Project in One Year. *Hosp Pharm* 2012; 47(9): 736-740. link

Featured Articles

Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

Kensy Maxwell, PharmD Candidate UMKC School of Pharmacy

Eric Wombwell, PharmD, BCPS UMKC School of Pharmacy

The Middle East Respiratory Syndrome (MERS) is a severe acute respiratory illness caused by a coronavirus (CoV). The first confirmed case was reported in 2012 in Saudi Arabia in a severe community-acquired pneumonia patient. Sporadic cases have been reported in surrounding countries around the Arabian Peninsula. In May of 2014 there was a significant increase in cases being reported worldwide as well as two confirmed cases in the United States. As of July 4 2014 there have been 827 laboratory-confirmed cases including approximately 287 related deaths as reported by the World Health Organization.

A wide clinical spectrum of disease severity associated with MERS-CoV has been described; from asymptomatic infection to acute upper respiratory illness, and rapidly progressing pneumonitis, respiratory failure, septic shock and multi-organ failure resulting in death. Common signs and symptoms include fever, chills/rigors, headache, non-productive cough, dyspnea, and myalgia. Other symptoms may include sore throat, nausea, vomiting, dizziness, sputum production, diarrhea and abdominal pain. The severity of associated pneumonia varies from mild to severe necessitating ICU management and ventilator support. In the patient population with co-morbid conditions such as diabetes, cancer, chronic lung, heart and kidney disease are an increased risk for developing more severe cases.

At risk populations for MERS-CoV include:

- Travel in the past 14 days from countries in or near the Arabian Peninsula
- Close contact with an ill traveler who has fever and acute respiratory illness with the same travel history as above
- Close contact with a confirmed or probable MERS case ill at the time of contact
- Health care personnel not using recommended infection-control precautions
- Exposure to camels

Incubation period for secondary cases from human-to-human contact is approximately 5 days, ranging from 2-14 days. The median time from illness onset to hospitalization is 4 days; in critically ill patients the time from illness onset to

intensive care unit admission is approximately 5 days and the median time from onset to death is approximately 12 days.

When diagnosing MERS-CoV radiographic findings may include unilateral or bilateral densities or opacities, interstitial infiltrates, consolidation, and pleural effusions. Laboratory findings may include leukopenia, lymphopenia, thrombocytopenia, and elevated lactate dehydrogenase levels. MERS-CoV virus can be detected with higher viral load and longer duration in the lower respiratory tract compared to the upper. It can also be detected in feces, serum, and urine; however, there is very limited data on the duration of MERS-CoV shedding. Most state laboratories are approved to test for MERS-CoV using the Center for Disease Control's RT-PCR (reverse-transcriptase polymerase chain reaction) assay. The FDA issued an Emergency Use Authorization on June 5 2013, to authorize use of CDC's 2012 real-time reverse transcription–PCR assay to test for MERS-CoV in clinical respiratory, blood, and stool specimens. The CDC has distributed this device to qualified laboratories in the United States and around the world.

There is no specific treatment for MERS-CoV infection currently available. Clinical management may include supportive care and management of complications and implementing infection prevention and control measures. According to the World Health Organizations Interim Guidance Document on the Clinical management of severe acute respiratory infections when novel coronavirus is suspected the following guidance is recommended:

Early Recognition and Management

- Recognize severe manifestations of acute respiratory infections
- Initiate infection prevention and control measures—standard precautions, droplet precautions, and airborne precautions
- Give supplemental oxygen therapy to patients with signs of severe respiratory distress, hypoxemia ($SpO_2 <$ 90%) or shock. Initiate Oxygen therapy at 5 L/min and titrate to $SpO_2 \geq 90\%$.
- Collect respiratory and other specimens for laboratory testing:
    - Routine clinical specimens for community-acquired pneumonia
    - Respiratory specimens from the upper and lower respiratory tract for known respiratory viruses
    - Testing should be done by RT-PCR.
    - Serial collection of respiratory specimens from multiple sites on multiple days (every 2-3 days)
- Give empiric antimicrobials to treat suspected pathogens, including community-acquired pathogens
- Use conservative fluid management in patients with severe acute respiratory illness (SARI) when there is no evidence of shock
- Closely monitor patients with SARI for signs of clinical deterioration, such as severe respiratory distress/respiratory failure or tissue hypoperfusion/shock, and apply supportive care interventions

Management of Severe Respiratory Distress, Hypoxemia and ARDS (Acute Respiratory Distress Syndrome)

- Recognize severe cases, when severe respiratory distress may not be sufficiently treated by oxygen alone, even when administered at high flow rates
- Mechanical ventilation should be instituted early in patients with increased work of breathing or hypoxemia that persists despite high-flow oxygen therapy
- Proceed with endotracheal intubation to deliver invasive mechanical ventilation
- Use a lung-protective ventilation (LPV) strategy for patients with acute respiratory distress syndrome (ARDS)
- In patients with severe ARDS, consider adjunctive therapeutics early, especially if failing to reach LPV targets
- Use conservative fluid management strategy for ARDS patients who are not in shock to shorten the duration of mechanical ventilation

Management of Septic Shock

- Recognize sepsis-induced shock when patient develops hypotension (SBP < 90 mmHg) that persists after initial fluid challenge or signs of tissue hypoperfusion (blood lactate concentration >4 mmol/L) and initiate resuscitation by protocol
- Give early and rapid infusion of crystalloid intravenous fluids for septic shock
- Use vasopressors when shock persists despite liberal fluid resuscitation
- Consider administration of intravenous hydrocortisone (up to 200 mg/day) or prednisolone (up to 75 mg/day) to patients with persistent shock who require escalating doses of vasopressors

Prevention of Complications

- Reduce days of invasive mechanical ventilation
- Reduce incidence of ventilator-associated pneumonia, venous thromboembolism, catheter-related blood stream infection, pressure ulcers, stress ulcers and gastric bleeding and ICU-related weakness

The MERS-Cov infection retains a concerning mortality rate of 30% overall; however, there has been evidence of sustained human-to-human transmission. Concern for infection amongst US citizens remains very low as both US cases developed in healthcare providers who lived in Saudi Arabia and traveled to the US. Emerging evidence points to camels as the primary reservoir for human spread.

REFERENCES

World Health Organization: Coronavirus infections [Online]. 2014 [cited 2014 July 9]; available from: URL: http://www.who.int/csr/disease/coronavirus_infections/en/

Center for Disease Control and Prevention: Middle East Respiratory Syndrome [Online]. 2014 [cited 2014 July 9]; available from: URL: http://www.cdc.gov/coronavirus/mers/

Arabi YM et al. Clinical Course and Outcomes of Critically Ill Patients With Middle East Respiratory Syndrome Coronavirus Infection. Ann Intern Med 2014; 160:389-397.

Assiri A et al. Hospital Outbreak of Middle East Respiratory Syndrome Coronavirus. N Engl J Med 2013; 369:407-16.

Cauchemez S et al. Middle East Respiratory Syndrome Coronavirus: Quantification of the Extent of the Epidemic, Surveillance Biases, and Transmissibility. Lancet Infect Dis 2014; 14:50-56.

Empiric Broad Spectrum Antimicrobial Therapy for Health Care Associated Pneumonia: A Review of Recent Literature

David J. Flynn, Pharm.D. Candidate - UMKC School of Pharmacy

Francis Kinyanjui, Pharm.D. Candidate - UMKC School of Pharmacy

Eric Wombwell, Pharm.D., BCPS - UMKC School of Pharmacy

Pneumonia is a major cause of morbidity and mortality across the globe. Data from the Center for Disease Control (CDC) indicates it is the number one cause of infectious disease related death in United States[1]. As a result, aggressive and effective treatment strategies are necessary to curb the rise in prevalence, severity, and ultimately mortality. In 2005, the American Thoracic Society (ATS) and Infectious Disease Society of America (IDSA) developed a new evidence based guideline for treatment of pneumonia and stratified pneumonia patients into 3 different subsets: community acquired pneumonia (CAP), health care associated pneumonia (HCAP), and hospital acquired pneumonia (HAP). The goal for this classification was aimed at assisting clinicians in identifying the risk factors predisposing their patients to pneumonia infections caused by more virulent and drug resistant pathogens (DRP) such as *Pseudomonas aeroginosa,* Methicillin-Resistant *Staphylococcus Aureus* and *Acinetobacte*r species. After extensive analysis of mostly retrospective studies and a few randomized controlled trials, the consensus guidelines of 2005 concluded that a subset of patients presenting from the community with specific risk factors have infections with resistant organisms more often, newly termed HCAP opposed to CAP patients. The guidelines classified a patient as having HCAP based on the following risk factors: hospitalization for ≥2 days in the preceding 90 days, residence in a nursing home or extended care facility, home infusion therapy (including antibiotics), chronic dialysis within 30 days, home wound care, and family member with multidrug-resistant pathogens.

According to the current pneumonia treatment guidelines, HCAP is empirically treated with broad-spectrum antibiotics comprising of three agents: anti-pseudomonal beta lactam, anti-pseudomonal non-beta lactam, and an agent active against MRSA[2]. However not all of the patients have drug resistant pathogens isolated from sputum or blood cultures. This brings in the concerns by many health care professionals that a substantial portion of HCAP patients are being over treated with unnecessary antibiotics which put them at a risk for drug toxicity and bacterial resistance notwithstanding unwarranted hospitalization and financial burden.

One of the most common primary outcomes studied in pneumonia patients is the 30-day mortality rate. There have been several studies that have analyzed the differences in mortality between pneumonia patients classified as having HCAP versus those classified as having CAP. One of which was a prospective observational study involving 1348 pneumonia patients that was conducted in the UK by Chalmers et al[3]. The study looked at the differences in mortality and the need for mechanical ventilation and/or vasopressor support (MV/VS) between the HCAP (277) and CAP (1071) patients. The results showed that HCAP was associated with a higher 30-day mortality rate (OR 2.15 [1.44–3.22]; P=0.002), but no difference in the need for MV/VS (HCAP: 5.8%; CAP: 7.9%; P=0.3). However, there were significant differences identified in the severity of presentation of the patients and the number of comorbidities between the groups. HCAP patients were found to be older than CAP patients (median age of 76 vs 65), had more comorbidities such as congestive heart failure, cerebrovascular disease, chronic obstructive pulmonary disorder, had overall worse functional status, had more risk factors for aspiration pneumonia, and had overall higher initial CURB-65 and PSI scores (which indicate greater severity of pneumonia disease). When these differences were included in the multivariate analysis, there were no differences in the 30-day mortality between these groups of patients (AOR 1.29 [0.83–2.01]; P=0.3). From this we can take away that, yes, there are differences in the 30-day mortality rates between HCAP and CAP patients, but this is primarily due the fact that HCAP patients generally present with a greater degree of severity of their illness due to a number of reasons including more baseline comorbidities.

A large retrospective study published in 2011 by Attridge et al looked at the difference in 30-day mortality and hospital length of stay (LOS) among 15,071 HCAP patients. The study grouped patients into one of three categories: those treated with guideline-concordant HCAP therapy (GC-HCAP) (1,211), those treated with guideline concordant CAP therapy (GC-CAP) (11,408), and those treated with non-guideline concordant therapy (with any combination of the above, for example: single AP coverage only, or MRSA plus AP coverage, etc) (2,452). Not surprisingly the results showed that when compared to GC-CAP, GC-HCAP had a longer average hospital LOS (7 days vs 4 days) and had a higher 30-day mortality rate (22.8% vs 9.9%). However, when comparing the non-GC group to GC-HCAP there were no significant differences in 30-day mortality rates, despite non-GC patients experiencing a shorter hospital LOS compared to the GC-HCAP group, 4 days vs 7days respectively. Other notable findings in this study were that patient mortality increased significantly as the number of HCAP risk factors increased from 1 to 3 or more, as well as the occurrence rates of *S. aureus* and *P. aeruginosa*[4]. Collectively the results of this study show that following the recommended initial empiric antibiotic therapy by the IDSA did not decrease the 30-day mortality rate or hospital LOS, but accumulation of risk factors yielded worse outcomes bringing into question whether broad-spectrum antibiotics are appropriate for all HCAP patients.

As mentioned earlier, being able to accurately identify the most pertinent risk factors that predisposes pneumonia patients to acquiring DRPs is key to knowing how and when to treat them with the most appropriate empiric antibiotic therapy. Trials published following the guidelines outline different approaches to predict pertinent risk factors in the subgroup of HCAP. One prospective multicenter study conducted in Japan from June 2009 to May 2011 used the above mentioned IDSA recommended HCAP risk factors and included two more: immunosuppression (defined as Acquired Immune -Deficiency Syndrome (AIDS), administration of chemotherapeutics, or receiving immunosuppressive agents) and poor functional status. Disease severity was then used to group patients into non-severe and severe subgroups. Severity was based on the need for mechanical ventilation or ICU admission. Non-severe patients with ≤1 risk factors received CAP therapy (quinolone OR macrolide/beta-lactam), non-severe patients with ≥2 risk factors received HCAP therapy, severe patients with zero risk factors received CAP therapy (beta-lactam PLUS macrolide or quinolone), and severe patients with ≥1 risk factors receive HCAP therapy. Monotherapy was prescribed in 47% of the HCAP patients, only 10% of whom were inappropriately assigned to monotherapy, which was not statistically significant[5]. As a result, basing empiric therapy for HCAP on severity and presence of the above risk factors may be a useful approach that achieves positive outcomes without excess use of broad-spectrum antibiotics.

Another prospective observational multicenter trial conducted in Japan aimed at investigating a totally new set of risk factors that are frequent in both CAP and HCAP patients and how those risk factors could be relevant in predicting the presence of DRPs. These risk factors were: recent hospitalization, immunosuppression (defined as either having AIDS, use of chemotherapeutics, or receiving immunosuppressive agents), use of antibiotics within the last 90 days, use of gastric acid suppressive agents, tube feeding, and non-ambulatory status. The study revealed that irrespective of CAP/HCAP classification, patients with 0-1 risk factors had □ 10% of having DRPs and thus could be treated with monotherapy. Patients with 2 risk factors have intermediate risk for DRPs and empiric therapy could be based upon patient status, like severity and medical history, while patients that had □3 risk factors had □40% of having DRPs and treatment with broad-spectrum antibiotics would be recommended[6].

Another mentionable study that was conducted in Unites States sought to investigate validity of risk scoring system that had been recommended by a prior study. Four prominent risk factors were given weights for DRPs as follows: recent hospitalization – 4 points, long-term care residence – 3 points, chronic dialysis – 2 points, and admission to intensive care units within 24 hours of evaluation in the emergency department – 1 point. Results from this study showed that patients infected with DRPs had a median of 2 risk factors ($p<0.001$) compared to median of 1 in patients not infected with DRPs[7]. A solitary risk factor may not be a lone determinant for initial broad-spectrum therapy in HCAP;

however recent hospitalization deserves higher consideration in the decision making for empiric broad-spectrum therapy as opposed to just admission to ICU.

In conclusion, pneumonia is a major cause of infectious disease worldwide. Despite having guidelines available, identifying the most significant risk factors for DRPs and the selection of the most appropriate empiric antibiotic therapy for the HCAP subset continues to be a challenge to clinicians. Using the guidelines as an initial guide to identify and treat HCAP is beneficial; however the more recent literature is suggestive of different approaches to improve identification and clinical outcomes. More recent studies recommend that initial antimicrobial selection be based upon a combination of severity of illness and number of risk factors that predispose patients to resistant pathogens.

References

1. Attridge R, Frei C. Health Care-associated Pneumonia: An Evidence-based Review. *Am J Med* 2011; 124: 689-697.
2. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. *Am J Respir Crit Care Med* 2005; 171: 388–416.
3. Chalmers J, Taylor J, Singanayagam A, *et al*. Epidemiology, Antibiotic Therapy, and Clinical Outcomes in Health Care – Associated Pneumonia: A UK Cohort Study. *Clin Infect Dis* 2011; 53(2): 107–113.
4. Attridge R, Frei C, Restrepo M, *et al*. Guideline-concordant therapy and outcomes in healthcare-associated pneumonia. *Eur Respir J* 2011; 38: 878–887.
5. Maruyama T, Fujisawa T, Okuno M, *et al*. A New Strategy for Healthcare-Associated Pneumonia: A 2-Year Prospective Multicenter Cohort Study Using Risk Factors for Multidrug-Resistant Pathogens to Select Initial Empiric Therapy. *Clin Infect Dis* 2013.
6. Shindo Y, Ito R, Kobayashi D, *et al*. Risk Factors for Drug-Resistant Pathogens in Community-acquired and Healthcare-associated Pneumonia. *Am J of Respir and Crit Care Med* 2013; 188.
7. Shorr AF, Zilberberg MD, Reichley RM. Validation of a Clinical Score for Assessing the Risk of Resistant Pathogens in Patients with Pneumonia Presenting to the Emergency Department. *Clin Infect Dis* 2012.

New Kids on the Block: New therapies in managing chronic obstructive pulmonary disease

Daniel Garrison, PharmD Candidate – St. Louis College of Pharmacy

Cassie Heffern, PharmD, BCACP – CoxHealth

Breo Ellipta® is a new COPD inhaler approved by the FDA for maintenance therapy in May of this year. Breo Ellipta® contains fluticasone furoate 100mcg & vilanterol 25mcg inhalation powder. This is the first COPD medication to contain vilanterol, an ultra-long acting beta agonist. Vilanterol has a much longer half-life than other commonly prescribed long acting beta agonists (LABA) such as salmeterol. Also, this is the first time fluticasone furoate has been approved for the treatment of chronic obstructive pulmonary disease (COPD). Fluticasone furoate has a higher lung tissue affinity than fluticasone propionate, which leads to increased lung residency. This has led researchers to believe that fluticasone furoate is more effective than fluticasone propionate but there haven't been any studies directly comparing the two.[1]

	Breo Ellipta®	***Advair®***	***Symbicort®***	***Dulera®***
Corticosteroid (half-life)	Fluticasone Furoate (24 hours)	Fluticasone Propinate (7.8 hours)	Budesonide (4.7 hours)	Mometasone (25 hours)
LABA (half-life)	Vilanterol (21.3 hours)	Salmeterol (5.5 hours)	Formoterol (7.9 hours)	Formoterol (7.9 hours)
Dosing	Once Daily	Twice Daily	Twice Daily	Twice Daily
Indication	COPD	COPD & Asthma	COPD & Asthma	Asthma

Comparison of popular corticosteroid / long-acting beta agonist combination products.[2]

Tudorza™ (aclidinium bromide) is a new long acting muscarinic antagonist indicated for the treatment of chronic obstructive pulmonary disease (COPD). Aclidinium will directly compete with Spiriva® (tiotropium bromide), as both medications are in the same class and have the same indications. A meta-analysis consisting of 21 studies (22,542 patients) showed that aclidinium and tiotopium were equally efficacious for COPD treatment.[3] Aclidinium has a lower potential for systemic anticholinergic side effects because aclidinium is quickly metabolized into inactive metabolites once it is systemically absorbed.[4] The quick hydrolyzation of systemic aclidinium leads to having a significantly better side effect profile when compared with tiotropium. Also, aclidinium was shown to reach its pharmacodynamics steady state within 2 days while tiotropium took an average of 8 days to reach its pharmacodynamic steady state.[5]

The Tudorza Pressair™ comes preloaded with 60 doses, a dose indicator, and a colored control window that is red but will turn green to signal that a dose is ready to be inhaled. The Spiriva Handihaler® is accompanied by a blister pack of capsules that have to be manually loaded into the inhaler by the patient. The Handihaler® does not have a dose counter or a way to signal when the dose is ready for inhalation. The differences in administration may make aclidinium easier for the patient to handle.

	Tudorza Pressair™	***Spiriva Handihaler®***
Active ingredient	Aclidinium bromide	Tiotropium bromide
Most common side effects	➢ Headache (6.6%) ➢ Nasopharyngitis (5.5%) ➢ Cough (3%)	➢ Upper Respiratory Infection (41% to 43%) ➢ Xerostomia (12% - 16%) ➢ Pharyngitis (7% - 9%) ➢ Sinusitis (3% - 11%) ➢ Constipation (4%)
Half-life elimination	5-8 hours	5-6 days
Dosing	Twice Daily	Once Daily

Comparison of side effects and dosing between aclidinium and tiotropium.[2]

1. Biggadike, Keith. "Fluticasone Furoate/fluticasone Propionate - Different Drugs with Different Properties." *The Clinical Respiratory Journal* 5.3 (2011): 183-84. *NCBI*. Web. 10 July 2014.
2. Micromedex® Healthcare Series, Thomson Micromedex, Truven Health Analytics. Greenwood Village, CO. (2014).
3. Karabis, A., L. Lidner, and M. Mocarski. "Comparative Efficacy of Aclidinium versus Glycopyrronium and Tiotropium, as Maintenance Treatment of Moderate to Severe COPD Patients: A Systematic Review and Network Meta-analysis." *International Journal of Chronic Obstructive Pulmonary Disease* (2013). *MEDLINE*. Web. 11 July 2014
4. Andersson PE and Olanoff LS. *Aclidinium Bromide, a Novel, Long-acting Anticholinergic in Phase III Development for Maintenance Treatment of COPD*. Presentation. Almirall and Forest Laboratories Inc., 2008. Web. 11 July 2014.
5. Fuhr, Rainard. "Efficacy of Aclidinium Bromide 400 µg Twice Daily Compared with Placebo and Tiotropium in Patients with Moderate to Severe COPD." *CHEST Journal* 141.3 (2012): 745. Web. 11 July 2014.

Electronic Cigarette, Cessation Tool or Bad Habit?

Brendon Wilson, PharmD Candidate – UMKC School of Pharmacy

Cassie Heffern, PharmD, BCACP – CoxHealth

We all know the routine of counseling patients on the benefits of smoking cessation. As providers it is also up to us to help patients choose which available product could benefit the patient the most in their journey to be tobacco free. The newest of these products to help smokers quit is the electronic cigarette, also known as an e-cig. Although the e-cig seems to be an effective tool, there has been some controversy surrounding the new product.

E-cigs come in both disposable and non-disposable forms. Both work similarly. See below for a simple illustration of an e-cig. There is a LED light on the end of the e-cig to simulate the burning of a cigarette when someone takes a puff from it. Inside the e-cig is a lithium battery to power this LED light as well as the heating coil. The heating coil heats up the liquid nicotine causing it to turn to vapor so that it can be inhaled by the consumer. In a disposable e-cig the product can be thrown away once all the liquid nicotine is used up. The non-disposable e-cigs are designed so that they can be refilled with liquid nicotine or a cartridge containing liquid nicotine. The non-disposable e-cigs can be recharged from the computer using a USB cord or from a regular wall outlet. The e-cig is often considered to be another form of smoking, but e-cig users aren't emitting second-hand smoke. The e-cigs release/emit water vapor rather than smoke.

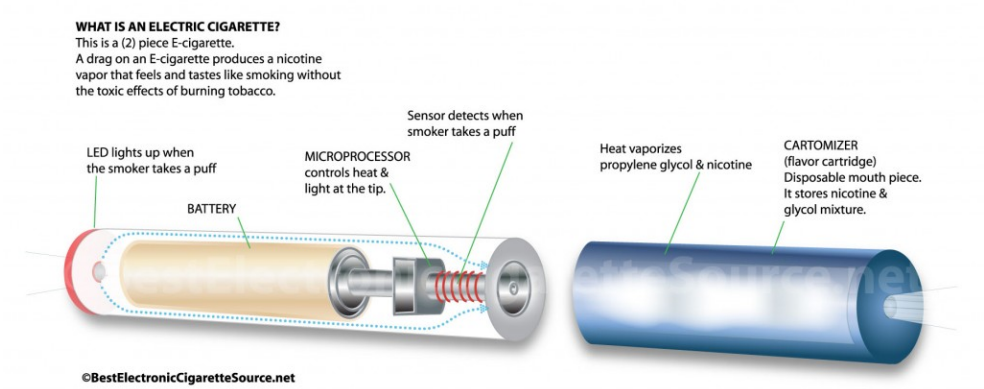

Illustration of an e-cig[1]

Some parties feel that smoking an e-cig is just as bad as smoking a cigarette. Both have nicotine in them which is highly addictive. The e-cigs aren't regulated by the FDA and therefore some consumers feel there could be unknown harmful ingredients that aren't regulated, as well as contain an unknown amount of nicotine. As e-cigs have become more popular, the number of calls to the Poison Control Center regarding their use has risen. Calls increased from 1 per month in September 2010 to 215 in February 2014.[2] Adding to this argument, the FDA's official statement on the matter is "e-cigarettes may contain ingredients that are known to be toxic to humans, and may contain other ingredients that may not be safe." [3] Others believe that the e-cigs are overly appealing to a younger population with being available in a multitude of different flavors. According to the CDC website, only 4.7% of high school students used an e-cig in 2011. This number rose to 10% in 2012 with 1 in 5 of the users saying they had never smoked cigarettes prior to the e-cig.[4] Parents are raising the concern that in some states an e-cig might be too readily available to minors. In 2012, The National Youth Tobacco Survey reported 85,000 teens said they had bought tobacco off the internet in the past 30 days. This equates to over 1 million tobacco sales each year to teens.[5] Another study showed only 7% of websites selling cigarettes required a driver's license. Over half of these web sites only required that the consumer mark a box saying they are over the age of 18.[5] with many of the online cigarette companies now selling e-cigs and e-cig supplies one might see why parents are concerned.

While much of the population is against the e-cig, many people are proponents of the product. It has been argued that although the e-cig contains nicotine, it doesn't contain all the other harmful ingredients making it less harmful to the consumer. Additionally, since e-cigs emit water vapor versus smoke, this could potentially lead to less second hand smoke exposure. A study was conducted to evaluate the merit of this concept (wording). Researchers placed individuals smoking either a cigarette or using an e-cig in an air tight room for five minutes then tested the air quality. The air samples showed that cigarettes produced over 10 times the amount of second hand nicotine as e-cigs. Cigarettes produced about 32 mcg per cubic meter of air while e-cigs produced about 2.5 mcg of nicotine per cubic meter.[6] others argue the e-cig is a cheaper alternative to cigarettes. Those in favor of using the e-cig as a cessation tool argue the amount of nicotine a "vaporer" is using can be controlled allowing for a down titration off of nicotine. Common strengths in which the e-cig cartridges are available range from 4 to 48 mg/mL. Adding to this argument, smokers have said it is better than other nicotine replacement therapies because it allows for the hand to mouth motion to be completed, satisfying the desire to complete this ritualistic motion. One particular study showed a statistically significant difference in successful cessation rates with the e-cig versus use of a nicotine patch (P=0.018). The success rate with e-cigs was 7.3% versus 5.8% in those using the nicotine patch.[7] Another positive aspect for the e-cig is the claim of no longer smelling poorly due to only vapor coming from the e-cig instead of smoke.

It is well known that nicotine is one of the most addictive drugs on the market today. Ask almost any smoker and they will tell you there is no easy way to overcome this addiction, but as providers we are here to help these patients achieve smoking cessation. It is up to us to provide all of the tools and facts about the options and help patients decide what is best for them.

References

1. "Making the Switch to E-cigarettes" Web. 14 July 2014. http://howtovape.com
2. Harrison, Laird. E-Cigarette-Related Poison Center Calls Surge. *Medscape*. Apr 03, 2014. Retrieved from http://www.medscape.com/viewarticle/823052
3. Norton, Amy. Study Finds E-Cigarettes Affect Airways, and Quickly. *Medscape*. Jan 05, 2012. Retrieved from http://www.medscape.com/viewarticle/756472
4. Centers for Disease Control and Prevention (2013). E-cigarette use more than doubles among U.S. middle and high school students from 2011-2012. Retrieved from www.cdc.gov/media/releases/2013/p0905-ecigarette-use.html
5. Cohen, Marsha. "FDA to Kids: Not 18? No Problem! Buy your e-cigs (and cigars and other tobacco products) online! *Tobacco USFC.* 05 May 2014. Web. 11 May 2014. http://tobacco.ucsf.edu/fda-kids-not-18-no-problem-buy-your-e-cigs-and-cigars-and-other….
6. Jegtvig, Shereen. E-Cigarette Vapor Contains Nicotine, Not Other Toxins. *Medscape*. Jan. 2014. Retrieved from http://www.medscape.com/viewarticle/818679
7. Canavan, Neil. Electronic Cigarettes as Good as Patch for Quitting Smoking. *Medscape*. Sept. 2014. Retrieved from http://www.medscape.com/viewarticle/818679

Other Announcements – Gwyn Collier, CPhT, MCPhT, MBA

Exciting program news!

As the final step of the programmatic accreditation, the American Society of Health-System Pharmacists (ASHP) completed on-site surveys on September 5 and 6, 2013 at the Zona Rosa and Independence campuses for the pharmacy technician program. The ASHP Commission on Credentialing met in March 2014, and voted to approve accreditation the pharmacy technician training program both locations. The ASHP Board of Directors reviewed and accepted the Commission on Credentialing's actions on April 9, 2014, to grant accreditation for six years (2020).

The initial steps for accreditation started in June 2012, with the applications sent in December 2012. With the help from our pharmacy technician students and graduates, deans and campus directors at Independence and Zona Rosa, pharmacy technician instructors, faculty, staff, advisory committee members, other program coordinators, preceptors, program chair and central administration, we were able to make the dream a reality.

Independence and Zona Rosa are currently the only ASHP accredited pharmacy technician programs in the State of Missouri. We are very happy for our students and NAU. Thank you everyone!

(From MyNAU Website, April 24, 2014)

Pharmacy Technician Accreditation

The American Society of Health-System Pharmacists (ASHP) completed on-site surveys of the pharmacy technician programs at the Zona Rosa and Independence campuses of NAU during September 2013. The ASHP Commission reviewed and accepted the Commission on Credentialing's actions during April, and accreditation was granted for 6 years. NAU's programs in Missouri are the only ASHP pharmacy technology programs accredited in the State of Missouri.

(From National American University National News, June 2014)