We interviewed Quinn Pack, MD, IHDP Fellow and Associate Professor of Medicine at UMMS-Baystate, about his Baystate-funded Research Pilot Award Program (RPAP) grant examining exercise prescription in cardiac rehabilitation.

**What are the goals of the project?**

This is a two year study that aims to examine the exercise progression of 60 patients who are participating in cardiac rehabilitation at Baystate Medical Center. A variety of exercise is good for healthy people, but the evidence is less clear about the activities that are good for patients who have had a heart attack. We think walking is good, but what about running, cycling, water aerobics, yoga, or strength training? Patients also frequently ask us detailed questions about types of exercise, the optimal amount of time that should be spent exercising, and how soon to return to vigorous exercise. This study aims to better understand the safest and healthiest approach to exercise for patients who have recently had a cardiac event.

Currently, there are two main methods for prescribing exercise as part of cardiac rehabilitation. The first is an effort-based exercise prescription where patients are asked to exercise at “moderate intensity” (typically at a 3 or 4 on a 10-point scale). The second main way to prescribe exercise is by giving patients a target heart rate goal (e.g. heart rate of 130 beats per min while exercising) to guide exercise intensity. These two methods are often used interchangeably, but there is recent evidence to suggest that a target heart rate goal leads to greater exercise gains in cardiac rehabilitation. This is important because higher exercise gains have been associated with better long-term prognosis. Yet no studies have ever prospectively compared these two methods, despite the fact that there is an entire industry of heart rate trackers geared towards increasing people's athletic performance.

To date, we have recruited 25 of 60 patients. Patients are randomized to get either an effort-based or a target heart rate-based exercise prescription. Some of the patients also undergo an exercise stress test.
Patients then attend cardiac rehabilitation for 3-5 months and exercise 2-3 times per week. At the end, everyone’s exercise capacity is measured and compared between groups.

**What are the next steps for this project?**

Because this pilot project will not enroll enough patients to definitively answer this question, we plan to use these early data to apply for a larger grant through the NIH to compare exercise strategies in 400 patients. We anticipate this pilot grant will provide the critical preliminary data needed for a successful application in June 2020.

**What does this research mean for patients at Baystate?**

We think that patients who participate will benefit from the extra attention given to their exercise prescription. Anecdotally, staff members at cardiac rehabilitation report that patients in the target heart rate goal seem to be exercising at a higher intensity and this is benefitting all patients who are attending cardiac rehabilitation, even if they are not participating in the trial. Conducting a large study such as this one will also further establish Baystate as a national leader in the field of research focused on cardiac rehabilitation.

**Who are your partners in this research?**

As part of this study, we have been very lucky to collaborate with Sam Headley, PhD, and Meredith Shea, PhD-candidate, both at Springfield College, an institution with a long history of doing research in physical activity and exercise. Our Springfield College-based collaborators have contributed to planning, developing, and implementing this research protocol.

**Tell us more about the RPAP mechanism!**

The Research Pilot Award Program (RPAP) has a goal of increasing the number of investigators whose research is supported by NIH or other external funding. We are very lucky to have received two years of funding through this mechanism, allowing us to gather and analyze the pilot data required to develop and submit a large NIH grant.

**Pneumococcal Urinary Antigen Testing is Underused in Patients with Pneumonia**


We interviewed Jennifer Schimmel, MD, Assistant Professor of Infectious Disease at UMMS-Baystate, about her recent paper, which appeared in Clinical Infectious Diseases.
What was the motivation for the study?
As a physician in the Infectious Diseases Division and co-director of the Baystate Health Antimicrobial Stewardship program, I am particularly interested in tools that allow us to minimize unnecessary antibiotics and avoid the unintended consequences of antibiotic overuse: microbial resistance, C. diff, and other adverse effects of antibiotics. Streptococcus pneumoniae is still the most common bacterial cause of community-acquired pneumonia, and can be identified by blood culture, sputum culture or pneumococcal urinary antigen (UAT). UAT is rapid, performed in-house at many hospital laboratories, unaffected by prior antibiotic administration and has a higher sensitivity than cultures. It is recommended in the recently updated (October 2019) IDSA/ATS Guideline for patients with severe community acquired pneumonia (CAP). The prior version of this guideline also suggested obtaining UAT in patients where broad-spectrum empiric antibiotics were recommended and knowledge of the specific pathogen would alter management decisions. Since there have also been recent studies showing that many patients with CAP are treated with empiric broad spectrum antibiotics, it follows that a positive UAT result would allow antibiotics to be narrowed, and UAT could serve as a useful antibiotic stewardship tool. The goal of this study was to characterize the use and impact of pneumococcal urinary antigen (UAT) in routine clinical practice.

What were the main findings?
Other studies have looked at the utility of UAT on a smaller scale, but for this study, my collaborators and I (former Baystate faculty member Dr. Michael Rothberg, as well as IHDPS faculty) used the large and nationally-representative Premier inpatient database. Over a 5 year time period, our analysis included 159,894 adult patients with pneumonia from 170 US hospitals, for whom we had UAT results, culture results and antibiotic data. Of these patients, 15.5% had UAT performed. In keeping with the IDSA/ATS Guideline, UAT was more commonly performed in ICU patients (18.4%). The proportion of patients who had UAT testing ranged from 0-69% at the hospitals with 100 or more eligible patients. Compared to patients with a negative UAT, patients with a positive UAT were more likely to have a culture (blood or respiratory) positive for S. pneumoniae and less likely to have a bacteria isolated that would have been resistant to therapy for S. pneumoniae. This is important because it should help reassure clinicians that using UAT as a tool for antibiotic stewardship and narrowing antibiotic therapy in these patients will not cause them to undertreat patients.

In terms of how the UAT result impacted antibiotic therapy, most patients who initially received broad-spectrum antibiotic therapy were still treated similarly 3 days later, but for those patients who had a positive UAT, coverage was narrowed in 38.4%, compared with 17% of those with a negative UAT and only 14.6% of untested patients. Overall, it seems that a positive UAT helps with antibiotic de-escalation for patients with pneumonia.
Are there any concerns about using UAT as tool for de-escalation?
Since overall mortality was low in this study, it is not possible to determine the safety of de-escalation based on UAT results. However, only 3 patients were admitted to the ICU after antibiotic de-escalation.

How can the results help guide clinicians at Baystate Health taking care of inpatients with pneumonia?
It is important to keep this test in mind for patients with pneumonia who are treated with empiric broad spectrum antibiotics for CAP, especially when the results would allow for de-escalation of antibiotic therapy. Future studies are still needed to look more closely at patient outcomes, not just antimicrobial de-escalation. It would also be helpful to better understand the economic impact of increased use of UAT.

Learning Health System in Focus: Improving outcomes for patients requiring outpatient parenteral antibiotic therapy (OPAT)

In October 2018, the BMP Quality Council launched its first learning collaborative, involving teams representing multiple clinical specialties. Each team assembled a group of front-line staff and providers to work together on a quality improvement project of their choosing under the guidance of an improvement specialist over 6 months.

Teams followed quality improvement processes using the DMAIC approach. The DMAIC is a five-phase improvement methodology—Define, Measure, Analyze, Improve and Control—for improving existing process problems with unknown causes. The learning collaborative supports peer-to-peer learning and empowers front line staff to measure a process, make changes, and engage the rest of the clinic team in creating new standards. The teams were successful not only in learning and applying state-of-the-art quality improvement processes but also in making progress on their established goals. Based on this success, the BMP Quality Council recently issued a call for proposals for a second collaborative, and has selected 5 teams that will start work on their projects in early 2020.

One of the projects selected for 2019 is ‘Transitioning the care of patients on long-term outpatient parenteral antimicrobial therapy (OPAT) from the inpatient to the outpatient setting,’ led by Megan Gallagher, an infectious disease specialist who joined Baystate in 2018. In the recent years, OPAT has experienced a significant growth due to acceptance with patients and providers, technological advances, once-daily antimicrobials, and cost-containment goals. However, transitioning the care of patients on OPAT requires coordination of multiple health care professionals– hospitalists, infectious diseases specialists, case managers, social workers, rehabilitation professionals, visiting nurses (VNA), and home infusion companies.
Patients typically have complex care needs: a vascular catheter (central line or PICC line) for antimicrobial infusion that needs maintenance care; an uninterrupted supply of intravenous drugs, which may be delivered by home infusion companies or administered in an infusion suite; weekly blood draws by VNA/home infusion nurse for safety blood work monitoring; and outpatient follow-up visits with the ID specialists and other physicians for clinical reevaluation. The discharge destination of patients on OPAT can be to home or a facility, adding a layer of complexity of the transition.

The literature shows that OPAT patient are at higher risk for readmissions compared to the general population; however readmission rates for OPAT patients at BMC are significantly higher than reported data on other US OPAT programs (13-26%).

Among the 142 patients discharged on OPAT between 10/29/2018 and 7/11/2019:
• 51 patients (36%) were readmitted within 30 days for a total of 60 readmissions
• 73 patients (51%) presented to an ED for a total of 89 ED visits
• 1 patient died

The OPAT team’s goal is to decrease preventable ED visits and readmissions in patients discharged on OPAT while simultaneously transforming patients’ experience. With her team, Dr. Gallagher will review the current state of OPAT in BMC to understand the processes and determinants of practice. The team will then choose, test, and adapt best practices to improve patients’ outcomes.

This project was recently presented at Baystate’s monthly Learning Health System rounds and was selected as a case-study. As such, it will receive additional support from a biostatistician and a researcher with expertise in implementation science. Stay tuned!

Recent IHDPS Publications: October-November


