



MUSCULOSKELETAL MATTERS

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COVER ART BY KIERAN BUCK

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FAMILY PRACTICE ON THE FIELD AND BEYOND: AN INTERVIEW WITH DR. WOLOSKI

Maya Van Gieson

Dr. Jason Woloski is a Family Medicine Physician located primarily in Wilkes-Barre. In addition to seeing patients in the typical clinical setting, he is also present at football games and in schools in the Wilkes-Barre School District. Sometimes we forget just how many areas medicine applies to and the diversity of places where it is practiced. Furthermore, there is great diversity within specialties as well, and Dr. Woloski is great example of that!

Could you tell us about your role as the physician at high school football games?

The PIAA (Pennsylvania Interscholastic Athletic Association) requires a physician and athletic trainer to be present at all high school football games. After joining Geisinger, Dr. Woloski learned the physician who used to cover the games, was leaving, and Dr. Woloski eventually transitioned into this role. He stated, "The best games are the ones that they don't need me." However, he explains, he finds his presence as a physician is particularly helpful as additional support to the athletic trainers and when there is a more serious concussion call.

How do you feel your Family Medicine training prepared you for this role?

Family Medicine physicians are trained to see all ages. He points out how caring for a freshman and a senior is very different and may lead to different approaches when explaining and counseling a player after an injury. Furthermore, family medicine is the frontline for many musculoskeletal complaints, which gives him experience with addressing many of the injuries the players experience. During training, family medicine residents complete sports medicine rotations, which also helps. Individually, Dr. Woloski has completed additional independent Continuing Medical Education (CME), and during his residency he worked at many high school sports events to increase his knowledge and experience in this area. While a fellowship in sports medicine can be beneficial, Dr. Woloski mentioned that at the high school level, it is not required.

You also mentioned your role at the Medical Director for the Wilkes-Barre School District, what does that involve?

Dr. Woloski explains he is involved in the sports physicals, general physicals for certain grades, and the development of certain protocols, such as the Return-to-Play protocol for

concussions. He delineates how it is important to screen for any conditions that could be exacerbated by exercise during the sports physicals. Two examples of symptoms he keeps in mind are blood pressure and history of fatigue or shortness of breath upon exertion. In the Pennsylvania School District, students in kindergarten, 6th grade, and 11th grade can receive a physical at school. Dr. Woloski says he often takes residents and completes the physicals for these students. He expresses the importance of these physicals because they can identify children with signs of asthma or allergies that can then be further examined by their primary care provider.

Can you explain the new Return-to-Play Protocol for concussions?

It is a 6-step protocol that can occur over six days. The protocol begins the first day with no symptoms after the event occurred and the patient is recommended to rest. Next, the patient tries light exercise and sees if any symptoms present. If symptoms present, then they do not move onto the next stage, if symptoms are absent, they progress. They progress with trying longer exercise, then practice without pads, then practice without contact and finally full practice.

Can you summarize how you feel this role connects you to the community?

Committing to five home football games and the physicals of numerous students each year, Dr. Woloski mentions this is a great role for him to be able to connect with the community. It is truly an example of how family medicine can be seen and utilized across various fields (get it?) and for different reasons.

Overall, Dr. Woloski serves as a great example for the diversity of applications of Family Medicine. From the clinic to the field to school, doctors are making an impact at all levels and many areas in the community. As future physicians, we should not forget the true range of where our skills may apply. Furthermore, there are many ways to give back to our community, deepen our knowledge about certain topics, and explore various areas where we can apply our skills. I'd like to thank Dr. Woloski for his time, and encourage you to realize the diversity of your skill set and the inspiring nature of the myriad of areas where it could be applied in the future!

VOLUNTEERING OPPORTUNITY FOR STUDENTS

NIKI VIRADIA

Housing insecurity has grown exponentially in the last few years all over the country, including in Pennsylvania. In Pike County, many people have been experiencing homelessness due to recent financial struggles and have taken to sleeping in their cars or on the streets of Milford. Pike County Hands of Hope is a volunteer organization that is seeking to alleviate some of the strains that Pike County residents are facing by providing resources for callers in need of housing, food scarcity, and other emergencies. PCHOH seeks to also empower the homeless and near homeless families by helping callers obtain their most basic needs while also encouraging positive life changes through engagement with community organizations. PCHOH began in 2011 when members of the St. Vincent de Paul Roman Catholic

Church noticed the growing numbers of homeless and near homeless in Pike County. While working with other non-profit organizations like the United Way and Retired Senior Volunteer Program, PCHOH has grown into a vital resource for Pike County community members. PCHOH has most recently been working with Geisinger Commonwealth School of Medicine's Masters of Biomedical Sciences Program, which is providing student volunteers to operate the "Hopeline" hotline. Students, who are eager to find volunteer work in the local area, are able to interact directly with callers who are on the brink of homelessness or facing other emergencies and provide immediate assistance. If you are interested in volunteering with this organization, please contact Jim Pierce at hopeline@pikecountyhoh.org.



OSTEOPATHIC MEDICINE

CEILIA SEVERINI

The profession of Osteopathic Medicine was founded by Andrew Taylor Still in 1874 in Kirksville, Missouri. After practicing frontier medicine with his father, he worked as a medic with militias in the Civil War. The medical practices of the day, such as “heroic medicine,” which included treatments focused on depletion like purging, bloodletting, and blistering often caused more harm than good. Training for medicine was through apprenticeships and short courses. “Alternative” therapies, such as bonesetting, homeopathy, magnetism, phrenology, and eclecticism, were also practiced by some. Andrew Taylor Still used all the common training in his day, including performing surgeries and obstetrics. After the loss of three of his children to meningitis, he was motivated to develop a system of medical care focused on promoting the body’s innate ability to heal itself. He called this system “osteopathy,” coming from the Greek osteon, meaning “bone,” and pathos, meaning “to suffer.” He chose this name because the musculoskeletal system was the starting point in order to find the cause of the pathological condition.

The principles that govern osteopathic medicine include that the body is a unit and the person is a unit of body, mind, and spirit, meaning that no single part of the body functions independently. Each part of the unit is interconnected with the others; these parts work together in order to benefit the collective whole of the person. Osteopathic physicians consider all of these parts when treating a patient, as any alteration in any part of the system affects the function of the body as a whole. The second principle is that the body is capable of self-regulation, self-healing, and health maintenance. Health is the natural state of the body, and because of this, the body has complex, homeostatic, self-regulatory mechanisms it utilizes to promote self-healing in times of injury or illness. When a body is not functioning optimally during illness or injury, other parts of the body may become unaligned to compensate for the dysfunction, perhaps, causing additional dysfunctions. Osteopathic physicians

come into play here, working to adjust the body in order to realign it to its natural state of health. The goal of Osteopathic Manipulative Medicine (OMM) is to restore the self-healing capacity of the body through techniques aimed to decrease allostatic load, bodily stresses, and enhance the immune system or lymphatic drainage. The third osteopathic principle is that structure and function are reciprocally interrelated. Therefore, an abnormal structure will manifest as dysfunction. Lastly, rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function. Osteopathic physicians use these basic osteopathic tenets in examination, diagnosis, and treatment.



restore the self-healing capacity of the body through techniques aimed to decrease allostatic load

Andrew Taylor Still founded the American School of Osteopathy in Kirksville, MO, in 1892. Today, it is known as Kirksville College of Osteopathic Medicine (KCOM). I attend A.T. Still University School of Medicine in Arizona (ATSU-SOMA), which is considered the other campus of KCOM. In its modern form, OMT attracts various individuals to the field. To get a better sense why, I spoke to Weston Burrup, an OMM fellow in between his third and fourth year at ATSU-SOMA, who has an interest in pursuing family medicine and using OMM with his patients. Weston, an Idaho native, applied broadly to allopathic and osteopathic medical schools, but he stated that, “Osteopathic medicine aligned with my values a little bit better. As far as hands-on Osteopathic Manipulation Treatment (OMT), I was very interested. Some of the philosophy behind the DO program also intrigued me more.”

He was first exposed to OMT minimally when he worked with DO physicians. Weston was drawn to ATSU-SOMA specifically, as his wife was ap-

plying to study Occupational Therapy, and they matched to ATSU, which also has an OT program. ATSU-SOMA also has a model in which first year medical students attend one year of school at the Arizona campus, and then split up into groups of ten students to continue their education of years two through four community health centers across the nation. Through this model, students are exposed to the clinic earlier while still taking pre-clinical courses. Because of his interest in OMM, Weston applied for the OMM fellow position, which occurs between third and fourth year and becomes a gap year. As a fellow, he returned to the Arizona campus. Through his fellowship, he has been able to attend conferences and receive extra training in OMT, work one-on-one with faculty, and assist in the educational experience of first year medical students. Weston says, “I was very interested in teaching. That was something I wanted to come back and get a little bit more exposure as to what that was like in a medical school. I thought this would be a breath of fresh air after having three rigorous years.” Weston plans to use his experience from the fellowship to augment the future treatment of his patients in a fast-paced clinical environment.



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OVERTRAINING IN CHILDHOOD SPORTS: THE PROVIDER'S ROLE

EMILY ELLISON

Sports make up a significant portion of American pastimes, whether you are cheering on your favorite team, or engaging in a sport yourself. This passion for sports gets ignited in childhood when you watch your caregiver get excited during a sporting event, or you join your first little league team. This love for sports looks different to everyone, but for many children it becomes spending every moment of free time practicing your beloved sport.

Heavy emphasis on year-round training in one sport has had detrimental effects on the physical health of today's youth. During three years of shadowing an adult orthopedic surgeon I saw many middle and early high-school-aged baseball players who sustained overuse injuries to their elbow or shoulder (especially those pitching) that resulted in long periods without training. Not only did they miss out on a good bit of development, but the plan to re-enter training was long and required multiple "phases" of starting to throw again. This falls in line with a study conducted by Dr. Makhni et al, looking at arm pain in youth baseball players in which 23% of survey participants reported a prior overuse injury and 46% of players were encouraged to keep playing despite pain. (1) I am emphasizing baseball injuries here, but studies repeatedly show that overuse injuries and constant training are harming the developing bodies for a variety of childhood sports. The American Society for Sports Medicine recommends that diversification of sports be encouraged to young athletes. (2)

What does this mean for us as future or current healthcare providers?

1. It means staying up to date on research that is coming out related to recommendations for youth sports training.

A. Go beyond what is being done in the US and look at other countries who have differing training strategies, and their statistics on youth injuries.

2. It entails counseling our patients and their parents (and our family/friends) on the dangers of year-round, single-sport focused training, and the benefits of a diversified training program.

A. Even as an adult I have been encouraged to cross-train. I was recommended cardiovascular training to maintain a healthy heart in addition to resistance training focused on strengthening my muscles and bones. There are numerous workout platforms that encourage this type of training (look at Peloton as an example). If we recommend this for adults whose bodies are finished growing, why has it not yet been fully

While overuse injuries are still a common occurrence in youth sports, hopefully with continued education and alterations in youth sport training programs, they can be fewer and farther between with an emphasis on the cheering, scoring and other exciting parts of being a child athlete.

promoted to children?

3. It requires treating your patients aggressively when they come in with an overuse injury.

A. Based on my pre-clinical experience, I can only speak to what I have observed and read, but it is better to have an athlete sit out for an extra week or two, then to rush them back into playing just in time for playoffs. Start them on a slow ease back into the sport, under the guidance of someone holding them accountable ensuring they do not dive back in too hard or fast. Encourage other modes of activity during this rest time.

B. As a child athlete who sustained overuse injuries, I was not happy with sitting out at the time, but looking back, I am grateful for the providers who thought of my long-term musculoskeletal health.

CONSIDERATION OF THE AUTONOMIC NERVOUS SYSTEM IN MUSCULOSKELETAL PAIN

JUSTIN PHILLIPS, DAOM, LAc.

Posture has been shown to be a significant causal factor in the development of musculoskeletal pain. The postures adopted in the processes of modern life are particularly indicated in many common pain disorders as can be seen in the increase of a number of pain patterns among the younger generations who are often termed "digital natives" due to their increased use of modern technologies. This pain is often sub-clinical and is frequently treated through over-the-counter pain medications such as ibuprofen and acetaminophen. Even when the pain becomes more severe, the interventions are often functional rather than invasive such as acupuncture, massage, chiropractic, and physical therapy. (1,2)

These interventions can provide a degree of palliative relief, and when combined with postural corrective activities, such as yoga or tai chi, might lead to long-term sustained improvement. However, these basic pain patterns can also prove difficult to fully overcome, become chronic, and even lead to more severe orthopedic disorders that could require more costly and invasive interventions. While the habitual postures and ergonomics of the modern environment must be chief considerations in the treatment of this kind of pain, it is not the only pathway for consideration. (3)

The Autonomic Nervous System (ANS) is principally indicated in the control of nonvolitional systems in the body such as heartbeat and pupil dilation, but it does have some impact on the musculoskeletal system. This neuromuscular connection is particularly relevant to the Sympathetic Nervous System (SNS) which is responsible for fight-or-flight responses. As an active threat response, the SNS is well known for increasing heart rate and respiration, decreasing bowel motility, and dilating the pupils but it will also modify activation pathways and lead to a muscular preference for flexor muscle tone. (4,5)

The postural position this creates is with the chest caved in, head hunched forward, shoulders rounded, hips tucked, and knees drawn up; the classic "fetal position." As an evolutionary safety response, this position puts all the soft fleshy bits, along with most of the organs and major vessels in the middle, with the large muscles and bones on the outside. In the fight response of fight-or-flight, this forward engaged position keeps the body structurally safe and prepared to strike and defend.

This sympathetic posture is unfortunately a mirror

of the ergonomics of modern life, from the forward neck posture due to excessive cell phone use, to carpal tunnel and upper cross syndrome typical of chronic computer use. This overlap of sympathetic posture with habitual posture means that the resolution of habitual postural pain can be complicated by the ongoing activation of the SNS. This is further aggravated by secondary aspects of the SNS which can further contribute to chronic pain. Under SNS conditions, the body will carry an elevated level of systemic inflammation that from the central nervous system out will lead to both an increase of peripheral nerve pain signaling and a decrease modulation of pain in the brain itself. (2,3)

“ Under SNS conditions, the body will carry an elevated level of systemic inflammation ”

Many of these secondary aspects can be managed separately, such as the ongoing use of anti-inflammatory pharmaceuticals, or cortisol and estrogen regulation by endocrine intervention. However, there is a direct pathway through the SNS that should be considered in the treatment of any type of chronic pain. This can be addressed via functional interventions that have been shown to regulate the SNS including acupuncture or Cognitive Behavior Therapy. (2)

In addition, lifestyle activities like regular meditation could prove powerful tools in the reduction of chronic pain, not simply through a placebo style moderation of conscious focus, but through a physiological modulation of the stress processes. Many of these are known referral pathways for clinicians treating chronic and habitual postural pain, but for many, these targets were principally anecdotal. There is an evidence-based awareness that the interventions have to show efficacy, but there was not a clear elucidation of any primary pathway through which the results were achieved.

By better understanding the postural role of the SNS in the creation of chronic pain cases, and secondarily, its larger role in the creation of a constitutional environment supportive of chronic pain, the clinician will be able to more effectively determine the optimal treatments and complementary therapies for pain patients.

RUCKING: RECONNECTING WITH EXERCISE AND NATURE

TYLER SCHUBERT

I grew bored of exercise during the summer between my first and second year of medical school. While a balance of cardiovascular and strength training has filled my mornings for many years, I had gradually lost the mornings of challenge, unpredictability, and self-induced competition, as these moments were eroded by thoughts of the coming day. Thoughts of, "I really need to finish my Anki cards," or "Am I studying enough to perform to my standards?" often emerged during my sessions. These once meaningful moments where I pushed my limits were disappearing. Like many others, exercising is a non-negotiable component of each day that catalyzes my brain and body for what is to come in the following hours. Exercise is an escape from the mundane details of life, and it builds resiliency, humility, and gratitude. To regain my mental edge and the physical benefits of exercise, I needed something new. Enter, rucking.

I was introduced to rucking by Michael Easter, a professor of journalism at the University of Nevada – Las Vegas, in his book titled *The Comfort Crisis: Embracing Discomfort to Reclaim Your Wild, Happy, Healthy Self*. Easter's thesis argues that by increasing discomfort in our lives, we can prevent burnout and create sustained happiness. He uses rucking as one mechanism to add challenge to his everyday life. Easter defines "ruck" as both a noun and a verb: a ruck is a weighted backpack, and rucking describes the physical act of carrying that backpack.(1) Easter provides a brief historical overview of rucking, which reveals that rucking has a long history among military personnel. Lieutenant Rob Orr of the Australian military writes that for nearly two thousand years, from Roman legionnaires to present-day American soldiers, infantrymen and women have built extraordinary levels of endurance by carrying weighted loads for long distances.(2) For contemporary context, American soldiers in Afghanistan carried loads of 45 kilograms, or approximately 99 pounds, during their day-to-day tasks and missions.(3) But why should rucking be something that I, as a civilian, add to my workout routine?

Through experience in operations for both the Special Forces and Central Intelligence Agency, husband and wife Jason and Emily McCarthy founded GORUCK, a company that produces rucking equipment in hopes

of promoting the activity in civilian communities.(4) Jason describes rucking as a perfect combination of cardiovascular and strength training, noting that rucking is "cardio for the person who hates running, and strength work for the person who hates lifting." It is a movement that simultaneously builds cardiovascular endurance and strength. Rucking has unique caloric expenditure and safety benefits when compared to standard physical activities of walking and jogging, respectively. When controlled for distance and time, rucking has been shown to burn nearly three times the calories compared to walking.(5) With regard to safety, the incidence of lower extremity injury among joggers ranged from 19% to 79% in one study, with increased weekly mileage spent running as a major risk factor for injury.(6) Lower extremity injuries are less common in rucking due to the decreased impact on joints during the activity compared to jogging. Fur-



Rucking has been shown to burn nearly three times the calories compared to walking.

thermore, a 10-week program consisting of rucking and periodic resistance training performed in the Australian Army All Corps resulted in significant improvements in maximal oxygen uptake rate (VO₂ max), push-ups, sit-ups, and psychophysical performance.(7)

It turns out that rucking has benefits that extend beyond physical gains and diversifying one's workout routine. Rucking is an excellent way to build community and to explore the outdoors, both of which have been shown to enhance resiliency and prevent burnout.(8,9) Employees at GORUCK gather every Friday morning for a company-wide ruck together, noting that these shared experiences through challenging workouts have strengthened company culture and relationships among employees. Beyond GORUCK itself, there are several established online communities that focus on rucking for civilians. Many of these groups have their own guides on how to get started and provide detailed training routines that vary by skill level. One online group, called Ruck for

Miles, suggests carrying between ten and fifteen percent of an individual's body weight when beginning a rucking program, while adding in increments of five to ten pounds as one's endurance increases.(10) Furthermore, accessibility is another attractive component of rucking, as it only requires a backpack, weight, and a pair of decent shoes.

The wealth of information that I discovered convinced me that I needed to try rucking for myself. Home on summer break, I searched through my parent's garage and basement for a backpack from high school and any items I could use for weight - old textbooks from college, rusty dumbbells, or patio pavers. I ended up selecting a few patio pavers to place in my ruck, as they were the least cumbersome, and dug up an old pair of shoes I used for mowing the lawn. The next morning would be my first experience rucking.

My alarm blared and I hopped in my car, ruck in tow, and made my way to White Rocks Trail, an area along the Appalachian Trail near my childhood home. As I arrived at the trailhead, the first light of the morning revealed an empty parking lot and steep ascent. Determined to enjoy this first experience by rucking in solitude, I left my phone and headphones in the car, threw on my backpack, and began trudging up the sharp incline. After an initial sixty seconds of acclimation to this new environment and the weight on my back, I noticed subtleties I often overlooked in my normal exercise. As the ruck weighed down my shoulders, I noticed I was taking slow, deep breaths. My heart rate spiked within a few minutes of beginning my hike and oscillated between zone two and zone three of my maximum heart rate through the changing elevation and terrain. Perhaps the most intriguing observation during my ruck was that I was vastly aware of my surroundings. In the early mist of this humid July morning, I heard the rustling of birds in the canopy above, and the pitter-patter of a mother deer and her fawns. Rain drops from an overnight shower fell from hundreds of feet above, striking the underbrush with a loud splash I would have otherwise ignored. As I continued toward the summit, I could not help but think how many of these quiet moments in nature I have missed while toiling away in a gym or a bike studio.

I continued my ascent to the rocky bluffs that marked the end of the trail. My shoulders, back, and core muscles were burning, as these areas were fully engaged as I carefully balanced my body's position over uneven terrain. Nearing closer to the top, I began to feel small muscles in my legs and hips tighten. Despite their importance in balance and stability, these small, underappreciated muscles are often underworked in traditional workouts as there are few movements that can repeatedly target them. I silently cursed to the birds and deer about how I would not be able to walk tomorrow.



After thirty minutes and a few hundred feet in steady altitude gain, I reached my mark and peered over the Cumberland Valley in south central Pennsylvania, a place that I called home for 18 years. The solace and quietness I found atop that trail still invigorates me. I was reveling in the physical and mental challenge of the ruck I just completed but felt something more. This was the farthest I had been away from other human beings in months. I could not be pestered by email notifications, phone calls, or to-do lists. I was alone, left with my own thoughts, ambitions, insecurities, and flaws. This experience was meditative. Among nature, with no connection to the human world, I became an astute observer of both myself and the world around me. I just existed, in a pile of sweat, watching my thoughts come and go through my mind as if on a screen, while hawks circled high above the valley. After these silent contemplations, I rose from the rocks, threw on my ruck, and began my descent.

Retreating to the trailhead through the thick air of that summer morning, I promised myself that I would make rucking a part of my exercise routine. I believe that while the physical act of rucking would help me strengthen underappreciated areas of my body, the largest benefits for me would come from the mental experience of disconnecting from the constructed world and immersing myself in nature. The first year of medical school drastically increased the time I spent each day looking at screens, reading textbooks, and staying indoors. Consequently, this time in isolation precipitated feelings of anxiety, and my disengagement from others grew in my daily life. Rucking is an antidote to these struggles. It is a way to balance physical challenge with mental growth, a mechanism to achieve wellness. If you are looking to diversify your exercise routine, strengthen your mind, and better yourself, I recommend finding an old backpack, some weight, and getting outside to a Northeast Pennsylvania trail. You will find a happier, healthier, and calmer you at the end.

A BRIEF LOOK INTO TURF SAFETY

PATRICK KOWALSKI

The National Football League (NFL) generated over \$11 billion in revenue over the course of the 2021 season, according to a report published by Sportico in July 2022. Recognizing this earning potential, Rob Walton and his financial group purchased the Denver Broncos for an American franchise record \$4.65 billion. These massive gains have resulted in further investment into the football sphere, but the National Football League Players Association (NFLPA) would argue this financial windfall is being applied without the player's safety in mind.

In early November 2022, JC Tretter, president of the NFLPA, published a letter to the organization's website urging NFL owners to ban the use of slit film turf citing a statistically significant increase in non-contact injuries, lower extremity injuries, and foot and ankle injuries. (1) According to the statement, seven NFL teams currently play in stadiums with slit film turf, with the two New York-based teams sharing MetLife Stadium in East Rutherford, NJ. At this time, the NFL has refused to comply with the NFLPA's mandate. From a purely financial perspective, one could claim that the NFL should be prioritizing the health and safety of its ultimate asset – the players.

There are 53 players on the active roster on gameday. Spread across 32 teams, an NFL weekly slate puts about 1,696 players at risk, with as many as 636 potentially playing on slit film turf. This does not include on-field staff such as the officiating crew. Now, consider the number of athletes at the local level that take to turf fields, perhaps even year-round, depending on the state. Are we putting youth athletes at unnecessary risk by implementing turf?

As a former high school soccer and lacrosse coach from 2016 – 2021 in Hellertown,

PA, most of the playing surfaces in our district were some combination of slit film, monofilament and dual fiber. The Daily Gazette of New York published an article stating that as of October 2022, the majority of New York school districts fielding a football team now had artificial turf. (2) They are increasingly pervasive and have become ingrained in high school sporting culture. Growing up and coaching at a school that only had a natural grass surface, there was always a sense of envy for the other schools that had turf. These turf fields were often accompanied by lights and multi-tier grandstands – a perfect environment for night games we were never able to host on our grass fields. The finances behind turf installation were frequently debated at school board meetings and regularly turned down at each proposal. Incidentally, the board may have been making a cost-effective decision that protected its young athletes.

According to *Natural Grass and Artificial Turf: Separating Myths and Facts*, the average cost of turf implementation is between \$850,000 – \$1,000,000, not including annual maintenance. Natural surfaces, including sand-based and native soil, range from \$50,000 – \$650,000. (3) When it comes to maintenance, the cost for turf fields is also greater than natural surfaces. The publication cites a study by the University of Missouri's Division of Plant Studies that found a native soil field averaged an annual cost of \$33,522 compared to an entirely synthetic field running an average of \$65,846. The Toxic Use Reduction Institute at the University of Massachusetts-Lowell published data in 2015 with lowered cost for synthetic fields with an annual maintenance range of \$13,720-\$39,220 and a slightly large range for natural surfaces at \$8,133-\$48,960, depending on the specific type. (4)

Anecdotally, each school in the district had varying issues with their playing surfaces. Some turf fields lacked the required maintenance for player safety and there were clear gaps, unruly seams, or inadequately replaced sections that were noncongruent with the rest of the field. Even as a coach on the sideline, I remember several instances of stumbling on worn scraps of turf. The few grass fields were not without fault, however, with numerous barren patches due to heavy traffic, or poorly rooted grass due to runoff. From a scheduling perspective, missing time due to rainy conditions can be difficult for an athletic department and this can be alleviated through turf fields. The financial and social aspects of turf can be debated, and the right amount of lobbying can swing local officials either way. However, from the healthcare professional's point of view, evaluating these surfaces in terms of injury prevention is paramount.

Non-contact injuries like anterior cruciate ligament (ACL) tears typically grab the headlines, in part due to the time missed and intensive rehabilitation required. In evaluating the FIFA 11+, a dynamic warmup program performed prior to training sessions and matches, a study found that the program prevented more ACL injuries on turf than the control group compared to no change on natural grass. (5) This points to the potential dangers of the fields and the adjustments required to protect players. ACL injuries are not the only cause for concern on turf fields. A 2011 study including soccer, union rugby and American football teams found an increase in ankle injuries on turf surfaces to the point in recommended ankle injury prevention routines in those playing regularly on turf. Additionally, it found changing between surfaces predisposed players to injury, especially in soccer. (6) In addition to musculoskeletal (MSK) inju-

ries, abrasion injuries are prevalent on turf. A systematic review investigated the impact of turf on abrasion and while there was not a statistically significant increase in incidence on turf, there was an increased disparity between players' perception of abrasion injury on turf compared to natural surfaces. (7) The psychological component of hesitation cannot be lost in relation to injury prevention as there is potential for MSK harm when moving too tentatively on a cut or pulling up short leading to an untimely incidental collision with an opponent. Assuming ideal conditions on a turf field, there is still great risk when training or during matches because of turfs inherent ability to trap heat. Brigham Young University conducted a study that demonstrated an average temperature of 117 degrees on its two turf fields compared to 78 degrees on natural grass. (3) It is impossible to perform physical activity at a safe level with those temperatures. The prospect of unbearable heat even moved the 2022 FIFA World Cup from its typical summer schedule to winter due to the climate of its host, Qatar!

While the installation of artificial turf fields is on the rise, it is worth investigating the potential risk we are posing on our young athletes. Not only does injury have a physical impact on one's development, but psychologically, too. Recovering from injury is often isolating and those recovering are removed from forming strong social bonds. The additional burden of medical bills and transportation to treatment can affect the entire family, emphasizing the importance of limiting injuries whenever possible. If the NFLPA, a group with some of the nation's premier sportsmen has concerns, one with access to the best training and rehabilitation services in the world, it is imperative that the same level of interest is shown to our developing athletes.



Tierney Lyons, Elizabeth B. Kavanaugh

In the study of movement, muscles, and bones, are equity and inclusion missing? Musculoskeletal (MSK) diseases affect people differently, especially people of color. This issue extends from the basic, such as symptom presentation differences based on skin pigmentation, to the complex, such as rheumatoid arthritis and pulmonary complications when the diagnostic tool is not designed to consider skin tone. To have equity, all people must have fair treatment and opportunities to develop healthcare, instrumentation, and medical textbooks as practitioners, researchers, and study participants. To have inclusion, everyone's contributions and presence must be integrated into MSK studies. According to AMA's Code of Medical Ethics, patients need to trust their healthcare providers, "which gives rise to physicians' ethical responsibility to place patients' welfare above the physician's own self-interest." (1) Including persons of color in MSK education and research is vital to following the Hippocratic Oath and doing right by ALL who need treatment.

As partners in care with students, staff, faculty, and healthcare providers across Geisinger, the Informationists (medical librarians) at the Geisinger Health Sciences Library and the Geisinger Commonwealth School of Medicine Library can help explore how we, in small ways, can better serve people of color. While Informationists are by no means experts on DEI (Diversity, Equity, and Inclusion) issues, we are adept in finding resources about and authored by people of color, especially in the medical field. Black and Brown people have been left out as research participants and as researchers intentionally, or unintentionally, due to study recruitment difficulties, restrictive inclusion/exclusion criteria, geographic disparities, and historical atrocities committed against research participants of color that have resulted in distrust of medical researchers. (2) Additionally, persons of color suffer worse clinical outcomes as patients.

Recent MSK literature highlights the problems surrounding study underrepresentation of historically marginalized groups. (3) This 2019 systematic review reported that in a rheumatoid arthritis (RA) clinical trial "enrollment of minority racial/ethnic groups was significantly lower than their representation within the US Census population (16% vs 40%; $P < .001$)." (3) This 2020 systematic review "found a paucity of data on racially/ethnically diverse RA patients and ASCVD outcomes" and could not assess its prevalence in non-White populations. (4) The

low enrollment is significant in many MSK areas. This narrative review on health disparities in systemic lupus erythematosus states "underrepresentation of marginalized communities in lupus clinical trials further worsen these disparities" due to systemic racism. (5) Equally problematic to underrepresentation is underreporting. Even when study participation is inclusive, researchers, as seen in this 2022 systematic review, find "both a lack of reporting as well as under-representation of selected racial/ethnic minorities in US-based randomized controlled exercise studies among adults..." (6) A 2022 nail psoriasis systematic review found of the clinical trials that only "35.6% reported race and/or ethnicity." (7) The study of Merkel cell carcinoma disparities is hampered by limitations in data registries. (8) In some registries, there are options to enter racial diversity, but not ethnicity. We need to design better systems to accurately reflect our ever-changing community. An analysis of racial/ethnicity in rehabilitation clinical trials notes that "Black or African American participants were overrepresented. An important finding was that many trials did not report age and/or race/ethnicity. Investigators should aim to include underrepresented populations and improve reporting." (9) Even when Black and Brown communities strive to be represented in research, they can still end up not being counted.

How can you affect change? When on research teams, advocate for inclusive study design and for people of color to serve as fellow authors, thus better reflecting the whole community. This systematic review of racial and ethnic diversity in orthopedic clinical trials states, "Investigators should initiate discussions about race and ethnicity reporting in the early stages of clinical trial development by surveying available published evidence for relevant health disparities, social determinants, and, when warranted, genomic risk factors." (10) In practice, ensure detailed race/ethnicity data collection and include participants from underrepresented groups you serve.

One way to support diversity in MSK education is advocating for inclusive textbooks and resources, such as through a student-led curriculum panel. Take this contemporary example: only in 2021 did UpToDate, the most EMR-embedded point-of-care resource, mention the inaccuracy of pulse oximeters on dark skin. Studies warn of false readings from pulse oximetry on darker skin dating back to 1976. (11) For over thirty years, Tobin & Jubran have been reporting similar findings and how

it increases occult hypoxemia occurrences and on the consequences for COVID-19 pneumonia patients where true SPO2 levels are unknown. (12) Outcomes of oxygen deprivation can cause organ failure, coma, seizures, and death. (13) The need for exactness cannot be overstated.

Due to these discrepancies, non-White patients are more likely to experience delays in life-saving treatments. It appears that, before it became obvious during COVID-19, pulse oximeter accuracy with nail polish was studied more extensively than use with varying skin pigmentation. (14) As their systematic review shows, Cabanas, et al. state that skin pigment has been studied only with a few pulse oximeter models and most are calibrated for light skin. (15) A small way to help is by sharing this knowledge and learning more about how people of color are adversely affected by medical education and research inequities. Oximeters have not worked correctly on all skin tones because too many Black and Brown people were excluded as scientists, physicians, study participants, and even as patients during the process of developing such medical devices. Just last month, a biotech firm released a skin-tone sensitive oximeter in response to a Food and Drug Administration panel on racial biased medical devices. (16)

At the crossroads of research and education, let us consider patient-centered tools available through medical libraries, such as those at Geisinger and the Geisinger Commonwealth School of Medicine. (17, 18) As we recognize better methods of inclusion and learn from past shortcomings in representation, libraries strive today to update collections of yesterday to bring new perspectives, print materials, electronic holdings, and more. The point of care tool VisualDX (Logical Images Inc.) provides decision support at the diagnostic level via basic search and differential builders. (19) VisualDX provides an app-based option in addition to the desktop site, and an opportunity to earn CME (Continuing Medical Education), with the creation of a personal account.

Novel in the world of library-subscribed databases, VisualDX's Skin of Color filter sorts image results that have been traditionally underrepresented in the visual content of medical literature and databases. (20) It is imperative to become visually attuned to how various symptoms, medications, or diagnoses may present in patients of varying skin tones with the use of these tools. Images used in VisualDX originate from medical experts nationally and internationally, with all patient identifiers removed prior to inclusion.

When searching for rheumatoid arthritis for example, we can view the condition, codes, diagnostic pearls, differential diagnosis and pitfalls, best tests, management pearls, therapy, drug reaction data, references, and outlinks to patient care tools (i.e., UpToDate) and research databases (i.e., PubMed).

Visually, the same synopsis page demonstrates images of the condition, Sympticons helpful for visual instruction, and presentation of diagnostic differences across variations in skin pigmentation.

Likewise, when browsing a differential builder for a patient's diagnosis, the searcher can add patient-centered factors such as symptoms and signs of their condition which include a MSK focus, or medical history inclusive of MSK disorders, to make the differential diagnosis even more specific. Pages that feature options for first and second considerations, emergencies, infectious, and drug induced results can likewise be filtered using the Skin of Color tool and priority view sorting for results that contain photos.

Life-long learning is fundamental to healthcare professionals. Scientific discoveries and medical advances move at a rapid pace and yet we must pause to ensure that those historically overlooked are now included in every aspect of current practice. Even more, let people of color lead the way. Individual Black physicians started the Skin of Color Society and Project Impact. (21, 22) In another example, a medical student created a handbook and social platform to connect patients to Skin of Color experts. (23, 24)



we must pause to ensure that those historically overlooked are now included in every aspect of current practice



As partners in your medical education, practice, and research, Informationists are experts in search techniques and resources that can be tailored to your literature searches and interests. Trained in inclusive terminology and search strategies across the libraries' holdings – print to electronic, books to journals, open access to open web – Informationists welcome your interests in exploring diversity in research beyond the introduction explored by this article. To continue your exploration of medical equity and inclusion, consider this sampling of current MSK literature: social determinants of inequities in physical activity; how the joint pain cycle differs by race; disparities in osteoarthritis management; pain research study designs for inclusion; MSK health literacy disparities in pediatric sports injury; and Critical Race Theory & Black patients in lupus trials. (25-30)

For more readings on these topics, please peruse the linked articles and contact your organization's Informationists to continue the conversation.

AI IN ORTHOPEDIC SURGERY

FRANK VAZQUEZ

The future, by definition, is difficult to predict. Everything we do at the present time seems so perpetual, yet if you went even just 30 years into the past, much of it would be unfathomable. We can, however, attempt to make educated extrapolations to start to understand what we may have in the future. The paper we are highlighting in this issue attempts to do just this by looking at current trends of artificial intelligence (AI) use in orthopedics and in medicine in general.

The subject of AI in medicine conjures up a wide array of emotion: excitement about improved patient outcomes, worries about the future careers of physicians, despair about future physicians no longer knowing what to do when the robot does not work, relief about the decrease in labor for the physician and medical team. To understand where the future is headed, let us talk about what AI means. AI stands for artificial intelligence and is a catch all term for many different types of techniques engineers use to optimize computer programs, such as machine learning and neural networks. On a basic level, machine learning is when a computer is fed a variety of inputs with predetermined answers, and it gives out an output with the answer. The idea is that the computer may get it wrong many times at first, but the iterative process leads to better and more accurate outputs (1). An example of this as related to medicine is how the program PelviXNet was developed. This algorithm was created to diagnose pelvic fractures, and it was fed 5,204 pelvic x-rays which had already been diagnosed by a trained professional. After that, it was given a test population of 1,888 pelvic X-rays and it correctly diagnosed 96% of these x-rays, a number comparable to radiologists and orthopedic surgeons (2). Another study showed that yes, a similar program meant for the shoulder performed similarly and sometimes outperformed radiologist and general orthopedic surgeons. However, it found that orthopedic surgeons specializing in the shoulder outperformed the AI (3).

AI can be used for more than just diagnosing when it comes to imaging. While AI in diagnostics relies on signs that humans are conscious and aware of, AI can find variables that trained professionals may not have recognized. For example, AI has been used in risk stratification for hip replacements. It is currently difficult to predict which patients may be at risk of hip dislocation after a hip replacement. A neural network was devel-

oped to determine the risk of hip dislocation using post-operative X-rays, and it was found that the AI was 89% sensitive with a negative predictive value of 99.5%. Since this AI was not trained on “known” variables like the diagnostic AI, it is unclear which specific variables lead to lower or higher risk of hip dislocation, yet it is still a helpful tool in the orthopedic surgeon’s toolbox (3).

The other area of orthopedics in which AI has started to make waves in is robotically assisted surgeries. So, what does robotic assisted surgery look like? There are three different types of robotic assisted surgery: haptic, active, and passive systems (3). Active is the least used in orthopedics, and it relies on completely autonomously completing the surgery. While these systems have been used for joint replacements, they have fallen out of favor due to learning curves and safety concerns. Haptic systems are commonly used in joint replacements. Usually what will happen, for example, in a knee replacement, is that a CT scan will be taken of the patient and turned into a 3D image. Using this image, AI can determine the optimal amount of bone to take off a patient. From there, a robot arm, that is still controlled by the surgeon, will guide the surgeon, and ensure that there is not too much bone taken by providing haptic feedback and disengaging if it determines that it is in an area that it should not be (Citation). Passive AI in surgery will simply provide the surgeon with data without limiting the surgeon in any way. Usually this is monitored by the AI using cameras, but an interesting new development is using sound to determine how far a surgeon can drill. It can do this because drilling through different areas of bone produces different sounds. This application can prevent breakthrough drilling of bone or excess damage (4).

The field of AI and robots in orthopedic surgery seems borderline sci-fi at this point, however, every instance demonstrated in this review is far from completely autonomic. Even the diagnostic AI used for radiographs are not perfect. This review emphasized the role of AI as an augmentor of physician skill rather than a replacer (3). The future is unknown to us, but it seems that for the time being, surgeons and other vital healthcare professionals will play an important role in delivering high quality patient care, even with the quick development and improvements to AI.

PEOPLE WHO MOVE TOGETHER, BOND TOGETHER

MARYBELLE DECLAN

It is widely known that physical movement improves both our physical and mental health and allows us to grow as individuals. But what about on the interpersonal level? How does moving our bodies affect our relationships and interactions with others? Dr. Emma Cohen, a renowned anthropologist and professor at the Institute of Cognitive and Evolutionary Anthropology at the University of Oxford, has performed extensive research supporting her hypothesis that group movement helps to forge and maintain social bonds and improve performance as a whole and individually. (1) From exercise, to dancing, to cultural rituals, studies have shown that physical activity done in coordination with others encourages social connection and further allows us to enjoy the pleasure of people’s company. In this essay, my aim is to highlight a wide variety of physical activities done in groups that help us become closer with each other and, in doing so, encourage a deeper appreciation of the universal human experience of moving with others, no matter in what form, to forge meaningful interpersonal relationships.

Let us take exercise, for example. In one of her lectures, Dr. Cohen asserted that exercising with others helps us sustain motivation and reduces perception of pain. She conducted a study with rowers at Oxford that showed that pain thresholds are much higher when exercising in a group versus individually. Her experiment suggested that group exercise leads to social bonding, and that social bonding leads to enhanced exercise performance. Dr. Cohen’s research also considers the role of the endocannabinoid system and opioidergic mechanisms in producing a euphoric sensation that allows us to forge those social connections with the people we are exercising with. Synchronous exercise blurs self-other boundaries and increases cooperation due to shared goals, leading to feelings of togetherness or ‘oneness.’ This may be because the intentional act of coordinating with another person necessitates sharing mental states. In order to achieve group objectives, the individual “I” must become the collective “we.” Once this goal is accomplished, it allows for the group to bond in celebration. Evidence also shows that dancing at parties and in groups encourages social bonding for similar reasons. Whether it is the tango, ballet, or even dancing at a nightclub, dancing with others allows us to connect with other people through physical expression. The social motion involved in dancing with others is characterized by two components: coordinated movement and physical exertion. Due to the coordination and synchronization of movement that occurs while

dancing, researchers have argued that people experience a blurring of the self into their groups, similar to the feeling of togetherness mentioned previously. (2) In addition, the physical exertion inherent to dancing releases hormones—like any other form of physical exercise—which are behind the social bonding effect.

What about cultural traditions and rituals? This is something I can speak on from my personal experience. As a Filipino-American, I have subconsciously forged and maintained social bonds with my immediate family and relatives through social gatherings in which we make and eat Filipino food, hold hands, and pray, and sing and dance along to music together. Our coordinated physical activities reflect our shared values, which in turn have helped to strengthen our ongoing connections and relationships. Even engaging in the traditions and rituals of my friends’ cultures have helped me to strengthen my social ties with them. Last year, I attended my first Holi event held by my classmates at school, and I participated in the throwing of colored powder with others to celebrate the Indian Festival of Colors for the first time. This year, I attended an event celebrating Diwali, and made my own henna tattoo design with my friends. By physically engaging in these traditions that belong to a culture that is different from my own, I was able to bond further with my classmates by learning about their values. By coordinating my physical motions to learn more about their cultures, I put myself in their shoes to better understand the things that are important to them. This is why I believe everyone should learn about other cultures, because the social motion involved allows us to empathize with others and form even stronger bonds in the process.

Social motion comes in many forms across cultures and contexts – exercise, dance, ritual, labor, and play. Bonding through coordination of movement transcends all cultures and speaks to the universal human experience of bonding through synchronized physical activity. Through moving together, the individual identity becomes part of a greater identity involving a group of people with a shared value or objective. In turn, this coordinated movement enhances our performance. Thus, moving in sync allows the body to do things it could not do alone. So next time you are out exercising with your gym buddy, dancing with friends, or even engaging in cultural traditions with family, take the time to appreciate the social bonds you are forming, maintaining, and strengthening, through the coordinated movement of your bodies alone.

KNOCKING IT DOWN FROM AFAR

EDWARD LIU

One evening amidst the bustling streets of NYC this past summer, my body ached for bowling after a long day of work. I hit up my friend, who was an experienced bowler, to bowl with me. Entering the bowling alley, the sound of pins falling and people screaming were familiar. From the disappointment of hitting the gutters to the enthusiasm of hitting spares and strikes, my muscles gravitated me toward the lanes.

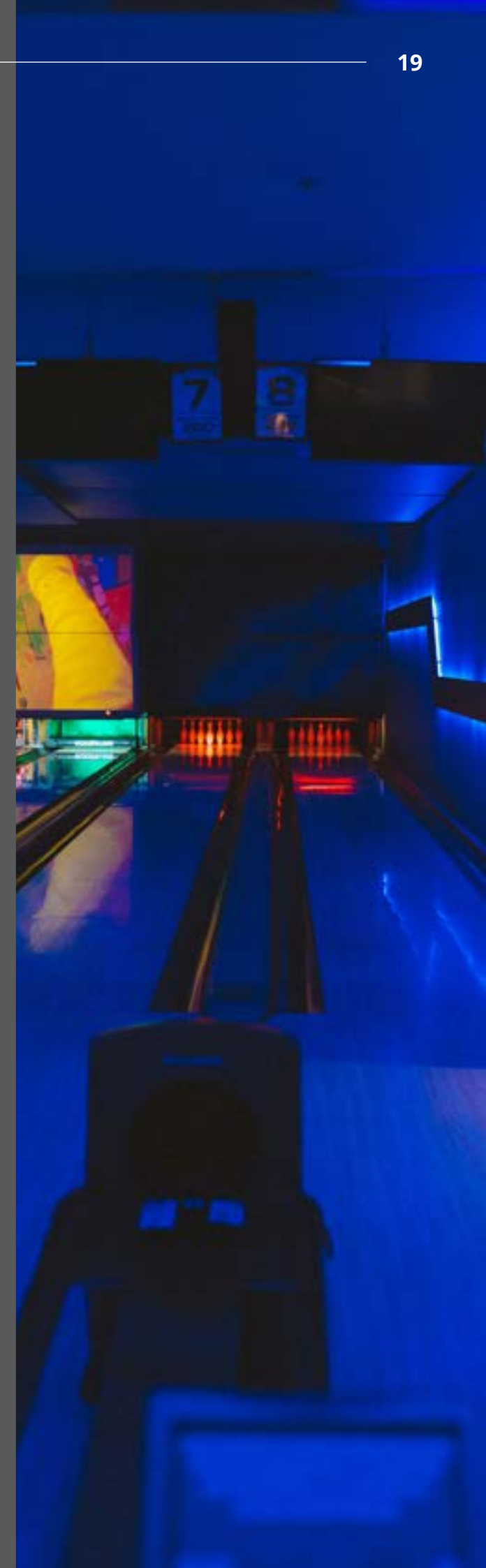
Arriving at our lane, I had two goals in mind: to improve in bowling and not give up on that endeavor. Stepping into the lane with the ball in my hands, my legs trembled, feeling afraid that I was going to embarrass myself again in front of others by rolling a gutter for what seemed like the hundredth time for the summer. Although the tug of war between my legs and I was fierce, I somehow managed to convince them to propel forward and release the ball from my stubborn grip. At first, I was proud of myself that I finally floored the ball down the lane. However, that feeling quickly faded as the ball went down the gutters again. Flustered and embarrassed, I felt demoralized that I was never going to improve in bowling. The second roll of the frame was not much better, as I only managed to knock out several pins. When it was my friend's turn, I watched him closely to get a sense of his play. I was mesmerized by how graceful his movements were from the swing of the ball to its release. It seemed like he had all the mathematics and physics down in his head ready to execute them. In a blink of an eye, the ball flew down the lane, ending in a loud plop with all 10 pins getting knocked down like dominoes. That moment was the last straw, as I immediately asked him to provide me with some explicit tips and demonstrations on how to improve on my bowling. After five minutes of demonstration and practice on my form and release, I was a bit more confident to begin my next round.

Butterflies started filling my stomach as I feared that the gutters were calling me again. It did not help that I felt like my arms and legs were giving up on me as I was frozen for a solid 10 seconds. Knowing that I must fulfill my duty to improve at the game, I finally mustered up the courage to pick up

my feet and grab the ball. Calculating every bit of my movement from glaring at the pins to rocking my arms, I eventually released the ball from my hands. My eyes never left the ball while watching it accelerate towards the pins. The satisfying sound of all 10 pins collapsing made me jump like a child, especially since it has been months since I scored a strike. The excitement intensified as I received a huge high five from my friend and words of praise for not giving up. As the evening progressed, I started hitting the pins consistently and scored some spares and strikes. From that day forward, I watched my scores gradually go up from 50s to 80s, eventually to the low-mid 100s.

My bowling experience this past summer is an example of my ability to never give up despite unfavorable circumstances. Whenever life gives me lemons, I usually try to make lemonade out of them and use the glucose to fuel my body to endure through. This little philosophy of mine resonates with me in almost every aspect of my life and is what makes me unique. I have experienced a spectrum of adversity that has tested my strength to endure through difficulties. These include living in public housing, overcoming social anxiety, working extra hard to improve myself, and living without my mother at an early age. In each one of these challenges, I picked up my feet and dragged them to the finish line amidst the slippery roads. I have yet to fulfill the "good" person my mother always wanted me to be. It remains vague what she meant by "good," as this term has many meanings in Chinese. However, I interpret it as caring for others, being a useful person, and persevering in the face of adversity, as my mother went through unparalleled hardships attempting to combat breast cancer, while raising her four sons and working to make ends meet.

As I reflect on my past summer, I know that the fond memories of the game are all but a distant past. My muscles and limbs continue to long for bowling with my mind continually replaying memories of the sound of pins getting struck from afar, the intermittent bursts of shrieks of elation from fellow bowlers and the tears of joy I shed while watching my scores gradually shoot up. I hope to one day relive those precious moments by knocking down the pins and scoring the strikes just like how I aim to conquer the unforeseen obstacles that life has set up for me, all while fulfilling my dear mother's wish for me to be a "good" person.



AN UNEXPECTED TWIST

NATE BAROTT

At SUNY Upstate Medical University, they say that the medical student experience does not really “start” until the musculoskeletal unit. They were not wrong. The beginning of my first year of medical school felt like a familiar continuation of undergraduate biology, and I welcomed the novelty of gross anatomy with open arms. Then labs arrived, like a much-anticipated slap in the face, becoming my second home and Netter’s Anatomy becoming my new roommate. Sleep brought no escape – I would even dream about the MSK system.

About two weeks into the unit, my new way of life was interrupted. It was a rainy morning, and I was nearing the end of my daily bike commute to school. In a foolish act of recklessness, I decided it would be fun to hop a curb with my 30ish pound, zero-suspension bike. Predictably, my stunt failed. It was a spectacular wipeout. Airborne and in full abduction, I remember thinking a brief “oops” before impacting the earth with a FOOSH directly onto my left outstretched hand.

Pain erupted throughout my proximal arm. Equipped with new medical terminology, my mind wasted no time diagnosing the situation. Did I just break my clavicle? Perhaps the surgical neck of my humerus? Or maybe I had – God forbid – a lower trunk neuropathy of the brachial plexus with subsequent Klumpke’s Palsy? I quickly assessed my distal range of motion and felt some relief when I could not detect any neurological deficits. A few witnesses stared at me with concern. I rose my hand to wave a casual, “I’m fine! All good here!” Alas, my wave translated into a sad-looking chicken wing movement and with a wince I realized I could not abduct.

I had some familiarity with musculoskeletal injuries going into medical school. For a few years after college, I worked as a ski patroller at a mountain that kept many of the local orthopedic clinics in business. Broken bones were everywhere; each shift brought a variety of sprained wrists, S-shaped forearms, “boot-top” breaks and femur fractures. For all the injuries I saw, one body part frequently topped the list as the most common chief complaint – shoulder injury.

My first patient was no different. His injury was a classic ski patrol encounter: 20-something-year-old snowboarder complaining of shoulder pain after falling in the terrain park. I was relatively new to patient care at the time, so although it took me quite a while to notice the obvious AC joint separation, I did record an exemplary EMT-level history for my write-up. After ruling out head injury and slinging his arm, I loaded the patient into a toboggan, strapped on my skis and away we went down the hill.

Vivid memories of that encounter reappeared in my mind as I sat in the soggy grass feeling for any deformity around my limp arm. Gingerly, I picked up my backpack, gathered my pride off the ground and took stock of my bike. Thankfully, it showed no obvious signs of trauma. As adrenaline gave way to a dull ache, I thought about the irony of my situation. Here I was, with an injured shoulder, nearly late to my first lecture of the week. The topic: rotator cuff anatomy. How relevant.

“In a foolish act of recklessness, I decided it would be fun to hop a curb with my 30ish pound, zero-suspension bike.”

A few minutes and 400 milligrams of ibuprofen later, I sat in a lecture hall listening to an expert on shoulder anatomy discuss the complicated network of tissues coexisting in my glenohumeral joint. Despite the poetic relevance to my situation, my mind drifted elsewhere. I thought of my past experiences as an injured patient. Thankfully, there were not too many. It had been some time since I suffered anything worse than a sprain or strain, and as my shoulder barked out in pain, I realized with some profoundness that I had forgotten what it felt like to be injured.

Over the next few weeks, I found that my injury actually served some utility. I became a willing standardized patient in my clinical skills class, and my friends and I had fun practicing special tests on real pathology (Neers test: positive! Hawkins test: positive! Empty can test: positive!). With my practical reminder of how anatomy on an uninjured shoulder

was supposed to work, I quickly learned the actions of the rotator cuff muscles. Clinical vignettes of musculoskeletal injuries suddenly seemed more relevant than ever, and I started to develop an unexpected comradery with the enormous hematoma migrating down my arm.

I have a strange gratitude for this injury that has, for better or worse, improved my understanding of shoulder anatomy. Since my crash I’ve enjoyed a pretty fast recovery, and now two months later, I can happily say that I currently have 5/5 strength and full range of motion for all of my shoulder movements (I passed the MSK unit, too). Physical therapy has helped, and although the gym will have to wait a few more weeks, progress is fast, and I have returned to bike commuting.

I do not endorse medical students injuring themselves in the pursuits of building empathy or understanding human anatomy. However, in my case injuring my shoulder brought about some unexpected

additional excitement for this field I have just only entered. Hopefully, the only chronic disability I will have from my accident will be a small rip in my puffy jacket and residual embarrassment from an epic wipeout in front of my immunology professor.



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