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Minoritized Females in Athletic Training: Educator and Clinician Perspective on Exploring Barriers to Healthcare Delivery

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Key Phrases
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EDITORIAL

In the last 5 years, there have been lessons learned about our country. A lesson of history, in general, is that disunity poses a threat to healthcare; our general health is a product of the connections that we share as individuals and healthcare providers. The COVID-19 pandemic has elevated the importance of these connections. This means we all need to work towards a collective vision of health and peace at all levels. This vision must be built on values of equity, mutual respect, openness, trust, and tolerance. To be successful, we must focus on creating communities that are welcoming to everyone, including those with perspectives that differ from our own. This requires us, as individuals and as a community, to rise above and set a clear example to our faculty, students, patients, and others of how a strong inclusive society operates, both professionally and personally, thus, enhancing our healthcare systems and patient-centered care for athletic training. Specifically, perspectives from minoritized females as healthcare providers and educators are critical in understanding the challenges as well as the positive endeavors that make us successful in our roles.

CULTIVATING CULTURAL PROFICIENCY THROUGH EDUCATION: STORIES FROM A MINORITIZED EDUCATOR

As a female Mexican-American faculty member at a large public institution, I acknowledge that there are many challenges we face as minoritized female faculty members at a predominantly White institution. However, there are also positive experiences starting with the environment of your institution. A positive environment values diversity, equity, inclusion, and social justice and there is a support system in place for minoritized faculty, staff, and students. The location where your athletic training program is housed may impact the education and research opportunities for faculty and students. From personal experience, being housed in an accredited School of Public Health allows for minoritized faculty and our athletic training programs to prepare professional practitioners and scholars to best serve our communities and impact disease prevention through healthcare, public health education, and intervention. It also provides a platform for faculty and students to collaborate in interprofessional practice, education, and research with public health professionals and healthcare providers. These collaborations improve the lives of individuals, families, communities, and diverse populations through a variety of educational and research endeavors (e.g., health inequalities, children's physical

activity, community health workers, Latino immigration studies, disability research, global health, speech and hearing, nutrition, exercise, rural and minority health).

It is our mission to work closely with the communities that we serve to provide the best patient-centered care to our underserved populations. Through our work (i.e., teaching, research, and service) and patient care we have an opportunity to advocate for making an impact on changing socioeconomic marginalization, disparities in healthcare, and racial injustice. We do this by educating our students on the diversity, equity, inclusion, and the concepts of cultural competence and cultural humility. These are all critical components of patient-centered care. Diversity in medical education signifies inclusiveness, mutual respect, and multiple perspectives and serves as a mechanism for change resulting in health equity.[1] In this context, diversity includes all aspects of human differences such as race, ethnicity, religion, national origin, age, marital status, disabilities, sexual orientation, gender, gender identity and expression, and socioeconomic status. Inclusion can be achieved by fostering an understanding of culture and climate of your organization or within patient care settings.

Culture competence highlights the demand for health care system and providers to be aware of and responsive to patient's cultural perspectives and backgrounds;[2] and requires healthcare providers to appreciate and respect the patient's individual viewpoints. Cultural competency also encourages awareness of health disparities and discrimination, which is a skill that can be taught, trained, and achieved and is often described as essential for working effectively with diverse patients to improve access to healthcare, increase health literacy, improve health care quality, and promote health equity.[3-5] Cultural humility is often confused with cultural competence; these terms are defined independent of each other but can be used at the same time. For example, cultural humility involves entering a relationship with another person with intentions of honoring their beliefs, customs, and values.[2] This is an on-going process of self-reflection and self-critique, combined with the willingness to learn from others and addressing power imbalances and avoidance of stereotyping. When we merge these two concepts, this allows for a more meaningful connection with each patient as a unique individual, with diverse perspectives, culture, and lifestyles. This concept was coined cultural competemility,[3] which is a synergistic process between cultural humility and cultural competence in which cultural humility permeates each of the five components of cultural competence: cultural awareness, cultural knowledge, cultural skill, cultural desire, and cultural encounters.[3] Faculty, students, and practitioners must be cognizant of these concepts and how they all intersect with patient-centered care, student-centered learning, and research collaborations.

Our healthcare system is professionally driven toward patient-centered care, which incorporates an individual's perspective and more involvement in his/her/their care results in better health outcomes and satisfaction.[6] However, it is important to note there are certain populations such as low-income individuals, uninsured persons, immigrants, racial and ethnic minorities, veterans, the disabled, and the elderly who are typically underserved by the health system. Thus, in turn, facing greater barriers to patient-centered care. To best tackle these challenges, it is critical to collaborate outside your organization and develop community partners. A goal of our program is to expose our faculty, post-professional athletic trainers, and professional athletic training students to a variety of patient populations and settings (i.e., Historically Black Colleges and Universities, private colleges, public colleges/universities, private and public high schools, rural private and public high schools, and inner-city schools).

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To be successful in these environments, it is critical to prepare young professionals prior to their clinical placements and provide on-going mentoring while they are providing patient care. Often young professionals are not aware of the social determinants of health in the population that they work with. Therefore, preparation begins with onboarding activities to include but are not limited to reviewing issues of diversity, equity, inclusion, social justice, how to become culturally proficient; ways to combat racism, and identify social determinants of health, healthcare, and health disparities within the community the serve. It is recommended, administrators integrate an activity during onboarding related to the clinician/student conducting thorough assessment on the community/city they serve (**Table 1**). With most of our students being from out-of-state, this not only allows them to familiarize themselves with the community/city, but also allows them to identify social determinants of health, potential resources, community collaborations and identify other healthcare practitioners to engage in interprofessional practice. This may also be conducted in a field trip manner.[7] Developing relationships with community partners allows for the integration of best practices with patient care and opens opportunities for research between clinicians, faculty, and marginalized communities. Building trust and mutual respect with these communities, allows for ethical recruitment of marginalized or vulnerable groups. In turn, this allows successful research in the identification of patient health care needs for each population and organization.

- Toni M. Torres-McGehee, PhD, SCAT, ATC

Table 1: Exploring the Community you Serve

1. Identify community/city population and distribution of race/ethnicity
2. Identify community/city cost of living
3. Identify community/city average household income
4. Familiarize yourself with surrounding neighborhoods, parks, and shopping areas
5. Familiarize yourself with public transportation
6. Identify types of community/city health services (e.g., financial support, communication resources such as speech and language services, behavioral resources, sensory and motor services, social and recreational services, family support services, school services, research opportunities, etc.)
7. Identify health care facilities (e.g., hospitals, clinics, urgent care, veteran services, dentists, optometrist, physical therapy, occupational therapy, disability services, specialty clinics, social work, counselors, etc.)
8. Identify current community/city social determinants of health data (e.g., social and community, neighborhoods/environment, demographics, educational attainment, economics, insurance coverage, health status – disabilities, heart disease, chronic disease, etc.)
9. Identify the location of public library
10. Identify communities of faith (religious facilities)
11. Identify locations of private and public schools
12. Identify cultural events in the community/city

PATIENT CARE PERSPECTIVES IN THE CLINICAL SETTING

As a black woman in health care, I have been on the receiving end of the negative preconceived notions, discrimination, and microaggressions that are projected onto minoritized populations. As humans we all wrongly assume things about those we do not know or understand. However, for too long the distorted images of people of color and minoritized persons that stem from racism and stereotypes, have been supported not only by individuals but also by institutions like our government, educational system, healthcare, and workplace. Within these institutions, we find that

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policies and laws, were by design, created to exclude. Systemic oppression creates barriers that are often covert, and inherently carry negative messages to minoritized persons about our "place" in society and what is or is not accessible to us. I recall stories from my parents about their experiences as children. Enduring everything from racial slurs to the struggles of segregation and integration. Because I was surrounded by a loving community and such a rich culture, my eyes were often blind to some of those racial tensions. But as a high school student my heart filled with many emotions as I marched for the first time to protest the murder of Trayvon Martin, a murder that that took place near my home in a neighborhood I had been several times to visit with family friends.

Fast forwarding to 2020, and our country's issues with police brutality towards people of color are still high. It is a very sad reality that some believe lives like mine are expendable or do not matter enough. These physical, emotional, and psychological traumas add to the subliminal messages that ring through society about race. I have experienced times of being racially profiled in stores, and as a college student even been asked where I learned to speak and if there were others like me where I come from. Being categorized as "exceptional for a Black student," was concerning as to suggest students of color are not bright, articulate students. The stigma of having to "work twice as hard" just to be on a level playing field seemed all too true. Usually being one of few students of color in my academic spaces illuminated the impression that I had to carry my culture alone. It highlighted this misconception, that what I do or how I perform will positively or negatively affect the way that others like myself would be perceived and accepted in those spaces. And while one's presence may aid in opening the door for those to come, minoritized persons certainly have the weight of feeling the pressure to succeed. For success was not only for one's self, but for others as well.

As a clinician today, I recognize how those feelings and encounters I faced have led me to be more mindful in the way I practice and interact with my patients. I began working at a low socioeconomic school in South Carolina, where most of the student-athletes were Black. Although I felt I could relate to the students I did not want to assume that I knew them. I did not want to take for granted that I knew their story, what their home life was like, nor what their passions were, or what they valued in life. I was intentional about being visible in the school, getting to know not only the athletes and coaches, but also people like the custodians, nurses, bookkeeper, receptionist, parents, and campus police. Establishing those relationships allowed me to better understand the overall culture, and advocate for the student athlete's health. I often verbalized my treatment plans and involved both the student, parent/guardian, team physician and coaches into the plan of care. I explained why I did something and made room for them to ask questions regarding their own health and progress. I consistently led with openness and transparency, as I wanted each student to feel like they were involved in what was happening to them. If I could, I would accompany students when seeing our collaborating physician to help them feel at ease because for many of them doctors represented people who were just there to capitalize on their pain and provide services they could not afford. I tried to take my time to dismantle the social disparities in health care experienced by my population. And while it was not my role to solve every issue in my time there, my efforts helped set the standard for what those student athletes now expected from health care professionals and improved the care that was available to them.

Regardless of the setting, becoming more aware of the patient population aids in establishing appropriate relationships with those we serve. This ultimately helps guide the process of decision-making that considers and respects their beliefs,

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values, language, and traditions. It has caused me to even evaluate what I tolerate as acceptable behavior and speech in the athletic training facilities. As one who is both ethnically diverse and a healthcare provider in athletic training, I recognize the influence I have in igniting change where I am. I have experienced firsthand the benefits and power of representation, mentorship, and leadership from minoritized athletic trainers as well as the benefits of diversity regarding collaboration and innovation. When we think about research and how it leads the way in creating the standards of how we care for our patients, overlooking the importance of diversity, even here, can be detrimental. Most research in the realm of athletic training does not currently reflect such inclusion, having shown to provide gaps in applicability. As clinicians we talk about evidence-based practice and integrating available research, merging that with clinical knowledge. This should include efforts in both addressing a lack of diversity amongst research participants involved, as well as research that gains the perspectives of diverse certified and athletic training students.

It may be easier said than done to operate in a way where we are proficient in interacting with those across an array of backgrounds. So, how do we transition from just merely having a "one size fits all" mentality in our care to one that is a lot more progressive and considerate of our patient's needs, background, health concerns, health beliefs, and values? Historically, there have been many systemic barriers that exist for minoritized persons pertaining to health care, along with other racial disparities that perpetuate discrimination and stereotypes. We must learn to come from a place of empathy and compassion with a desire to understand our patients. Additionally, there must be acknowledgment of any biases that hinder us from effectively treating others or that cause us to treat one group different from another. These steps are key to change from the inside out. It will take a willingness to be uncomfortable, as there is always difficulty with having to realize biases thoughts and feelings that sit within the subconscious mind.

- Kenya Moore MS, SCAT, ATC

BLENDING CULTURES WITHIN PATIENT-CARE SETTINGS

Through my academic and professional career, I have been an athletic training student, an undergraduate teaching assistant, a secondary school athletic trainer, a performing arts athletic trainer, a military athletic trainer, a doctoral research and teaching assistant and in each setting – a minoritized person. Twenty years ago, if you were to ask my parents what they expected of their children regarding education, they would both state, and I translate: "to accomplish more than I did." I am the daughter of two Mexican born and raced individuals, one whom completed 4th grade and the other not much further, 6th grade. The resources were so limited that they had one classroom and one teacher to teach students regardless of their grade level or age; and where 6th grade was the highest level of education you could attain. Living there, never did high school cross their minds, and let us not even mention college, because odds are, they had no idea what that was or how to even get there. If asked that same question ten years ago and knowing what a college education meant, that was the new expectation; an expectation soon to be met by all five children of a meagerly educated Mexican couple. In 2015, I became a 1st generation college graduate; that same year my oldest sister and brother received their master's degree. It did not stop there; today I am a second year PhD student and scholar in the making.

Following my education and clinical rotations at an institution with many resources available at hand, I began my journey as a clinician in the same

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community I came from a predominately Spanish speaking and low-income city on the Mexican border. Health literacy is extremely low and often I found myself translating orthopedic or concussion associated terminology to patients and parents, which is quite difficult for anyone who went through an English-only curriculum, even when Spanish is your first language, and you speak it daily. Information always had to be simplified, and though difficult, I was comfortable; I was around those that looked like me, talked like me, and shared the same culture and values as me. The students could reflect on me and I could reflect on them. I was once in their shoes and the concerned parents reminded me of my own mother driving me to urgent care to get an X-ray because that is what you do when your ankle looks like a balloon, right? It was here I learned the importance of patient education, whether that was in English or in Spanish. I learned to have open discussions about their injuries, their goals, their accessibility to care and medical insurance, and what the best plan of care and treatment would be for them. It was here I learned to be patient centered, around the same community I grew up in, around the same struggles I, as a patient, faced.

I transitioned to practice across the country in a small rural high school in St. Matthews, South Carolina, where the state's Hispanic or Latino population is less than 6%. I was an outsider; my patients constantly asked if I played soccer growing up, because "that is the only sport the Hispanic kids play here." As much of an outsider as I was, there were some things that remained the same—my work was in the best interest of my patients and their well-being. I was now in a predominately Black school, coaches were predominately White males, and the community was close knit; I was no longer in my comfort zone. Head coaches constantly questioned and undermined me, parents always asked where I was from; people around me said I spoke "funny." One of my biggest challenges was being told I was not a doctor and my medical opinion did not count compared to that of a nurse practitioner who signed a clearance note. Once again, education was my most powerful tool. I do not think coaches ever expected a female athletic trainer to hold her ground, as I did; and to make it known that my number one priority was the health of the patients.

All the patients had different upbringings from mine, but in some ways so similar. I submerged myself into the community there too, I made it known that my job was not 2-7pm and that where I came from did not mean I did not understand what they were going through. The greatest appreciation came from parents; I gained their trust simply through education and patient-centered care. We learned about each other in the process; we respected our diverse backgrounds and adapted to what their needs were. When the resources were not available, I went out of my way collaborating with our collaborating physician and orthopedic network to provide as much as we could for them. What goes unnoticed in these settings is the power of research, constant self-assessment, and patient-reported outcome measures. To bring change and more resources, others must see the value of our work. Lastly, a few things we always kept in mind: an open-door always meant you were welcomed in, respect was reciprocated and practiced daily, and patient care and goals were the priority. I learned that the patient-clinician rapport can only evolve with continuous communication, trust is earned, and happiness in the workplace is not dependent on the resources available but network you build in the community.

- Nancy A. Uriegas MS, SCAT, ATC

SUMMARY

Our experiences are diverse and unique in their own way. However, all three of us have faced similar challenges as minoritized female clinicians and educators. We have also seen the challenges

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faced by our diverse patients and students. We as an athletic training profession, should promote and practice diversity, equity, inclusion, and social justice across our settings. We must come together, rise above, and lead by example and this begins with providing opportunities of education, research, and patient-centered care equally across our communities. Let us all take a step back, evaluate where we are, who we serve, and how we can improve in the best interest of those around us.

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Intersectionality: The Role of the Athletic Trainer in Providing Culturally Competent Patient-Centered Care

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INTRODUCTION

One of the key components of evidence-based medicine is incorporating the patient's values and characteristics into the plan of care. As healthcare providers, athletic trainers should understand the importance of patient values and providing patient-centered care. However, this process of incorporating the patient's values into the care provided requires learning more about the patient as a whole, rather than solely obtaining information regarding the reason they sought care. This process of patient-centered care provides focus beyond the simple characteristics seen on the outside. Historically, patients who are of racial or ethnic minorities, such as those that are Black or indigenous persons of color (BIPOC) experience unconscious biases in medical care that lead to healthcare inequities.[1] It has been documented in Black women that the intersection of gender and race can lead to further discrimination.[1,2] Similarly, individuals of sexual and gender minorities have been marginalized and experience significant healthcare disparities.[3] Individuals that identify as lesbian, gay, bisexual, transgender, queer, intersex, or other gender or sexual minority (LGBTQ+) experience healthcare disparities due to inadequate treatment, as well as avoidance of seeking care due to discrimination and stigmatization by healthcare providers. Similarly, patients who are of racial or ethnic minorities, such as primarily those that are BIPOC, have also experienced unconscious biases in medical care that lead to healthcare inequities.[1] Studies on athletic trainers' perceptions of lesbian, gay, and bisexual (LGB) patients[4] and LGBTQ+ patients[5] have shown that respondents overall had positive attitudes toward LGBTQ+ patients, however, this was largely dependent on clinicians being female and/or having a close friend or relative that identified as LBG or LGBTQ+.[4,5] To our knowledge, there are no published studies specific to the healthcare provided to BIPOC patients by athletic trainers. However, it is important not to compartmentalize our patients as belonging to one group or via a single-axis framework. This is highlighted by Crenshaw's work describing how the intersection of race and sex often results in the multidimensionality of the discrimination some individuals face.[2] The intersection of race and sexual orientation and gender demonstrates that these factors are not mutually exclusive.[2] Individuals that belong to more than one marginalized group (i.e. race, sexual orientation, and gender identity) may have negative experiences (i.e. discrimination,

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inadequate care) in healthcare due to belonging to a "dual minority".[1]

Implicit biases, prejudices, and stigmatization faced by marginalized groups often negatively impact mental health; this is referred to as minority stress.[6] The LGBTQ+ community, and other minority groups, find these experiences further lead to healthcare and health disparities. Understanding these various aspects of intersectionality as it relates to ethnic minorities, sexual minorities, and other marginalized groups is essential in providing culturally competent care. Therefore, the purpose of this commentary is to describe culturally competent care for LGBTQ+ patients impacted by intersectionality and healthcare disparities.

INTERSECTIONALITY

People who have multiple marginalized identities often experience additional barriers to equitable healthcare when compared to those with singular marginalized identities; this cumulative effect is attributed to the theory of intersectionality.[2] Intersectionality is a theoretical framework that considers multiple social categories (i.e. race, ethnicity, gender, sexual orientation, socioeconomic status) intersecting at the micro level of individual experience to reflect multiple interlocking systems of privilege and oppression at the macro, social-structural level (i.e., racism, sexism, heterosexism).[7] The phrase "women and minorities," often used together, implies these two identifiers are mutually exclusive, when in fact, these two categories often intersect.[7] Additionally, minority has many different definitions. It can reference populations such as individuals in the LGBTQ+ community; people with mental and/or physical disabilities; or, when living in other countries, White people.[7] For example, the multiple layers of intersecting categories can lead one to a low-income Black bisexual man with a physical disability.

When considering the social determinants of health (i.e., socioeconomic status, gender, race, ethnicity, community), it is critical to consider how intersectionality can create complexity in treating patients. Inequities and/or unfair gaps are widened when a person falls into more than one category. Historically, White males with financial security receive the best medical care.[7] Consider the Latino gay male who is not financially secure. The care he receives could change simply because of several distinct characteristics, in that he is gay, is a member of an ethnic minority, and is not financially secure. Social justice in healthcare is relevant, but those who tend to be most harmed by social inequalities are those who have multiple forms of discriminatory characteristics in their being.[8] Part of the role of any healthcare provider is to know their patient; lack of understanding on potential barriers to care and discriminatory experiences by an athletic trainer can negatively affect the patient-provider relationship and lead to future health concerns of the patient. For example, athletic trainers should be concerned with their patients' health across the lifespan; if a patient has a negative experience with one healthcare provider, this can be a deterrent and prevent this patient from seeking care from another provider in the future. Therefore, understanding healthcare experiences may be moderated for patients who fall into more than one specific category and how this can impact their treatment and recovery. Further, this understanding becomes imperative for any athletic trainer to better understand the needs of the patient.

MINORITY STRESS

Health disparity research often focuses on an individual cultural group, often race or sexual orientation, as opposed to considering the whole person which exists at the center of multiple identities.[1] For persons with multiple social disadvantages, both health and well-being are influenced in a variety of ways.[1] Both

intersectionality and minority stress theories are helpful frameworks for understanding how compounding experiences of racism and homophobia cause barriers to seeking care and mistrust in the patient-provider relationship.[1] For example, an individual that is part of an ethnic minority and is also part of the LGBTQ+ community may experience adverse treatment that is commonly noted in each community, such as refusal of care or having expressed needs ignored or dismissed. Often, having a very negative experience while seeking care from a healthcare provider is unique in that the patient's hardships experienced in vastly differently communities converge.

The minority stress model evolved from Dr. Ilan Myers original work in 1995 to build the concept of a unique stress that sexual minority people (i.e., individuals in the LGBTQ+ community) experience as a result of stigma, prejudice, and discrimination due to their sexual identity.[6] Lived experiences marked by hostile and stressful social environments contribute to higher incidences of mental health disorders and other health concerns. Minority stress specifically addresses the excessive stress experienced by individuals from stigmatized social categories as a result of their marginalized social identities (i.e., race, religion, sexual orientation, gender identity), which deviate from societal norms and influence intergroup relations.[6]

Viewing minority stress through the lens of the model of multiple dimensions of identity highlights how different identity dimensions are present in each individual but vary in degree of saliency based on context. Common moderators of salience are family background, sociocultural conditions, and current life experiences.[9] The minority stress processes include the experience of prejudice, expectations of being rejected, hiding and concealing, internalized homophobia, and various coping processes.[6] Since identity is both externally defined and internally experienced, instances of discrimination or expectations imposed from outside sources heavily impacts how a person makes meaning of their life experiences.[9] The cumulative effect of holding a minority position in society further exacerbates the unyielding cycle of stress. In an attempt to cope, African-American LGBTQ+ persons may compartmentalize their sexuality or attempt to diminish or hide their sexuality so they are seen embodying only one marginalized identity. Hiding this aspect of their identity may help to lessen the anticipated effects of minority stress but will likely worsen their health outcomes.[1] Although taxing, the process of hiding an invisible, marginalized identity and engaging in performativity of gender occurs in the hope of receiving more equitable care. As noted earlier, a negative experience with a healthcare provider may result in a lack of trust in healthcare providers and lead an individual to not seek care.

One way to alleviate the stress placed upon vulnerable patients is to create a safe space and engage in shared decision-making, which may facilitate better patient-provider communication and treatment compliance. A safe space can be anywhere that individuals feel included and comfortable being themselves. For example, in an inclusive athletic training clinic, a patient that identifies as transgender can ask the athletic trainer and others to refer to them by the pronouns with which they identify without negative consequence. An inclusive healthcare facility uses inclusive intake forms that allow patients to share their identity and guide patient care. A safe space allows patients to share relevant medical information freely, without judgement, as part of the shared decision-making process[1] In addition to creating a safe space, clinicians must maintain awareness of the disadvantages among patients of marginalized identities within the healthcare system and across social class while providing patient-centered care for all.[1] A lack of a safe space by a healthcare provider can lead to disadvantages experienced by minoritized

groups; these may include barriers to access, erasure of identity (gender identity, sexual orientation), healthcare stereotype threat, and refusal to treat, which lead to healthcare disparities.

HEALTHCARE DISPARITIES

In addition to the minority stress experienced by individuals in marginalized groups, these individuals often experience health disparities, or a diminished quality of health and healthcare across racial, ethnic, and socioeconomic groups.[1,5] Healthcare disparities often occur as a result of explicit or implicit biases from their healthcare provider, often affecting both mental and physical health. For example, an athletic trainer may have negative biases toward individuals that are transgender; as a result, the clinician may not provide adequate care to a transgender patient that is injured. These implicit biases by clinicians toward sexual and gender minorities, as well as other marginalized groups, have been shown to negatively impact patient perception of care, clinical decisions, and patient-clinician interactions.[3,10] These disparities have been noted in various settings, including the pediatric population. LGBTQ+ youth are at greater risk of healthcare disparities compared to their heterosexual, cisgender counterparts.[11] These inequities may be due to stigmatization, family rejection, victimization, and lack of adequate training in healthcare providers.[11] The disadvantages faced in LGBTQ+ youth often continue into adulthood and can lead to increased substance abuse, depression, anxiety, and suicide.[11]

Research on healthcare disparities often focuses on single social groups, and not on the intersection of various identifiers or groups an individual may belong to.[1] The intersection of gender and sexual minorities with race and ethnicity may result in greater healthcare disparities for individuals that may be subjected to discrimination due to belonging to multiple marginalized groups. This is especially true for BIPOC that identify as being part of the LGBTQ+ community.

Although recent studies suggest athletic trainers are knowledgeable about the importance of patient-centered care and being culturally competent, it is unclear how clinicians can best implement this knowledge into clinical practice. Athletic trainers and other healthcare providers should strive to continue to learn more about cultural competency and how to incorporate this information into their history taking, physical exams, management of injuries, and other aspects of their clinical practice. Some examples of how athletic trainers can learn more and be more inclusive include seeking out continuing education opportunities regarding the LGBTQ+ population and healthcare as well as reading the latest research regarding this patient population.

Athletic trainers and other clinicians can utilize this information to create a more inclusive environment in their setting. Creating an inclusive athletic training environment can include the use of appropriate terminology and representation of inclusion and diversity, creating culturally competent forms for documentation, and ensuring all policies and procedures are reviewed to ensure they are inclusive (Figure 1).[12] It is also important to assess environmental and social factors that may be impacting the patient's physical and mental health.[1] Whether or not an LGBTQ+ individual is accepted by their family, friends and teammates, for example, can impact an individual's physical and mental health status. If a young high school athlete has been kicked out of his home and does not have access to basic needs or medical insurance, this can have a devastating impact on their health and wellbeing. Incorporating this information into the care provided would be a prime example of how minority stress and the negative impacts that discrimination and negative experiences can have

on someone's physical and mental health can impact the care rendered by the athletic trainer.

CLINICAL APPLICATION

There are several action steps providers can take to ensure that they are providing patient-centered care to all patients, particularly those that are BIPOC, of sexual or gender minorities or other marginalized groups. Patient-centered care is a philosophy of care that encourages shared decision-making, focusing on the patient as a whole, and treats patients as partners in care. By understanding the role intersectionality plays in the lives of some of our patients, athletic trainers will enhance the patient-provider relationship. Assessing one's own biases will provide insight of how care may need to be adjusted to meet a patient's needs. Research has demonstrated disparities in shared decision-making and communication among sexual and gender minorities as well as BIPOC and other racial/ethnic disparities. Therefore, it is imperative for healthcare providers to ensure they are utilizing shared decision-making and patient-centered care. Through shared decision-making, the clinician and patient can work together to have open communication, discuss treatment options, and develop a plan that will meet the needs of the patient.[1] In addition to a self-assessment and the individual initiatives of each clinician, there are several system-based actions that should be taken to improve the clinic environment. The clinic should publicly display their non-discrimination policy, provide diverse educational materials, use inclusive intake forms, and train the entire staff (i.e., receptionist, insurance coordinators, etc.) not just the clinicians. Furthermore, the facility should perform regular audits to ensure that the patients' experience match the intended outcomes of the clinic.

CONCLUSION

Most LGBTQ+ and BIPOC individuals have experienced some form of discrimination in their lives. Individuals that identify both as LGBTQ+ and BIPOC likely experience more discrimination due to the intersection of their race and sexual orientation or gender identity. Unfortunately, some of these instances of discrimination have occurred with healthcare providers. As athletic trainers, it is important for us to increase our knowledge of the impact of intersectionality and minority stress on healthcare, examine our own biases, create an inclusive athletic training setting, and ensure that we are providing quality patient-centered care to all patients.

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Clinical Practice in Athletic Training Volume 4 Issue 1

Intersectionality and the Role of the Athletic Trainer to Provide Culturally Competent Patient-Centered Care

Intersectionality

A theoretical framework that considers multiple social categories (e.g., race, ethnicity, gender, sexual orientation, socioeconomic status) intersecting at the micro level of individual experience to reflect multiple interlocking systems of privilege and oppression at the macro, social-structural level (e.g., racism, sexism, heterosexism).

Patient-Centered Care

Care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions. By providing patient-centered care a clinician considers the interactive effect of multiple identities and how the cumulative lived experience of individuals contributes to health disparities.

Shared Decision-Making

When patients and clinicians work collaboratively to identify treatment plans that meet the individual patient needs and preferences.

The shared decision-making model has 3 key domains:

- **Information-sharing** between patients and providers
- **Deliberation** about the pros and cons of treatment choices
- **Decision making** about a treatment plan that is endorsed by both the patient and the clinician.

Figure 1: Supplemental Infographic

Impact on Healthcare and Outcomes

Health Disparities

Health disparity refers to a higher burden of illness, injury, disability, or mortality experienced by one group relative to another.

Currently health disparities are not well studied through the lens of intersectionality but rather single societal groups. Minority stress is the unique stress that sexual minority people experience as a result of 'stigma, prejudice, and discrimination', but overall health disparities are not well studied through the lens on intersectionality

For example, a gay African-American male will have interactive effects of being gay and African-American as those identities intersect. This will be different for a male that is either gay or African-American.

Healthcare Disparities

Healthcare disparity typically refers to differences between groups in health insurance coverage, access to and use of care, and quality of care.

Marginalized populations have well documented and studied inequities regarding the healthcare received. This includes barriers to accessing healthcare, discrimination, biases, patient dissatisfaction, delays seeking care, poorer outcomes and more.

Action Items For Athletic Trainers

1 Know your patients

Spend time getting to know your patients. Identity is both externally and internally defined. Don't make assumptions and engage your patient in their healthcare.

2 Assess your biases

External (explicit) bias are the stereotypes or prejudices toward one group that you are conscious of, whereas internal (implicit) biases are the biases you are unaware you have as a clinician. Both have a significant impact on health care.

3 Use Inclusive Intake Forms

Allow the patient the opportunity to share their identities with the clinician and use the information to guide patient care.

4 Implement Shared Decision-Making

Work collaboratively with your patient to decide on plan of care. This will improve patient compliance, adherence, and comprehension.

5 Audit Your Practice

Audit your documentation to see if you are accounting for your interactions, and use patient satisfaction survey. Are your patients experiences the same as you perceive them?

6 Create Inclusive Facility

Publicly display an inclusive non-discrimination policy. Provide educational materials that are diverse including sexual orientation, race, ethnicity, age, etc.

7 Staff Training

All staff should be trained to create a welcoming and inclusive experience in the clinic. Staff should be mindful of using inclusive language, non-presumptive interviewing, and educated on important health related conditions for all marginalized populations.

Clinical Practice in Athletic Training

Best Practices for Clinical Evaluation of Sacroiliac Joint Pain: An Evidence-to-Practice Review

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ABSTRACT

Sacroiliac joint (SIJ) pain serves as an under-recognized source of chronic low back pain. Improvement in the accuracy of a clinical SIJ pain diagnosis lends a higher likelihood of appropriate treatment measures, better patient outcomes and decreased out-of-pocket costs. Therefore, the overall purpose of this evidence to practice review was to highlight the main points of a systematic review on the clinical diagnosis of SIJ pain. Searches of five electronic databases revealed 758 studies, nonetheless only six studies met final inclusion criteria. Studies included were assessed by the authors for methodological quality using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) tool. Evidence suggests pain provocation tests including distraction, thigh thrust, compression, sacral thrust, and Gaenslen's are minimally useful individually at diagnosing sacroiliac joint pain. The thigh thrust test was the most sensitive and the distraction test was most specific. Furthermore, the compression test carried the strongest positive likelihood ratio. The highest likelihood ratio was reported when three or more of the following pain provocation tests were positive: distraction, compression, thigh thrust, sacral thrust, and Gaenslen's test for both the right and left sides. A comparable likelihood ratio was found when any two of the remaining four tests were positive after excluding the left and right-side applications of the Gaenslen's test. Prior to the performance of pain provocation tests, research suggests using McKenzie Mechanical Diagnosis and Therapy to exclude pain of disc origin. The use of safe, efficient, and clinically effective diagnostic evaluation techniques is essential to the provision of high-quality patient care.

Key Phrases
Diagnostic testing and physical examination: spine, thorax, and abdomen; low back pain; sacroiliac joint

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Sivayogam A, Banerjee A. Diagnostic performance of clinical tests for sacroiliac joint pain. Phys Ther Rev. 2011;16(6):462-467.

SUMMARY

CLINICAL PROBLEM AND QUESTION

Approximately 10-30% of all low back pain is originated from the sacroiliac joint (SIJ).[1] The SIJ is a large, auricular-shaped, and arthrodial synovial joint formed by the connection of the sacrum to the right and left iliac bones.[2] The primary function of the SIJ is to absorb shock and transfer forces between the upper and lower extremities.[3] More extensive dorsally, the ligaments of the SIJ function to limit motion in all planes.[3] While the SIJ lacks significant range of motion, patients may possess hypomobility or hypermobility of the SIJ articulation.[2] The most common mechanism for acute SIJ pain results from a combination of axial compression and rapid rotation, such as with twisting while carrying a heavy object or falling.[1] However, most athletes will experience a slow and progressive onset of symptoms resulting from repetitive activity performed over time.[1] Common pathologies arising from the SIJ include: sprains, strains and dysfunction of the joint secondary to insufficient or excessive mobility.[1] Factors that increase the risk of these conditions include leg length discrepancy, antalgic gait, scoliosis, and prolonged vigorous exercise.[1] This multitude of triggers, makes low back pain of SIJ origin extremely challenging for the health care provider to clinically diagnose.

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Regrettably, no single history presentation, clinical examination finding, or diagnostic imaging technique can definitely establish a diagnosis of sacroiliac joint pain.[4] However, previous research has studied these measures in an effort to improve accuracy in the diagnosis of SIJ pain.[5] While many publications have referenced controlled local anesthetic blocks as the best available tool to determine the source of SIJ pain, these measures are invasive and expensive, making them clinically unpractical for routine use in the ambulatory care setting.[5] There are a variety of "special" tests used by clinicians in the evaluation and diagnosis of SIJ pain. These include motion palpation and pain provocation tests.[6] Numerous studies have proposed palpation as a method to assess movement or asymmetry at the SIJ.[7] However, generally their inter-examiner reliability has shown poor.[7] This leaves clinicians to rely on pain provocation tests, which stress the structures of the SIJ and provoke reproduction of symptoms, as measures of non-invasive clinical evaluation of SIJ pain.[7] Common pain provocation tests used for clinical evaluation include distraction, compression, sacral thrust, thigh thrust, and Gaenslen's tests in addition to a host of others.[7] The diagnostic accuracy of pain provocation tests has been called into question for its inability to discriminate pain of sacroiliac origin as compared to the reference standard.[7] Consequently, clinicians must be aware of both the sensitivity, or ability to distinguish subjects with the disease, as well as the specificity, or the ability to identify patients without the disease associated with the tests used for effective diagnosis of SIJ pain.[8]

Therefore, the overall purpose of the guiding paper was to systematically review and synthesize evidence associated with the clinical diagnosis of SIJ pain. More precisely, this Evidence to Practice Review aims to remedy the following research question: In patients with low back pain, which clinical evaluation tests are most accurate for diagnosing pain of sacroiliac origin?

SUMMARY OF LITERATURE

Authors of the systematic review performed a methodical search of MEDLINE, Scopus, AMED, CINAHL, and EMBASE databases to determine the diagnostic performance of clinical tests for SIJ pain. Searches were filtered to include only articles published in English between 1990 and 2011. Studies specifically addressing SIJ dysfunction rather than SIJ pain were excluded. Single articles were included in the systematic review according to the following criteria: (1) patients were at least 18 years old, (2) had non-specific and non-pregnancy related low back pain and/or buttock pain with or without radiation into the lower extremity, (3) used clinical tests with clear definitions of positive and negative test results, and (4) provided sensitivity and specificity data. Initially 758 studies were identified, however 752 were excluded for failing to meet selection criteria. Of the six studies included, two studies evaluated the validity of each individual test; three studies evaluated the validity of several composites of tests; and one study evaluated the validity of both individual and composites of tests. All six of the studies included used a contrast-enhanced intra-articular anesthetic block as the reference standard. The number of patients enclosed in the studies ranged from 34 to 140 with a mean age between 42 and 51 years old.

SUMMARY OF OUTCOMES

Studies included in the guiding systematic review were assessed for methodological quality autonomously by both authors using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) tool. The QUADAS tool consists of 14 items which can be answered with a yes, no, or unclear. Nine of the 12 items relate to bias, while three of the 12 items related to the quality of the reporting and two of the 12 items conveyed variability. Intra-articular administration of an anesthetic block into the SIJ bilaterally was

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agreed upon by the authors as the best available reference standard for fulfilling QUADAS item number 3 and correctly classifying SIJ pain. Furthermore, to achieve item number 4 of the QUADAS and to rule out spontaneous recovery or progression to more severe pain, the acceptable gap was agreed on by both authors as no more than seven days between performance of clinical and reference tests. Items 1,5, 10, 11, and 12 were scored using a 3 for yes; items 3 and 6 were marked 2 for yes; and all other items were counted 1 for yes.[6] A quality score of 17 was assigned to five of 6 items, while a quality score of 18 was allocated to the sixth study.[6]

FINDINGS AND CLINICIAL IMPLICATIONS

The systematic review guiding this paper aimed to assess the diagnostic performance of clinical tests commonly used to evaluate SIJ pain. For each clinical test, sensitivity and specificity were documented. In addition, positive predictive values (PPV) were included to describe how often a positive finding was correct, while negative predictive values (NPV) were provided to consider the accuracy of a negative test result. Furthermore, positive and negative likelihood ratios were extracted when available. Positive likelihood ratios (LR+) were used to provide confidence in the fact that the pathology was present when a test was positive. Likewise, negative likelihood ratios (LR-) express the probability that the condition was present despite a negative result on the diagnostic test. Evidence revealed that when used in isolation, most clinical tests had poor diagnostic performance.[9] Clinical tests including the Gillet, pain over SIJ or groin or buttock, sitting position, posterior superior iliac spine pointing, sacral spring, and sacral sulcus revealed poor clinical utility as result of low specificity, low sensitivity, and positive likelihood ratio.[9] However, the high sensitivity and specificity values of FABER, thigh thrust, and resisted abduction may make these tests better indicators of SIJ pathology.[10] Furthermore, evidence suggests pain provocation tests including distraction, compression, thigh thrust, sacral thrust, and Gaenslen's are not effective predictors of a positive intra-articular SIJ anesthetic block when used alone without any other tests.[11] However the thigh thrust test was most sensitive, while distraction test was most specific and compression test carried the strongest positive likelihood ratio (**Table 1**).[6,11]

Clinicians should choose a composite of tests which may strengthen the likelihood of an accurate clinical diagnosis. Evidence suggests an optimal ratio of pain provocation tests composites which can provide high specificity paired with low sensitivity while still maintaining a high likelihood ratio.[11, 12] The highest likelihood ratio was reported when three or more of the following pain provocation tests were positive: distraction, compression, thigh thrust, sacral thrust, and Gaenslen's test for both the right and left sides.[11] A comparable likelihood ratio was found when any two of the remaining four tests were positive after eliminating the left and right-side applications of the Gaenslen's test **(Figure 1).**[11] The inclusion of positive and negative likelihood ratios in the individual studies helped to formulate the conclusion that when in the presence of pain below the lumbosacral region or groin, the three prime tests for diagnosis for SIJ pain are distraction, thigh thrust and compression.[6] Only after all six SIJ pain provocation tests are negative, can SIJ pain be ruled out.[11] Using clinical examination techniques with high diagnostic accuracy can eliminate or significantly reduce the need to refer patients for diagnostic imaging. Safe, effective, and efficient diagnostic techniques can help improve the quality of care. Furthermore, the use of clinical evaluation techniques can decrease health care costs, making care more equitable for everyone.

To further reduce false positives, research suggests using the McKenzie evaluation to exclude pain of disc origin prior to the performance of

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Table 1. Summary of Diagnostic Accuracy for Individual Clinical Tests of Sacroiliac Joint Pain

Intervention	Study	Sensitivity (95% CI)	Specificity (95% CI)	+ LR†
Thigh thrust	Dreyfuss et al.[8]	0.36	0.50	
	Broadhurst and Bond[9]	0.80	1.00	
	Laslett et al.[10]	0.88 (0.64–0.97)	0.69 (0.82)	2.20
Gaenslen's	Dreyfuss et al.[8]	0.71	0.26	
	Laslett et al.[10]	0.53 (0.30–0.75) R	0.71 (0.53–0.84) R	1.84
		0.50 (0.27–0.73) L	0.77 (0.60–0.89) L	2.21
Sacral thrust	Dreyfuss et al.[8]	0.53	0.29	
	Laslett et al.[10]	0.63 (0.39–0.82)	0.75 (0.58–0.87)	2.50
Distraction test	Laslett et al.[10]	0.60 (0.36–0.80)	0.81 (0.65–0.91)	3.20
Compression	Laslett et al.[10]	0.69 (0.44–0.86)	0.69 (0.51)	2.20

Note: *CI: confidence interval.
†+LR: positive likelihood ratio.

pain provocation tests.[13] McKenzie Mechanical Diagnosis and Therapy (MDT) is a well-studied technique which utilizes repeated movements to assess musculoskeletal disorders of the spine and extremities.[14] By performing repeated movements during the examination, patients may develop a direction of preference (e.g., truck flexion, extension, or lateral bending) that is correlated to a movement which centralizes the pain from the extremities to the spinal midline.[14,7] Centralization has been reported as highly specific to discogenic pain, yet is not observed in patients with confirmed pain of sacroiliac origin.[7] Therefore, we strongly recommend the prerequisite use of MDT by clinicians to rule out discogenic pain prior to evaluation of the SIJ using pain provocation tests. Moreover, current research suggests MDT can also be used in adjunct to pain provocation tests to as a method of alleviating pain and further strengthening SIJ pain diagnoses.[14] Patients may be further classified with SIJ pain when repeated anterior and posterior innominate rotation movements alleviate pain and symptoms from the region of the posterior superior iliac spine (PSIS).[14]

CLINICAL BOTTOM LINE

Diagnostic tests are a critical component of health care. Information on the accuracy of diagnostic tests can help in clinical decision-making and assist in the provision of safe, timely, effective, efficient, and equitable care. Based on the findings of this review, we suggest a framework for improved diagnosis in the evaluation of SIJ pain. Evaluation of pain below the lumbosacral or groin region should begin with a thorough patient history. Moving forward, a McKenzie MDT evaluation assessing for centralization should be performed to rule out pain of discogenic origin. This should be proceeded by the performance of 6 pain provocation tests: beginning with distraction, thigh thrust, and compression tests and continuing with the sacral thrust and Gaenslen's test for both the right and left sides as needed. The receipt of 3 or more positive tests provide the optimal balance between high specificity, low sensitivity, and a high likelihood ratio. We believe use of this criterion is best practice for establishing a highly accurate SIJ pain diagnosis. Alleviation of the patient's symptoms through repeated anterior and posterior innominate rotation may further validate diagnosis, but more research is needed to support

this recommendation. It is our view that improved diagnostic accuracy will lead to a higher likelihood of appropriate treatment measures, resulting in decreased out-of-pocket costs, improved patient care, and enhanced patient outcomes.

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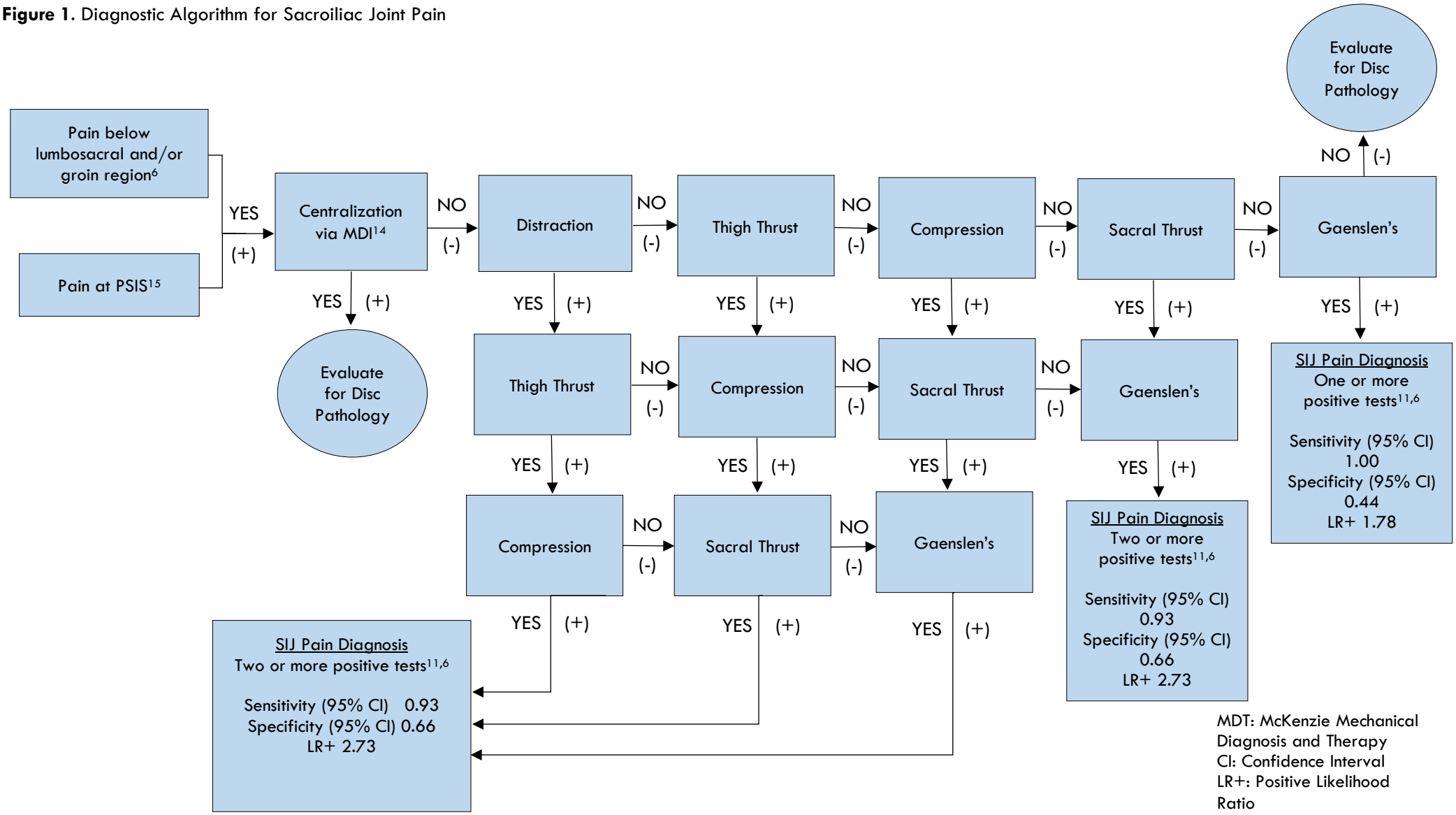
Figure 1. Diagnostic Algorithm for Sacroiliac Joint Pain



Use of Response Shift to Improve Agreement between Patient-Reported and Performance-Based Outcomes in Knee Patients

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ABSTRACT

The purpose of this study was to determine whether the implementation of performance-based tasks (PBTs) prior to completion of patient-reported outcome measures (PROs) would create a change, or a response shift, in PROs in patients with knee injuries. A randomized controlled trial was implemented to examine the effectiveness of a response-shift based interventions to enhance the correlation between PBTs and PROs. Participants (n=20) were knee-injured patients who were removed from activity for a minimum of 1-week. Participants were randomly assigned to complete PBTs (intervention) or to watch videos detailing an injury prevention program (control). The International Knee Documentation Committee Subjective Form (IKDC) and the Knee Injury and Osteoarthritis Outcome Score Recreational and Sports Subscale (KOOSsports) were completed both pre- and post-testing. The independent variable was Group. Dependent variables included raw change scores and absolute change scores on the IKDC and KOOSsports. Mann-Whitney U tests were used to examine between Group differences. Changes in PRO scores were not considered statistically significant or clinically meaningful (IKDC Raw $p = 0.14$, Absolute $p = 0.74$; KOOSsports Raw $p = 0.85$ Absolute $p = 0.32$). Implementation of PBTs prior to PROs did not induce a response shift. PROs may better evaluate symptoms and/or confidence in a patient, while PBTs evaluate physical function.

Key Phrases
Patient-reported outcomes, clinician-rated outcomes, functional testing

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INTRODUCTION

After an injury, patients often seek medical treatment to resolve their injury. Whether that treatment is therapeutic rehabilitation, surgical interventions, or even just the application of ice, it is important to evaluate the effectiveness of the method of treatment. The assessment of health outcomes is a fundamental component of a clinician's duties, as it provides a basis to determine which treatments are more effective.[1] Assessment of health outcomes also provides a foundation to determine whether a patient can return to their pre-injury levels of activity.[1] In athletics, most often the goal is to return patients to their pre-injury status and back to full participation as quickly and safely as possible. Different evaluation techniques have been employed to assess a patient's health status and to determine whether a patient is able to return to sport. These different techniques often include disease-oriented, performance-based, and patient-oriented measures.[2-4]

Disease-oriented measures assess outcomes associated with impairments at the body function and structure level.[2] These measures typically include testing or evaluating the involved tissue, such as the Lachman's maneuver or the KT-1000 device, to test the integrity of the ACL.[2] Performance-based measures are typically closed-kinetic tasks that examine the patient's ability to perform functional tasks that will likely stress the involved structure.[3-5] Frequently used lower extremity performance-based measures include the single-leg hop for distance, crossover

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hop, 6-metered timed hop, shuttle run, and star excursion balance test.[2,6-8] Lastly, patient-oriented outcomes are used to determine the perceived limitations and restrictions, most often through the use of patient reported outcome measures (PROs).[9] While many reliable and valid measures exist for each type of outcome, the observed correlation between various types of outcome measures is often poor to moderate, at best.[10,11] Specifically, performance-based measures and PROs have frequently been observed to be only low to moderately correlated among knee-injured patients.[10,11]

It has been theorized that failure to provide a frame of reference for patients to answer questions on PROs has led to the disagreement between PROs and performance-based measures.[10] Patients may be asked to answer questions related to tasks that they have not performed since sustaining injury.[12] Asking patients to complete questionnaires prior to completing functional testing may result in patients having an insufficient sample of experiences from which to self-evaluate their current function. As proposed by Logerstedt et al.,[13] if patients can be provided with a relevant sample of experiences to be used to evaluate their current function, then their perceived function may be more in line with their true physical performance. Anecdotally, it has been observed that patients tended to either underestimate or overestimate on PROs if completed prior to performance-based testing.14 Fitzgerald et al.[14] hypothesized that completing performance-based tasks prior to the completion of PROs allowed the participant an opportunity to self-evaluate the status of their knee, which provided more accurate ratings of knee function on the self-report surveys.

Inconsistencies between PROs and performance-based measures may be due to the varying frame of reference patients use to complete PROs. As a result, PROs may be influenced by a response shift phenomenon. Although primarily studied in ill and chronic disease patients, response shift can also be detected in individuals suffering from an orthopaedic injury.[15,16] Response shift is defined as a change in an individual's internal standards, values, or conceptualization of a construct when evaluating their health related quality of life.[17] A response shift results in a change in one's self-evaluation either through recalibration, reconceptualization, or reprioritization.[18] Recalibration refers to a person's change in their internal standards of measurement; reconceptualization refers to a change in definition of the target construct; and reprioritization refers to a change in an individual's internal values.[18] If individuals are susceptible to these changes, then it may be possible to recalibrate and/or reconceptualize an individual's self-perceived function through the implementation of a performance-based assessment intervention. While the response shift phenomenon has been reported in orthopaedic cases[15,16], use of this theory to optimize PROs has not been previously evaluated. Therefore, the purpose of this study was to examine the effect of testing order on PRO scores to determine if completing a performance-based assessment with the intent to provide a frame of reference for the individual prior to the administration of PROs would alter PRO scores in knee patients. We hypothesized that completion of performance-based assessments prior to PROs would lead to a greater change on PRO scores between pre-test and post-test when compared to a control group.

PATIENTS

Participants were between the ages of 14-40 and had been restricted due to a knee pathology from full participation in physical activity for at least 1-week prior to testing and had recently been cleared to return to full activity. Participants could have no other injuries besides their current knee injury affecting their sports participation status, and they must have reported having a pre-injury activity level of 5 or greater on the Tegner

Physical Activity Assessment.[20] Additionally, participants were excluded based on the following criteria: known balance disorders, not cleared to return to activity, not cleared to perform functional testing, scored below a 46 on the IKDC, failure to pass the pre-participation functional assessment screening, or cleared for activity > two weeks at time of recruitment. As a precaution, participants who scored below a 46 on their pre-intervention IKDC were not permitted to continue in the study. A cut-off of 46 was chosen because this value represented the mean pre-operative value for surgical knee patients in the University of Kentucky Patient Registry at the time of study development which suggested that the patient may not be able to safely complete the functional tasks required of the study.

INTERVENTION

Design

A randomized controlled trial was used for this study, with participants randomized into either a performance-based assessment intervention group or an educational control group (**Figure 1**). A block randomized design with random block sizes ranging from 2-6 participants was used to complete randomization. An independent third party generated the randomization scheme using a publicly available randomization generator (http://randomization.com/) and created blinded envelopes for subject allocation. Individuals in the performance-based assessment group completed a battery of functional tests, while those selected for the educational control group participated in a placebo intervention consisting of watching exercises from the FIFA 11+ program.[19] The intervention session lasted approximately 40 minutes for both groups. Both groups completed the International Knee Documentation Committee Subjective Knee Form (IKDC) and the Knee Injury and Osteoarthritis Outcome Score Sports and Recreation Subscale (KOOSsports) pre- and post-intervention. All participants reviewed and signed an informed consent approved by the University of Kentucky IRB prior to study participation.

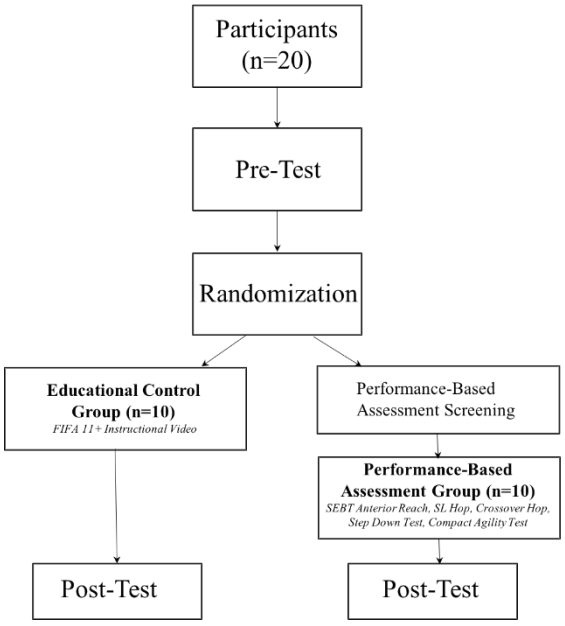

Figure 1. Study Design and Participant Allocation

Procedures

Participants completed a single testing session in a clinical laboratory lasting approximately 40 minutes. After informed consent and prior to randomization, all participants completed the IKDC and KOOSsports as pre-test assessments. Upon completion of pre-test PROs, the participant randomization envelope was opened, revealing group allocation.

Educational Control Group

Participants randomized into the educational control group were shown the FIFA11+19 exercise videos. The FIFA11+ is a sports and injury performance program that has been used extensively in the soccer community and beyond and, when implemented with high compliance, has been shown to reduce injury risk among soccer players.[19,24-27] It was chosen as an educational control for this study, as the information provided in the video may be of some benefit to study participants, but was not anticipated to alter PRO

scores. We chose to include a patient education component for the control group to reduce participant bias and provide some benefit to all participants. At the conclusion of the study, participants in both groups received a handout with links to the FIFA 11+19 website as additional information to take with them. Following conclusion of the videos, the participants were again asked to complete the IKDC and KOOSsports.

Performance-Based Assessment Screening

As a precaution, prior to the completion of the performance-based tests, participants randomized to the performance-based assessment group completed a screening to verify the patient's eligibility/readiness to complete the performance-based tasks included in the study protocol. This screening consisted of a series of single-leg squats, side-to side-hops, and vertical hops. All participants were required to complete these tasks without pain, or any other symptoms.

Instrumentation

Those participants randomized into the performance-based assessment intervention group completed a 5-minute jogging warm-up followed by a battery of performance-based assessments. To ensure there was minimal fatigue and muscle soreness throughout the study, the order of tests was standardized for all participants and a three-minute rest period was provided between each test. For all assessments, participants were given ample time to practice each task, and for unilateral assessments the uninvolved limb was tested first.

Star Excursion Balance Test (SEBT) – Anterior Reach[28]

The SEBT was used to assess dynamic balance. Participants maintained a single-leg stance on the involved limb while reaching for maximum distance in the anterior direction with the opposite limb. The participant's first toe was placed at the 0 point on the tape measure. Participants then reached as far anteriorly as possible and touched the tape measure while maintaining a single-leg stance. Participants were required to keep their hands on their hips and stance heel in contact with the ground. All participants were given the opportunity to complete 4 practice trials, followed by 3 test trials in the anterior direction only. The test was performed bilaterally with the uninvolved limb first. Reach distances were measured in centimeters and normalized by leg length. Leg length was measured from the anterior superior iliac spine to the base of the medial malleolus of the tibia. Mean reach distances were used to calculate limb symmetry index (LSI = (mean distance involved limb/mean distance uninvolved limb) x 100).

Single-Leg Hop Tests[29]

The Single-Leg Hop for Distance test is commonly used to measure power and confidence. The patient began standing on one leg and then jumped as far forward as possible landing on the same leg. The total distance hopped forward was recorded (cm). The Crossover Hop for Distance also measures power and confidence in the tested leg. The patient began standing on one leg and then hopped as far as possible forward 3 times while alternating crossing over a 6-centimeters wide strip on the floor. The total distance hopped forward was recorded (cm). Both hop tests were performed three times, with a 10 second recovery between trials. A successful trial included landing stable on the test leg and maintaining balance for three seconds. The trial was repeated if the participant landed with early touchdown of the contralateral leg, lost balance, touched the surrounding area, or included additional hops after landing. Mean hop distances were used to calculate limb symmetry index (LSI = [mean distance involved limb/mean distance uninvolved limb] x 100). The Single-Leg Hop for Distance and the Crossover Hop for Distance have previously been reported to be reliable and valid measures

of functional performance,[30] and are routinely used clinically to evaluate recovery and readiness to return to sporting activity.

30 Second Step-Down Test[31]

Participants were asked to perform a step-down motion from a platform 8-inches high. Participants were instructed that contact with the floor should only be a brush and not be used to accelerate back onto the step, hands must remain on the hips, and to complete as many repetitions as possible within a single 30-second trial. Participants completed one 30-second test trial on each limb, with a 3-minute recovery time between test legs.[31] Limb symmetry index was calculated using the following equation: (LSI = [mean distance involved limb/mean distance uninvolved limb] x 100).

Compact Agility Test (CAT)

Participants completed an assessment of agility, quickness, and body control by completing a sprinting and shuffling task on a 4-meter path. The path was marked by tape and the individual performed the following tasks with their best effort. The testing procedure followed the pattern presented in **Figure 2**. This resulted in a total distance traversed of 20 meters. Participants completed a walk-through of the task to gain familiarity and then were asked to complete a submaximal effort of the task to ensure fluidity of the task. Additional submaximal trials were permitted if necessary, for the participants to feel comfortable with the test. The participants were then asked to complete two test trials at the highest speed with which they were comfortable. A two-minute rest period was given between test trials. Verbal cuing occurred from the investigator throughout the entire testing session of the CAT. The faster of the two trials was used as the CAT result for analysis. This test was designed to be completed in a small space, such as a doctor's office, and to provide patients with a sampling of experiences that involved sprinting, cutting/planting, and lateral movements.

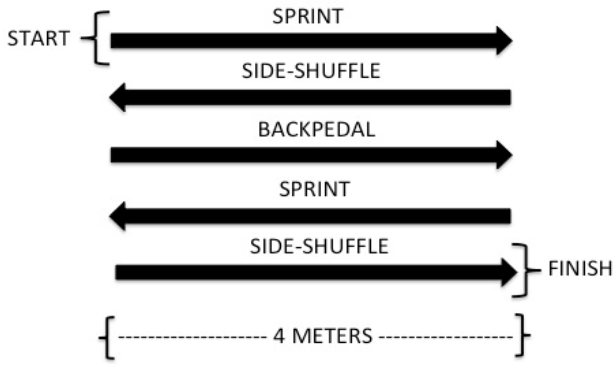

Figure 2. Compact Agility Test (CAT). Completed on 4-metered pathway.

OUTCOME MEASURES

Following completion of the performance-based assessment battery, participants completed the post- IKDC and KOOSsports assessments. To avoid biasing PRO scores, participants did not receive scores on performance-based measures until post-test PROs were completed. Both the IKDC and KOOS are valid and reliable PROs used for individuals suffering from knee pathology.[21,22] The IKDC is a 20-item outcome measure used to determine patient perceived function. The KOOSsports is a 5-question subscale of the KOOS used to evaluate patient perceived function for activities such as running, cutting, and jumping. All PROs were collected and managed using Research Electronic Data Capture (REDCap) tools hosted at the XXX. REDCap is a secure, web-based application designed to support data capture for research studies.[23]

Statistical Analysis

Descriptive statistics were generated for all performance-based measures and PROs. To ensure that the randomization resulted in comparable groups, independent t-tests or Mann-Whitney U tests were used to compare height, weight, age, and time between clearance to RTS and the data collection session between groups. To determine if participation in performance-based assessments resulted in a change in PRO

scores, Mann-Whitney U tests were used to compare the raw change (post-test – pre-test) and absolute change (|post-test – pre-test|) between groups for both the IKDC and KOOSsports scores.[15] Minimal detectable change (MDC) values were interpreted to identify clinically meaningful changes in the IKDC and KOOS sports scores.

RESULTS

A total of 20 participants were enrolled into the study (performance-based assessment n=10, educational control n=10). Participants' demographic information are presented in **Table 1**. Eleven out of 20 of the participants were cleared to return to activity following ACL-reconstruction. Two other patients were post-surgical (medial meniscal allograft transplantation and meniscectomy). The remaining nine participants suffered from IT band friction syndrome (n=1), Morel-Lavalle lesion (n=1), lateral collateral ligament sprain (n=2), articular cartilage damage (n=2), meniscal tear (n=2), or patellofemoral pain syndrome (n=1). Participants were tested a median of 1.5 days from physician and/or other healthcare professional's clearance to return to sport. There were no differences in demographics between the two groups. Average pre-test, post-test, and change scores for the performance-based assessment group and educational control group are presented in **Table 2**. Descriptive statistics for performance-based measures are presented in **Table 3**. No significant differences were observed between groups when comparing raw change scores and absolute change scores for the IKDC and KOOSsports (IKDC Raw Change $p = 0.14$, Absolute Value $p = 0.74$; KOOSsports Raw Change $p = 0.85$ Absolute Value $p = 0.32$) (**Table 2**).

DISCUSSION

To our knowledge, this is the first study to use a response shift theory-based intervention to enhance the agreement between performance-based measures and PROs. The aim of this study was to determine whether testing order would improve the agreement between performance-based measures and scores on the IKDC and KOOSsports. However, our results did not support our hypothesis as we observed that providing a specific frame of reference from which patients could evaluate themselves did not result in systematic changes in PRO scores. These results suggest that PROs can be implemented before or after performance-based testing during the rehabilitation of knee patients and support the use of both PROs and performance-based testing in clinical practice.

While no between group differences were identified, some participants included in this study did increase or decrease their score at the post-test despite their ability to successfully complete performance-based tasks with high LSIs (**Table 3**). In accordance with Howard et al.,[20] the present study also observed evidence that a response shift may occur on a patient-by-patient basis after knee injury. Fifty percent of the participants randomized into the performance-based assessment group reported lower scores on the IKDC at the post-test (**Table 4**). This suggests that participants overestimated their function prior to completion of functional testing. Concerns for overestimation on PROs in patients after ACL reconstruction has been previously postulated.14 While evaluating decision-making criteria for return to sport after ACL reconstruction, Fitzgerald et al.[14] altered their methods of administering PROs to their patients to accommodate anecdotal observations involving testing order.14 Investigators reported observing that patients tended to overestimate or underestimate on self-report scores if hop tests were performed after the completion of PROs. While not statistically or clinically meaningful between groups, the results from the present study further support this observation that individual patients may shift their responses on PROs due to their experience while engaging in the performance-based assessments.

Table 1. Participant Demographics

Measure	Performance Group (n=10)	Educational Control (n=10)	Total (n=20)	P-Value
	Mean (SD)			
Height (cm)	177.24 (9.43)	173.00 (11.27)	175.12 (10.32)	0.37*
Weight (kg)	80.40 (18.70)	82.20 (17.22)	81.30 (17.52)	0.83*
Tegner Score (Current Level)	8.00 (1.70)	8.00 (1.42)	8.00 (1.52)	1.00*
	Median (IQR)			
Age (years)	20.00 (3.00)	20.50 (4.00)	20.00 (3.00)	0.63#
Time from Clearance (days)	6.50 (7.00)	1.00 (3.00)	1.50 (7.00)	0.09#
Tegner Score (Before Injury)	9.00 (3.00)	9.00 (3.00)	9.00 (2.00)	0.39#

*PBA = Performance-Based Assessment Group, EC = Educational Control Group
*Independent T-Test, #Mann Whitney-U Test

Table 2. Patient-Reported Outcome Measures Pre-Test, Post-Test, and Change Scores

Measure	Performance-Based Assessment Median (IQR)	Educational Control Median (IQR)	Total Median (IQR)	Mann-Whitney U Test P-Value
IKDC Pre-Test	87.94 (11.78)	88.51 (22.13)	87.94 (13.21)	0.57
IKDC Post-Test	87.36 (15.80)	89.66 (23.56)	87.94 (15.23)	0.35
$KOOS_{sports}$ Pre-Test	90.00 (26.00)	92.50 (41.00)	90.00 (29.00)	1.00
$KOOS_{sports}$ Post-Test	90.00 (26.00)	92.50 (41.00)	90.00 (29.00)	0.91
Δ IKDC Raw Change	-0.57 (3.16)	0.01 (2.59)	0.00 (3.16)	0.14
Δ IKDC Absolute Value	1.16 (2.87)	1.72 (2.30)	1.16 (2.30)	0.74
Δ $KOOS_{sports}$ Raw Change	0.00 (6.00)	0.00 (0.00)	0.00 (0.00)	0.85
Δ $KOOS_{sports}$ Absolute Value	2.50 (5.00)	0.00 (1.00)	0.00 (5.00)	0.32

*IKDC = International Knee Documentation Committee, $KOOS_{sports}$ = Knee Injury and Osteoarthritis Outcome Score Sports and Recreational Subscale, PBA = Performance-Based Assessment Group, EC = Educational Control Group

Table 3. Outcomes of PROs change scores and performance-based testing demonstrating mean values and standard deviation (SD), and p-value

	Performance-Based Assessment Mean (SD)
SEBT Anterior Reach	99.22 (4.90)
SL Hop for Distance LSI	100.29 (11.12)
Crossover Hop for Distance LSI	95.91 (13.66)
30 Second Step Down Task LSI	96.50 (11.71)
Compact Agility Test AVG	10.13 (1.57)

*LSI = Limb Symmetry Index, SEBT = Start Excursion Balance Test, SL = Single Leg

Table 4. Individual Changes in PRO Scores Between Groups

	IKDC – PRE	IKDC - POST	$KOOS_{sports}$ - PRE	$KOOS_{sports}$ - POST
PBA	91.95	91.96	100	100
PBA	89.66	89.66	90	90
PBA	51.72	41.38*	25	35#
PBA	80.46	79.32*	85	80*
PBA	87.36	86.21*	75	70*
PBA	79.31	77.02*	90	90
PBA	78.16	73.57*	70	75#
PBA	90.8	93.11#	100	95*
PBA	90.8	91.96#	100	100
PBA	88.51	88.51	100	100
Control	57.47	55.18*	55	55
Control	87.36	87.36	90	80*
Control	83.91	82.76*	90	90
Control	97.7	97.7	95	95
Control	78.16	80.46#	60	60
Control	94.25	97.71#	100	100
Control	40.23	42.53#	35	40#
Control	94.25	94.26	100	100
Control	100	100	100	100
Control	89.66	91.96#	100	100

PBA = Performance-Based Assessment, IKDC = International Knee Documentation Committee, $KOOS_{sports}$ = Knee Injury and Osteoarthritis Outcome Score Sports and Recreational Subscale * = decreased from pre to post test, # = increased from pre to post test

These results also highlight the importance of integration of a holistic approach to health outcome evaluation. Performance-based measures completed in this study provided information about the patient's strength, power, and agility. However, those tasks may only provide limited information about the patient's pain or confidence levels, particularly when performed in a controlled laboratory environment. Evaluation of a patient's confidence levels, and perception of function are just as important as evaluating the patient's strength, power, and agility. Providing a frame of reference did not alter median PRO scores, which suggests that these outcomes are measuring different aspects of health. This study adds to the growing body of literature supporting a multifaceted approach to outcome measurement to provide the most effective evaluation of patient care and progress.

Interestingly, 4 out of 10 participants in the educational control group exhibited increased scores on the IKDC at the post-test (**Table 4**). We hypothesize that these results may have occurred because of the influence of modeling on confidence.[32] It has been demonstrated that vicarious experiences, or knowledge gained through observing the experiences of others, can enhance confidence.[32] Participants in the educational control group may have increased their confidence to complete functional tasks through observation of individuals completing functional tasks in the FIFA 11+19 videos. It is plausible that deficits in confidence were present in this sample at the time of testing as previous literature has demonstrated that lack of confidence is often reported as a barrier for return to sport after a sports-related knee injury.[33] These results further support the integration of PROs into clinical practice. Use of the IKDC and KOOSsports may also provide insight into a patient's confidence levels prior to return to sport.

Limitations

This study is not without limitations. Due to the nature of subject recruitment, researchers were unable to test most participants on the day of clearance. Participants, particularly those randomized into the performance-based assessment group, could have already been exposed to different stimuli that would represent a sample of experiences from which to answer PRO questions. Another limitation of this study is the small sample size (n = 20). However, despite the small sample size, given that only 1 participant demonstrated a change value exceeding minimal detectable change values for either PRO (IKDC = 6.7-20.5, KOOS sports = 12.2-7), it is very clear that neither statistical nor clinical significance were likely to be reached for PROs even if more subjects had been enrolled.

CLINICAL APPLICATION

Evaluating health outcomes following rehabilitation is a fundamental component of a clinician's duties. This study demonstrated that providing a frame of reference for a highly trained athletic population did not significantly alter median PRO scores. Therefore, among knee patients it is acceptable to complete PROs either before or after completing performance-based measures. Furthermore, these outcome measures should not be used in substitute and both should be incorporated into clinical practice to provide a holistic approach to rehabilitation after knee injury. Patient reported outcome measures may be better suited at the evaluation of symptoms and/or confidence in a patient, while performance-based measures evaluate physical function in a controlled setting. Thus, it is important to utilize all forms of health outcome evaluation techniques to provide the best healthcare for our patients.

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Implementing Cardiac Testing to Mitigate the Risk of Sudden Cardiac Death: An Evidence-to-Practice Review

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ABSTRACT

In the United States, sudden cardiac death (SCD) is the leading cause of fatality in young athletes during exercise. Allied healthcare professionals have used screening tools such as the 12-Element American Heart Association recommendations, the European Society of Cardiology (ESC) recommendations, and the International Olympic Committee guidelines to screen for cardiovascular abnormalities in athletes. Although each of these protocols consist of personal and family history questions complemented with a physical examination, a uniform screening strategy to identify athletes at risk of SCD does not exist. The purpose of this evidence to practice review is to summarize a systematic review regarding SCD-related abnormalities in young Middle Eastern and African competitive athletes and to assess available cardiac preparticipation physical examination (PPE) screening tools. The authors examined literature that reported the prevalence of positive cardiac abnormalities detected with history and physical examination tools compared to noninvasive cardiac testing, such as electrocardiography. The review also highlights the significant number of false positives achieved through history and physical examination tools only, whereas electrocardiography interpretations indicated by the 2014 Refined Criteria are superior to the 2013 Seattle Criteria and the 2010 ESC Recommendations. The guiding systematic review indicates that electrocardiography is sensitive and specific to predicting SCD-related abnormalities and should be a tool implemented in the PPE.

Key Phrases
Public health, clinician-rated outcomes, patient-rated outcomes, professional standards

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SUMMARY

CLINICAL PROBLEM AND QUESTION

Prior to a competitive season, athletes undergo a preparticipation physical examination (PPE). The PPE includes vital screening tools utilized by allied healthcare professionals to determine readiness for a specific sport and identify any potential or correctable conditions that may impair athletic performance.[1] The National Athletic Trainers' Association (NATA) has compiled recommendations for items included in a PPE which includes personal and family medical history, current medical conditions, signs and symptoms during exercise, and system-based physical examinations (e.g., cardiovascular, central nervous system, pulmonary).[2] Currently, the NATA position statement recommends "noninvasive cardiac testing (e.g., echocardiography, ECG, exercise stress testing) not be a routine aspect of PPE screening unless warranted by findings from personal and family history".[2] This position statement also indicated the need for continued research on cardiac screening methods to "improve the ability to identify at-risk individuals in a cost-effective manner" with an acceptable false-positive rate to be utilized as a screening method to reduce the rates of sudden cardiac death (SCD).[3]

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In the United States between 2014-2018, 50% of sudden cardiac arrest cases occurred in Caucasian competitive athletes with 55% (n=88/164) of those cases resulting in survival.4 However, the survival rates for African American athletes was only 25% (n=39/109) with an accompanied incidence rate for a male, African American, National Collegiate Athletic Association (NCAA) Division 1 basketball player at 1:2087.[4] The rates in male, African American athletes are 2.4 times higher when compared to their Caucasian counterparts.[1] The NCAA also reports the incidence of SCD as higher in Black athletes (1:1700) and male basketball players (1:7000).[5] Reports in the United States have estimated an incidence of 110 SCD cases each year in young athletes, which equates to 1 death every 3 days.[5] Additionally, the literature supports that African American/Black athletes are 5 times more likely to develop hypertrophic cardiomyopathy (HCM), which is the leading cause of SCD in young competitive athletes when compared to their Arab counterparts.[6]

The scarcity of literature reporting the prevalence rates of SCD in the Middle East and Africa highlight the lack of ethnic-specific cardiac PPE screenings in these regions. Therefore, there is a need to exploring equitable screening and testing practices dependent upon race/ethnicity. The purpose of this evidence-to-practice review was to assess cardiac PPE screening methods and their ability to detect predisposing abnormalities correlated with SCD in young Middle Eastern and African competitive athletes.

SUMMARY OF LITERATURE

The guiding systematic review's authors conducted a systematic search with PubMed (MEDLINE) and Google Scholar that examined the findings of Middle Eastern and African competitive athletes using any cardiac PPE screening method. The authors applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to conduct their search. The studies included in the systematic review had to meet the following inclusion criteria: (1) original published studies in peer-reviewed journals, in English or Arabic, involving PPE cardiac screening in Arab or African competitive athletes, (2) study population not restricted to gender, or athletic level, but age restricted to less than 36 years of age, (3) involved no less than 100 participants as sample size, (4) included cardiac screening programs and African or Middle Eastern Athletes, and (5) articles published between January 2009 and March 2019.

The PubMed (MEDLINE) and Google Scholar database searches identified 17 articles that met the initial inclusion criteria. Studies were eventually excluded due to their title, abstract screening, non-athletic populations, studies conducted outside of Arab or African competitive athletes, or if they were a book, editorial, case report, or review. The number of papers were reduced to 6 prior to the authors conducting a full text screening for eligibility. Overall, 4 studies were included in the qualitative synthesis of this systematic review. The inclusion of only 4 studies in this systematic review diminished the authors potential to generalize this data, yet this discrepancy depicts the gap in literature focused on PPE screening in athletes in this region of the world. The regions where these articles were conducted include 2 studies in Qatar, 1 study in the United Arab Emirates, and 1 study in Gabon. The authors noted that the main limitation of this study was the restricted access to only 2 databases, which may have decreased their yielded results.

SUMMARY OF OUTCOMES

The authors of the guiding systematic review gathered the sample characteristics, sample size and population, study setting and focus, screening tools, prevalence of cardiovascular abnormalities, and personal and family history from the

participants in the 4 studies. The authors designated the 2010 European Society of Cardiology (ESC) as the guideline used to interpret ECG findings amongst the studies. The study conducted by Alattar et al.[7] (listed as Maffulli N et al. in the guiding systematic review) incorporated the Lausanne recommendations along with the ESC for interpretation of United Arab Emirates National athletes. This method includes collection of personal and family history, a physical examination, and a 12-lead ECG.[7] The abnormalities associated with SCD that were examined in these studies included Wolff-Parkinson-White syndrome (WPW), arrhythmogenic right ventricular cardiomyopathy (ARVC), HCM, dilated cardiomyopathy, and long QT syndrome.

FINDINGS AND CLINICAL IMPLICATIONS

The guiding systematic review assessed the reported prevalence of cardiac abnormalities with the efficacy of various cardiac screening methods for Middle Eastern and African athletes. The information from the 4 studies compiled to a total of 3,655 men, with ages ranging from 12 to 35 years, who participated in a variety of sports including: football, basketball, tennis, volleyball, and handball. All studies incorporated the ESC recommendations to assess the results of cardiovascular screenings of participants.

There were variations in results pertaining to the prevalence of these SCD-related abnormalities, which ranged from 0.47%-4.29% across all studies. Specifically, Alattar et al.[7] reported 5 Arab athletes (2.17%) with SCD-related abnormalities including 2 with WPW, 1 with atrial fibrillation, 1 with Long QT syndrome, and 1 with ARVC. Riding et al.[6] documented SCD-related abnormalities in 10 (0.47%) athletes: 5 Black and 2 Arab athletes with HCM, and 3 Arab athletes with WPW. Wilson et al.[8] recorded 7 (0.63%) athletes with an SCD-associated abnormality: 1 Arab and 1 African athlete had WPW, 2 Arab and 1 African athlete had HCM, 1 African athlete had ARVC, and 1 Arab athlete had Long QT syndrome. The final study by Schmied et al.[9] detailed those 9 (4.29%) African athletes had an SCD-related abnormality: 5 with Long QT syndrome, 3 with WPW, and 1 with HCM upon echocardiography.

The prevalence of SCD-related abnormalities in these Arab athletes were 2.17% and produced false-positive rates at 20.4 %.7 The Riding et al.[6] study examined false-positive rates when using the ESC, Seattle Criteria, and the 2014 Refined Criteria in Arab and Black athletes. The ECG interpretations by the 2014 Refined Criteria decreased false-positives to 3.6% in Arab athletes (vs 19.1% using ESC guidelines and 9.7 % using Seattle criteria) and 10% in Black athletes (vs 29.9% using ESC guidelines and 16.6% using Seattle criteria).[6] The 2014 Refined Criteria was 100% sensitive in discovering SCD-related cardiac pathologies, while reducing false-positives.[6]

Alattar et al.[7] indicated 2 Arab athletes had a positive family history of SCD, 6 (2.6%) Arab athletes reported a history of syncope, and 8 (3.8%) experienced a form of chest discomfort. Wilson et al.[8] reported 17 west Asian and 14 Black athletes with a family history of SCD and 8 (0.66%) athletes reporting cardiovascular symptoms during activity. Finally, Schmied at al.[9] shared those 36 (17%) African athletes had a family history of SCD with 19 (9%) indicating atypical chest discomfort.

CLINICAL BOTTOM LINE

The American Heart Association (AHA) estimates the prevalence of SCD-related abnormalities that predispose young athletes is 0.3%, whereas the incidence of potentially lethal SCD consistently ranges between 0.2 to 0.7%.[1] This correlate to 1 in 500 athletes with an undetected cardiac abnormality.[1] The AHA, the ESC, and the International Olympic Committee recommend

cardiovascular screening for all athletes. Nevertheless, these entities do not have a uniform protocol, nor do they all advocate for the inclusion of a resting 12-lead ECG in PPE.[1] Several differences exist when comparing the ESC recommendations to the 12-Element AHA recommendations for cardiac pre-participation screening.[10]

Based on the findings of the guiding systematic review and other supporting evidence, the sensitivity of preparticipation protocols that simply implement history questions and physical examinations do not significantly detect predisposing SCD-related abnormalities in young athletes. In a previous systematic review comparing screening strategies, the most clinically sensitive method to rule out a cardiovascular condition was an ECG (94%) as compared to history (20%) or physical exam (9%).[11] However, the specificity of each of these methods is similar (ECG: 93%, history: 94%, physical exam: 97%).11 In a report of 115 SCD cases in young athletes, only 1 athlete (0.9%) was accurately diagnosed with an underlying cardiovascular issue when using the history and physical examination screening model.[1]

Although there is a concern that ECGs produce a high number of false-positive results leading to unnecessary diagnostic testing, studies have shown that the adoption of modern, strict ECG criteria have lowered false-positive rates to 6% compared to history at 8% and physical examination at 10%.[1,3] The studies in this review highlight that the rate of false-positives are greater with a history and physical examination model. Another consideration is the cost component associated with the implementation of ECG to pre-participation screenings. The cost to perform the AHA-recommended cardiovascular history and physical examination is estimated at $0 because it is done in conjunction with a PPE.[12] However when an SCD-related abnormality is detected, the athlete will undergo a cardiology consultation (average cost of $150), potential treadmill testing (average cost of $225), and 2D echocardiography (average cost of $350) for an average cost of $500 to evaluate an abnormality detected with the AHA-recommended screening.[12] Conversely, the estimated cost to perform an ECG during mass PPE is $10 with an average cost of $365 to evaluate detected abnormalities.[12] Cardiac abnormalities that have gone undetected in traditional PPE screenings prior to physical activity have resulted in wrongful death lawsuits.[13] In 2012, the family of Ronald Rouse, an 18-year-old former Hartsville football player, were compensated $260,000 to dismiss the wrongful death of their son from an undiagnosed cardiac arrhythmia that resulted in cardiac arrest.[13] Similar instances of young athletes dying from cardiac arrest from detectable abnormalities include cases such as Kleinknecht v. Gettysburg College with the death of a lacrosse player and 15-year-old Star Ifeacho at Dunbar High School.[14,15] This upstream initiative to minimize fatalities related to SCD through early detection could potentially save young lives at a low incremental cost of $10 and negate costly wrongful death lawsuits.[12] The interpretation of the guiding systematic review and supporting literature suggests that the addition of the updated criteria for 12-lead ECG in PPE could potentially positively detect SCD-related abnormalities when compared to history and physical examinations alone, especially in susceptible minority populations.

Conditions that predispose athletes to SCD are preventable if effectively managed through activity modification and medical intervention. The guiding systematic review reported that the prevalence of SCD occurred at higher rates in football and basketball as compared to soccer. We suggest that clinicians use this data to provide a comprehensive, patient-centered PPE exam that is reflective of the cultural and ethnic differences of the individuals we treat. While equal care would incorporate advanced cardiac testing for

all, the results of this guiding systematic review suggest, at minimum, equitable care be provided to the predisposed young individuals of African and Middle Eastern descent. However, equitable care extends beyond cardiac testing in minority populations. Athletic trainers must be cognizant how social determinants of health based on a patient's race and ethnicity may influence their health outcomes and risks. A prime example of this bias in care, involves how Blacks and other minority populations in the United States have been systemically denied mortgages or approval for leased housing in neighborhoods at higher rates than Caucasians for decades.[16] This housing crisis cascaded to create an increasing educational gap where Black students are inadequately prepared for academic success because they attend poorer, disadvantaged school systems.[16] Overall, this is just one example of how Blacks and African Americans have been impoverished and unhealthy because of an oppressive system established over 300 years ago that resulted in racialized institutions and further perpetuated white privilege.[17]

To provide patient-centered care, we must recognize how race and ethnicity, as well as other social determinants of health, may change the PPE process for some athletes as compared to others. Barkley et al.[16] discussed how diversity in athletic participation is continually increasing in the NCAA, but there is a need for sports medicine literature to address additional knowledge, skills, and abilities in cultural competency and to promote health equity.[16] Historically in this nation, minority populations, especially Black people, have not been treated equitably in the healthcare system compared to their Caucasian counterparts.[16,17,18,19] Evidence also suggests that health care professionals, such as athletic trainers and team physicians, have limited knowledge about effectively delivering culturally competent care.[16] This variance in treatment in minority populations, especially in Black communities, stems from the higher proportion of minorities living in "medical deserts" where communities lack health care resources.[19] Residential segregation and racial disparities are a fundamental cause for health disparities and have an association with infant mortality, adult mortality, poor health status, smoking during pregnancy, poor birth outcomes, tuberculosis and other infectious diseases, and exposure to cancer-causing air toxins.[16] The discord in research that quantifies these statistics and the effort to combat these issues do not align. The majority-white decisionmakers include public health researchers, policymakers, medical educators, officials, hospital administrators, and insurance and pharmaceutical executives.[17] Caucasians make up three quarters of those practicing medicine, 77% of American Medical Association delegates, 85% of American Medical Association board members, 23 of 27 directors of the National Institutes of Health, 90% of National Institutes of Health branch and lab chiefs, and 83% of senior investigators.[17] These healthcare providers write policies from a position of privilege, creating a White framework which normalizes discriminatory practices and reinforces institutionalized inequity in health care and health – a contributing factor in the delay to adopt cardiac screening by many leading sports organizations.[17] Public health efforts to reduce SCD in Black athletes is a crucial step; however, it is only a small aspect of the health disparity issue that needs to be addressed holistically for true equality to be achieved.[18] Further research is needed to understand the underlying persistent racial differences in SCD-related abnormalities to mitigate the risk of SCD in Black athletes.[18]

The profession of athletic training is continuously advancing its skillset to minimize patient risk of injury and illness. Athletic trainers complete PPEs annually to mitigate these risks. In the United States, the NATA suggests the implementation of the 12-Element AHA recommendations for cardiovascular screening to detect potential underlying cardiac conditions in young athletes.[2]

However, evidence indicates that questioning an athlete about their personal and family history paired with a physical examination does not accurately detect these fatal disorders.[12] A parallel example of a lethal medical condition in the athletic setting is sickle cell trait, which athletic trainers now readily test for. The literature provides evidence that ECGs are highly sensitive in indicating SCD-related abnormalities and should become common practice during PPEs in both the collegiate and youth setting. These entities should strive to incorporate ECG testing into their policies and procedures as a means of best practice. The results from the manuscript suggest that additional research on the prevalence of abnormalities correlated to SCD in young Middle Eastern and African competitive athletes should be conducted since SCD disproportionately impacts athletes of color; especially young, African American males.

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Racial and Ethnic Disparities in Pain Management

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ABSTRACT

Pain is subjective, which makes its management a complicated task. The challenge of medical decision-making associated with pain often requires health care providers to rely heavily on their individual discretion and experience. This often creates an avenue for biases to play a role in the selection of the best available and most appropriate pain management interventions. Therefore, the overall purpose of this review is to summarize the current literature related to racial and ethnic disparities in pain management. Electronic searches of four databases revealed 2,112 articles; however, only six studies met criteria for inclusion in this review. Even when the source of pain is the same, research indicates management may differ between racial or ethnic groups. While the treatment of objectively painful conditions remains relatively constant among races and ethnicities, inequities in pain management become more apparent in the treatment of conditions characterized by only subjective pain indicators. Further disparities were identified in the dosage, dosage reduction, and oversight of opioid analgesics between groups. Inequities in prescribing patterns widen existing healthcare disparities by contributing to undertreatment of pain in ethnic minorities and overtreatment of pain and subsequent risk of opioid abuse in Whites. Health care providers must use a patient-centered and evidence-based approach to combat the ambiguity of clinical decision-making regarding pain. When knowledgeable of appropriate standard of care for pain management, athletic trainers can identify when a patient's pain needs are unmet or when substance abuse interventions may be necessary.

Key Phrases
Public health, clinician-rated outcomes, patient-rated outcomes, professional standards

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CLINICAL PROBLEM AND QUESTION

According to Healthy People 2020, healthcare disparities adversely affect people who encounter substantial systemic obstacles to health based on their racial or ethnic group.[1] Healthcare disparities have been reported across the continuum of care including in the treatment and management of pain.[2] For example, scholars have noted Black patients receive inadequate treatment for pain conditions as compared to White patients.[2-6] Primary care physicians were reported as being twice as likely to underestimate pain in Black patients as compared to all other ethnicities combined.[4] Analgesic medications are often a principal component of pain management, and to no surprise, disparities have also been suggested to affect the prescribing patterns of these medications. Black patients have been prescribed pain medications at a lower frequency and a lower dosage than non-Black patients.[2, 4, 5] A study of analgesic administration by nursing staff in the emergency department (ED) found African Americans received analgesics in 57% of instances and non-Hispanic Whites in 74% of cases, with no significant differences in the amount of pain reported to medical personnel.[5]

Discrepancies exist in the use of analgesic medication to manage pain between racial and ethnic groups; however, the source of inequality in pain management practices cannot be limited to a single cause. Racial disparities in pain management have been attributed to several theoretical approaches of discriminatory practices among health care providers.[7] First, the application of bias, clinical uncertainty, inaccurate beliefs, or stereotypes contributing to health care behaviors may result in inequitable treatment.[7]

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For instance, providers may make assumptions that a Black patient will be noncompliant and therefore fail to prescribe medications that align with the standard of care.[2, 3] Second, based on stereotypes, physicians may invalidate the experience of pain allowing racial bias to contribute to the undertreatment of pain.[4, 8, 9] Investigators have determined perceptions of hardship, internalized as strength or toughness, influence perceptions of pain and contribute to racial bias in pain perception.[10] Lastly, many stereotypes of substance use and abuse in ethnic minority groups have been developed secondary to the United States (US) illegal drug epidemic of the 1990s.[11] A perceived potential for abuse in non-White minority groups may bias providers not to prescribe analgesic pain relievers to individuals of minoritized groups, despite the fact that non-medical use of prescription opioids is two times greater in the Whites.[11] These results further highlight how dominant narratives of the experiences of people of color are built on racial stereotypes and can influence the care patients in marginalized communities receive. While provider bias may have good intention to protect minoritized communities from the use and abuse of opioid analgesics, in addition to causing undertreatment non-White patients, these prescribing patterns may in turn also contribute to higher opioid-related overdose and death rates in White patients[11] Racial inequities are not limited to health care or any specific medical setting, but it is important for athletic trainers to understand the types of experiences their patients have after being referred for further care. We echo the Institute of Medicine's call for all health care providers to actively eradicate contributions to racial and ethnic biases in health care.[7]

As health care providers, the goal of athletic trainers is to provide the best possible care to every patient. We must uphold the first principle of the National Athletic Trainers' Association (NATA) Code of Ethics by practicing with compassion and respecting the rights, well-being, and dignity of others.[12] Pain is expressed differently based on personal experiences and context; therefore, providing appropriate care in those moments is central to ensuring the primacy of patient care. Advocating for patient needs can begin when athletic trainers develop a better understanding of the experience patients of color may have when seeking pain management. Research suggests that in recent years, the practices of medical professionals regarding pain management are not applied equitably among racial and ethnic groups due to personally held beliefs.[13] In fact, the standard of care a patient receives is often influenced by their race or ethnicity.[2, 3, 4, 5] The subjective nature of pain raises the concern of whether race or ethnicity can affect a clinician's approach to managing pain. To our knowledge, there is no published literature discussing the influence of race and ethnicity on pain management in athletic training. Therefore, this review aims to address the following research question: In patients with pain of subjective or objective origin, does race or ethnicity affect the prescription of analgesic medication?

SEARCH OF THE LITERATURE

Data Sources and Searches

A wide-ranging, electronic search of four individual databases (SPORTDiscus, EBSCOHost, PubMed, PsycINFO) was performed. Boolean terms and phrases included the following: racial bias AND pain perception AND athletes, ethnicity AND pain sensitivity AND athletes, ethnicity AND pain tolerance AND athletes, ethnicity AND pain perception AND athlete, social determinants AND pain perception AND athletes, minority AND pain perception AND athlete, pain perception AND cultural competence (**Table 1**). Additionally, reference lists were searched by hand for relevant articles.

Study Selection

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Table 1. Search Terms, Databases, and Number of Articles Retrieved

Search Terms	SPORTDiscus	EBSCOHost	PubMed	PsycINFO	Total
Racial bias AND pain perception AND athletes	1	113	1	1	116
Ethnicity AND pain sensitivity AND athlete	286	8	4	0	298
Ethnicity AND pain tolerance AND athletes	710	5	4	0	719
Ethnicity AND pain perception AND athlete	323	19	4	0	346
Social determinants AND pain perception AND athletes	1	239	15	0	255
Minority AND pain perception AND athlete	192	4	4	0	200
Pain perception AND cultural competence	2	167	7	2	178
Total	1515	555	39	3	2112

Articles were included in this review if they were peer-reviewed and published in English, between 2010 and 2020, and explored pain management in ethnically diverse patients. In attempts to synthesize evidence of high methodological quality, authors aimed to include meta-analyses, systematic reviews, randomized control trials, cohort and cross-sectional studies with satisfactory design, validity, and applicability to patient care. Editorials, commentaries, and studies of non-scientific origin were excluded. Additionally, articles including patients with health conditions outside of those commonly seen in athletic training practice were also omitted.[14] Furthermore, research studies that did not address the question of interest were also excluded in this review.

Succeeding the removal of duplicate articles, both authors completed a dual-step process to classify articles for inclusion. Initially, each author (NAH, SL) screened the title and abstract of each identified article, after which, a meeting was held between both authors to ensure consensus on inclusion criteria. Next, a full-text review of articles was performed by both authors (NAH, SL) followed by a meeting resulting in agreement to further constrain inclusion criteria to pain management articles included within this study. Articles were excluded if consensus on the inclusion criteria was not reached at any point during the selection process.

Assessment of Methodological Quality

The methodological quality of each study was assessed using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies or the NIH Quality Assessment of Systematic Reviews and Meta-Analyses. The NIH Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies contains 14 items, 12 of which were applicable to included studies.[15] Two checklist items, participation rate, and loss to follow-up, were not relevant to the retrospective nature of studies included within this manuscript. Each of the 12 items were eligible to receive a yes, no, not applicable, not reported, or cannot determine rating. Items that fulfilled 'yes' criteria were assigned a score of 1 point, while items that fulfilled 'no' criteria or that were not reported received 0 points toward a total quality score of 12.[15] Items not applicable to the included study were not counted negatively toward the overall methodological quality score. Likewise, the NIH Quality Assessment of Systematic Reviews and Meta-Analyses is a checklist of 8 items.[15] Each item meeting the quality standard was scored 1 point while those that did not meet the item standard or did not report sufficient information to evaluate item criterion were assigned a score of 0.[15] Cohort or cross-sectional studies were eligible to achieve a maximum score of 12 and systematic reviews or meta-analyses a maximum of 8.[15] For purposes of

comparison, quality assessment scores were weighted by dividing raw scores by the number of applicable items and multiplying by 10. Each study was scored using the NIH Quality Assessment Tools by both authors. Disagreement in scores between authors were resolved through discussion. Weighted scores of 6 or higher were deemed high-quality studies, while weighted scores under 6 were considered low-quality. A rating of good-quality translates into a low risk of bias.

Grade of Recommendation

Recommendations resulting from the conclusions of this manuscript were graded using the Strength of Recommendation Taxonomy (SORT). The SORT was first used to classify the level evidence provided to each individual study.[16] Level 1 evidence is demarcated by good-quality studies such as meta-analyses and systematic reviews which are patient-oriented, while Level 2 evidence is patient-oriented but lacks quality or consistency in findings.[16] Level 3 is used to categorize disease-oriented evidence or evidence derived from case series and studies.[16] After a level of evidence was assigned to each individual study, we used the SORT to provide a weighted grade for the collective strength of evidence supporting each conclusion. Grades of A were reserved for conclusions constructed from Level 1 evidence with consistent results across studies.[16] A grade of B was given to conclusions resulting from studies of Level 2 evidence.[16] Conclusions formulated from Level 3 evidence were given a grade of C. Grade B and C recommendations should be incorporated into clinical practice on an individualized and case-by-case basis.[16]

Data Extraction, Analysis, and Synthesis

The study design, participants, sources of pain, outcome measures, interventions, results and conclusions were extracted from all included studies (**Table 2**). Data were analyzed by authors using the NIH quality assessment tools[15] and SORT[16] based on study content and context relevant to the research question. Data synthesis was expressed using a qualitative synthesis of the context of findings relevant to the research question. Synthesis of medication administration based on patient demographics was grouped by treatment setting and prescribing patterns of analgesic drugs.

SUMMARY OF FINDINGS

Search Results and Study Inclusion

Our preliminary search resulted in a total of 2,112 articles for potential inclusion in this review. Of these articles, there were 1,496 that were identified as duplicates and subsequently excluded. The remaining 561 were screened by title after which 518 were excluded for being irrelevant for the subject of this paper. The abstracts of the remaining for 43 articles were screened by authors for inclusion. After appraising abstracts, an additional 8 articles were excluded for study designs that failed to assess the use of analgesic medication for the management of pain. Therefore, 35 articles persisted to full-text evaluation and data extraction (**Figure 1**). An additional 29 articles were excluded during the data extraction process: 7 studies featured experimental pain; 5 studies did not adequately answer the research question; 5 studies investigated only the assessment of pain; 3 studies focused on linguistic barriers; 2 studies did not report the source of pain; 2 studies did not address pain as an outcome; 2 articles did not report race or ethnicity; 1 article did not provide age range data; 1 article had pain outside the professional scope of athletic training; and 1 study looked at incidence or prevalence/trends. A total of six articles remained from which data was extracted and summarized into findings.[17-22]

General Characteristics of Included Studies

This review included one meta-analysis,[18] two studies presenting with cross-sectional designs,[21,22]

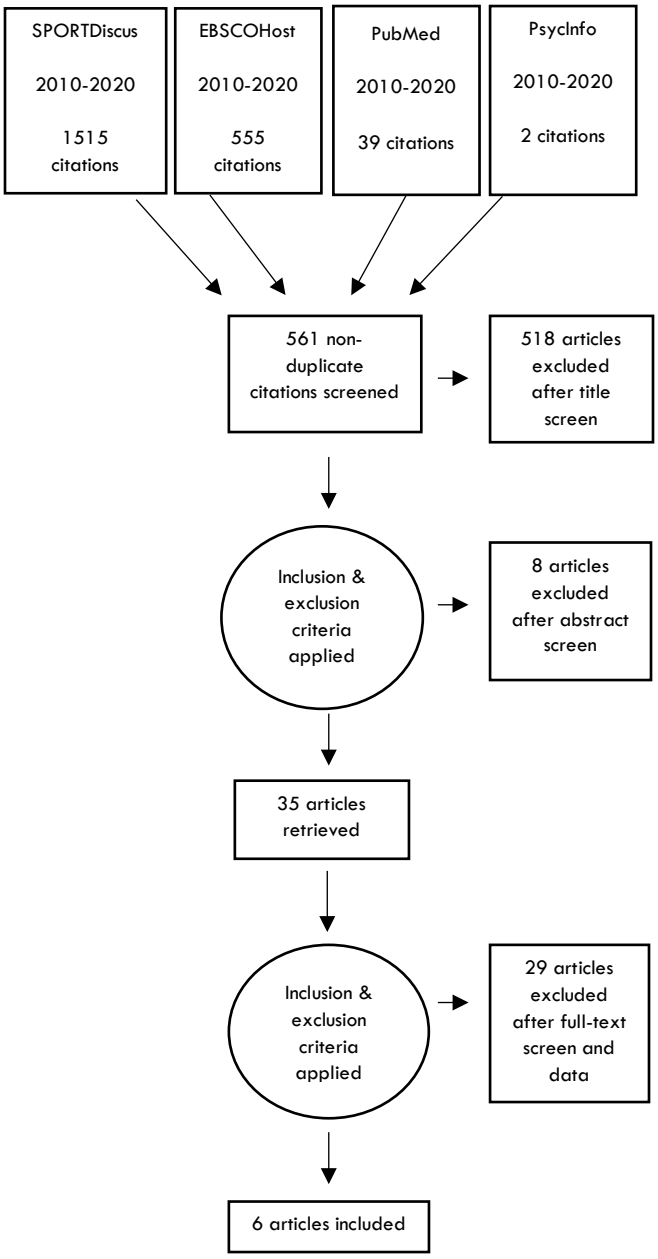

Figure 1. **Study Selection Process**

and three studies categorized as retrospective cohorts[17, 19-20] (**Table 2**). All study participants were adults, age 18 or older, presenting to the ED or an outpatient clinic for pain-related conditions. A majority of the studies were conducted with White, Non-Hispanic, Black/African American, and Hispanic Latinos. Demographic variables including age, gender, and race/ethnicity were collected from participants across all studies in addition to the source of pain. Pain sources included non-definitive conditions such as toothache, back pain, and abdominal pain, as well as definitive conditions such as long bone fracture, kidney stones, appendicitis, or gallbladder disease.

Furthermore, a range of outcomes were reported within the included studies regarding the prescription and receipt of analgesic drugs. Outcome measures focused on the prescription, administration, and dose reduction of opioid and non-opioid analgesic medications. Opioid medications included, but were not limited to, fentanyl, morphine, oxycodone, hydrocodone, methadone, tramadol with or without acetaminophen, aspirin, and ibuprofen combinations. Likewise, non-opioids involved non-steroidal anti-inflammatory drugs, salicylates, analgesics combinations, anti-migraine agents, and COX-2 inhibitors. Additional outcomes included total dosage of analgesic medication, type of insurance, wait time to see a provider, length of visit in the ED, concurrent benzodiazepine prescription, and total medications overall. A single study[17] investigated the outcome of dose reduction of opioid pain relievers within a two-year follow-up period.

Data Synthesis Summary

In regard to non-opioid medications, no racial or ethnic differences in the prescription of analgesics were found in the ED or ambulatory settings.[18] Specifically, when the use of opioids for the management of pain-related complaints in the ED was investigated, no racial or ethnic disparities were found to exist in prescription or administration for definitive and objectively painful conditions such as toothaches and kidney stones.[19] Additionally, no statistically significant interactions were discovered between race or ethnicity and opioid administration for individuals presenting to the ED with definitive pain confirmed

Table 2. Summary of Included Studies (n=6)

Source	Study Design	Participants	Source of Pain	Outcome Measures	Interventions	Results	Key Conclusions
Meghani, Byun, and Gallagher	Meta-analysis	N/A	Traumatic/surgical (bone fracture, postoperative); non-traumatic, non-surgical (migraine, back pain, abdominal pain, osteoarthritis); cancer pain; and mixed pain.	Prescription of any analgesic, opioid analgesic, and non-opioid analgesic medications.	Opioid and non-opioid analgesic medications	No disparities were found in prescription of any analgesia for Hispanics/Latinos, but Hispanics/Latinos were 22% less likely than Whites to receive opioids treatment. Blacks/African Americans were 22% less likely than Whites to receive any analgesia and 29% less likely than Whites to receive opioid treatment for similar painful conditions. No disparities were found in prescription of opioids to Hispanics/Latinos for traumatic/surgical pain, but strong differences were found in prescription of opioids for non-traumatic/nonsurgical pain types for which Hispanics were 30% less likely than Whites to receive opioids. Blacks/African Americans were 34% less likely to be prescribed opioid medication for non-traumatic/nonsurgical pain.	Opioid treatment disparities are present between Hispanic/Latinos and Black/African Americans which present health care safety and quality concerns.
Rasu and Knell	Cross sectional	Adults (n=690,205,290) aged 18 or older treated for Chronic Problem-Routine or Chronic Problem-Flare up visits in US outpatient settings.	Non-Malignant Chronic Pain (NMCP) of neuropathic, inflammatory, muscle, mechanical/compressive, or general chronic pain origin.	Opioid prescribing; age, gender, ethnicity, pain diagnosis, number of total medications, region of prescribing, payment type, physician	Opioids including morphine, codeine, fentanyl, hydrocodone, hydromorphone, levorphanol, meperidine, methadone, oxycodone, propoxyphene, and tramadol with or without acetaminophen, aspirin, and ibuprofen.	Hispanics and patients with private insurance were less likely to receive opioids for chronic pain management.	Differences exist between those prescribed and not prescribed opioids. Further research is needed on prescription and monitoring of opioids to diminish

				specialty, and patient relationship with provider.			treatment disparities.
Singhal, Tien, and Hsia	Retrospective cohort	Adults (n=16,428) age 18-65 with non-definitive or definitive pain conditions	Non-definitive conditions including toothache, back pain and abdominal pain as well as definitive conditions involving long-bone fractures and kidney stones.	Numerical pain score (0-10); Race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic and non-Hispanic other); age, sex, type of insurance, location of the ED. Point of care: opioid prescribed at emergency department (ED) discharge, administered in the ED, or both.	Opioids including narcotic analgesics or narcotic analgesic combinations. Non-opioids included nonsteroidal anti-inflammatory agents, salicylates, analgesic combinations, anti-migraine agents, and COX-2 inhibitors.	Non-Hispanic Blacks were less likely to received opioid prescription at ED discharge for back pain and abdominal pain, but not for toothache, fractures, and kidney stones as compared to non-Hispanic Whites.	Racial/ethnic disparities in opioid prescription and administration exist for most non-definitive conditions but not for definitive conditions. Differential prescription of opioids by race/ethnicity may lead to widening of existing health disparities and the burden of opioid abuse among non-Hispanic whites.
Buonora et. al.	Retrospective cohort	Adults (n=1,097) aged 18 or older prescribed with 3 or more opioid pain relief prescriptions at least 21 days apart with stable dosage.	Non-cancer related pain	Opioid pain relievers (OPR) dose reduction within two years following the end of each patient's baseline period. Reduction was defined as a reduction in daily OPR dose of at least 30% in any 6-month follow-up period relative	Opioid dose or concurrent benzodiazepine use.	Black race and female gender were associated with greater odds of opioid dose reduction.	Clinical decision-making regarding OPR dose reduction may be influenced more by social factors such as race and gender rather than clinical factors such as dosage and concurrent drug use which may indicate actual risk.

				to baseline. Clinical variables included baseline daily OPR dose and concurrent benzodiazepine prescription and race/ethnicity and gender.			
Rosenbloom et al.	Retrospective cohort	Patients (n=553) aged 12-55 visiting emergency department (ED)	Appendicitis or gallbladder disease	Race/ethnicity; sex; receipt of opioid analgesic medication; receipt of non-opioid medications anti-emetic medications, wait time to see a provider (in minutes) and length of visit in the ED (in minutes).	Opioids included fentanyl, morphine, hydromorphone/Dilaudid, oxycodone, hydrocodone, hydrocodone-acetaminophen/Vicodin, tramadol, and oxycodone-acetaminophen/Percocet. Non-opioids included acetaminophen/Tylenol, ibuprofen/Motrin, and ketorolac/Toradol. Antiemetics included ondansetron/Zofran, famotidine/Pepcid, and metoclopramide/Reglan.	No interaction was identified between sex and race/ethnicity on the odds of receiving opioids. No significant difference in opioid administration was found between non-Caucasians as compared to Caucasians. Non-Caucasians did not different from Caucasians on receipt of non-opioid analgesics or antiemetics. Wait time to see provider nor length of hospital also did not differ between ethnicity.	No statistically significant interaction between race/ethnicity and sex for administration of opioid analgesia to patients presenting to ED for appendicitis or gallbladder disease.
Romanelli et al.	Cross sectional	Patients (n=11,576) aged 18 or older with emergency department (ED) discharge diagnosis of long bone fracture.	Long bone fracture on a single limb	Prescription for an opioid analgesic at ED discharged; total morphine milligram equivalent (MME) units or oral medications.	Opioids including oral hydrocodone, parenteral hydromorphone, parenteral morphine.	Rates of opioid prescribing were no different by race/ethnicity however among patients with an opioid prescription, total MME units prescribed were less for Hispanics, blacks, and Asians relative to non-Hispanic whites.	Racial and ethnic minorities received similar frequencies of opioid prescribing for cases of long bone fracture, but small potency differences exist. More research is needed on why potency differences exist.

to originate from the appendix or gallbladder.[20] Moreover, two studies confirmed the frequency of opioids prescribed at discharge was similar between racial and ethnic groups for patients presenting to the ED for long bone fracture.[19, 21]

In contrast, racial and ethnic disparities were established for non-definitive and more subjectively painful conditions such as back and abdominal pain where a distinct source of pain was not always clearly identifiable.[19] Chronic pain conditions are associated with drug-seeking behavior; therefore, it is worth investigating how this knowledge may affect providers decisions on drug administration. Previous research has found that non-Hispanic Whites have a higher frequency of opioid addiction.[17,19] However, despite this fact, both Hispanics/Latinos and Black/African American patients remain at significant risk of under-prescribing. Hispanics/Latinos were less likely receive opioids for the treatment of non-definitive pain conditions when visiting ambulatory care facilities.[18, 22] Likewise, Non-Hispanic Blacks were less likely to receive a prescription for opioid pain medication at discharge despite lower opioid abuse and addiction rates as compared to non-Hispanic Whites.[19] Specifically, Black/African Americans were 22% less likely to receive any analgesic and 29% less likely to receive opioid analgesics as compared to White counterparts with similar pain conditions.[18] Similarly, with respect to patient reported sex, Black and female patients had greater odds of dose reduction of opioid pain relievers as compared to White and male patients within the same urban academic health system.[17] These findings are in line with previous research indicating that Black patients received tighter oversight as compared to Whites undergoing treatment with opioid medications.[23] This is suggestive of a reverse disparity in the strategies used to monitor opioid use between racial and ethnic groups.[23]

Methodological Quality Results

Five of the six included studies were rated as high-quality (**Table 3**). The mean quality score for the six included studies was 7.92, indicating overall good methodological quality. One study[19] failed to clearly state the research question. Likewise, one study[22] failed to clearly define independent variables. Two studies[20,21] failed to assess exposure(s) more than once over time and examine different levels of exposure as related to the outcome. One study[21] did not adjust for key confounding variables, while all studies failed to blind the exposure status of the participants.[17-22]

Table 3. Methodological Quality

Source	Quality Assessment Score	Quality Rating
Meghani, Byun, and Gallagher	10	High
Rasu and Knell	5.83	Low
Singhal, Tien, and Hsia	8.33	High
Buonora et. al.	9.16	High
Rosenbloom et al.	7.5	High
Romanelli et al.	6.67	High

Table 4. Level of Evidence

Source	Level of Evidence Rating
Meghani, Byun, and Gallagher	1
Rasu and Knell	2
Singhal, Tien, and Hsia	1
Buonora et. al.	1
Rosenbloom et al.	2
Romanelli et al.	2

Grade of Recommendation

Conclusions regarding racial and ethnic disparities in pain management were graded using the SORT (**Table 5**). Conclusions have been allocated into 5 primary areas: non-opioid analgesic treatments, opioid analgesics for the treatment of objective sources of pain, opioid analgesics for the treatment of subjective sources of pain, opioid

tapering or dose reduction, and risk of opioid abuse or overdose death.

Non-opioid Analgesic Medications

1. Racial/ethnic inequalities appear to exist in the prescription of non-opioid analgesic medications. Black/African Americans are less likely to receive prescription of any analgesic medication as compared to White counterparts with similar subjectively painful, non-specific conditions.[18] (Grade = A)

Opioid Analgesics for Treatment of Objective Sources of Pain

2. There is no apparent racial or ethnic disparity in opioid prescription nor administration for treatment of objectively painful conditions. The frequency of opioid prescription is similar between races/ethnicities for conditions resulting from verified pain sources such as toothaches, kidney stones or gallstones, long bone fractures, and appendicitis. [19, 20, 21, 22] (Grade = B)

Opioid Analgesics for Treatment of Subjective Sources of Pain

3. Disparities seem to exist between races/ethnicities for the prescription of opioids for the treatment of conditions in which the source of pain may not be readily verifiable. Both Blacks/African Americans and Latinos/Hispanics are significantly less likely to receive an opioid medication for the treatment of non-traumatic or non-surgical pain conditions such as non-specific back or abdominal pain.[18, 19] (Grade =A)

Opioid Abuse Risk

4. Racial/ethnic inequalities may occur in the tapering and reduction of opioid doses. Black/African American have greater odds of opioid dose reduction as compared to Non-Hispanic Whites.[17] (Grade = A)

5. There are evident racial/ethnic disparities in the risk of opioid abuse and opioid overdose death. Non-Hispanic Whites have a higher risk of opioid abuse and opioid related overdose death.[17, 19] (Grade = A)

DISCUSSION AND CLINICAL IMPLICATIONS

Findings of this review suggest racial and ethnic minorities are at significant risk for the undertreatment of pain conditions. This is evident by the fact that disparities exist in the prescribing of analgesic pain medication. While inequalities were less stark for Hispanic/Latino patients, Black/African American patients were significantly less likely to receive prescription of any analgesic medication to treat their pain at discharge from the ED.[18] However, when pain type was considered, these disparities were eliminated for conditions with objective sources of pain such as surgery or trauma; yet disparities persisted for subjectively painful conditions in which a source of pain could not be clearly identified.[18]

These findings extended to the prescription and administration of opioid pain relievers. We concluded, with good confidence, that there are no apparent racial or ethnic disparities in the administration of opioid pain relievers in the ED or at ambulatory discharge for patients with definitive conditions such as toothaches and kidney stones[19], long bone fracture[19, 21], or from the appendix or gallbladder.[20] All of the previously mentioned conditions have a clear diagnostic process that can be confirmed with objective data, which could also influence why disparities were unfounded. To the contrary, racial and ethnic disparities emerge in the prescription of opioid analgesic medications for

Table 5. Grades of Recommendation

Conclusion	Source(s)	Grade
Racial/ethnic inequalities appear to exist in the prescription of non-opioid analgesic medications.	Meghani et al.	A
No apparent racial/ethnic disparities exist in opioid prescription or administration for treatment of objectively painful conditions.	Singhal et al; Rosenbloom et al; Romanelli et al.	A
Racial/ethnic disparities are present in the prescription of opioid analgesics for subjectively painful conditions.	Singhal et al; Meghani et al.	A
Racial/ethnic inequalities may occur in the tapering and reducing of opioid doses.	Buonora et. al.	B
There are evident racial/ethnic disparities in the risk of opioid abuse and opioid overdose death.	Buonara et al.	A

subjectively painful conditions.[18, 19] Both Hispanic/Latino and Black/African American patients were less likely to be prescribed an opioid medication for the treatment of back pain, abdominal pain, or migraine headache.[18] In instances where the provider was required to extend trust to the patient regarding conditions reliant on subjective confirmation racial disparities were apparent. Racial and ethnic differences in the management of pain using opioid pain appraise the severity of the patient's pain as well as judge their risk of misuse or abuse by their sociocultural characteristics.[17]

Over and above the fact that Black/African American patients obtained fewer opioid prescriptions, we also concluded that this population received lower doses of medication plus tighter oversight when compared to non-Hispanic Whites with equivalent diagnoses.[17, 21] Specifically, the odds of dose reduction were 82% higher in Black/African American patients when compared to White patients within the same time interval.[17] Inconsistencies in the prescription and administration of these drugs between ethnicities may suggest implicit biases on part of the health care provider. Again, evidence suggests racial and ethnic inequalities in pain management may be reflective of a health care provider's ability to appraise the severity of pain in Latino/Hispanic and Black/African American patients.[17] Failure in appraisal may lead providers to underestimate the severity of symptoms and be conservative in the prescription of opioid medications to non-White patients in medically ambiguous situations.[19] This unconscious bias leads to a pattern of discrimination which denies vulnerable patient populations access to pain relief. [18] Undertreatment of pain has the potential to accelerate existing health disparities and further promote poor health outcomes in racial and ethnically diverse communities that already experience greater barriers to obtaining appropriate health care.[17, 19]

Inequity in pain management does not only affect ethnic minorities. In the case of opioid monitoring, it appears that non-Whites actually receive care that is more in-line with that of expert recommendations, while Whites experience inappropriate laxity in the monitoring of their opioid treatment and the implementation of risk reduction strategies.[23] The use of opioids for pain management presents high potential for addiction and abuse of these medications in non-Hispanic Whites.[19] The fact that these individuals are much

more likely to be administered and prescribed high-dose opioid medications for long-term duration is a potential contributing factor to why Whites have an age-adjusted death rate that is more than three times that of non-Hispanic Blacks.[19] Ethnic disparities in prescribing practices may contribute not only to undertreatment of pain in non-Hispanic Blacks, but also promote the misuse, abuse, and potential opioid overdose death in non-Hispanic Whites.[19] These findings suggest the assessment of a patient's treatment risks may rely on the clinician's interpretation of the patient's self-reported pain and the clinician's judgement about the patient's potential misuse of opioids.[19] The highly subjective nature of these decisions and the influence of implicit bias leave room for assumption and unchallenged misconceptions to play a role in the selection of pain management interventions. To combat this, we advocate for a universal approach to the prescription of opioid analgesics medications as well as in the management and risk-reduction for patients with definitive and non-definitive pain conditions.[23]

The treatment of pain is complicated by its inherently subjective nature, but identification and acknowledgement of implicit racial or ethnic biases, as well as use of an evidence-based approach, may assist health care providers in clinical decision-making during times of medical ambiguity. Individual patient factors such as cultural traditions, religious beliefs, and previous lived experiences need to be valued by clinicians for their potential to affect the pain experience in patients from various racial and ethnic backgrounds.[24] Likewise, all providers within the interdisciplinary health care team should be knowledgeable regarding current and appropriate standards of care. When properly educated on the standard of care and health inequities, athletic trainers can serve as vital patient advocates.[25] Furthermore, we can evaluate and document the effectiveness of these analgesic medications to determine when a patient's pain needs are not being met or when intervention for substance misuse or abuse may be warranted.[26]

CLINICAL BOTTOM LINE

Clinicians have a responsibility to act in their patients' best interest and provide high-quality patient care. Therefore, they need to remain aware of the role implicit bias may play in treatment decisions. Analgesic medications are often a principal component of pain management. Findings of this review concluded equity exists in the prescription of analgesics for definitive injuries such as long bone fractures, yet disparities are present in the prescription of analgesic drugs for more subjective conditions like back or abdominal pain between racial and ethnic groups.[18, 19, 20, 21] Furthermore, evidence suggests that ethnic minorities may suffer from lower medication dosing and stricter opioid oversight from prescribing providers.[17, 21] Racial and ethnic disparities in prescribing of these drugs may contribute not only to the inadequate management of pain for non-White communities but contribute to the high rates of abuse and overdose-related death characteristic of the opioid epidemic within the non-Hispanic White population.[17]

Respect for the patient's values, preferences and subjective reports of pain are important factors for all clinicians to consistently consider during clinical decision-making. It is particularly important that athletic trainers be aware of the current standards of care for managing pain through the use of analgesic medications. Furthermore, we should be knowledgeable and actionable regarding the signs of opioid misuse, abuse, and addiction. This will require acknowledging pain in patients, detecting the source of pain, evaluating pain at routine intervals, and developing an interdisciplinary plan with physicians and other health care professionals for successful pain management.[26] Because athletic trainers regularly work with

patients recovering from surgery and other painful conditions in which analgesics are prescribed, future research directions should specifically investigate racial and ethnic disparities in the prescription, administration, and abuse of these medications in the athletic population.

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Bi-Lateral Hand Compartment Syndrome Secondary to Autoimmune Disorder in a Former High School Multi-Sport Athlete

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ABSTRACT

Patient is a 21-year-old female former multiple-sport athlete who has suffered from the development of multiple cases of compartment syndrome throughout their body. At the time the medical staff encountered the patient, they were diagnosed with bilateral hand compartment syndrome. An autoimmune disorder known as Scleromyositis was diagnosed as the source of the multiple diagnosed cases of compartment syndrome. Prior to surgical intervention, the patient was unable to complete everyday tasks as a student. As pressure within their hypothenar, thenar, and interosseous compartments grew, the patient was no longer able to complete everyday fine motor skill tasks. A post-surgical rehabilitation plan was developed and implemented to improve the patient's dexterity, grip strength, and range of motion. The patient successfully regained strength and dexterity by 8-week post-surgical intervention. Currently, the patient has not shown any recurrent signs and symptoms of compartment syndrome returning to any anatomical structure. However, it has been roughly four years since their diagnosis of Scleromyositis, they are no longer on immune suppressants, and their primary care physician found no evidence of the autoimmune disorder.

Key Phrases
College and University Patient Population, Diagnostic Testing and Physical Examination: Upper Extremity

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INTRODUCTION

According to the National Institutes of Health, approximately 24 million people in the United States suffer from an autoimmune disorder.[1] In a healthy person, the immune system protects the body against disease and infection. However, in an individual who is diagnosed with an autoimmune disease, the immune system does not function properly, and wrongly starts attacking healthy cells. Scleromyositis is a unique and very rare overlap autoimmune disorder. Scleromyositis is classified as a cross-over disorder because the disease presents with both symptoms of scleroderma and myositis.[2] Scleroderma is characterized by excessive collagen production and storage within a person's connective tissues.[3] This excess collagen is coupled with inflammation of the muscles caused by symptoms of myositis. Scleroderma can develop within different anatomical structures throughout the body.[3] Depending on where the increase in collagen production takes place, this can lead to the inability to compete in athletics or even complete tasks associated with daily life. Due to the excessive amount of collagen production within the connective tissues paired with the significant amount of inflammation of muscle within the hand, the patient developed bilateral compartment syndrome of their hypothenar, thenar, and interosseous compartments. This inflammation and collagen production lead to the patient being unable to hold a pencil, drive, brush their hair, or compete in extramural athletics without severe pain. This particular patient had been managing developing compartment syndrome in multiple parts of their body without a proper diagnosis for years. The lack of answers from medical providers coupled with continued pain took a significant toll on the patient's overall quality of life.

PATIENT INFORMAITON

Patient is a 21-year old female college senior participating in extramural athletics. The patient was a former high school multi-sport athlete who participated in repetitive impact sports for

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multiple years (soccer, cross-country, basketball). The patient has a previous history of compartment syndrome in their anterior and superficial posterior compartment of the lower limbs as well as in the dorsal and superficial volar compartments of the forearms. Treatment included 12 fasciotomies across the lower and upper extremities of their body in total over five years. The patient also has a previous history of endometriosis in addition to multiple cases of compartment syndrome. The medical team was introduced to the patient in the athletic training clinic after a formal diagnosis of scleromyositis was issued by the patient's primary physician back home. Following this diagnosis, the patient was referred to an immunologist and rheumatologist to rule out the differential diagnosis of carpal tunnel syndrome, median nerve compression at the elbow, ulnar or cubital tunnel syndrome, brachioplexus pathology, or spinal stenosis. The patient stated that proper diagnosis was achieved after a series of extensive blood work to diagnosis the autoimmune disorder and compartment pressure measurement to diagnosis the bilateral compartment syndrome of the thenar, hypothenar, and interosseous compartments. As an out-of-state resident, the patient was making numerous trips to their home state of Wisconsin to get proper testing, follow-ups, and formal visits with their primary physician and care team. The medical team was introduced to the patient after surgery to assist them with post-surgical rehabilitation.

INTERVENTION

To relieve the pain, diminished sensation, loss of grip strength, and dexterity, the patient underwent three simultaneous fasciotomies of the thenar, hypothenar, and interosseous compartments of both hands. When the patient first reported to the athletic training clinic, to the athletic training clinic, clinic staff (or whomever) conducted a preoperative evaluation. For the presurgical evaluation, the following assessment tools/diagnostic tools were used: Sollerman Hand Function test [4], hand-grip dynamometer, manual muscle testing, goniometry, blood pressure, reflexes, myotomes, and dermatomes, pulse oximeter, heart rate, and hand and forearm girth measurements. Because the patient would undergo anesthesia, medical staff chose to include vitals in pre and postoperative assessment to accurately monitor for adverse reactions following surgery. Two weeks post-surgery, the patient returned to the athletic training clinic for re-evaluation. The patient underwent the same preoperative qualitative and quantitative testing, and SOAP (explained in parenthesis) notes were completed every two weeks to monitor the patient's postoperative results. Medical staff waited to implement the developed protocol until the patient was pain-free or 0/10 on a numeric pain scale, which was predicted to happen three-weeks post-surgery. Due to pain limitations, the developed rehabilitation was not implemented until week four. Bi-weekly assessments and nerve flossing exercises were recommended in the interim. At four weeks postoperative, the patient was pain-free and able to start a rehabilitation regimen. Rehabilitation consisted of nerve flossing (ulnar, median, radial), passive and restive range of motion exercises of the wrist, 6-way wrist movements (flexion, extension, radial/ulnar deviation, supination, pronation), water cup pick up with various amounts of liquid, coloring in an adult coloring book with multiple writing implements, and the use of progressive resistive exercise putty. Formal rehabilitation sessions took place once a week in the athletic training clinic where the majority of these exercises were performed. The patient was encouraged to color and complete nerve flossing multiple times a week.

OUTCOMES

After surgical intervention, the patient's nerve function fully returned after 5 weeks. The patient stated that their range of motion and strength

returned to functional levels 8-10 weeks postoperative. However, the patient stopped coming into the athletic training clinic for scheduled rehabilitation appointments after seven weeks due to patient graduating and moving out of state. The patient's relocation also meant testing values and SOAP notes at four weeks and six-week postoperative were unable to be completed. However, medical staff maintained communication with the patient for postoperative follow-up. After the surgical intervention, the patient has not redeveloped any signs or symptoms of compartment syndrome in the hands. As of June 2020, patient's previously diagnosed autoimmune disorder is asymptomatic without the use of immunosuppressant medication. The patient was closely monitored by their primary care physician upon returning home and continues to have no symptoms of compartment syndrome.

DISCUSSION

The diagnosis of the injury in this patient's case was extremely complex. Without a direct mechanism of injury and conflicting symptoms, the diagnosis remained unclear until the rheumatologist and immunologist confirmed with differential diagnostic testing. The patient and medical team also faced additional challenges during treatment: the patient's status as an out-of-state resident, lack of insurance coverage due to patient's out-of-state status, and a lack of expertise in autoimmune disorders at the treatment facility. This patient's case was unique with regard to epidemiology – the case presentation was individual and atypical. Due to the complex nature of this case, medical professionals from various specialties were involved in the diagnosis, treatment, and rehabilitation of this patient. It is important to note that an accurate diagnosis would have been unlikely without proper referrals and the patient's quality of life and functional capabilities would have continued to suffer. More importantly, without the proper referrals during the diagnosis, treatment, and rehabilitation phases the patient's quality of life and functional capabilities would have continued to suffer.

CLINICAL BOTTOM LINE

When diagnosing a patient, referral for clinical lab testing, alternate diagnostic tools, and referral to the appropriate medical professional team could be the defining factors in proper diagnosis and treatment for your patient. Athletic trainers are a valuable piece of the sports medicine team that work collaboratively with other medical professionals in diagnosis and treatment of illness and injury. This case serves as a great reminder that athletic trainers are a critical component of the healthcare team and often serve as facilitators for communication and collaboration among team members, ensuring the patient receives the highest possible level of care.

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Redeployment of Athletic Trainers During a Pandemic

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ABSTRACT

Before COVID-19 was recognized as a global pandemic involving the United States of America in March of 2020, MedStar Health employed 40 Athletic Trainers (ATs) in multiple settings. While ATs worked in the traditional setting at 17 high schools, 2 universities, and with 2 professional teams in the Baltimore, MD and Washington, DC area, they also have been used in nontraditional ways. They are used in the physician practice setting to manage clinic flow, evaluate patients and present to the physician, provide pre- and post-surgical patient education, and being an overall patient point of contact in a busy clinic. They have also been used in nontraditional ways with work as coordinators for research projects, helping to organize information and write grant proposals. Community Liaisons (CL), an additional AT function in our system, are also a crucial and beneficial member of the MedStar Health Sports Medicine Staff. There are 5 CL's in the system ranging from working in locations such as the national headquarters of US Lacrosse and the Saint James Sports Complex, a commercial multipurpose sports training site, and on the front-line overseeing partnerships such as the Maryland Black Bears and Area Boys and Girls Clubs.

It has not been uncommon for employees within medical systems to be furloughed due to shifting clinic needs. No employees of MedStar Sports Medicine have been laid off as a result of redeployment, they have been utilized in different areas. In these times, system ATs have exemplified their versatility by being redeployed to call centers, facilitating patient contact with COVID test results, working Urgent Cares shifts to do Preop testing and help with patient flow in busy centers, and becoming contact tracers. This presentation will explore how MedStar Health Sports Medicine responded to COVID-19.

Telehealth Optimization – Role of Clinical Athletic Trainers In Orthopedic/Sports Medicine Practice

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ABSTRACT

Background: Prior to COVID-19, telehealth (TH) implementation in most health systems was minimal. The transition to high rates of TH was dramatic in response to COVID-19, and many health systems struggled to develop optimal, efficient TH workflows.

Hypothesis/Purpose: The primary purpose of this study was to evaluate the role of clinically integrated athletic trainers (ATs) into the TH transition of a major orthopedic academic center through growth of TH visits as well as physician satisfaction.

Methods: Workflows and tip sheets were designed to include considerations of TH visit increases, adoption of appropriate technology platforms and optimal staff models. The rapid rate of TH adoption by orthopedic providers as well as the rates of TH visits were monitored. Growth of TH and in person (IP) visits was reviewed over a 4 month period. The percentage of TH visits compared to total visits was calculated. These results were then subjectively reviewed by physician leadership for satisfaction and effectiveness of the TH clinic.

Results: TH became common practice in March due to COVID-19 social distancing measures. In mid-May, the organization lifted restrictions to allow for greater IP visits. March – June, TH visits were 291, 702, 408 and 193, respectively. IP visits were 862, 393, 730 and 788 for months March – June, respectively. Percentage of TH visits was highest in April, accounting for 64% of all visits (**Figure 1**). At the beginning of TH implementation (March), the organizational electronic medical record platform was used for virtual visits. There was a high drop-rate, inability to share images and overall patient dissatisfaction. TH visits were transitioned to a 3rd party platform in April. Initial concerns were that it required more man-power to run: families had to be emailed a link, patients were manually checked-in/out, and documentation had to be collected. ATs were used exclusively to coordinate and execute the visits. Physician satisfaction for TH visits resulted in compliance and increased desire to continue a virtual-based clinic.

Discussion/Conclusion: While the future of TH is not clear health systems will increasingly rely on this modality. Developing optimal workflows will be critical for further acceptance, effectiveness, and managing the financial costs/returns of providing this service. A clinically integrated athletic training team can be utilized to develop, monitor and maintain a TH system, both for sports medicine and general orthopedic practices.

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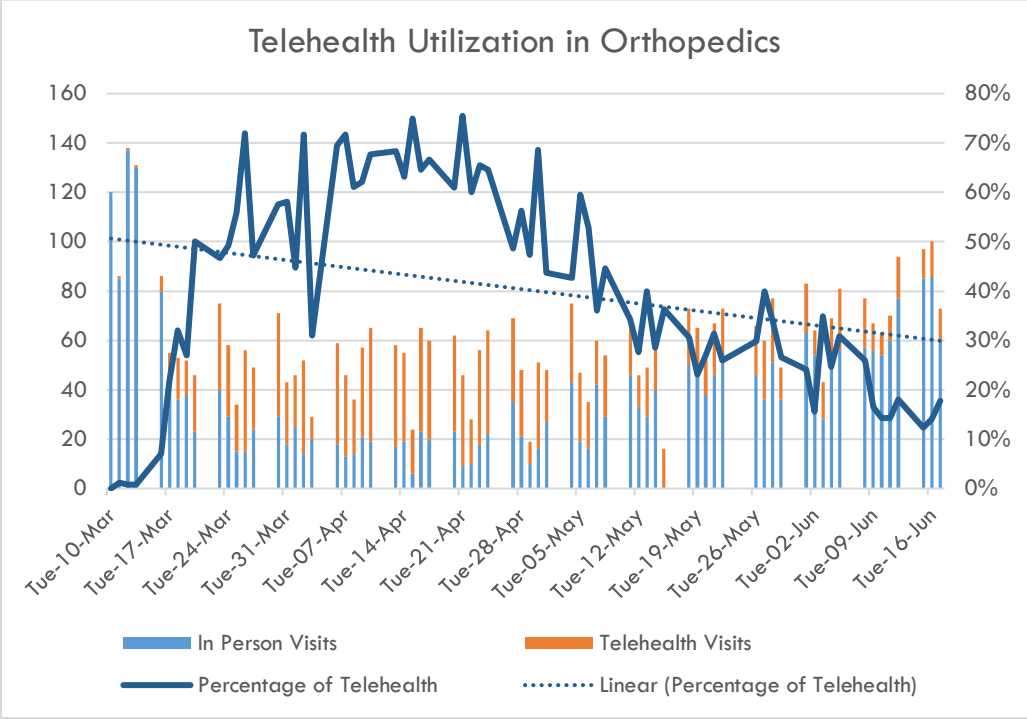
Figure 1. Telehealth Utilization in Orthopedics



The Presentation of Adhesive Capsulitis of the Hip: A Case Study

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ABSTRACT

A 47-year-old female patient employed as a nurse in a mental health facility working 10-hour shifts reported to the sports medicine clinic for an initial orthopaedic examination after she twisted and fell out of bed causing direct compressive forces on her right hip. She has a history of an underdeveloped right hip, a non-steroidal anti-inflammatory drug (NSAID) allergy, and low back pain (Oswestry score: 41/50, NPRS: 8/10) and is classified as a heavy smoker for 30 years.

After initial onset, the patient's pain increased with all motions. The patient also described a 'catching sensation' in her hip. The patient used crutches for one month until her pain was intolerable, and she began to utilize a wheelchair to ambulate for daily activities. The differential diagnoses included acetabular labrum tear and ASIS tendonitis with additional considerations given to iliac spine avulsion fracture and lumbar radiculopathy. The initial examination included x-ray which showed no abnormalities and a magnetic resonance imaging scan which identified ASIS tendonitis with a possible symptomatic acetabular labrum tear. The patient's last full day of work was December 31st, 2019.

Due to past medical history, the traditional management of NSAID use was ruled out and this patient was prescribed other pain medications. In addition, other interventions included an ultrasound guided intra-articular corticosteroid injection (CSI) and physical therapy with no positive response from the patient, however, minor relief was noted with oral steroid use. Pre-operative blood work showed elevated levels of inflammatory markers, prompting a rheumatology referral. Patient reported feelings of anxiety, emotional stress, and depression on her health history questionnaire after three months of pain. The sports medicine clinic healthcare team ordered surgery of the acetabular labrum tear, which was delayed for five months due to the COVID-19 pandemic.

The patient's increasing pain and decreased ambulatory status forced her to remain out of work for the totality of the case presentation which spanned 8 months. Finally, in August 2020, an arthroscopy of her right hip was completed which confirmed a final diagnosis of an acetabular labrum tear and adhesive capsulitis of the right hip (ACH). Post-surgery, the patient reported that her pain is improving and that she can ambulate using crutches.

Adhesive capsulitis of the hip (ACH) is an extremely rare clinical diagnosis with very little literature written on the topic. Currently there are no specific special tests for the identification of ACH. However, ACH can present with similar indications as adhesive capsulitis of the shoulder such as chronic onset, decreased and painful ranges of motion, and synovial inflammation. Due to the uncommon nature of this ailment, traditional differential diagnoses are ruled out prior to consideration of ACH using diagnostic imaging. Traditional management of ACH includes oral anti-inflammatories, CSI, and physical therapy.

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Once other pathologies are ruled out, arthroscopy can be performed to confirm the presence of ACH which is similar to this case presentation. Providers should consider ACH when a patient presents with hip pain that is non-specific in terms of mechanism of injury, inflammatory markers, and pain location.

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The Role and Value of the Athletic Trainer in the Chiropractic Medicine Setting

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ABSTRACT

In the United States, back pain is the most common cause of activity limitation in people younger than 45 years, the second most frequent reason for visits to the physician, the third most common cause of surgical procedure, and the most frequently reported subcategory of musculoskeletal impairment in the United States of people aged up to 65 years (51.7%).[1] Chiropractors are healthcare professionals who are trained in the evaluation and treatment of this patient population and utilize a variety of skills like spinal manipulation, soft tissue mobilization, modalities, and therapeutic exercise. Athletic trainers are healthcare professionals whose educational and clinical background in musculoskeletal evaluation make them specifically suited to work alongside chiropractors as both providers utilize many of the clinical skills listed above. As the employment of athletic trainers in the physician practice setting continues to grow, the setting of chiropractic medicine offers athletic trainers unique opportunities that are both similar and different from that of the traditional orthopedic physician practice. Comparable to the orthopedic physician setting, athletic trainers can provide indirect value in the chiropractic setting through rooming patients, taking vitals, and charting during evaluations. However, the chiropractic setting also offers athletic trainers the unique opportunity to perform therapeutic exercise and manual therapy in the physician practice setting. By doing so, the athletic trainer can provide direct value to this setting by performing billable services that would otherwise not be offered without either the training of another provider or at the expense of the chiropractor's time. Specifically, using data from our practice, we see that an athletic trainer alone performs approximately 30% of the services billed for by the provider. When projecting the value of these services over a calendar year, an athletic trainer alone can provide up to $40,000 worth of services in a practice operating at near full patient load. As athletic training continues to grow in the physician practice, the profession should continue to be aware of the variety of settings in which athletic trainers can provide value and practice near the top of their scope of practice. This presentation will overview the direct and indirect value an athletic trainer can provide in the chiropractic setting.

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