

### ICSC Culture Diversity Module 09

#### ICSC09 \_Section 6\_Regional Diversity

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Welcome to the ICSC Cultural Diversity Module. The FICS Education Commission, has started building up new material, covering sports, cultural, and religious diversity to expand further into our sports knowledge and application.

Sports has been a constant tie-in between nations, cultures, and groups. We have managed to break those boundaries and move all our information not only into looking at different groups in the world, but what similarities we have.

What we came up with was that there are 9 main regions that FICS has been predominantly involved in. We have split those 9 regions and identified the top 10 sports in each region.

From there we have reviewed the top 3 sports per region in the following categories:

1. What injuries are happening around those top 3 sports.
2. The similarities between sports and regions they are commonly popular in.
3. Which sports are commonly found across regions.
4. Looking at the Worldwide Sports Federation and the most popular sports across the 9 regions.

The 9 regions that identified are:

1. Latin America,
2. Asia,
3. Middle East,
4. Europe,
5. Scandinavia,
6. United States of America,
7. Canada,
8. Australia,
9. South Africa.

This module is to present the top-rated sports per region, to highlight the similarities, diversity, and links between the different regions. It educates us as Sports Chiropractors to be able to work across regions, adapt to diversity, unify our approaches and accommodate any sport on any playing field.

Our passion as Sports Chiropractors, is sport and our belief is to give sports athletes the best advantage by boosting their performance, by understanding their biomechanics and addressing their needs in the sport that they are participating in. This is achieved by learning and understanding the sports around the world.

The following regions have these specific top sports that we are going to look at and break down the collected information to look at the most common sports out of each of those regions. Further we can look at the common injuries that occur in those sports.

#### **Region 1: Latin America:**

Football (FIFA) was the top-ranking sport in the region. Football is the most popular sport in the world, it is not uncommon to see it, and we will see it appear in almost all the regions.

Rugby League and Rugby Union; mostly Rugby Union are played in some of the larger countries in South America, Argentina, Paraguay, and Uruguay. There has been a lot of conferencing across the

world when it comes to Rugby. Argentina is a high-ranking nation in the IRB standings especially in the Rugby World Cup.

Golf is the third most popular sport due to the good weather and southern hemisphere climates.

Tennis, basketball, volleyball, baseball, and motorsports such as Rally, Formula 1, and MotoGP are very popular in the Latin American regions. There is quite a famous rally race around the country of Bolivia, due to the extreme altitudes and tough terrains.

Beach Volleyball is quite prominent in international competition especially in Colombia, Brazil, Panama, and Chile.

Surfing is a popular beach sport which is prominent around the Brazilian coastline.

The common injuries found in the top 3 sports in the Latin America region.

Football: A recent study revealed that lower extremity injuries were involved in 84% of the cases that were documented in high level football players. 66% of those lower extremity injuries were traumatic-based injuries, due to from tackles, from falls and, or from bumps. There is a 34% occurrence of overuse injuries which are non-traumatic in nature. These occur due to training many hours with a high turnover of match time due to more than 1 league occurring at the same time.

Research was done in the 1980s where it calculated the average distances that football or soccer players had covered during match time. The average soccer player in a 90-minute match runs up to 15 Kilometres. It is a large distance considering a 100-meter-long sports field that they are running over 150 times.

- Ankle sprains were the most common out of those lower limb injuries.
- The contact injuries were mostly from tackling and challenges.
- More than half of the 20% of knee injuries were caused by tackling.
- Players participating at Premier league levels had only 30% of injuries during tackling and 54% more in the running phase.

Rugby Union: Due to the physical nature of the game and the contact tackling in Rugby, Traumatic injury commonly occurs. Thigh hematomas were the most common injury for forwards and backs in the sport itself. Rugby is a tactical sport where the players in the 15-man team is assembled in two packs working together on the field, the packs are divided into; 8 forwards numbered 1 to 8 and 7 Backliners numbered 9 to 15.

Very similar to American football NFL, where we have your offensive and defensive teams, excepting that all 15 players are on the field throughout the game of play, and there is no break between plays, it does increase the pace and increases risk for injury.

ACL injuries are more common in forwards injuries in forwards. Ankle injuries affected backs more than forwards. The contact mechanisms accounted for 72% of injuries. Foul play was only implicated in about 6% of those injuries. The ruck and maul elements of the game are the most common points of injury to the forwards. Being tackled caused the most injuries to the backs.

Due to the high-impact nature of the sport, head and neck injuries, though not common via active prevention measures, and strict refereeing techniques and the control measures, do still occur.

Rugby has implemented what we call the White Flag or the White card component which allows a player to be taken off the field quickly and assessed for any concussion and or head and neck injury. This is activated if the referee deems that there is a potential head or neck injury, they pull out a white card, play is stopped to remove that player, allow the player to be assessed but still continues with play once

the player is removed off the field. If the player is cleared, they are allowed to come back onto the field and return to play. If they are not, there is an immediate substitution which is allowed without losing that substitution.

Golf: Most golf injuries, whether it is pro or amateur level. Overuse injuries are due to excessive time spent in golfing and practicing swing and improvement in technical deficiencies.

Repetitive motion injuries that do happen tend to affect the golfers over time and may be post event on presentation.

The two main causes among golfers have their specific differences, but the pattern in which they occur in professional and amateur golfers do tend to differ, but the results do end up being the same.

We do see more overuse, and traumatic origin injuries in an amateur golfer who hits the ground with their club this is a high resistance impact with a force follow through from torsional forces in the spine, hips and shoulder. This mechanism causes a lot of vertebral impingement or even synovitis in most of the joints undergoing torsion. This can result in disc based injuries.

In the amateur golfers, the elbow is the primary affected region or joint.

There are more cases recorded of tennis elbow than golfer's elbow. Yes, the names differ across each other, but the tennis elbow mechanism, especially on the lead arm, does cause lateral epicondylitis. For most golfers.

If performing a right-handed golf swing, and if there is contact with the ground instead of hitting through the ball, the lateral epicondyle takes more strain and that causes more of a tennis elbow epicondylitis. Whereas on the back hand, if there is more force coming through there, we might see the medial epicondyle taking strain.

We do see thoracolumbar-based problems, because of that rotation of the trunk and the torso, especially in the golf swing. If there are any insufficiencies, we do see that they are more core muscle strength-based and do affect the ability of play for each player.

### **Region 2: Asia:**

Football: Football Association (FIFA), was the most popular sport across Asia.

Cricket: Due to the high population numbers in the sub-continent, contributed to cricket being ranked as the second most popular sport in the Asian region.

Baseball is the 3<sup>rd</sup> most popular sport, especially in Japan. There is quite a lot of crossover sports that have come across the regions, and we find that Japan and China have embraced baseball.

Other sports which are quite prominent in the Asian region are; Table tennis, Basketball. Basketball being popular in the Russian Federation. Gymnastics which is popular especially for the Russian IOC (ROC), and the Chinese sporting groups. Athletics and IOC based sports, mostly in Russia and China,

Competitive martial arts such as Judo, Karate, Taekwondo, Kickboxing, and Mui Thai. Those have really grown worldwide. The focus being around Thailand and the Thai cultures. A lot of Thai-based sports such as Mui Thai, have really grown quite a lot and developed popularity in competitive platforms.

Field Hockey in India and sub-continent that one of the top ranked teams in most of the hockey-based competitions.

Precision Sports, such as archery, do tend to be competed, especially Taipei. Chinese Taipei and Singapore does have a big following. China and India also have strong groups in this sport.

With football, the information provided is based on world stats. We will see quite a lot of repetition of information with regards to football.

Cricket is quite a fun sport to watch in quite high intensity, especially that it has grown quite vastly, especially in the Indian Premier League or IPL.

There is a lot more cricket being played, so we are beginning to see a lot more injuries. Acute injuries are the most common form of injury in the sport, especially contact injuries from either the ball hitting the batsman from bowling, or the batsman hitting the ball into a fielder.

We have seen quite a lot of traumatic injuries locally in South Africa. There was a famous case, that of best wicket keepers, Mark Boucher. He suffered a bad injury, where the ball hit the stumps and the bails, (the little wooden pieces that sit on top of the stumps) dislodged and impaled him in the eye. It caused permanent eye damage for him and forced him into retirement from the sport.

Overuse injury is also common, with hamstring strain as the most common form of injury. Cramping is quite a common issue, especially in the longer formats of cricket such as unlimited overs cricket.

There are 3 formats. The first format is our shortest format being T20 Cricket, which is 20 over Cricket. In each innings, the batting team faces 20 overs in their innings, and they need to score as many runs as possible in those 20 overs, or their allotted wickets, which are 10 wickets. The Bowling team aims to get the batting team out as soon as possible and prevent as many runs from being scored as possible. The only way of getting a wicket is by bowling the ball into the stumps (Wickets) or their legs before the stumps, catches the ball in the air or runs the batsman out, when they are outside of their Crease (safe zone).

The second form is the most popular and the most mainstream format of the game is the One Day International or ODI Cricket. This is 50 overs-based Cricket where the innings are 50 overs each.

We do tend to see higher scores but it is a lot more strenuous on the body where the batsmen are out there for at least one and half to three hours depending on the pace of play.

Then you have the 5-day Cricket, which is unlimited overs. There is no limitation in the overs bowled in the innings, but the game is extended over 5 days. Each team gets 2 innings to score as many runs as possible in the 5-day game. Every single batsman has the potential to stand at the crease for multiple days of play, which means that dehydration is a big factor and a lot of strain on the player, and high enough electrolytes, fluids, and nutrition being utilized throughout their batting time. With this prolonged batting time, there is repetition of movements and strain.

Each bowler has the chance of 6 attempts to bowl the ball which is called an Over. In international cricket, in ODI, the bowlers will have a maximum of 8 overs, and in the longer format: unlimited overs, the bowlers are not limited to the number of overs they bowl. This means that some bowlers can bowl up to 20 or even 30 overs. You now consider that they are running up to 180 times down the pitch. This results in a lot of strain if there is a lot of force, especially when they are launching the ball in the bowling action, and that can cause a lot of stress fractures. We do see it in a lot of the younger groups, 19 to 20-year-olds, who are high-performance junior players. They start suffering with a lot of these stress fractures or hot spots, lumber stress fractures that do come up later in their careers.

Concussion is something that does happen, especially when they have been hit by a ball. There was a famous case only a few years ago where there was a famous Australian batsman that got hit on the back of the head and unfortunately passed away due to severe head damage. More safety improvements have been practiced where they have created more shielding on the helmets

themselves, but it does add risk and cause more discomfort for the batsman, more heat under the helmet, more temperature management issues, and more risk for dehydration.

Baseball: Baseball is quite an interesting sport because there is the impact factor but also repetitive motion factor, especially for pitchers, there is a lot of repetitive strain. Rotator cuff and ligamentous capsule injuries are very common, this results commonly in shoulder dislocation, and a lot of biomechanical lesions, such as SLAP lesions, biceps tears, and shoulder instability. Pitchers also develop hip and groin injuries because of the motion used in the wind up and launching the ball. The batsman does suffer traumatic injuries when hit by the ball and when they are running between bases, the base plates themselves protrude from the ground which causes traumatic injury to fingers, toes, feet, ankles. Commonly Mallet finger is caused when the batter has slid into the plate, and unfortunately the plate has contacted them and dislocated the distal interphalangeal joint causing a lot of damage. There have been a couple of times where an ankle has sprained, especially stepping onto the plate on the edge where the ankle slips causing a lateral ligament (ATFL, CFL or PTFL) sprain or even a full subluxation, or fracture.

### **Region 3: Middle East**

FIFA football is the most popular sport in the Middle East. It is the world's most popular sport, and it is followed quite strongly in the UAE, in Israel, and in Lebanon.

Cricket is the second most popular in the region but is prominent in the Saudi Arabian region and in the United Arab Emirates. Cricket is played in the United Arab Emirates (UAE) which is a host to Pakistan and Bangladesh. Pakistan now is using the United Arab Emirates as their neutral field because of political issues, monitored by the International Cricket Commission or ICC.

Horse Racing is the third most popular sport in the Middle East region. Most equine sports such as horse riding, do tend to feature in the UAE.

Another sport that does feature is tennis in the UAE. There was quite a famous friendly match that happened between Roger Federer and Rafael Nadal, where they played on the helipad on the Burj Al Arab. It was recorded as the highest altitude game of tennis ever played.

Other sports that are featured in the middle east are: Motorsports: Lebanon as one of the frontrunners in the A1 GP, which was launched about fifteen years ago. Many middle eastern countries that are famous for hosting the F1 GP Jordan, Bahrain, UAE, and Saudi Arabia do host a lot of the big F1 sports [inaudible]

Camel racing: The middle east has a strong cultural history and being such a big traditional area. Due to this camel racing is still one of the most popular sports.

Golf: Golf has featured a lot in Israel and in the United Arab Emirates. Other places like Turkey do tend to have quite a lot of beautiful golf courses and a lot of local golf competitions.

Basketball has grown in Israel quite a lot, which reaches up in rank number 8.

Rugby has grown again in the UAE, Saudi Arabia, and Israel. Israel hosts an event called the Maccabiah Games, and rugby is one of the main features in the Maccabiah competitions.

Falconry, especially in the UAE and in Saudi Arabia. There is a lot of focus in traditional falconry, which is considered a sport.

We have discussed the injuries and management of Football and Cricket in previous regions.

Horse Riding is quite an interesting sport. This is because of the volatility of the animal and because of the high-risk nature, the unpredictable nature of forces, the height, their weight, and their potential high speeds, equestrian athletes are at risk to head and spinal injuries, and quite severe injuries.

Traumatic brain injuries or TBIs, including concussions, are more common than spinal injuries. Both injury types are most related to a rider falling from a horse. There have been several cases, Just recently in the Olympics, there was a rider who fell from a horse, and the horse ended up trampling on the rider. It is a common thing to happen in the sport, especially in high-speed equestrian pressure riding.

In the dressage and jumping competitions, there is always that high potential for falling off the horse. Spinal injuries are less common but are associated with potentially significant neurological morbidity when spinal cord injuries do occur. Most equestrian-related injuries occur during schooling or non-competitive riding. A large proportion of the injuries involve children and teenagers, with one study finding that 39% of horse-related injuries occurred in patients under the age of 19 years.

### **Region 4: Europe.**

FIFA football is the most popular sport in Europe. After that; Golf, Rugby Union, Boxing, Tennis, Motorsport, Cycling, Field Hockey, Cricket, and Handball all feature as major European sports. Boxing has quite a big following. Handball even though it is a young sport, and especially for the chiropractors who are working in the World Games, it is a main feature sport in the IWGA World Games. It is always an interesting sport to follow and to read up about.

The aim of this module is to expose you to what sports are out there, and also get you to be prepared so that when you go out to these sports events, you have brushed up or you have read up on the sports that you will be working on.

The next portion to this is the common injuries that are found in the top sports in the European region.

Football (FIFA) is the most popular sport in the European region:

As we know the largest football tournaments in the world are based across the European continent. These are; the English Premier League, the UEFA cup, the Euro championship, La Liga, Spanish La Liga, Bundesliga and many more.

It is assumed that some clubs are playing up to 3 matches a week each for a different week. If we had to consider field and play time of approximately is 90 minutes a game, that is 270 minutes of playing time per week, excluding training time. We find that most of these players, if 270 minutes are the playing time, it is a minimum of 514 minutes of training time excluding the matches. This has increased the incidence of overuse injuries in European football, but again we still see a lot of those traumatic injuries in high paced tackles or hard challenges. The rules have, limited injuries, but again the level of refereeing has also a big role to play in prevention of dangerous tackles or play.

Golf is the second most played sport across Europe. There is a short period for the European tour, There are a lot of open tournaments that do happen around Europe, especially with high intensity games where we find that in the Ryder Cup or the Presidents Cup (Which each happen every alternate year).

This results in a golf being played where a lot of the players are playing up to 72 holes a day over a 4 day period, so it is a lot of pressure on the players, and they take a lot of the strain.

Fitness levels do have a big role to play with these players, and a lot of the professionals do tend to manage what they can and cannot do. You will see players often pull out of a tournament or “not make the cut” due to fatigue or drop in performance.

On a professional basis, these players are not allowed to use golf carts. On an amateur basis, golf carts are used, but again in certain competitions, it can be frowned upon.

Rugby is the third most played sport in Europe. Most statistics have come from Europe, South Africa, Australia, New Zealand, and from Latin America. But, we do find that the information has been put into one big mix, and a lot of the Southern Hemisphere players are crossing borders and playing in Europe during their ‘off season’. We are finding a lot of South Africans, Australians, and New Zealanders playing in a lot of the French Leagues or even in the British Heineken Cup. There is a lot of cross-over where these players are going around, playing for clubs in Europe outside of their home season, and having full year seasons instead of the old winter season only, and no longer resting throughout the summer months.

### **Region 5: Scandinavia**

We find that, FIFA football is the most popular sport in this region.

Then comes an interesting sport, being floorball, which is a static version of roller or ice hockey, but instead of using rollerblades or ice skates, they are using normal footwear, and they are running a wooden floor court. Equestrian sports are also quite popular in the region. Handball, Golf, Gymnastics, Athletics, Ice Hockey, Winter Sports such as Skiing, Bobsled, Cross Country, and Curling, amongst others, and then also Korfbal. Korfbal being a very interesting sport, very similar to Netball, but there are certain differences where you have an attacking team and a defending team, and being a mixed sport, it opens a lot of interest into these cultural diversity changes where there is no gender effect in the sport itself.

The common injuries found in the top sports in Scandinavia:

We are looking at football where the lower extremity was involved in 84% synonymous to the worldwide statistics based on traumatic and overuse injuries, during normal routine play and practice along with foul play.

Floorball. We find that there are overuse injuries that were more common among the men and were primarily back problems. The thigh was the most common injury location in male players, and the ankle in female players. We found that the traumatic injuries were more common in women, and mainly knee and ankle injuries were noted in those injuries. The incidence was significantly greater in female floorball players throughout the entire floorball year. Male players sustained mostly overuse injuries while female players suffered traumatic injuries. Most injuries in floorball were mild irrespective of player gender.

Equestrian sports in Scandinavia were the third most popular.

Injuries in this sporting type is due to the unpredictable nature of horses and the intensity the type of riding. We see a lot of fall and trample injuries that result in severe injury especially spinal, and traumatic brain injury (TBI). Most of these injuries occur during practice and training rides more than competition.

Most of our injuries do occur in younger riders due to the inexperience and control issues of the animal. But we cannot overlook that in high performance competition, that riders do not fall off their horses and get hurt.

### Region 6: United States of America.

Collecting sporting information from the USA is amazing. It is a unique sporting culture and especially because it has created its own sports. We see a big difference in the USA compared to many other regions. American football or NFL based football is the most popular sport in America, followed by baseball or Major League Baseball (MLB), and basketball, which is the National Basketball Association (NBA), and then ice hockey, soccer or major league soccer (MLS) in the US, tennis, golf, wrestling in the form of both Olympic wrestling, grapple or sports entertainment wrestling, rugby, and then motorsport.

The culture in the USA focuses mostly on high performance. Even in entertainment wrestling, there are still high risk manoeuvres or high injury manoeuvres that do occur. I was very privileged back in the day when WWE wrestlers came to South Africa to visit here in Johannesburg. I got to meet some of the big guys that all of us saw as big heroes, guys like Rikishi, Brett Hart, Triple H, Ray Mysterio and many more. These athletes who were rather large individuals and watched them move around a small ring. Their bodies took a lot of damage due to falls, collisions and blows. These guys all suffered from knee problems, hip problems, thigh problems, and we got to work with them with a lot of the sports chiropractors in South Africa.

NFL American football as the most popular sport across the USA region has a long list of injuries.

We see the knee injuries in the sport. It is a high contact sport. It is a high paced sport, and it is large amounts of forces in tackles where guys are throwing full bodies into the tackles themselves, and again, a lot of extension where there is open chain or even coming down into a closed chain in an attack. There is protective equipment that is worn by the athletes, but due to the forces and stress from full force tackles, we still see severe injury to players. Commonly ACL injuries, PCL and MCL injuries, are most common being the ACL tear in the knee. Head injuries are prevalent where the NFL is recorded as the highest concussion in world sports. There is a high incidence of head injuries due to helmet use, but also helmet use has reduced the severity of concussion, so there is quite a big conflict in the concussion discussions where injuries have happened because of guys throwing their whole bodies into a tackle, compressing their heads against a hardened helmet and causing contusions or contra-coup lesions.

The concussion research that we have seen is from the NFL, and again, this has opened up a whole new chapter of looking at post-concussive syndrome and the best management of concussion.

Upper limb injuries do happen, especially the shoulders, hands, and digital injuries, especially in receivers, especially guys who are jumping and getting tackled landing on their shoulders landing on their arms, commonly called FOOSH injuries or fall onto outstretched hand injuries. This does tend to result in a lot of strain, fracture or dislocations in multiple different sites.

Major League Baseball is the second most popular sport.

There are a lot of rotator cuff and ligamentous capsule injuries. These injuries involve the hip and groin. Traumatic finger and foot injuries also occur, such as Mallet finger, avulsions, due to impact on the plates, causing a lot of those dislocation, subluxations, and a lot of traumatic joint injury.

Basketball is the third most popular sport.

It does tend to have some injuries, but there not a massively high rate of it, so they do tend to have a lot more game-related injuries compared to practice-related injuries. We do see ankle sprains more than anything else, followed by patellofemoral inflammation, which is the most significant problem in

terms of days lost in competition. It is not the most common injury, but it does have a big effect on game time or loss of game time.

We do see hip and groin injuries especially when they are considered in a lot of court hours in training where they must perform court sprints, or run, and we do find that there is a lot of avulsions especially in the adductor region because of their wide base twist and turning. Again, true ligamentous injuries of the knee were surprisingly rare.

### **Region 7: Canada**

What we do find is that in the Canadian region, we have got different kinds of sports that are presented as popular sports.

It is presumed that due to the Isolation and unique weather systems in Canada, and also that there is a little bit of crossover and influence from the USA that the sports have adopted their own unique versions of common sports.

We are looking at the 3 common sports where Canada is predominantly strong.

We do see ice hockey as the first-choice sport.

Ice hockey is a high impact sport. It is on an unstable surface, and again, high velocity both in players and in puck velocities. The puck being the little disc that they play with on the ice. We do see a lot of trauma that happens in ice hockey. Most people who I have spoken to, especially Canadian guys, say that I think it is the trauma and the violence that makes it such a popular sport. But again, it is quite a skill-based sport and there is a lot of training behind it. The injuries are related to direct trauma. We see 80% of those cases there. Then there is also overuse on a 20% case scale.

Due to high puck velocities, aggressive stick use, and body checking or collisions, they are the reason why we see a lot of these traumatic injuries. The participant can anticipate an injury from playing 7 to 100 hours of hockey depending on their age. Most injuries are caused during the actual game rather than during the practice. Although facial injuries are common, they are decreasing because of adequate use of helmets, masks. Conversely, cervical spine injuries are actually increasing because now with helmets and masks, we are seeing a lot more impact blows to the head. Injuries to the upper extremity include acromioclavicular joint dislocations, clavicle fractures, scaphoid fractures, and gamekeeper's thumb due to their thumbs constantly gripping the stick and the torsion from the forces of stick impact and slap shots. The risk of the thumb getting caught can cause dislocation at the carpometacarpal joints or the interphalangeal joint in the thumb itself, most commonly the CMC joint, which is the most important restraining joint of the thumb. We do see injuries to the lower limb predominantly which involves soft tissue with strains of the hip adductor, tears of the medial collateral ligament of the knee especially in a lot of the fouls that do happen, and then contusions of the thigh, which are quite common.

Lacrosse is the second most popular sport, and is a very interesting sport that was developed from a combination of common sports into one.

We see links between hockey and football, but comes into quite a high impact, high contact sport, which is quite popular in the world games, and quite a fun sport to watch. Lacrosse does pose problems when it comes to injury management. There is also Canadian football, baseball, cricket, soccer, rugby, and then the winter sports, especially in the Winter Olympics, where Canada does hold a strong ranking amongst the winter Olympics countries.

In Lacrosse, we find that the primary injury mechanism was by contact either with another player or stick or a ball. In women, body-to-body and stick-to-body are the most common injury mechanisms,

followed by no contact at all during those injuries. Most injuries noted were contusions, rib and chest injuries and shoulder injuries due to body checking, elbowing, getting hit by a stick, getting hit by the ball. It is again a very intense sport and again adopts from its 2 kinds of root sports that actually has adopted quite a physical game of play.

Canadian football is very similar to the NFL. The stats are very similar to NFL. The difference is just the leagues and the regularity of play in Canada compared to what it is in American football. I have not seen a lot of research on specific Canadian football to compare the statistics on scale to NFL in the USA.

Cycling. Canada hosts the largest endurance mountain bike challenge known as the BC or British Columbia bike race. It starts and finishes in Vancouver, covering the whole of British Columbia territory over 3 weeks of racing. With the country having access to some of the Great Lakes and especially in the summer seasons, there are a lot of water sports that are pursued followed a lot.

### **Region 8: Australia**

The next region that we talked about is Australia. Now, Australia has a different proportion of sports, but in the same categories as most of the regions.

The one difference is that Australia has its most popular sport in Swimming. Because of the constant fair to hot weather, and most cities are located close to the coastlines, and municipality has good recreational sporting infrastructures. It does lend to most of the Australian population doing swimming and aquatics on a regular basis.

Australia is rated the greatest Olympic achieving nation in aquatics. Excepting swimmers such as Michael Phelps, Fans witnessed great Australian swimmers such as, Shane Gould, Ian Thorpe, Grant Hackett, Ariarne Titmus, Kaylee McKeown and Stephanie Rice to name a few. I think, at the Olympics, there have been more Australian competitors in swimming than other nations in the world.

Rugby is the second most popular sport in Australia.

Falling into the SANZAR group, (South African, New Zealand, and Australia rugby unions). It has quite a strong holding when it comes to its establishment of rugby. Australia has won 2 World Cups in the RWC Competition.

Soccer is the third most popular sport in Australia its team is known as the Socceroos. They have climbed the rankings in soccer, in FIFA based football, and have crossed over into the northern hemisphere where a lot of players do tend to play in European leagues.

Dancing is a very important sport in Australia, followed by basketball.

In Australian football, "Aussie rules", this is a format of football that is completely different to rugby, but it has taken some concepts of rugby, and been placed on a cricket oval, changed some of the rules where you are able to pass forward by punching a ball or kicking a ball forward, and there are different objects of the game. Also, scoring is kicking based, but not really the same scoring based on traditional rugby scoring.

Tennis. Australia hosts one of the biggest tennis tournaments such as the Australian open.

There is cricket. Surprisingly, Australia has been ranked one of the top cricket playing nations with an influential contribution to sports in both ICC and Test cricket. It hosts a continuous rivalry against England, called "the Ashes series", which is I think since colonisation. Australia and England have been hosting this Ashes test series every year. Also, in the Indian Premier League, you will see a lot of

Australian players moving over to the IPL, especially in their offseason, where IPL is more prominent. There are a lot of Australian players that do tend to take high ranking roles in the IPL itself.

Hockey, as in field hockey. Australia is also high ranking the field hockey rankings, and then Golf.

Swimming: In swimming, it has been reported that 90% of complaints by swimmers of sufficient magnitude do seek physician's advice, which pertained to the shoulder.

Problems with the hand and elbow occur less frequently and often can be attributed to other causes instead of swimming. A lot of it might be due to dry training, or gym-based training, or other sports that they could play a role in etiology.

Epidemiologic studies have reported prevalence of shoulder pain in swimmers ranging from about 3% to 80%. The pain does vary in locations depending on the physique of the swimmer, the length of time that they are swimming, and also the type of stroke that the swimmer is focused on.

It has been estimated that the average collegiate swimmer performs more than 1 million strokes annually with each arm, so there is a lot of overuse-based injuries that do happen around the shoulder joint. It does tend to limit itself sometimes but can limit the progression of the ability to train. It is generally agreed that this repetition or overuse is a major factor in the development of shoulder pain, and that because not all swimmers develop shoulder pain, overuse must be combined with a secondary insult.

These include supraspinatus avascular tendinitis, biceps avascular tendinitis, impingement syndromes, labral damage, instability secondary to ligamentous laxity, and instability secondary to muscle dysfunction. In swimmers, however, we do believe that most shoulder pain is caused by instability stemming from demands that are specific to the sport.

Rugby Union: The crossover between South Africa and New Zealand, Australia, England, British and Irish Rugby Unions, the French Rugby Union, and Argentinian Rugby Unions with smaller groups has created more unified statistics and allowed us to actually focus on worldwide based injuries than just regional statistics.

Soccer football: There is a lot of bleed over where Australians are playing more in the English Premier League and European leagues. But again, in high performance sports, such as soccer World Cup, we do see Australia achieving higher rankings as they compete more.

### **Region 9: South Africa:**

This is, my home region. South Africa is quite a culturally diverse country, and because of that and especially with its history, we found that sports have changed over the years, but there is still quite a big popularity to certain things because of certain population demographics.

Football: Football or FIFA based soccer is still quite a big and popular sport. Yes, South Africa is not one of the stronger nations in international soccer, but the local derbies are quite competitive. It is quite a big local league in South Africa, called the PSL or Provincial Soccer League, and also the MTN8, which is a knockout based top 8 teams. There are a lot of interclub derbies that happen.

Rugby: Rugby, being the second most popular but probably the largest sport in South Africa in the sense that we are the highest ranked in rugby standings and current RWC champions.

Cricket: Cricket is a near third, also ranking quite high in the world, but all my Australian listeners will probably love it that South Africa just cannot manage to do well in the ICC Cricket World Cup.

**Running:** We do have a high popularity for long distance running in marathons and ultra-marathons. South Africa does host one of the most prestigious ultra-marathons known as the Comrades marathon, where people from across the world come to run in a 89 kilometres long stretch between two towns, Pietermaritzburg and Durban. Pietermaritzburg, being a little bit inland and Durban being a coastal town. They alternate between up and down runs because of the escarpment and the hills. It is one of the most gruelling races and people come from across the world to try and run this ultra-marathon.

**Golf:** South Africa has got a very big following in golf. Again, we see some big names playing in the European and PGA tours.

**Boxing:** South Africa has a very big, deep-rooted boxing culture, especially around the poorer communities. Boxing being a highly disciplined sport. We have produced quite a lot of international boxers that are still ranking quite well.

**Powerlifting:** South Africa has adopted powerlifting as a mainstream sport, and the IPF has adopted South Africa as one of its most popular countries of representation. We do host the Arnold classics and then in the International World Games Association (IWGA).

In the 2017 World Games, we saw that 4 out of the 12 judges were South African judges in the International Powerlifting Federation. Powerlifting is separate to Olympic lifting where Olympic lifting is quite an interesting sport where you are combining all the 3 main disciplines to achieve an overhead lift of the weights, whereas with powerlifting they separate the 3 different disciplines where it is a squat, a bench press, and a deadlift, and they do a total accumulation of your points.

**Triathlon sports:** South Africa being a very fair-weather country and very mild winters, we are able to do a lot of triathlon sports. It has become quite a destination country for Iron Man competing. We see a lot of guys like Henry Schoeman coming into the Olympic triathlons and doing a lot of Olympic and sprint events.

**Tennis:** South Africa, being an outdoor kind of country, because of its good weather, we do tend to have good outdoor sports such as tennis. The Davis Cup has actually been well contested throughout the '80s and '90s in South Africa, and then other associated racquet sports such as squash, badminton, and now recently Padel, which has taken the world by storm.

**Cycling:** Considering that this country is vast and spacious, we do host quite a lot of cycling events. I think the third biggest cycling event is known as the Cape Epic, and is fast growing. A lot of international riders come over to ride in the cape provinces for quite a big bragging rights.

Football and soccer, lends from the international statistics in football injuries.

Rugby Union, same thing, also South Africa being a major contributor to the statistics in the sport. South Africa has won 3 World Cups, with New Zealand, Australia each on 2 World Cups, England has won one. We are seeing a big growth in other countries where World Cup rugby is becoming more and more contentious.

**Cricket:** South African cricket is high ranking in the worlds. Many South African cricketers have moved into the IPL especially in the South African off-season. But South Africa has had its fair share of ICC World Cup attempts and also a part of the T20 world cup. Just a reminder that 20 over based cricket, which is a much more fast-paced and quicker acting format of cricket, where a lot of more impact-based injuries that are happening in these faster paced versions of the game.

Amongst the nine regions, the following common sports were of most interest. We did see that football, FIFA soccer, rugby union, golf, cricket, Major League Baseball, equestrian sports, floorball,

football, basketball, ice hockey, lacrosse and swimming were seen as the biggest crossover sports across the nations. For most of the nine regions, the following common sports were of most interest.

We saw this as FIFA football, rugby union, golf, cricket, baseball, equestrian sports, floorball, football, basketball, ice hockey, lacrosse and swimming.

Coming to conclusions of the sports, we went and we looked at as many researches as possible, looking for those common injuries and those major injuries that happen in these sports.

FIFA Football: In soccer, we took a series of major investigations of soccer injuries, which was done amongst 123 players participating at various competition levels in a Danish soccer club.

The injury incidents during these games is highest at Division level with 18.5 players per 1000 hours and the lowest in that series level of 11.9 per 1000 hours.

Commonly, as explained earlier, the lower extremity was involved in 84% of injuries, of which 34% were overuse injuries. The ankle sprains were most common with 36% of injuries, and equally found in all levels.

Contact injuries during tackling occurred most often in lower series and use, where discipline is still a problem or not at such a strict level.

Players participating at high levels had only 30% of the injuries during tackling and 54% during running, so more than half of the 20% of knee injuries were caused by tackling and most serious injuries presented with a 65% of return-to-play ratio in the same season and a 35% season ending injury.

Rugby Union: Coming through to rugby and rugby union, we found a large-scale epidemiological study of match injuries, which was sustained by professional rugby union players.

To define the incidence, nature, severity, and causes, the method of this was a two-season prospective design that was used to study match injuries associated with 546 rugby union players at all English premiership clubs. Team clinicians reported all match injuries on a weekly basis and provided details of the location diagnosis, severity, and mechanism of each injury. Match exposures for individual players were recorded on a weekly basis. The loss of time from training and match play was used as the definition of an injury.

So, looking at those results of the criteria that we just discussed, the incidence of the injury was 91 injuries per 1000 player hours, and each injury resulted on average in 18 days of lost time. The recurrences which occurred for 18% of the injuries were significantly more severe, which kept the players out for 27 days and then new injuries which was 16 days.

The common occurrence of injuries was thigh hematomas, which were the most common injury for forwards and backs, and that was contact-based, the ACL injuries for forwards which was non-contact based, hamstring injuries for backs caused by greatest number of days in absence, which is also non-contact based, and then contact mechanisms accounted for 72% of the injuries.

Foul play was only implicated in 6% of those injuries. The scrum or the ruck and maul elements in the game that caused most injuries to forwards and being tackled caused most injuries to the backs. The hooker, which is your number 2 position. In the scrum formation, they are right in the middle of the front row of the scrum. They were the most common forward to receive injuries. They are at highest risk of injuries. The outside Centre, number 13 player, is usually the player who runs with the ball probably as an impact player. They were more likely to be injured in the back line.

Golf: Moving on to golf. Over the years, golf has become an increasingly popular sport, attracting new players of almost all ages and socioeconomic groups. Golf is practiced by up to 10 to 20% of the overall

population in many countries. Beyond the enjoyment of the sport itself, the health-related benefits of the exercise involved in walking up to 10 kilometres and relaxing in a pleasant natural environment were often reported to be the main motives for adherence to activity by recreational golfers.

There is a moderate risk for a sports injury. However, excessive time spent golfing, the technical deficiencies lead to overuse injuries. These are two main causes of injuries among golfers, and each has specific differences in the pattern in which they occur in professional and amateur golfers. Golf injuries originate from overuse and traumatic origin. These are the two characteristics that relate to most golf injuries. It primarily affects the elbow, wrist, shoulder, and thoracolumbar sites. Again, we have got to consider that in the amateur player not striking the ball correctly and in the professional player, more the overuse or the chronic swing. Professional and weekend golfers, although showing a similar overall anatomical distribution of injuries by body segment, tend to present differences in the ranking of injury occurrence by anatomical sites. These differences can be explained by the playing habits and the biomechanical characteristics of the golf swing. Many of these injuries can be prevented by a presentation or by a pre-season and year-round sport-specific conditioning program which is presented to them and applied by each golfer. Muscular strengthening and flexibility, aerobic exercise components are a must, followed by short, practical pre-game warm up routines. Then the adjustments of an individual's golf swing to meet their physical capacities and limitations through properly supervised golf lessons. Finally, the correct selection of golf equipment and an awareness of environmental conditions and etiquettes of golf can also contribute to making golf a safe and enjoyable lifetime activity.

Consider yourself as sports chiropractors, where would you fit into this chain of maintaining golfers?

Cricket: Moving on to cricket. Again, cricket was one of the first sports to publish recommended methods for injury surveillance in 2005 from England, South Africa, Australia, West Indies, and India.

While the incidence of injuries is about the same, the prevalence of injuries has increased due to game format changes, an increasing number of matches played, and decreased risk between matches. Bowling, which accounts for 41.3%, fielding and wicket keeping: 28.6%, account for most of the injuries. Acute injuries are most common, with 64 to 76% of occurrence followed by an acute-on-chronic at 16% to 22.8%, and chronic injuries, which sits at 8 to 22%.

The most common modern-day cricket injury is hamstring strain. The most severe is lumber stress fracture in the young fast bowlers. Instances of bone injury to the hand, chest, face, head, legs, and thighs have been recorded due to injury from impact by the ball on the batsman. Referring to the image on the presentation. A very famous South African cricketer over here by the name of Gary Kirsten was hit by the ball. You can see that it hit his helmet and you can clearly see the visor of the helmet there. The cricket ball went through the visor and fractured his cheekbone. Yes, he continued to play, but I think he regretted that decision in the later stage. Looking down, we spoke about that Australian cricketer who passed away unfortunately. This was the incident itself where he was struck on the back of the head by the ball. Again, a freak circumstance that happened but again has motivated for improved helmets and technologies for safety.

Baseball: Coming through to Baseball. Baseball, again, another high impact sport, large, weighty ball, hardened leather ball that is thrown at high speed, high velocities. I think it is thrown nowadays at over 100 miles an hour, which is an incredible speed if you think about it. It is an absolutely interesting sport to look at with regards to injury. The impact of pathomechanics of throwing, presents the following issues.

Namely it is rotator cuff and ligamentous capsule injuries. They are common in young baseball players. It is important to understand shoulder mobility and stability as well as the biomechanics of throwing.

This background information does make it easy for us to see how shoulder injury is really all part of progressive continuum and begins with instability leading to subluxation.

Can we avoid it? Can we prevent it? Can we make progress in it? Or can we make sure that in a later stage, they are not suffering with arthritis or issues that are further complications, and later impingement which can result in a rotator cuff tear. Besides history taking and physical assessments, they are crucial in determining where the patient might be on the continuum of play or pain free lifestyle.

Just following up on that, we have got to understand that accurate evaluation places the patient in one of the following 4 groups.

- Number 1 is pure impingement,
- Number 2: anterior instability due to trauma with secondary impingement,
- Number 3: anterior stability due to hyperelasticity with secondary impingement, and
- Number 4, pure anterior instability.

For example, this baseball pitcher over here. You can see how much he is severely hyperextended at the elbow joint, but also how much of external rotation has really formed up in the shoulder joint with our main horizontal abduction. This puts a lot of stress on the shoulder joint, thus it can end up being a severe shoulder injury if he continues to persist this way.

We have got to take a kinesiologic approach, which is the initial treatment of choice. It is the best preventative early treatment available and includes a specific strengthening program.

If this fails, as in only 5 to 10% of the cases, an anatomical repair is instituted. There are 4 basic guidelines when doing the surgery. We have got to maintain the muscle attachments and proprioceptive fibres. That would be our first or our gold metal. Second to that, do not shorten the capsules significantly. Number 3, build up the anterior labrum, and number 4, regain full range of motion quickly through adduction, splinting, and rehabilitation. We have got to make sure that the post-operative rehabilitation program is then diligently adhered to. This is that stage 4 or sport-specific rehabilitation that we should have in our minds. Also, if you do have the ability for biokineticists or for physical therapists, and to work with them to progressively help the athletes, it is always good to include them at this stage.

Conclusions on baseball. Finally, the injuries involving the hip and groin are relatively common in baseball players. Our knowledge of the mechanics of overhead throwing continues to evolve and as does our understanding of the contribution of power from the lower extremities and core. It is paramount that the team physician be able to accurately diagnose and treat injuries involving hip and groin, as they may lead to significant disability and inability to return to elite levels of play. This review focuses on hip and groin related injuries in the baseball player including femoroacetabular impingement or core muscle injury and osteitis pubis.

Horse Riding: We spoke about equestrian sports and especially we are going to take into account not only the falling aspect but the animal itself. Equestrian sports represents a variety of activities including a horse and rider. Due to the unpredictable nature of horses, their height, and their potential high speeds involved, equestrian athletes are at risk of head and spinal injuries.

Traumatic brain injuries, including concussions are more common than spinal injuries. Both injury types are most commonly related to a rider fall from a horse. Spinal injuries are less common but are associated with potentially significant neurological morbidity when spinal cord injury occurs. An improved understanding of preventable injury mechanisms, increased certified helmet use, improved helmet technologies, and educational outreach may help address the risk of head and spinal injuries in

equestrian sports. Most equestrian-related injuries occur during schooling or long non-competitive riding. A large proportion of the injuries involve children and teenagers. We spoke about that earlier where we saw quite a large portion around about 39% were at or under the age of 19 years. In contrast, in many other contact and high risk sports, participants in equestrian activities are predominantly female and particularly at the recreational level. Horse-related injury is the eighth leading cause of emergency department presentation for sports and recreation related injuries in females worldwide, while the rates of overall injury from riding is rather low, with 2 per 1000 hours of riding, compared to other sports such as wrestling, where you see 10.7 per 1000 hours of exposures of football, 6.1 per 1000 hours of exposures, the track and field events was 5.7 per 1000 hours of exposure. The risk of severe injury from equestrian activities was considered to be higher than that of American football, motorcycle, and automobile racing.

Despite the high incidence of fractures reported in the literature, head injuries have been found to be the most common cause of prolonged hospitalizations and deaths due to horseback riding. In Australia, studies have reported an estimated mortality of 1 out of 10,000 riders, with 60% of these deaths from head injuries.

Floorball: Floorball is a very interesting sport. It has become a modified and more static version of roller and Ice Hockey.

The results: the injury incidents was greater in female players during preseason, with a 22.9 versus 7.4 with a P value of 0.01, game season with 39.5 versus 28.3 with a P value of 0.002, as well as the whole year combined with 33.9 versus 20.8 with a P value of 0.02. The thigh was the most common injury location in male players and ankle in female players. Overuse injuries were common among men and were primarily back problems. Traumatic injuries were more common in women, mainly knee and ankle injuries. Most injuries were of mild severity. A great number of anterior cruciate ligament injuries occurred in women with a numerical value of 11, than men with a numerical value of 2.

To conclude on that, the injury incidence is significantly greater in female floorball players throughout the entire floorball year. Male players sustained mostly overuse-based injuries, while female players suffered traumatic injuries. The majority of injuries in floorball were mild irrespective of player sex.

NFL: This is a large data field where the NFL spends a lot of funding on researchers and especially on injury management. Knee injuries are among the most common musculoskeletal injuries in US football players. The literature includes little information about the role of player position and risk for knee injury. Knee injury in elite collegiate US football players is high, and that type of injury varies by player position. There were 332 elite collegiate US football players at the 2005 National Football League evaluated with a 54% or 178 players that had a history of previous knee injury.

Current knee injuries totaled to around about 233 players. All players underwent radiographic examinations including pain x-rays and/or magnetic resonance imaging when necessary. All knee pathological conditions and surgical procedures were recorded. Data was analyzed by player position to detect any trends. We found that 86 players, 25.9%, had a total of 114 injuries. The most common injuries were medial collateral ligament of the knee with a number of 79, meniscal injuries with a number 51, anterior cruciate ligament or ACL injury had a number of 40 players who had surgeries. The most common surgeries were arthroscopic meniscectomy activities with a number of 39 patients, ACL reconstructions with 35 patients, and arthroscopic meniscal repair with 13 patients.

A history of knee injury was most common in defensive linemen with 68% of players, tight ends: 57%, and offensive lineman with 57%. Knee surgery was more commonly performed on running backs with

86% and linebackers: 34%. There were no significant associations between the type or frequency of specific injuries with regard to player position. Knee injuries are common injuries in elite collegiate football players, and one-fourth of these players undergo surgical procedures. However, there were no statistically significant differences in type or frequency of injuries by player position.

American football is a collision sport and it is played by athletes at high speeds. Despite the padding and conditioning in these athletes, the shoulder is a vulnerable joint, and injuries to the shoulder girdle are common in all levels of competitive football. Excuse the fact that I put an ankle injury here where we saw ankle fracture, dislocation in this player. But again, the relevance coming through to this is how severe some of these injuries actually end up being.

Some of the most common injuries in these athletes include anterior and posterior glenohumeral instability, acromioclavicular pathology, including separation, osteolysis, or osteoarthritis, rotator cuff pathology, including contusions, partial thickness or full thickness tears, and pectoralis major and minor tears. Usually in pec major, we see more commonly the full thickness there compared to partial thickness.

In this conclusion, the study, we saw 1385 injuries occurred to hand, first ray, and fingers over 10 seasons studied. Of these injuries, 48% involve the fingers, 30% involve the first ray, and 22 involve the hand, with game injuries more common practice injuries at each location. There are metacarpal fractures and proximal interphalangeal joint dislocations, the two most common forms of injuries. Offensive and defensive lineman were the most likely to sustain a hand injury, with 80% of hand injuries being metacarpal fractures. The most common injuries to the first ray were fractures 48%, sprains 36%, which occurred most often in athletes playing a defensive secondary position. Finger injuries were most commonly dislocations at the level of proximal interphalangeal joints, typically involving the ulnar 2 digits. Finger injuries were most common in wide receivers and defensive secondary players. The act of tackling produced the most injuries at 28% of incidents.

Basketball: A total of 1094 players appeared in the database 3843 times, so that means 3.3 injuries per player in 2.6 seasons. Lateral ankle sprains are the most frequent orthopedic injury, with a number of 1,658 or 13.2% of cases, followed by patellofemoral inflammation with 1,493 cases or 11.9%. In lumbar strains, we saw 999 cases or 7.9%, and hamstring strains in 413 or 3.3% of cases. The most games missed were related to patellofemoral inflammation, where 10,370 cases or 17.5% of lateral ankle sprains, which were 5,223 cases or 8.8%, knee sprains or 4369 cases or 7.4%, and lumbar strains, which sat at 3933 cases or 6.6%. In conclusion of that, professional athletes and NBA experience high rates of game-related injuries, patellofemoral inflammation is the most significant problem in terms of days lost in competition, whereas ankle sprains are the most common injury. True ligamentous injuries of the knee were surprisingly rare, importantly, player demographics were not correlated with injury rates. Further investigation is needed regarding the consequences and sport-specific treatment of various injuries in the NBA players.

Ice hockey: Again, speaking that this is a mostly collision-based sport. We saw that injuries are related to direct trauma, with 80% of the cases happening, and overuse: 20%, most commonly caused by high velocity, aggressive stick use, and body checking. A participant cannot anticipate an injury after playing roughly about 7 to 100 hours of hockey depending on their age and activity.

Although facial injuries are common, they are decreasing because of adequate helmets and protection. Conversely, cervical spine injuries are being reported more frequently, and injuries to the upper extremity include acromioclavicular joint dislocation, scaphoid fractures, and gamekeeper's thumb. Injuries to the lower extremity predominantly involve soft tissue with strains of the hip adductor, tears and medial collateral ligament of the knee and contusions to the thigh. Scientific studies have reduced

injuries by providing improved protective equipment, strict rules, and enforcement of the laws effective to training and conditioning.

Lacrosse: Previous research has found that the location, type of mechanisms of injuries in lacrosse players vary by gender. The patterns and risk factors of injuries in lacrosse players are still not well known.

The study population consists of lacrosse players who utilized the accident medical insurance provided to US lacrosse members. Cluster analysis was used to explore the aetiology of lacrosse-related injury. Between 2002 and 2006, there were 593 game injuries, 496 were in men and 97 were in women.

Play scenarios resulting in injury were not determined by the position played.

In males, the primary injury mechanism was by contact either with another player, stick, or ball.

In women, body-to-body and stick-to-body and no contact were the most common injury mechanisms. In both genders, the majority of injuries occurred during legal play.

Swimming: It has been reported that 90% of complaints from swimmers was a sufficient magnitude to seek a physician's advice pertaining to the shoulder. Problems with the hand and elbow occur less frequently and often can be attributed to a secondary cause. Epidemiological studies report prevalence rates of shoulder pain in swimmers ranging from 3% to 80%. The pain varies in location about the shoulder including anteriorly or anterolaterally, superiorly or posteriorly, and at the insertion of the deltoid.

It has been estimated that the average collegiate swimmer performs more than 1 million strokes annually with each arm. It is generally agreed that the repetition or overuse is a major factor in the development of shoulder pain, and that because not all swimmers develop shoulder pain, the overuse must be combined with a secondary insult. These insults must include supraspinous avascular tendinitis, biceps avascular tendinitis, impingement syndrome, labral damage, instability secondary to ligamentous laxity, and instability secondary to muscle dysfunction.

Given the varied and pervasive nature of shoulder pain in swimmers, it is unlikely that any one cause can adequately explain its prevalence. Shoulder pain in swimmers has multiple causes including those mentioned above, along with recognized causes of shoulder pain in older populations such as rotator cuff tears, calcific tendinitis, adhesive capsulitis, glenohumeral arthritis, acromioclavicular arthritis, scapular thoracic inflammation, and cervical disease. In swimmers, however, we believe that most shoulder pain is caused by instability stemming from demands that are specific to the sport of swimming. The inflammation can lead to swelling and scarring which can result in further inflammation and perpetuation of symptoms. By understanding how these demands contribute to reduced stability of the shoulder, a rational plan can be formulated for treating and preventing swimmer's shoulder.

[END]