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A letter from the AEMA Education Committee:

Fellow Equipment Managers:

I would like to welcome you to the 2015 edition on the AEMA Journal. I would like to thank all the authors for their contribution to the AEMA Journal and the Association.

Like last year, we are continuing our “Starting a New Sport” theme. In this edition, two sports will be discussed: gymnastics and soccer. Again, these articles will discuss what is needed to start and maintain a collegiate sport program while focusing on the equipment and the rules and regulations of that equipment.

As everyone knows, concussions as they relate to football continues to be a “hot button” issue. With that in mind, I wrote an article relating properly fitted helmets and concussion prevention. Although it is common knowledge that no helmet is concussion proof, research shows that a properly fitted helmet will help reduce the risk. Related to this subject is an article on helmet caps and their place in the discussion of head protection.

Lastly, from the outside of the equipment world, we have an article discussing anatomy and its importance when fitting protective equipment. The Education Committee hopes that you find these articles educational and useful for your equipment staff.

I would be remiss if I didn’t mention the need for future articles. If you have a topic you wish to discuss, by all means contact me or someone else on the education committee. It is from these articles that we draw our test questions from for the certification exam. I personally want to encourage the membership to write. We all have “extra” knowledge in an area of equipment management that we can share with everyone else. It is this knowledge that will make us better equipment managers and better as an association.

Brad Oster, MAED, EM,C
Education Committee Chair
When players first began wearing protective headgear for contact sports, they did so mainly to prevent head fractures and lacerations—concussions weren’t even on the radar back then. Now, however, helmet manufacturers and members of the sporting goods industry know that concussion prevention is the main goal behind the design of today’s headgear. Still, the general public and a number of law makers feel helmet manufacturers are not doing enough to quell the recent concussion epidemic. Moreover, they are now holding the helmet industry to an impossible standard, demanding that manufacturers create “concussion proof” helmets.

While the above statements might seem a bit over the top, they are not totally without merit. Over the past several years, helmet manufacturers have continually produced helmets with a lower and lower SI (severity index) number. The Severity Index is a performance based assessment test to calculate head injury risk. The pass/fail threshold of 1200 SI is set by NOCSAE, and today’s helmets are typically tested in the 400 to 600 SI range. It is important to note that a 600 SI helmet is not necessarily safer than an 800 SI helmet. As a matter of fact, NOCSAE purposely does not release SI values so it doesn’t confuse the public. With that being said, NOCSAE is also exploring the possibility of lowering that threshold in order to eliminate helmets that would, under the current threshold, be permissible to wear.

So what, if anything, can be done from an equipment standpoint to better protect athletes from concussions? And are there any ways to eliminate concussions from sports? The answer to the second question is: Probably not. To address the first, as professional athletic equipment managers the best we can hope to do is to reduce an athlete’s risk through proper education and training. We are part of a comprehensive team of professionals that seek to work towards reducing the risks involved in sports. There are many reasons and theories of why concussions occur, but the best ways to reduce concussive episodes are simple things. The array of fixes are varied: not playing sports, proper tackling techniques, good sleeping habits, and recent studies have shown the influence of hydration as it relates to concussions, and just overall good health. However, for the purpose of this article, I am focusing on two very important things can and should be done to better protect athletes—helmet fitting and maintenance.

While having properly fitted and maintained protective athletic equipment may sound obvious to athletic equipment managers, unfortunately it is not discussed by law makers or the court of public opinion even though it is by far one of the best practices to reduce concussive episodes. Since 2009, all 50 states and the District of Columbia have enacted legislation on concussion in sports for youth and/or high school athletes. However, these tend to be “reactionary laws.” In other words, they provide

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education on how to recognize concussions and provide procedures for “return to play.” No state, at the time of this article, requires any policy for properly fitting and maintaining helmet. By addressing proper fit and maintenance of the helmet, the focus is proactive rather than reactive.

According to the California State Automobile Association, people wearing seat belts have a 45% better chance of surviving a serious accident, and a 50% better chance of surviving without severe injuries. Researchers at Temple University, the Orthopedic Center in Rockville, Maryland, and the Nationwide Children’s Hospital in Columbus, Ohio, found that athletes wearing properly fitted football helmets were 82% less likely to experience concussion with loss of consciousness (LOC). In today’s society, no reasonable person questions the importance of wearing seatbelts when driving or riding in a car. Yet getting legislation passed for properly fitted helmets is still years away.

Seatbelts and helmets share common ground. Seatbelts, if worn correctly, do not guarantee that one will survive a crash or escape severe injuries. But, if worn correctly, a seatbelt will drastically reduce your risk of severe injury and death.

The same thing can be said about helmets. If worn correctly, they will not guarantee against a concussion, but will drastically reduce your risk of severe injury, including concussions. Again, let me be clear, a properly fitted helmet will not prevent a concussion, but athletes with properly fitted helmets are 82% less likely to suffer a severe concussion with LOC.

Along with proper fit, continual maintenance of the helmet is just as important in concussion prevention.

Along with proper fit, continual maintenance of the helmet is just as important in concussion prevention. Whether it is a bad value, a player making “self-adjustments,” or air temperature changes, air bladders lose air pressure over a season. According to Joseph Torg, MD, of Temple University, air bladder helmet liners pose an increased risk of catastrophic intracranial brain injury (subdural hematoma/cerebral edema), with 84% of the injuries of this type occurring between 1989 and 2001 involving air bladder helmets. The increased risk may be related, the authors said, to decreased maintenance, as air-bladder systems are prone to leaking, and helmet fit may be compromised with an insufficiently filled air bladder. Additionally, a 2012 Boston Globe article found that at one school, players were constantly letting the air out for comfort reasons, making their helmets too loose. In fact, it is such a common problem at one high school that the coach carries an air pump during practice to inflate the bladders within the helmets.

For many years, I have executed weekly helmet checks. Through these inspections I examine the air bladders, the valves, and hardware. While I have always valued these inspections, they became increasingly important three years ago while fitting helmets for a local institution.

Midway through the year, the team’s athletic trainer called to inquire how many student athletes at my institution experienced a concussion. We had two. They, on the other hand, had 19 confirmed concussions.

That year, I fit my 145 of my players and 120 of his. There could have been many reasons for the difference injury rate, but from my perspective the only difference was the weekly maintenance I provided for my players. Admittedly, this is not a scientific finding, but I think it does show the importance of continual maintenance of the helmets once fitted.

There are other factors not discussed in this article that play a role in concussion avoidance in including: hydration, tackling techniques, genetics, sleeping habits, and overall good health practices. However, USA Football and helmet manufacturers all agree that the proper fitting and maintenance of helmets are a very important, if not the most important, step in concussion prevention. We, as an organization, also have a responsibility to educate athletes, coaches, parents, and the public at large on the importance of properly fitted and maintained helmets as it pertains to concussion prevention.

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A large part of being an equipment manager is ensuring proper fit of protective equipment to minimize the risks of injury to athletes. While we cannot eliminate injuries from happening, putting players in properly fitting equipment and ensuring they wear it during practices and games may help reduce the occurrence and severity of injury. While the AEMA and major sports equipment companies provide a plethora of information on properly fitting athletes for every sport, equipment managers could benefit from an increased knowledge of anatomy and a better understanding of why protective equipment covers certain portions of the human body.

Not every manager has a strong background in anatomy. The AEMA Certification Manual provides some basic information on the acromioclavicular joint (AC joint) and burners or stingers (AEMA, 2004 p. 50,52) and Jerry Fife’s 2006 AEMA Journal article “Know it to Protect it,” further explored the bones and joints of the human body. Both of these articles provide a great starting point to understanding anatomy so that we can best protect the athletes we fit, but there is a lot more to the human body than what is covered in the current literature.

The purpose of this article is to expand AEMA literature on human anatomy in hopes that an increased knowledge pool will lead to better fitting equipment, and safer athletes. Though it will elaborate on some of the more important structures, it is by no means comprehensive. This article will focus specifically on football shoulder pads and the anatomy of the shoulder—the AC joint, the neck of the humerus, the rotator cuff, and the brachial plexus—and why these areas need to be protected.

THE ACROMIOCLAVICULAR JOINT: WHAT IS IT?

The AC joint is always at the center of discussion when it comes to fitting shoulder pads and for good reason. This joint connects arm to the rest of the body. It is formed by the articulation, or joining, of the acromion process of the scapula (the shoulder blade) and the clavicle (the collar bone).

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The scapula is positioned on the back of the thoracic cage and forms the glenohumeral joint with the head of the humerus, the bone of the arm. The scapula and clavicle serve as attachment points for many of the muscles that create arm movements.

The strong and fibrous acromioclavicular ligament holds the two bones together and allows for normal arm movement. Damage to the AC ligament, typically sustained in a direct blow to the shoulder, can cause a weakened connection of the AC joint and lead to a decreased ability to properly move the arm (Drake, 2010).

WHY PROTECT IT?

The AC joint needs to be protected so that arm movement is not affected. This is especially important for players manning the skill positions, such as quarterbacks, wide receivers and defensive backs, which require an overhead arm motion to throw and catch.

The AC channel of the shoulder pad protects the AC joint. Typically this channel forms an arch over the AC joint and distributes compressive forces away from the joint itself. Equipment managers should check the manufacturer’s recommendations of each pad to make sure the AC channel fits properly to ensure the safety of the AC joint.

If spider pads are employed for further protection of the AC joint, care must be taken to ensure that the AC joint falls within the gaps of the spider pads. If the padding directly covers the AC joint, the forces will not be dispersed, and instead may be directed on it. Remember to always measure the distance between AC joints first when fitting for shoulder pads. This is how you determine initial shoulder pad sizing. Adjustments can always be made for a better fit, but shell size is dependent on distance between AC joints (AEMA, 2004).

THE SURGICAL NECK OF THE Humerus: WHAT IS IT?

The surgical neck of the humerus needs to be protected so that voluntary movement, sensation and blood supply to the arm are not effected.

The surgical neck of the humerus lies distal to (below) the humeral head, where it articulates with the scapula to form the glenohumeral joint. The surgical neck is a narrow, weaker part of the humerus that is commonly fractured. Fractures to the surgical neck can be very dangerous because nerves and arteries that provide voluntary movement, sensation and proper blood supply to the upper extremity can be damaged. If damage to the nerves and arteries is sustained during a fracture, long-term neurological and vascular issues can persist even after the bone has healed (Drake, 2010).

WHY PROTECT IT?

The surgical neck of the humerus needs to be protected so that voluntary movement, sensation and blood supply to the arm are not affected. The epaulets or flaps and the cups of the shoulder pads protect the surgical neck.

The protection of cups varies by manufacturer and by position. Typically, skilled positions have smaller cups to allow for more movement. Linemen should have larger cups as they typically make more contact with the shoulder and upper arm during play.

The AEMA Certification Manual does not specifically address cup size, but most shoulder pads provide adequate protection to this area. If you are fitting a lineman into lighter pads, check with your athletic trainer to ensure the upper part of the arm is well protected.

THE ROTATOR CUFF: WHAT IS IT?

The rotator cuff is a group of four muscles—the supraspinatus, infraspinatus, teres minor and subscapularis—that originate on the scapula and attach to the humeral head. These muscles are critical in generating arm motions, as well as stabilizing the glenohumeral joint. The rotator cuff also stabilizes the head of the humerus in the glenoid fossa of the scapula to maintain the articulation of the humeral head with the scapula, which
ensures that the glenohumeral joint moves properly. Throwing, catching and blocking with the arms are all aided by the rotator cuff. Damage to the rotator cuff can lead to dislocations of the shoulder and improper movement of the arm (Drake, 2010).

WHY PROTECT IT?
The rotator cuff needs to be protected to ensure arm movement is not affected. Without a healthy rotator cuff, overhead movements like throwing and catching are almost impossible.

The arch of the shoulder pad covers the scapula and muscle bellies of the rotator cuff and the cups of the shoulder pads protect the head of the humerus where the rotator cuff muscles attach. The pads will protect the muscles from trauma from a direct blow, but there is no way for padding to protect tearing of the rotator cuff muscles or shoulder dislocations.

These injuries can occur from improper technique with throwing or tackling, which can cause direct damage to the rotator cuff or put the arm in a position more prone to injury. To ensure protection from a direct blow always check to make sure the scapula and upper arm are covered (AEMA, 2004).

THE BRACHIAL Plexus: WHAT IS IT?
The brachial plexus is a network of nerves that controls all the movement of the shoulder, arm, forearm, wrist and hand. It extends from the spinal nerves in the neck and runs under the clavicle, into the axilla (armpit) and ends as several large nerves that supply the entire upper extremity. Damage to these nerves can cause a drastic loss in motion and sensation in one or more portions of the upper extremity.

Because these nerves run underneath the clavicle, clavicular fractures can cause neurological damage. Burners or stingers are common injuries where these nerves are overstretched, compressed or subject to a direct blow (Drake, 2010).

WHY PROTECT IT?
The brachial plexus needs to be protected to ensure proper movement and sensation of the shoulder, arm, forearm, wrist and hand. Because of its location in the axilla, the brachial plexus is not directly protected by shoulder pads. However, the collar and arch of shoulder pads reinforce the clavicle.

If the clavicle becomes damaged, the brachial plexus may in turn be damaged. Keep in mind that stinger injuries will not be prevented by pads, but protecting the clavicle will aid in preventing more severe nerve injuries due to clavicular fractures or damage.

Properly fitting pads should completely cover the clavicle and redistribute direct forces away from it. Always check to make sure pads properly cover the clavicle, and that it is not exposed at the collar (AEMA, 2004).

CONCLUSION
Football is very much a contact sport, and improper fitting of shoulder pads can risk serious injury to the anatomical structures discussed above. The shoulder is a very complex joint with many muscles, nerves and blood vessels contributing to optimal function of the entire upper extremity.

Issues at the shoulder can cause deficits in function that extend down the arm and into the hand that can sideline a player on the field and in life. My hope is that by highlighting these critical structures in shoulder anatomy, equipment managers don’t just know how to fit equipment but why we fit it properly.


Always check to make sure pads properly cover the clavicle, and that it is not exposed at the collar.
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Soccer: The First Football

By Roxann Moody EM,C

Soccer may require less equipment than most sports, but that doesn’t mean that their equipment is any less important or should be overlooked. On the contrary, the equipment worn by soccer players is vital to the success of the players and team. This article will focus on player equipment needed for practice and competition: shoes, shinguards, and goalie gloves.

The correct footwear is an absolute necessity. The idea is to keep your gear light in order to allow for the widest possible range of movement and comfort over the entire 90 minutes of a game.

Proper fitting soccer shoes are necessary for players of all ages and skill levels to perform optimally. The type of soccer shoe selected will often depend on comfort, the level of play, the type of field on which your team is playing, weather conditions, and how much of your budget allows you to spend.

Soccer shoes should be tried on with soccer socks rather than regular athletic socks to ensure proper fit. They should fit more snugly than other athletic shoes with the toes close to the end of the shoe, but not touching. An ideal fitting soccer shoe will cause no discomfort or pressure points.

Soccer shoes come in dozens of shapes, sizes, and prices. Most important is comfort and a close fit that offers complete support through all the sudden starts, stops, and turns native to the sport. It is also critical to make sure cleats or studs are suited to the type of surface you are playing on.

As for construction materials, soccer shoes are made of leather or synthetic materials. Leather shoes break in easier, are usually more comfortable, and provide a superior touch and an improved ability to "feel" the ball. However, the leather shoes can be heavier and more expensive than synthetic, and wear more quickly.

Synthetic shoes are extremely light and typically built to promote speed and acceleration. They are typically less expensive, but depending on the style, can also be less comfortable and forgiving during the break-in process and do not typically mold to the player’s foot as well as leather. Equipment managers must understand the different types of soccer shoes available in order to determine which style of soccer shoe is best for the style of the player and for the field on which the team plays.

Cleats or boots are usually the first choice for firm ground. These are typically the classic soccer shoe outfitted with cleats and studs designed to provide traction and

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stability on most outdoor soccer surfaces. This shoe may feature a molded outsole. Firm ground boots typically have a series of non-removable thermoplastic urethane (TPU) studs that are either bladed or conical in shape. This is the most versatile soccer boot and is practical on most field surfaces and conditions.

Soft ground shoes are sometimes referred to as having detachable cleats. This shoe offers greater stability and control on wet, soft fields as they have removable, metal-tipped studs that can be exchanged and replaced easily depending on field conditions. Replacement studs are usually sold separately. Another soft ground option are blades, which represent a relatively recent design in soccer shoe technology. Arranged in a circular pattern, these cleats are so named because they resemble the blades of a knife. These are said to improve traction and particularly the ability to turn and pivot.

Indoor soccer shoes have a flat rubber outsole, often with a herringbone pattern, to increase traction on artificial turf or gym hardwood or tiled floors. Indoor facilities with artificial turf may require this type of shoe, to help preserve the turf.

Sandals, while not a necessity, provide comfort post game and practice. This shoe is easy to slip on while still wearing game socks and shin guards. Many soccer sandals have cushioning foot beds with massaging nubs to help comfort tired feet and feature an adjustable strap.

Before an athlete hits the field with a new pair of footwear, showering in warm water while wearing cleats and soccer socks is recommended to expedite the break-in process.

It is important to note that there are significant differences between men’s and women’s soccer shoes. Female-specific models are designed on a narrower last or foot mold to better fit the female foot.

Ultimately, the style of shoe chosen for the athlete should be the one that fits best, is most comfortable, and meets the needs of their position. Strikers will generally be concerned with speed and as such, a synthetic shoe may be best in these situations. Contacting the ball cleanly and accurately is also important to strikers, so offset or covered laces are also a consideration.

Midfielders will do the most running of any position on the field, so comfort is a primary concern. A leather shoe with traditional round cleats will be most comfortable for the solid 90 minutes of running a midfielder is expected to put in each match. Defenders will put their shoes through the most abuse, so something sturdy and durable is best. Synthetics will tend to last longer than leather shoes. Defenders will also have to turn and pivot often as part of their role, so shoes with bladed cleats might be ideal.

Soccer shoes are not easy to break in. Before an athlete hits the field with a new pair of footwear, showering in warm water while wearing cleats and soccer socks is recommended to expedite the break-in process.

As the shoes begin to dry, the leather will begin to form to the shape of the player’s foot. The player should take off the shoes and stuff balled up newspaper inside the shoes. This will absorb excess water and retain the shape of the shoe. In addition, rubbing petroleum jelly onto the uppers will help keep the leather soft and while preventing the formation of blisters.

As with all new shoes, players should wear them to practice before wearing them for a game. It is also recommended that players bring an extra pair so they can wear the new cleats for a short period of time and then switch to the old pair if discomfort or blistering occurs.
Shinguards are extremely important at any level of soccer. Though they cannot prevent major breaks and serious injury, they will save the players from the daily knocks and bruises that inevitably afflict their shins. Shin guards fit on the front of the leg and are held in place with Velcro straps or tape. They can also be slipped into the sock and may or may not include a section designed to support the ankle. Strikers tend to wear smaller, lighter models, while defenders, midfielders, and goalkeepers tend to opt for designs that offer more coverage. Although commonly ignored in the soccer community, it is important to purchase and issue shinguards that are both NOCSAE certified and age and size appropriate. In other words, college athletes should not be wearing youth shinguards. The proper measurement for shinguards is two inches below the knee to the top of the ankle.

Goalkeepers are the only players who wear gloves all the time. Players in the field sometimes wear gloves in cold conditions and there are no rules for these as long as they are light. For goalkeepers, there are many models available so it is important to find a design that offers maximum mobility to the fingers and support to the wrists. Currently, there are three main glove styles.

Flat Palm was the traditional cut for goalkeeper gloves when they were invented. It is still considered the most popular glove cut and the best cut for finger protection gloves. The palm of this style is usually made of a single piece of latex. If you look at how each finger is constructed it looks like a box (hence the name of box-cut, used by some) and consists of the backhand on top, two side gussets and the palm on bottom.

The stitching that attaches the latex palm to the gussets is done so that the seam is on the exterior of the glove. This cut has less contact area with the fingers and does not give as tight of a feel on the ball.

This style of glove typically fits looser than many other styles and glove fingers can twist during catching. Those that prefer a snug fit but still want a traditional glove often wear a glove that is one half to one full size smaller than their normal size.

The Roll Finger cut does not use gussets. The palm is directly attached to the backhand, wrapping the latex palm around the fingers. This cut is definitely a more snug fit than the traditional flat cut palm. This allows goalkeepers to have better contact and feel on the ball especially when catching or throwing. Roll Finger cut may also be a better fit for female keepers as it fits more snug than Flat Palms.

The Negative Cut is very similar to the Flat Palm cut in that the palm is made of a single piece of latex and there are gussets between the palm and the backhand. The difference is that the stitching that attaches the latex palm to the gussets is done so that the seam is on the inside of the goalkeeper gloves.

This glove style fits snugger than a traditional Flat Palm and many consider it offers better ‘feel’ when catching and throwing. Its fingers are not prone to twisting which results in better latex to ball contact when catching.

Those with thinner hands may prefer this cut. In fact, this style is marketed to women as it fits slimmer hands better than the traditional Flat Palm cut goalkeeper glove.

When compared to most other sports, equipment used by soccer players is minimal, but it also very important in ensuring their safety and allowing them to perform at the highest level possible. Because of the nature of the sport, it only makes sense that footwear and shinguards are the most important aspects of perfection and performance.
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A concussion is a type of traumatic brain injury that is caused by a blow to the head or body that shakes the brain inside the skull and cannot be physically seen. Some signs and symptoms are headaches, temporary loss of consciousness, confusion, amnesia surrounding the event, dizziness, ringing in the ears, nausea or vomiting, slurred speech, and fatigue.

Concussions can occur in every sport. According to the National Center for Catastrophic Sport Injury Research at least 678 high school players died as a result of or complications from helmet-to-helmet contact. The Sports Concussion Institute in Atlanta and California estimates that NFL players on average absorb 900-1,500 head blows during a season.

To minimize the effects of helmet-to-helmet contact, two products have emerged: Shockstrips and Guardian Cap. Below is a breakdown of each.

**SHOCKSTRIPS**

Created by Dr. Steven Novicky and launched in January of 2010, Shockstrips is an external device that adhered to the outer shell of a football helmet to help protect and reduce the forces associated with helmet-to-helmet impacts in football players. These strips were researched, tested, and developed to reduce impact by absorbing shock from the collisions. They act as a bumper of sorts. Patent is currently pending.

The actual strips are made from a material called AKTON Xi75 Viscoelastic Polymer. This material is flexible, antimicrobial, can withstand extreme temperatures and extreme impact, and does not discolor after multiple uses. The material’s primary functions are absorption, deflection of energy, and to help deaden the sound of helmet-to-helmet contact.

The Shockstrips are adhered to the outer shell of the helmet by a product called Loctite 4205. Some characteristics of this product is that it has extreme impact shock-absorption, high tensile strength and elasticity, high load bearing capacity, retains its original shape after deformation, can be molded into any shape or form, easily cleaned, color customizable, and has extraordinary adhesive properties.

Four tests were recently conducted to evaluate Shockstrips’ effectiveness. They were: Drop Testing, Linear Impact Testing, Adhesive Compatibility, and Friction Coefficient. Each of these tests were conducted by different independent testing groups located all over the country.

The tests found that helmets with Shockstrips performed significantly better than helmets without Shockstrips. In all four tests, helmets with Shockstrips showed a significant decrease in impact, the severity index, and head injury criteria, the standard measure-

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ments in helmet certification. Theses strips also helped to decrease the stress forces on the cervical spine. The Shockstrips do not appear to damage the outer surface of the helmet nor shorten the life-span of the helmet. After two years of continuous use on the field, athletes on 28 teams in 13 states are using Shockstrips. (www.shockstrip.com)

THE GUARDIAN CAP

Created by POC Ventures in 2011, the Guardian Cap is worn on the outside of the helmet. The main goal of this type of cap is to help reduce the impact players feel by dampening the force of impacts and extending them. The Guardian cap meets both the criteria for greater deflection and time extension during impacts or deflection using soft shell technology. This cap has been worn by over 20,000 players from youth through college in 2012 and 2013. Currently, football teams at Centerville, Clemson, South Carolina, Toledo, and Akron all wear the Guardian Caps on contact practice days. Patent is pending.

One size fits all and the unit connects to the facemask via four elastic straps and it does not affect the integrity of the helmet. The unit is lightweight, has a lower coefficient of friction than the helmet, is water resistant, insulates in hot and cold weather, and is machine washable and air dryable.

Studies have shown that the Guardian Cap can help reduce impact up to 33%. The soft outer shell dampens and redistributes the energy from the helmet-to-helmet contact and helps reduce the impact that the helmet can inflict force on other parts of the body that has been hit. Penn State Biomechanics Labs and Wayne State University Bioengineering Labs both conducted tests with football helmet impacts with and without the Guardian cap. (www.guardiancaps.com)

Helmet manufacturers have said that if any third party equipment is added to the inside or the outside of the helmet, the warranty will be voided.

Mike Oliver, executive director of NOCSAE, recently commented on these types of products:

“If a company wants to put out a product and they want to market it as reducing concussions, to me it’s their responsibility to come forward with peer-reviewed scientific data and say, here it is. Not just say, ‘we’ve tested it and it reduces G-force by X percent, or the anecdotal (evidence)—we’ve had it on this team for three years and they’ve only had two concussions.” (Star)

NOCSAE’s issue with products is this, companies that produce the products lack the required certification testing that helmet manufacturers are required to adhere to. And until it happens, products that are added to the helmet will be banned from play. According the testimonials on the products websites players, coaches, and parents all like and believe in the products. Many of the players that have worn the products say that they can feel a difference when they are hit, whether it is a big hit or a small one.

Football is a violent sport, legitimate research and attempts to make the sport safer for the athletes needs to be taken seriously. With all of the recent studies and new information about concussions, different companies have begun to figure out new and innovative ideas to help the statistics decrease.

Article continues on page 18
Men's or women's gymnastics programs are wonderful additions to any athletic department. Still, adding those sports takes some work and there are many people and departments that the equipment manager will need to work with to ensure the startup process meets the coaches' and program's needs.

For a startup program, there will be an extensive amount of equipment that will need to be ordered. As the equipment manager, you will need to evaluate all the requests from the coach and facility manager as well as work with your financial personnel to decide the most important items that need to be ordered to get your program started.

The main focus of this article will be for the collegiate level, but this information is also applicable to the high school level. All gymnastics is governed by the Federation Internationale de Gymnastique (FIG). The NCAA and most programs at all levels use the rules and regulations that FIG uses for equipment and uniforms. When adding a gymnastics program to your school, there are many things that need to be considered.

For practice sessions, gymnasts will need space to rehearse their routines on each of the events. For both high school and college, a gym or basketball arena should be large enough for practice. Most universities will have a separate gym where practice equipment can be left up all the time. Competitions, however, are usually held in a school's basketball arena or another gymnasiun with ample seating. In those cases, equipment must be set up beforehand and torn down following the event.

While the head coach will have a budget for their team that includes equipment costs, the equipment manager will help in guiding the coach with team needs on a day to day basis. The equipment manager is best suited for this role because that person has extensive knowledge of each athlete's daily needs and knows best how to meet those needs.

Gymnastics requires a lot of large equipment set at certain heights depending on the event. Women's gymnastics events are uneven bars, balance beam, vault, and floor exercise. Below is a brief description of the apparatus used for each of the female gymnastics disciplines, including two that men also utilize:

Held by a steel frame, the uneven bars are made of fiberglass with a wood coating. The upper bar is 8.2 feet high the lower bar is 5.6 feet high. The diameter of each bar should be four centimeters wide and 7.9 feet long. The distance between the two bars should be between 4.3 feet to 5.9 feet and should be adjustable depending on each gymnast’s preference.

For the balance beam, the height should be 4.07 feet high and the diameter should be four centimeters wide and 7.9 feet long. The distance between the two bars should be between 4.3 feet to 5.9 feet and should be adjustable depending on each gymnast’s preference.
inches. The beam should be covered in suede or leather and be sprung to accommodate difficult tumbling and dance skills. During practice, the beam is usually regulation size, but sits closer to the ground.

The floor exercise is comprised of a spring floor to provide bounce. They contain springs and a rubber foam and plywood combination which makes the floor bouncy so that it can lessen the impact of landings and give the gymnast height on their jumps, flips, and acrobatics. Floors have clear out of bounds areas indicated by a white border. The dimensions of the floor are the same for men and women, 39 feet by 39 feet.

The vault event has a run up which is 82 feet long and features a flat cushioned surface that is nearly parallel to the floor, which slopes downward at the end toward the spring board and vaulting table. The vaulting table is 3.9 feet by 3.12 feet. For women, the height of the vaulting table is 4.10 feet, and for men it is 4.43 feet. The floor exercise and the vault are the only two events which both male and female gymnasts compete in.

For men, the six competition events are the vault, floor exercise, pommel horse, still rings, parallel bars, and high bar. Below is a brief description of the four exclusive to male competitors:

The pommel horse is a metal body covered with foam rubber and leather with plastic handles. Its height is 3.77 feet and it is 5.2 feet in length. Its width is 14 inches. The height of the pommels is 4.7 inches and the distance between pommels is 16 to 18 inches with them being adjustable depending on gymnast.

The still rings are two rings hanging freely from a metal frame with each ring being supported by a strap which connects to a steel cable that is suspended from the metal frame. The distance between the two points of attachment is 1.6 feet and the inner diameter of each ring is 7.1 inches. Composed of wood, the parallel bars are two bars parallel to each other and elevated from the floor by a metal supporting frame. The bars are 11.5 feet long 1.6 inches wide. The height of the bar from the floor is 6.6 feet. The distance between the bars is anywhere from 17 to 20 inches depending on the gymnast’s preference.

The final male event is the high bar, which has a similar composition as the women’s uneven bars with a height of 278 cm, a length of 240 cm, and a diameter of 2.8 cm.

Like other teams on campus, the gymnastics programs will also need daily equipment that must be ordered annually, including towels, laundry carts, bag tags, locker tags, laundry loops, and padlocks for lockers if needed. These items will depend on the coach’s wants and the layout of the locker room and laundry room.

Another consideration is uniforms. Worn by female competitors, leotards require special fitting. In most programs, the head coach usually is in charge of fitting athletes for their leotards, but equipment managers can also be part of the process.

Fitting female athletes for leotards can prove to be challenging. First, you must understand the FIG rules for uniforms for female athletes. If you are a male equipment manager, I recommend that you have a female coach present for a leotard fitting. If that is not possible, ask a female athletic trainer to be present.

To fit a female athlete for a leotard begin by working from the bottom up. Start by measuring the hip, waist, torso and chest. With these measurements you can follow manufacturers’ guidelines in finding the right size for the gymnast.

When the athlete is trying on the leotard, make sure there is a high leg line but that the hip bone is not exposed and the leotard does not ride up, which is illegal according to FIG.
rules. Having a wider crotch helps in preventing it from riding up. In women's gymnastics they have to wear panties (no thongs, which is illegal by FIG rules) and the panties can't show.

Most women will use a skin adhesive that will help hide the panties and keep the bottoms of the leotard in place. This type of adhesive can be found at most drug stores in the beauty section.

You also want the leotard to be as form fitting as possible. A good leotard will have a four-way stretch throughout, not just in one or two areas of the garment. Also, depending on your coach's preference, the sleeve length will be a factor in your athletes' fit and performance. Most coaches will opt for a three-quarter inch or S/S length on the sleeves. This is important especially for women who compete in the uneven bars and wear bar grips. Having shorter sleeves keeps them out of the way without having to push them up and risk having them come down on them during competition. Make sure you let the coach know if the girls are having issues with long sleeves.

Sizing is not a straight size when it comes to fitting leotards. Because of the various shapes and sizes of your female athletes, you will most likely have hybrid sizes. Both the top portion and the bottom portion can be two different sizes. You will know if one of your girls falls into this category when you take the initial measurements of her body.

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There is a lot of equipment for the equipment manager to check when it comes to gymnastics. For both men's and women's gymnastics, this will include checking the equipment used in the various events.

Some girls may be a large top but a medium bottom. Size examples include small extra-long and medium extra short. Many companies such as GK Elite and Rebecca's Mom Leotards will be able to accommodate you in customizing the sizes. Remember that the leotard is supposed to be a second skin to the athlete, so you want it to be as perfect of a fit as possible.

Men wear two layers of clothing for competition. The first is a singlet, which is simply a sleeveless leotard. Then depending on the event, there are a couple different types of bottoms they will wear.

For the floor and vault events, men usually will wear competition shorts. For all other events, long pants are typically worn with stirrups as the bottom to keep them tight around the feet and ankle. The singlet is usually jazzed up similar to how women's leotards are.

The final pieces of equipment that are fitted is each athlete's bar and ring grips. Most of the time, the head coach will fit the girls for these and the equipment manager will not have to deal with it. Still, it's always good to know the equipment your athletes and coaches are working with.

There are two different types of grips, ring grips and bar grips. Ring grips for men are very similar to bar grips for women. They both have two finger holes and are made of leather. Men's high bar requires a specific high bar grip with three finger holes. Depending on the gymnast, high bar grips come in four different types: overhand, reverse, underhand, and mixed. All gymnasts that partake in bar and ring events need to be fitted for grips.

There is a lot of equipment for the equipment manager to check when it comes to gymnastics. For both men's and women's gymnastics, this will include checking the equipment used in the various events. You want to check the springs in the run-up for the vault and the springs for the floor in the floor exercise. Rusting or damaged springs need to be replaced, as does any foam that may be tearing.

You will also want to check the leather on the vault, pommel horse, and balance beam for tears. These will need to be patched up or recovered depending on how bad the tear is.
The bars for the uneven, parallel, and high bar as well as the apparatuses supporting them should also be checked for damage before and after competition and practices. The rings for men's gymnastics will also need to be checked in order to make sure that they are secured to the metal frame and that the rings are not damaged in anyway.

These checks should be made each time before a competition to ensure the safety of the competing athletes. Also, you will want to check the landing mats that line all the various events to ensure that there are no tears and that the foam is not hard or too thin in certain areas of it. Practice equipment should also be checked on a regular basis.

Taking on a new sport can be difficult but with good organization skills an equipment manager can effectively start up the program with much success. Gymnastics requires more equipment and more managing then most would expect and equipment managers play an important role in making sure athletes are safe and well-cared for.

At the same time, everyone needs to take a practical, common sense, approach to these relatively new products. While these items may test well in the laboratory, it does not guarantee safety on the field. For example, is it possible that these products can put athletes in a greater risk of injury?

Shockstrips are strips that stick out of the tops of the helmet. What affect does this have on the “glancing blow” effect of helmets? Helmets are made to hit and slide off each other. In the case of the Shockstrips, is it possible that these strips could stick or cling on to each other and cause neck or spine injuries?

The same aspect goes for the Guardian Cap. With the type of material used on the cap, it would seem to produce friction. Hence, reducing the sliding effect and producing an effect causing the helmets to stick.

Each individual organization needs to evaluate their specific needs and determine if these or other similar products are a right fit for their athletes. Additionally, they also need to weigh the risks involved with possible warranty violations by the helmet manufactures.
CEU QUESTIONS

In order to receive Continuing Education Units, please mark the answers to the following questions on the form located on page 22. Then photocopy the form and mail it to your CEU District Representative (see back page for a listing of CEU District Representatives).

**Being Fit to Hit**

1) The original concept of protective headgear was for:
   - A. Preventing concussions
   - B. Prevent head lacerations
   - C. Prevent head fractures
   - D. Both B & C are correct

2) The Severity Index (SI) number is an assessment to measure:
   - A. Concussion Grade
   - B. The Length of concussion symptoms
   - C. Head injury risk
   - D. None of the above

3) On average, the SI range of helmets fall between:
   - A. 400-600
   - B. 600-800
   - C. 800-1000
   - D. Over 1200

4) How many states currently have enacted some sort of concussion legislation?
   - A. No state
   - B. Only California and Texas
   - C. 50% of the states
   - D. All 50 states and the District of Columbia

5) According to research by Joseph Torg MD, properly worn helmets:
   - A. Had no effect on concussion prevention
   - B. Were 50% less likely to cause a concussion resulting in LOC.
   - C. Were 82% less likely to suffer a concussion with LOC
   - D. Prevented all concussion from taking place

**What Lies Beneath**

6) This joint connects the upper extremity (arm) to the rest of the body:
   - A. Acromioclavicular joint
   - B. The surgical neck of the humerus
   - C. The rotator cuff
   - D. The Brachial Plexus

7) This is a group of four muscles – the supraspinatus, infraspinatus, teres minor and subscapularis - that originate on the scapula and attach to the humeral head:
   - A. Acromioclavicular joint
   - B. The surgical neck of the humerus
   - C. The rotator cuff
   - D. The Brachial Plexus
8) This lies distal to (below) the humeral head, where it articulates with the scapula to form the glenohumeral joint.
   A. The acromioclavicular joint
   B. The surgical neck of the humerus
   C. The rotator cuff
   D. The brachial plexus

9) This is a network of nerves that controls all the movement of the shoulder, arm, forearm, wrist and hand:
   A. Acromioclavicular joint
   B. The surgical neck of the humerus
   C. The rotator cuff
   D. The Brachial Plexus

10) This needs to be protected so that voluntary movement, sensation and blood supply to the arm are not effected:
    A. Acromioclavicular joint
    B. The surgical neck of the humerus
    C. The rotator cuff
    D. The Brachial Plexus

Soccer: The First Football

11) In soccer, “Firm Ground” refers to what:
    A. Playing surface in need of watering
    B. A classic soccer shoe with cleats and studs
    C. A synthetic shoe built to promote speed
    D. A shoe having detachable cleats

12) In soccer, “Soft Ground” refers to:
    A. Playing surface in wet or soggy conditions
    B. A classic Soccer shoe with cleats and studs
    C. A synthetic shoe built to promote speed
    D. A shoe having detachable cleats

Helmet Caps

16) This product is an external device that it adhered to the outer shell of a football helmet to help protect and reduce the forces associated with helmet-to-helmet impacts in football players:
    A. Guardian Cap
    B. Shockstrips
    C. AKTON XI75
    D. Loctite
17) The primary function of AKTON XI75 Vicaelastic Polymer is to:
   A. Absorption
   B. Deflection of energy
   C. Deaden sound
   D. All of the above

18) This product is applied to the outside of the helmet. The main goal is to help reduce the impact that the players feel when hit by dampening the force of impacts and extending them:
   A. Guardian Cap
   B. Shockstrips
   C. AKTON XI75
   D. Loctite

19) As of the time of this article, Helmet manufacturers' stance on helmet caps is:
   A. They are encouraged to better enhance their product
   B. Helmets using the product are in jeopardy of losing their warranty
   C. The User assumes all risk and liability
   D. Both B & C are correct

20) The Sports Concussion Institute in Atlanta and California estimates that NFL players on average absorb:
   A. 900-1500 head blows per season
   B. At least 2000 head blows per season
   C. 600-900 head blows per season
   D. Less than 700 head blows per season

21) All Gymnastics is governed by the:
   A. NCAA
   B. Federation Internationale de Gymnastique (FIG)
   C. The International Olympic Committee (IOC)
   D. World Gymnastics Federation (WGF)

22) Women's Gymnastics events include:
   A. High Bar
   B. Pommel Horse
   C. Still Rings
   D. Balance Beam

23) Men's Gymnastics events include:
   A. Vault
   B. Uneven Bars
   C. Floor Exercise
   D. Both A & C are correct

24) When Sizing/Fitting Leotards for gymnast:
   A. Straight sizing is best
   B. Hybrid sizes are best
   C. Two-way stretch material is recommended
   D. Both B & C are correct

25) The following are types of high bar grips:
   A. Overhand
   B. Reverse
   C. Underhand
   D. All of the above
CEU ANSWER SHEET

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