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AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

AIR UNIVERSITY ATHLETIC PROGRAMS
AND RELATED SPORT INJURIES:
WHAT YOU SHOULD KNOW

MAJOR NANCY J. DRISCOLL 84-0710

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REPORT NUMBER 84-0710

TITLE AIR UNIVERSITY ATHLETIC PROGRAMS AND RELATED SPORT
INJURIES: WHAT YOU SHOULD KNOW (A HANDBOOK FOR
ATHLETIC OFFICERS/COACHES)

AUTHOR(S) MAJOR NANCY J. DRISCOLL, USAFR

FACULTY ADVISOR LT COL PATRICIA A. PURDY, ACSC/EDOWC

SPONSOR MR. LUTHER W. D. CHAMBERS
MORALE, WELFARE AND RECREATION
3800 ABW/SSR
MAXWELL AFB, AL 36112

Submitted to the faculty in partial fulfillment of
requirements for graduation.

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AIR UNIVERSITY

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PREFACE

Physical fitness is an expectation for all Air Force personnel. Good physical conditioning and weight control are essential for vigorous, alert and energetic job performance. Individual responsibility for maintaining good physical conditioning and adherence to established weight standards are outlined in AFR 30-1 and AFR 35-11.

The basic philosophy underlying the Air Force's stress on physical and mental fitness was aptly stated by President John F. Kennedy in AFR 35-57 Preface:

Physical fitness is not only one of the most important keys to a healthy body, it is the basis of dynamic and creative intellectual activity. . . . As the Greeks knew: that intelligence and skill can only function at the peak of their capacity when the body is healthy and strong; that hardy spirits and tough minds usually inhabit sound bodies.

The expectation within the Air University (AU) for physical and mental fitness is evidenced through the aerobic and team sport programs provided for all personnel within its academic setting. The aerobic program is designed to build and maintain individual fitness. Team sport programs are designed to build on the individual's strengths, physical and intellectual, toward the betterment of the group as a whole. Leadership and team esprit de corps are basic premises underlying the competitive sport programs within the Air University.

Students attending AU come from a cross section of the Air Force community. From personal experience and observations, I am aware of the vast differences existing in the extent to which physical fitness and weight standards have been enforced.

Participation in aerobic and team sport programs while attending one of the colleges at AU is a requirement for all students. Based on personal experience and conversations with other students, participation in a team sport program prior to attending AU was not done with any regularity. This is particularly true of the officers attending Air Command and Staff College (ACSC). The possibility of sustaining a sport related injury, therefore, is greatly increased.

CONTINUED

The intent of this handbook is to provide the student who is responsible for coordinating and directing team sport activities with an easy to read, informative and useful guide for managing sport related injuries.

By identifying the first aid principles and techniques for the initial treatment of sport injuries, the athletic officers will have the knowledge necessary to manage injuries immediately, thereby minimizing their severity. He/she will also have the knowledge necessary to appropriately direct injured personnel to the emergency room for further evaluation and treatment.

Knowledge is the key to the success of any endeavor. Non-medical athletic officers need the information contained within this handbook to effectively and responsibly discharge their duties. Inherent in their leadership role is the responsibility to educate and safeguard the individual participants from injury, or when injury occurs, provide timely first aid. By utilizing this handbook, athletic officers will be better prepared to meet their leadership responsibilities.

ACKNOWLEDGEMENTS

Inherent in leadership is a responsibility to acknowledge others for their efforts. There are a few people deserving my thanks for their help and support. Lt Col Patricia Purdy, my advisor, gave freely of her time providing me significant and meaningful feedback. My gratitude is also extended to Thelma Bowick and Sheila Roten who had to read and reread my handwritten material on several occasions prior to typing it. Their professionalism and dedication to detail were outstanding.

ABOUT THE AUTHOR

MAJOR NANCY J. DRISCOLL, USAFR, NC, has had extensive experience in both military and civilian nursing. She was commissioned as a 2nd Lieutenant in the USAF in September 1967. While on active duty her assignments included: medical-surgical staff duty; head nurse of a labor-delivery and nursing unit; operating room supervisor; and outpatient nurse specialist. Major Driscoll left active duty in October, 1969 with a concomitant assignment to the 67th Aeromedical Evacuation Squadron. She attended Flight Nurse School at Brooks School of Aerospace Medicine in May 1970. She has continued on flight status performing aeromedical evacuation nursing with the 67th AES, the 74th AES and is presently with the 68th AES (MAC-ASSOC) at Norton AFB, CA. Major Driscoll has over 1300 flying hours in a variety of aircraft. Her most recent assignment with the 68th AES includes duties as a flight nurse examiner and Educational Coordinator.

Major Driscoll's civilian nursing experience has been diverse. In 1970 she joined the Veterans Administration Nurse Corps as a surgical staff nurse. She progressed to a staff nurse position in the Surgical Intensive Care Unit, later becoming head nurse. She was later promoted to coordinator over all surgical specialty units (Surgical Intensive Care, Renal Transplant Unit, and Surgical Recovery Room). Her present VA assignment is as an Adult Nurse Practitioner in a Primary Care Clinic.

Civilian and military education has provided Major Driscoll a broad background. Her initial nursing education was received at Beth Israel Hospital School of Nursing, Boston, MA, 1964-1967. A Bachelor of Science Degree in Nursing (Magna Cum Laude) was obtained in 1978 from Worcester State College, Worcester, MA. In 1980 Major Driscoll earned a Master of Science Degree as an Adult Nurse Practitioner from Boston University. She received American Nurses' Association Certification as an Adult Nurse Practitioner in November, 1980. Major Driscoll's military education includes Flight Nurse School, Jungle Survival Course, National Security Symposium, Medical Red Flag-6, and Chief Nurse Management Symposium. Currently Major Driscoll is attending Air Command and Staff College in residence.

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GLOSSARY

ABRASION

Outer layers of skin are scraped off through some mechanical (rubbing/scraping) process. Bleeding is minimal.

CONCUSSION

A mild bruising of brain tissue from a blow to the head. No loss of consciousness, but a slight dizziness or lightheadedness may exist without associated mental confusion.

CONTUSION

Bruises to the skin, to the fat layer, and to the muscles and bones from a blow. Blood vessels rupture causing a black-and-blue discoloration in the skin, or a pooling of blood in the fat, muscle layers forming a "lump" (hematoma).

DISLOCATION

A displacement of a bone end from the joint usually as a result of a fall or a direct blow. Common dislocation sites are at the shoulder, elbow, fingers, and thumb.

FIRST AID

The immediate care given to a person who has been injured or has been suddenly taken ill. It includes self-help if medical assistance is not available or is delayed.

FRACTURE

A break or crack in a bone.

LACERATION

A wound displaying jagged, irregular, or blunt breaking or tearing of the skin and underlying soft tissues. Bleeding may be rapid and extensive.

LIGAMENT

A band of fibrous tissue connecting bones or cartilages to support and strengthen joints.

NON-REPORTABLE ACCIDENT

No loss of work time or duty restriction; property damage totals less than \$1000 (AFR 127-4(C1)).

CONTINUED

REPORTABLE ACCIDENT

Personal injury/illness resulting in lost work day(s), one or more or work activity had to be restricted. Property damage costs of \$1000 or more (AFR 127-4(C1)).

SPRAIN

An injury to a ligament or muscle tendon in the region of a joint. It involves the partial tearing or stretching of ligaments, tendons, blood vessels, and the contusing of surrounding soft tissue.

STRAIN

An injury to a muscle from overstretching the muscle fibers, or as in severe muscle strains, fibers are torn, ruptured.

TENDON

A fibrous cord attaching muscles to bones.



EXECUTIVE SUMMARY

Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

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REPORT NUMBER 84-0710

AUTHOR(S) MAJOR NANCY J. DRISCOLL, USAFR

TITLE AU ATHLETIC PROGRAMS AND RELATED SPORT INJURIES:
WHAT YOU SHOULD KNOW. (A HANDBOOK FOR ATHLETIC
OFFICERS/COACHES)

I. **PURPOSE:** To provide non-medical, non-nursing AU student officers with an appreciation for the types of injuries most often associated with a particular sport; to provide basic first aid concepts and techniques which should be utilized initially to minimize the injury; and to assist the athletic coach in recognizing types of injuries and the need for follow-up medical evaluation and treatment.

II. **PROBLEM:** Students attending Squadron Officers School (SOS) and Air Command and Staff College (ACSC) are required to participate in one or more organized team sport programs. Frequently participation in any organized team sport has not been a reality for the majority of students attending these two schools. Consequently, lack of conditioning and skills associated with a particular sport predisposes the student participant to the risk of sustaining a sport injury. Further, students acting as athletic coaches have had little or no first aid background in the immediate treatment of sport injuries.

III. **DATA:** Air Force experience with sport related injuries continues to be significant in terms of lost work time and

CONTINUED

financial costs. Sport injuries consistently represent fifteen (15) to nineteen (19) percent of all reported ground accidents, surpassed only by motor vehicle injuries. At Air University, sport injuries are also second only to motor vehicle injuries. SOS and ACSC students in 1983 accounted for 26 to 64 percent of the reported sport/recreational injuries a month at Air University. These injuries were sustained while playing either softball, soccer, volleyball or flickerball. Soccer and softball generated the greatest number of injuries, 157 and 149 respectively, followed closely by volleyball (91) and flickerball (80). From these figures it is obvious sports, while physically and mentally beneficial, are also a source of injury for a large number of SOS and ACSC students.

Athletic coaches for the various sports are students. Very few have had any coaching experience or training in first aid treatment of sport injuries. While some of the students attending SOS and ACSC have medical and nursing backgrounds, they are few in number. They cannot adequately provide assistance to the large number of teams that comprise any given class of students in SOS or ACSC. To further complicate this situation, no handbook currently exists at Air University which addresses sport injuries and their initial first aid management. Athletic coaches, or designees, should be provided information relative to the causes, types and initial management of sport injuries.

IV. CONCLUSION: Sport injuries are a fact of life. The Air Force and Air University cannot hope to totally eliminate sport related injuries. Priority must be given to reducing the number of injuries and minimizing their severity. Educating sport participants and coaches is essential. Knowledge of potential injuries, their causes, and initial first aid management will help reduce the number and severity of sport injuries.

V. RECOMMENDATIONS: A handbook addressing the causes, types and initial first aid management of sport injuries should be developed for use at Air University. As a minimum, this handbook should be distributed to the athletic coaches in Squadron Officers School and Air Command and Staff College. A wider distribution would include the coaches of intramural teams through the base gym or the Morale, Welfare, and Recreation Office.

Part I

Air University Athletic Programs

Chapter One

SIGNIFICANCE OF SPORT RELATED INJURIES

Injuries can have a significant impact on the individual, his/her family, organization and the ability of the Air Force to adequately carry out its mission. Constant vigilance to possible sources of injuries, coupled with the thorough investigation of sustained injuries are critical to the development and implementation of preventative measures.

Participation in aerobic and athletic programs is in keeping with the overall objectives of the Air Force for individual physical and mental readiness. The AF mission can only be accomplished if its members are physically and mentally capable of carrying out their mission responsibilities. Injuries sustained while participating in aerobic or team sport programs are counter productive to the intended benefit of such activities. Through studying the types and causes of sport related injuries, the Air Force can take positive measures to prevent, or at least minimize, the frequency and severity of sport related injuries.

In reviewing the Air Force experience with recreational/sport related accidents, one is impressed with the frequency and cost. Sport injuries consistently represent the second leading cause of injuries from all reported ground accidents. Sport injuries are surpassed only by those sustained in motor vehicle accidents. In 1953-54, 18% of the total injuries incurred by ground accidents resulted from sport/recreational activities (17:2). A similar study done for the five year period, 1965-1969, demonstrated 15% of reported accidents were related to sport/recreational activities (11:i).

The team sports, in terms of this handbook, which accounted for most of the injuries were: softball (19-24%), volleyball (3-4%), and soccer (less than 3%) (11:7). Flickerball was also noted as one of the injury producing team sports (11:3). The most recent Air Force study available demonstrated that over a five-year period (1965-69) softball accounted for 1,421 disabling injuries, costing \$762,892; volleyball produced 242 disabling injuries, costing \$101,616; soccer, 67 injuries, costing \$31,550; and flickerball/lacross/rugby accounted for 51 injuries costing some \$16,650. These four sports accounted for 1,781 injuries, a

total of 24% of all sport/recreational injuries. Total cost to the Air Force was \$912,708 and a total of 17,287 work days were lost (11:10-12). (See Figures 1 and 2, Appendix I.)

There is little doubt in light of the above statistics that sport related injuries are a significant drain on Air Force resources. Prevention of sport injuries is the responsibility of all levels of management, starting with the individual participants. Only at base-level can the problem of sport injuries be adequately addressed and preventative measures instituted. Most AF sport injuries occurred on-base, supervised by the base's Morale, Welfare and Recreation Office. The on-base versus off-base ratio of injuries was approximately six to one (11:4).

Having reviewed the Air Force's experience as a whole, let me now address the experience of Air University. In particular, I will discuss the team sports played in Squadron Officers School and Air Command and Staff College.

These two schools provide the largest number of players and the sports - softball, volleyball, and soccer - are the major intramural sports played at Air University. As previously noted, they are also the sports producing significant numbers of injuries.

During the period Jan-Jun 83, there were 27 reported injuries resulting in lost work time and additional dollar costs. Of the 27 injuries, four were from softball and one from volleyball. This represents 18.5% of all reportable injuries for the six month period. There were also three additional injuries--one each from basketball, horseback riding and rollerskating. This brings to 29.6% the number of injuries directly related to sport/recreational activities. In the first six months of 1983, softball and volleyball injuries have cost Air University (AU), 24 lost working days and a total dollar outlay of \$7,605 (Figure 3, Appendix I). (16:4)

In addition to the reportable injuries above, there were 610 non-reportable injuries from sport/recreation activities in 1983. Of these 610 injuries, 477 (78.1%) were due to softball, volleyball, soccer and flickerball. Soccer accounted for 26% of the injuries, softball 24%, volleyball 14%, and flickerball 13% (Figure 4, Appendix I). On a monthly basis, Squadron Officers School (SOS) and Air Command and Staff College (ACSC) accounted for 26-64% of the total sport/recreational injuries sustained at AU (Figure 5, Appendix I). The areas of the body most frequently injured were the legs, 59%; the hands/arms, 29%; head/neck, 8%; and the trunk, 4% (Figure 6, Appendix I).

Chapter Two

COMPETITIVE SPORT PROGRAMS AT AIR UNIVERSITY

Participation in a competitive sport is a fact of life for all students attending one of the schools or colleges within the Air University. Each college has its own sport program, consisting of various competitive team sports. This chapter provides a brief description of the sports played within two schools at AU; Squadron Officers School (SOS) and Air Command and Staff College (ACSC).

Squadron Officers School is composed of students primarily in their early to late twenties, and holding the ranks of First Lieutenant and Captain. The athletic program consists of an aerobic running program and a team sport program consisting of soccer, volleyball and flickerball. Each student must participate in two of the three team sports.

Soccer essentially is a running and kicking game. The ball is moved from one end of the field to the other by players kick-passing the ball to one another. No player except the goalkeeper may intentionally carry, strike, propel, or touch the ball with the hands, arms, or shoulders. A soccer team is composed of eight players. The overall objective of the game is for one team to move the ball from their own end of the field to their opponent's end by kicking the ball with their feet, ankles, and legs. To help minimize injuries, SOS soccer prohibits intentional body contact between opposing players. Any player who contacts or causes another player to make bodily contact, will be called for a contact foul and sent to the penalty box. A soccer game consists of four eight-minute quarters. There are no overtime periods. Each student is required to play a minimum of two complete periods in each half (a total of 16 minutes). For safety, players must wear appropriate athletic shoes, shin guards, and if playing as goalkeeper, must also wear knee pads; elbow pads are optional. If eyeglasses are needed, they must have unbreakable lenses and be secured with an elastic retainer strap. No heavy rings, watches, or hard-billed hats may be worn (18:35-82).

In addition to soccer, volleyball must also be played by SOS students. Unlike soccer, volleyball involves hitting, blocking, serving and passing the ball by using the hands. There is

minimal running, but jumping, stretching and bending are common. The game is played on a rectangular court, divided in half by an eight foot high net. Volleyball teams consist of nine players positioned on either side of the center net. A volleyball game has no time constraints and lasts until 15 points, with a two point advantage, is scored by one of the teams. Each student is required to play a minimum of two complete games.

Each player on the volleyball team must wear knee pads. Additionally, watches, bracelets, hard-billed caps and large rings must be removed before playing. Eyeglasses must have non-breakable lenses and be secured with a safety strap. Any time an unsafe act or condition occurs, any player or official may call a time out. (18:85-111).

The last of the three team sports played by SOS students is flickerball. This is a less well known sport, although common to Air Force educational institutions. Flickerball is played on a rectangular field, 53 and 1/3 yards in length and 30 yards wide. There is a goal located 5 yards behind the endline, centered between the sideline markers and parallel to the endline.

Each team consists of seven players. The game has eight 4-minute periods, divided into quarters and halves. Each student participates a minimum of two complete periods in each half.

The object of flickerball is to score points by advancing the flickerball from one end of the field to the other. To score, the ball must be thrown at the goal behind the endline. To advance the ball, it may be thrown laterally or passed forward. No player may run or walk forward toward their goal with the ball. In maneuvering for position, players may only move away from his/her goal. A player gaining control of the ball while advancing toward his/her goal must establish a pivot foot with the first foot touching the ground. The player must clearly stop on this foot before passing or shooting.

Flickerball combines the rules of tag football and basketball with several variations. It is a fast game due to restrictions on possession times for such things as passing, shooting, and inboundings. With passing the ball, there are increased chances for physical contact. No team player may intentionally cause contact with another player. Physical contact results in a penalty to the player not avoiding the contact (18:1:33).

These three team sports require varied levels of physical conditioning and skills. Among the three sports, each student will be required to run, sprint, jump, throw, punch and catch balls. All three sports have the potential for body collisions, tripping, and trauma to the legs as well as being hit with the ball.

For further information and specific rules governing the play of these three sports, consult the handbook "Rules and Aids for Competitive Sports" prepared by the Squadron Officers School. It is noteworthy that safety is a principle consideration in developing the rule modifications for these sports.

The last sport to be discussed in this chapter is softball. It is the only organized team sport played by students attending ACSC. Softball is a well known sport and does not require in-depth explanation. Essentially it is "baseball" played with a larger ball. In pitching, the ball must be thrown underhand, rising at least 10-12 feet in the air when released by the pitcher. This results in a much slower ball approaching the batter. The ball must cross the plate within a "strike-zone" - shoulder to knees. The batter must remain within the designated "batter's box" when hitting the ball.

In discussing "ACSC softball," rule modifications are noteworthy. Several rule changes affect the basic game play when compared with intramural softball, which is also played at Air University. The rule modifications are predicated on safety considerations. In ACSC softball, the following rules apply:

- a) Catcher and plate umpire must wear face masks;
- b) No sliding at any base is permitted;
- c) Over-running at all bases is permitted, not just at first base
- d) Runners are responsible for avoiding physical contact with defenders. A runner is automatically out if contact is made with an opposing team player; and
- e) To avoid contact on the bases - runners do not have to touch the base, if running to the "bag" would result in a collision with the defending player.

These rule changes are intended to prevent injuries. Most injuries in softball occur from collisions with other players, improper sliding techniques, and attempting to stop running suddenly when reaching a base. Wearing a face mask behind the plate obviously prevents the facial injuries associated with foul-tipped balls and the swinging of the bat.

To enhance the "team concept" of play, all ACSC students are to play a minimum of three innings each game. Communication among all team members is expected on and off the field, developing strategies, adjusting field positions and above all, calling for fly balls to prevent players colliding with each other. Team participation, attitudes and sportsmanship are the

critical aspects of the game, not individual ability or inability to play softball.

In conclusion, this chapter has provided the reader with an introduction to the specific team sports played in SOS and ACSC. Major focus was not on the intricacies of play, but was on the safety precautions built into the games. Emphasis was also placed on the concepts of team play irrespective of individual abilities. An appreciation of how soccer, volleyball, flickerball and softball are played provided the background to better understand the following chapters which deal with various types of sport injuries.

Chapter Three

COMMON SPORT INJURIES AT AIR UNIVERSITY

This chapter will address the types of injuries associated with the sports played in Squadron Officer's School and Air Command and Staff College.

Soccer, volleyball, flickerball, and softball are sports associated with frequent injuries. Each sport requires different physical skills. Certain types of injuries are more prevalent in one sport than another.

Softball ranks among the top injury producing sports. Other team sports such as volleyball and soccer also accounted for significant numbers of sport injuries. The injuries associated with these team sports were strains, sprains, dislocations, broken limbs, and concussions. Collision of players with each other or fixed objects such as fences and poles accounted for most of the concussion type injuries. Holes, ruts, or uneven playing surfaces accounted for the majority of the strains, sprains, dislocations, and broken limbs. Also significant in team sport injuries were unsafe acts or conditions. Unsafe acts most often responsible for injuries were: over-aggressiveness, lack of particular skills, failure to wear protective equipment, and unsportsmanlike conduct. (11:8)

Relative to the specific team sports addressed in this handbook, what are the most common types of injuries sustained in each sport? Volleyball is a comparatively safe sport. One would expect finger and hand injuries to be the most common. This is not the case, however. Sprained, dislocated, or fractured ankles are the most prevalent injuries. Generally, these injuries are sustained in jumping mishaps as a result of trying to block or spike the ball. Also common are injuries resulting from collision of players and falling or tripping while running or jumping for the ball. (17:11-12) Volleyball injuries for SOS students follow the same general pattern. Approximately 49% of all volleyball injuries involve the legs, with the ankle being the area most often injured (AU Safety Office Reports). Next to leg injuries, finger injuries - strains, sprains, and dislocations - are common. (5:257) Forty-two percent of AU volleyball injuries involved the hands and arms.

This makes soccer very different from volleyball. Soccer entails running, turning, jumping, kicking and "heading" the ball. Ball control must be maintained without using the hands or arms. Surprisingly, however, injuries are very similar to those in volleyball. Much of the trauma associated with soccer involves the lower limbs. The foot, ankle and knee are common sites of injury. Sprains and fractures are common joint injuries, while muscle strains involving the thigh are also common. Knee sprains most often result from twisting motions with the foot planted, especially on a soft surface, or when tackled from the side. Ankle sprains most often occur while running or attempting to kick the ball resulting in the ankle "turning over" (everting). Foot injuries usually result from kicking the ball, the ground or another player. The major bones of the fore-foot and the toes can be fractured, dislocated, or severely bruised.

Thigh injuries are predominantly due to kicking and sprinting. Muscle strains of the quadriceps group (the front of the thigh) occur most commonly during the kicking movement. Muscles of the hamstring group (the back of the thigh) tend to be injured during sprinting and overstretching.

Another common type of injury, seen more in soccer than in any other team sport, is soft tissue injury as a result of being kicked by another player or hit by a kicked ball. Depending on the severity of the blow, bleeding occurs either superficially, just under the skin, or more significantly, bleeding within the muscle itself. Again the legs are the most common site for soft-tissue injuries, with the lower leg most frequently traumatized. (5: 126-131)

In reviewing the soccer injuries sustained at Air University, 81% of all injuries involved the legs. Ankles, feet and knees represent the areas injured in descending order of frequency. Reported causes of the injuries were twisting, being kicked, tripping and falling or colliding with other players (AU Safety Office Reports).

The last of the team sports played by SOS students is flickerball. It combines the skills required in tag-football and basketball with certain modifications as explained in Chapter Three. The injuries most often incurred are related to running and catching the ball. Knee and ankle sprains or strains are the predominant leg injuries. They usually result from jumping to catch, block or intercept passes. Slips, falls and twisting while running or pivoting also accounts for a number of leg injuries. Other injuries such as concussions, bruised or fractured ribs, and various lacerations result from falls or collisions with other players. Attempting to catch hard thrown passes results in sprains and dislocated fingers. (17:6-8).

Accident reports from the emergency room at Maxwell AFB hospital showed the majority of injuries sustained by SOS students involved the ankles, followed by the knees, hands and fingers, and feet respectively. Sixty-one percent of flickerball injuries involved the legs.

In 1983 (Jan-Dec) 328 injuries were sustained in the following sports: soccer (157), volleyball (91) and flickerball (80) at Maxwell AFB. The vast majority, greater than 80%, were sustained by students attending Squadron Officers School. The injuries ran the gamut from minor bruises and lacerations to fractures of leg and arm bones (AU Safety Office Reports).

The final team sport I will discuss is softball. It is the only organized sport played by students attending Air Command and Staff College (ACSC). Historically, softball has been the leading injury generator. The most common causes of injuries in softball were from sliding (prohibited in ACSC games) and from base running. Base running injuries usually resulted from slipping while making turns around the bases, checking forward movement, colliding with defensive players, or charging into base defenders (also prohibited in ACSC games). Other common injuries, especially for outfielders, resulted from colliding with another team member, falling or tripping, and running into fences while chasing a flyball. (17:4-6) Injuries fall into five categories: sprains, strains, contusions, pulled muscles, and fractures. Sprains primarily result from sliding and base running. Strains are caused from throwing or base running. Collisions cause most contusions, while running and throwing cause most muscle pulls. Fractures result from falls, poor base running techniques, and from catching or being hit with the ball. (10:19-20, 53)

Accidents to ACSC students ran the gamut from getting hit with balls to collisions, falling, throwing and running injuries. In 1983, there were 59 leg injuries. Most were the result of twisting the ankles and knees, and muscle strains, especially of the hamstrings. Hand and finger injuries accounted for an additional 60 injuries. The thumb and ring fingers were the most frequently injured. Most injuries resulted from catching the ball improperly or being hit with the ball. Collisions with other players accounted for eleven face and neck injuries. All-in-all there were a total of 149 softball related injuries reported to the Maxwell AFB hospital in 1983.

From the preceeding paragraphs, it is clear the playing of team sports at AU can be traumatizing. Injuries from volleyball, soccer, flickerball, and softball are, for the most part, not serious. The majority of injuries fall into the categories of strains, sprains, muscle pulls, bruises and lacerations. The more serious injuries, fractures, are few in

number, and usually "simple" in nature, not requiring surgery or traction.

If, on the other hand, one considers there were 477 reported injuries in 1983 directly attributable to the sports played at SOS and ACSC, one is impressed with the significance of team sport injuries. Awareness is the first step toward prevention. By discussing the causes and types of injuries sustained in playing volleyball, soccer, flickerball and softball, I hope to enhance the awareness of players and particularly those charged with coaching responsibilities. In later chapters, first aid techniques aimed at minimizing injuries will be discussed. Through greater awareness of potential injuries and knowledge of basic first aid principles, players and coaches at SOS and ACSC should be better prepared to safely engage in team sports.

Chapter Four

RUNNING AND RUNNING INJURIES

Running is a common factor in the four team sports discussed in this handbook. In addition, running is fundamental to the aerobics program within the Air Force. It is a sport in and of itself, as well as a basic component of volleyball, soccer, flickerball, and softball. This chapter will address running as an impact sport and identify the most common causes and types of running injuries.

In running, by definition, only one foot is in contact with the ground at a time. Each foot and leg must be able to withstand the impact stress. When running, each foot strikes the ground approximately 800 to 2,000 times per mile with an impact force that can amount to as much as eight times body weight. Since running entails repetitive, or cyclical activity, there is a cumulative stress effect resulting from no relaxation of foot and leg muscles. The repetitive motion of foot strike and leg swing can result in injuries primarily affecting the lower extremities. (4:154-155; 7:3)

Injuries in running occur at all levels of experience. In studying over 3,000 runners at the "Runners' Clinic" at George Washington University School of Medicine it was found that sixty percent of runners will at some time sustain an injury. (7:2) Injuries most commonly occur at the start of a running program or when progressing from one level of running to another. The jogger or novice runner is hurt when running too much too soon, or when running on hard surfaces with poorly made or inappropriate shoes. More experienced runners incur overuse injuries to the soft tissue and bone when increasing their mileage or speed too quickly, or when changing running surfaces.

Knee injuries are most common, followed by injuries to the Achilles tendon, anterior lower legs and the feet. Typically, more than one type of injury is sustained. Joggers or novice runners most frequently sustain shin splints, knee pain, muscle soreness, hamstring strain and low back pain. More experienced runners, along with long distance runners, are more prone to soft tissue injuries of the feet, Achilles tendonitis, stress fractures, and muscle injuries in the thigh, calf and back.

Injuries result from two mechanisms - training errors and mechanical abnormalities. Training errors fall into three categories and are the most frequent cause of running injuries. First, excessive mileage, intensive workouts with interval training (alternately running fast and slow), and rapid increase in speed all produce injuries. Inadequate warm-up can also lead to overstress injuries. Second, poor running surfaces produce injuries. A soft, level surface is ideal, but most people run on whatever surface is convenient. Running on hard, uneven surfaces exaggerates the shock transmitted to the feet, legs and back. Grassy or sandy surfaces are irregular and unstable. Sloping or banked surfaces cause the foot to strike the ground abnormally, placing additional stress on the tendons and ligaments of the lower legs. Uphill running strains the Achilles tendon and lower back muscles, while downhill running increases the impact force on the heels. Third, the wearing of poorly constructed or excessively worn shoes contributes to injuries from inadequate support and cushioning of the repetitive shocks of running. (7:3)

Mechanical abnormalities producing injuries result from poor or improper running techniques or form. If the running gait is faulty, such as heel-foot strike, toe push-off, knee extension and flexion, hip swing, and carriage, then undue stress is transmitted to the muscles, tendons, ligaments and bones of the legs, hips and lower back. Exaggerated stresses from poor body alignment and poor body control produce muscle, joint and tendon injuries. (7:5)

Running has become a popular participant sport. Its upsurge in popularity is attributable to increased concern with physical fitness and a growing dissatisfaction with sedentary lifestyles. Certainly within the military community, running is an accessible and highly aerobic form of exercise with linkage to a healthier life and improved physical conditioning. Unfortunately, the increased popularity in running has been associated with an increase in running injuries. (8:27) Students attending SOS and ACSC participate in aerobic running and in team sports which also entail running.

Participation in team sports such as volleyball, soccer, flickerball and softball requires entirely different running skills than those required in jogging. These sports utilize sprinting principles and skills. Sprinting is significantly different from jogging. The differences have been responsible for a number of injuries, even to the most experienced, well conditioned jogger.

Sprinting, by definition, is to "run at top speed over a short distance." (2:1412) In essence, this requires rapid

acceleration generating, in some cases, up to 6hp. (5:137) Impaired muscle coordination at the start and finish of the sprint produces both soft tissue and joint injuries. The soft tissues most susceptible to injury are the quadriceps and the hamstring muscles. Tearing may occur in the belly of these muscles or in the musculo-tendon junctions. The joint most frequently strained is the knee. Tearing of ligaments may occur, although rarely. The ankle joint together with the "shin bones" may also be injured. Muscle injuries, localized tears or strains, occur when a muscle exerts quick, powerful and often poorly coordinated contractions. Joint injuries most often result from the runner being off balance or from running on poor surfaces. (5:137-138)

Sprinting injuries at AU most often occur in soccer and flickerball played at SOS and in softball played at ACSC. Soccer injuries are sustained in running after and attempting to kick or control the ball. In flickerball, sprinting to catch a pass and then stopping quickly produces muscle strains, especially to the hamstrings. Base running, stretching the legs to tag the base, and sudden stops and turns around the bases produce both hamstring muscle injuries and knee or ankle (twisting) injuries.

In summary, running injuries can and do occur in the experienced, well conditioned athlete as well as the novice. Injury prevention is based on awareness of when and how injuries occur. Running injuries most often occur when starting a running program or when changing distance, speed or running surfaces. Regardless of whether jogging or sprinting, an individual must progress slowly, gradually building up stamina and muscle strength. Warm-ups, stretching exercises and appropriate footwear are critical for injury prevention.

The differences between jogging and sprinting outlined in this chapter should assist the athletic officer in understanding the dynamics of running and sprinting, and the possible types and causes of injuries.

Part II
Sport Injuries
and
First Aid

Introduction

The intent of the following chapters is to provide a broad look at various types of sport injuries and their immediate first aid treatment. The definitions, subjective and objective signs of injury, first aid treatment(s), and follow-up recommendations are not all inclusive. Neither are the information and treatment recommendations intended to substitute for appropriate medical evaluation and treatment. The critical principles guiding this section of the handbook are knowledge of the types of injuries most often sustained in team sports, how to manage them initially with proven first aid techniques, and recognition of serious injuries requiring prompt medical evaluation and treatment.

First Aid

First aid immediately following injury is the start of rehabilitation. In most sport injuries the length of the disability period depends upon the speed with which the initial treatment is made. First aid is the initial treatment of injuries given before more definitive medical treatment can be administered.

FOUR basic principles underlie all initial first aid treatment for sport injuries: RICE

- Rest - Modify or stop participation in sport activity. Allow the injured area(s) to rest.
- Ice - Immediately apply ice to injured area; leave in place for thirty minutes, remove for 15 minutes, then reapply ice. DO NOT put ice directly on skin.
- Compression - Apply pressure for support of an injured muscle or joint; compresses tissues and blood vessels to minimize bleeding and tissue fluid loss. Use elastic bandage.
- Elevation - Raise injured part, especially the lower extremities to assist gravity drain fluids; decreases the swelling.

RICE therapy should be started as soon as possible. First place a towel (any cloth material) over the injured area. DO NOT apply ice directly to the skin, it may cause skin injury. For compression, wrap an elastic bandage firmly over ice, around the injured area (not tightly but firmly). Check for signs of restricted circulation (numbness, tingling, cramping, pain, and swelling below wrapped area). Leave ice pack and ace bandage in

place for thirty minutes, then unwrap area for fifteen minutes to allow skin to rewarm and blood to freely circulate. Rewrap area and repeat cycle for at least three hours. RICE program may be continued for 24-48 hours. After forty-eight hours, apply heat to assist with healing. Further treatment depends on the type of injury. (6:40-41)

Reference Note: Information in this section was obtained from various sources. References are cited by chapters at the end of this section.

Chapter Five

ABRASIONS - CONTUSIONS - LACERATIONS

ABRASION

Definition

Outer most layers of the skin are scraped off by friction from hard, rough, jagged surfaces.

Causes

Falls primarily; collision with walls, poles, fences, etc.

Symptoms

Minimal bleeding; rarely penetrates more than top layers of skin; DIRT, GRAVEL, GRASS embedded in wound; slight tenderness or pain.

Sites. Palms, forearms, elbows, knees, lower legs.

Treatment. Remove all foreign material.

1. Clean wound - running water, soap, hydrogen peroxide.
2. Bandage - Avoid if possible; if needed to protect from dirt or irritation from clothes, apply loose, light gauze pad; remove at night.
3. Topical medication - Thin coat of antibiotic ointment can be applied, but usually is not needed.

Complications

Rarely infection (if wound was initially cleaned well).

Physician Referral

Not indicated, unless signs of infection develop (pain, redness, swelling, warmth of wound).

CONTUSION

Definition

Skin remains intact; underlying blood vessels and soft tissues (fat and muscles) are injured with release of blood and tissue fluids.

Causes

Falls, collisions, hit with objects such as balls and bats. Blunt force over small area.

Symptoms

Pain and stiffness within six hours; skin discoloration becomes evident (black and blue); bleeding into fat and muscle tissues produces a "lump" (hematoma); muscle stiffness and tenderness with muscle use may persist for days.

Sites. Thighs, lower legs and arms most commonly injured.

Treatment

Start RICE - immediately apply ice and maintain for 48 hours; apply warm packs, warm bath or soaks twice daily for 20 minutes; avoid activities involving use of contused area for 2-3 days to a week.

Complications. Usually none.

Physician Referral

Severe contusion of major muscles may require physical therapy, whirlpool and ultrasound therapy.

LACERATIONS

Definition

Blunt breaking or tearing of skin extending through both skin layers; may involve deeper tissues (muscles, tendons, nerves, blood vessels); wound edges usually irregular, jagged. "Burst" injury of the skin.

Causes

Force exerted by sharp or blunt objects contacting skin directly over superficial bones such as the eyebrow.

Symptoms

Wound extends through skin layers; bleeding slight to moderate; may have foreign material embedded in wound; minimal-moderate pain; localized swelling.

Sites

Sharp objects - any body surface area.

Blunt objects - around eyes, knuckles, knee caps, and ankle bones.

Treatment

Superficial (small and involves only skin layers)

1. Clean - running water, soap, hydrogen peroxide to remove any foreign material.
2. Bleeding - direct pressure to wound to stop bleeding.
3. Bandage - apply gauze bandage loosely to protect from dirt, irritation from clothes. Bandage should be changed at least every 24 hours. Remove as soon as wound has sealed itself.
4. Topical Medication - See abrasion treatment #3.

Severe (wound extends to deeper tissues)

1. Cover with gauze bandage, and apply direct pressure to stop, control bleeding (as above).
2. Laceration must be examined by physician to rule out tendon, nerve involvement, and for debridement of tissue prior to suturing. Deep, large lacerations must be examined and sutured within 6-12 hours.
3. Deep or "dirty" lacerations - Tetanus prophylaxis should be considered, especially if last Tetanus booster was more than 6 years ago.

Complications. Infection or reopening of wound.

Physician Referral

1. Small, superficial lacerations with major bleeding, or very contaminated (dirty) wound.

2. Large, deep lacerations for examination, cleaning and suturing.

3. Facial lacerations.

Chapter Six

MUSCLE STRAINS

This chapter will first provide a general discussion of muscle strains, and second, a discussion of specific muscle strain injuries, principally those most frequently sustained at SOS and ACSC.

Muscle strains (tears or pulls) are defined in terms of severity, Grades I to III.

Grade I: Minimal stretching of a few muscle fibers, less than 10 percent, and without a notable defect in the muscle.

Grade II: Partial tear of muscle fibers, between 10 and 50 percent of the fibers. Defect is discernable on touching the muscle groups.

Grade III: An extensive tear or complete rupture, 50-100 percent of the muscle fibers, with a large palpable depression in the muscle unit. In a grade III strain, the muscle will contract abnormally.

Muscle strains may involve any muscle or group of muscles. The extent of an injury is dependent on the force generated within the muscle. A strain is usually related to sudden changes of tension in the muscle. Sudden bursts of power as in sprinting or rapid deceleration cause injury.

HAMSTRING MUSCLE STRAIN

Definition

Stretching or tearing of muscle fibers in the posterior thigh when the leg is fully extended. The strain most often occurs where the muscle attaches to a tendon, approximately one-third of the way down the thigh.

Causes

Sudden increase of force on muscle fibers associated with sprinting. Frequently seen in softball, soccer, and flickerball.

Symptoms

Subjectively - feel a pulling or ripping sensation in back of thigh; pain gradually increases. In grade I and II tears, pain intensifies in three to six hours; grade III tears, pain intensifies within thirty minutes. With grade II and III strains, tissue swelling and discoloration (black and blue) develops in 24 to 48 hours. (In two weeks black and blue area will gravitate down thigh to the knee area.) Contracting the hamstring muscle (bending knee) causes pain.

Objectively - swelling and discoloration are evident. Defect in muscle tissue can be felt.

Treatment

RICE started immediately. The sooner treatment is started, the less disability experienced. Apply ice immediately, wrap thigh with ace bandage and maintain ice for next three hours. For first 24 hours apply ice for 1 hour 3 times daily and continue other RICE steps. After 24 hours start heat treatments (heating pad, warm towels, warm baths).

Healing times: Grade I: 3 to 5 days
Grade II: 1 to 2 weeks
Grade III: At least 3 weeks

Complications. Chronic pain, muscle weakness, re-injury.

Physician Referral

After 24 hours of RICE, if there is difficulty contracting a muscle or a definite defect (depression) can be felt, a follow-up evaluation with the Physical Therapy Department should be gotten. Grade II and III strains may require post injury muscle stretching and strengthening exercises.

Post-Injury

Pain with muscle contraction should be gone before resuming sport activities. External thigh supports should be worn (Neoprene thigh sleeve, Elastoplast tape, Ace wraps).

QUADRICEPS MUSCLE STRAIN

Definition

Largest, most powerful muscle of the body is located in the anterior thigh. Most strains occur in the central area of the muscle grouping, directly over the front of the thigh bone. Strains are graded as I, II or III depending on the extent of muscle tearing. Infrequently injured.

Causes

Running before muscles are adequately warmed up and flexible. Any sudden forceful contraction (leg straightening) or stretching (knee bending) can tear muscle fibers.

Symptoms

Subjectively - feel immediate giving way or tearing in mid-front thigh area. Minimal pain at first, increasing in severity over next two or three hours. Muscle spasms (quivering, irregular muscle fiber contractions) are common. In all grades of quadricep tears, knee bending is painful, limited.

Objectively - swelling and black and blue discoloration is visible. Defect (depression) in muscle tissue can be felt, especially in grade II and III tears.

Treatment

RICE immediately and continue for 48 hours (see hamstring strain). Grade III tears usually require the use of crutches for a few weeks. After 48 hours, warm soaks, whirlpool should be started.

Healing times:	Grade I:	2 to 3 weeks
	Grade II:	3 to 6 weeks
	Grade III:	6 to 8 weeks

Complications. Chronic pain, muscle weakness, re-injury.

Physician Referral

Moderate-severe pain associated with bending the knee, rapid swelling and discoloration, physician evaluation should be obtained within 24 hours. Physical therapy will be required for appropriate muscle strengthening program.

Post-Injury

Sport activities should not be restarted until pain free and cleared by physician. Thigh external support should be used when running.

SHOULDER MUSCLE STRAINS

Definition

Small tears in one or more of the muscles surrounding the shoulder. Strain usually occurs in the muscle fibers, not in the musculo-tendon junctions.

Causes

Improper, inadequate warm-up prior to game, or overworking muscles. Softball and flickerball shoulder strains caused from trying to throw the ball too hard or too far.

Symptoms

Subjectively - feel muscle pull or tear, followed by the onset of dull pain 6 to 12 hours later. Movement of shoulder causes pain to increase.

Objectively - swelling and discoloration may be seen within 6 to 12 hours. Grade II and III tears will produce a palpable defect in the muscle.

Treatment

Stop activity involving shoulder; apply ice immediately, and continue for 48 hours. After 48 hours begin warm packs, soaks,

heating pad twice daily for 20-30 minutes each time. Rest shoulder for three to five days (may use sling), then begin range of motion exercises moving shoulder through all planes. Two weeks after injury begin strengthening exercises.

Complications. Re-injury, muscle weakness.

Physician Referral

Physical Therapy department should be contacted to guide exercise program.

Post-Injury

Extra care must be taken to insure warm-up exercises are done. Avoid excessively hard throwing, pitching.

Chapter Seven

SPRAINS

Sprains will first be discussed in general terms, followed by discussion of specific sprain injuries frequently seen in SOS and ACSC. SPRAINS differ from STRAINS in that they involve the ligaments, tendons and soft tissues surrounding joints. Severity is indicated as minimal (Grade I) to severe (Grade III). Grade definition is as follows:

Grade I: Minimal stretching of ligaments supporting a joint. No loss of joint stability or normal range of functional mobility; minimal swelling.

Grade II: Partial tear (25-75%) of one or more of the supporting joint ligaments. Joint stability is decreased and pain prevents normal functional mobility; moderate swelling and discoloration present.

Grade III: Complete tearing of one or more joint ligaments causing significant joint instability - abnormal movement. Joint becomes rapidly and severely swollen and discolored (black and blue).

Sprains may involve any joint, but typically the knee and ankle joints are the ones most often injured in sports. Sprains may be caused by a quick, forceful turning motion, by jumping and landing in an abnormal way, or by twisting a joint when running or stepping on an uneven surface.

KNEE SPRAIN

Definition

Stretching or tearing of ligaments supporting the knee joint. Medial (inner side of knee) ligament is most frequently injured.

Causes

Simple sprain (Grade I) most often occurs when running, stopping quickly and turning with one foot firmly planted on the ground, as in base running, or ball chasing in soccer.

Grade II and III sprains most often occur in contact sports (football) when tackled about the knee.

Symptoms

Subjective - mild to severe pain immediately over injured ligament; pain increased with movement of the knee.

Objective - minimal swelling and no discoloration in Grade I sprains. Grade II and III have notable swelling, discoloration from bleeding; decreased knee mobility from pain and swelling. Significant lateral instability of the knee present in Grade III sprains.

Treatment. RICE started immediately at time of injury.

Grade I - RICE continued for 48 hours; compression bandage continued for 72 hours. Warm soaks, heating pad or whirlpool started after 48 hours. Minimal or no walking for 3 days - crutches should be used.

Grade II - RICE for 48 hours; compression bandage for five days; off knee (crutches) for seven days; whirlpool, warm soaks started after five days.

Grade III - RICE immediately and transport to hospital. Surgery usually required, casting.

Complications

Grade II and III injuries inadequately treated can produce permanent disability.

Physician Referral

All knee injuries should be evaluated by a physician immediately. Even minor knee sprains deserve professional evaluation. Physical therapy will also be needed to strengthen the knee.

Healing Time: Grade I: 1 to 2 weeks
Grade II: 2 to 3 weeks
Grade III: 6 months (surgery plus physical therapy)

ANKLE SPRAIN

Definition

Stretching or tearing of one or both ligaments supporting the ankle joint. Most sprains result from the ankle tipping outward, causing the ligaments on the outside of the ankle and foot to be injured. The greater the force and the longer the duration, the greater the sprain severity.

Causes

Jumping and landing on the side of the foot, stepping into pot holes or on the edge of a raised surface can cause the ankle to "turn over." Volleyball, softball, soccer, and flickerball frequently produce sprained ankles.

Symptoms

Subjectively - feel pain and something "pop" immediately on turning the ankle; pain subsides for approximately 30 minutes, then pain starts again, with stiffness and muscle spasms developing over 12 hours.

Objectively - after 30 minutes, first swelling becomes evident. Severe sprain, discoloration (black and blue) noted in 6 to 12 hours. Touching in front of ankle knob and at bottom of knob produces pain (double ligament sprain). Severe sprain will have significant swelling and decreased movement of ankle. Walking without limping impossible.

Treatment. RICE immediately, and for next 24 hours.

Grade I - RICE for 24 hours; compression bandage continued for 3 days, then start whirlpool or warm soaks.

Grade II - RICE for 24-48 hours; compression continues for 5 days, then start whirlpool or warm soaks.

Grade III or two-ligament sprain - 24 hours of RICE, then usually placed in soft or hard cast (2 ligaments) for one to three weeks depending on type of sprain.

Complications

Grade III and two-ligament sprain not adequately treated will cause unstable ankle and frequent recurrent sprains.

Physician Referral

Sprains that produce notable swelling or any discoloration should be seen by physician after 24 hours. Pain causing a marked limp should be examined immediately - crutches and compression bandage, x-rays may be needed. Physical therapy will also be needed.

Healing Times: Grade I: 5 days (need ankle support)
Grade II: 5-10 days (ankle support required)
Grade III: 2-3 weeks (ankle support required)
Double ligament sprain: 5 weeks; ankle support used in sport activities for 6 months.

WRIST SPRAIN

Definition

Forcing wrist beyond the normal range of joint movement resulting in ligaments, muscles, tendons, and blood vessels being stretched or torn.

Causes

Falls or collisions force the wrist to bend downward or backward. Wrist sprains common in volleyball and soccer.

Symptoms

Subjectively - pain felt immediately in area of injured ligament, but subsides for 15 to 30 minutes, then intensifies over next 3 hours. Pain is increased with wrist movement.

Objectively - swelling noticeable within one hour. Discoloration starts in 6 to 12 hours in severe sprains.

Treatment. RICE immediately; even minor wrist sprains should be splinted.

Grade I - immobilized in plaster splint for 3 days; fourth day start wrist curl exercises twice daily. Heals usually in one week.

Grade II-III - splinting for one to two weeks, splint removed after third day to do range of motion exercises (wrist curls) in water; splint reapplied. Healing in three to six weeks. When participating in sports, wrist should be taped for at least a month.

Complications

Inadequate treatment of wrist sprains may cause chronic pain and weakness.

Physician Referral

All wrist sprains, even minor ones, should be examined by physician within 24 hours. Splinting and physical therapy most often needed for proper treatment.

FINGER SPRAINS

Definition

Forceful extension of one or more finger joints beyond normal functional range resulting in stretching or tearing of ligaments, blood vessels, and muscles.

Causes

Catching, hitting balls; falls and collisions; softball, flickerball, volleyball frequently produces finger injuries. Thumb, index and 5th fingers most commonly injured.

Symptoms

Subjectively - immediate pain in injured joint; initially sharp, intense, becoming a constant, dull aching pain. Difficulty bending involved joint, stiffness.

Objectively - all finger injuries produce swelling and discoloration; the more severe the injury, the greater the swelling and discoloration.

Treatment

RICE immediately and continue for 48 hours; then start warm soaks; within 5 days start range of motion exercises and continue for 5 days for Grade I and II injuries. Hand squeezes and Silly Putty used to increase finger strength. Grade III injuries may require surgery. Immediate first aid is RICE.

Complications

Inadequately treated Grade II-III sprains can produce deformity and disability.

Physician Referral

Grade II-III finger sprains should be examined by physician; splinting and x-rays are required. Strengthening exercise program needed - physical therapy.

Healing Time: Grade I-II: 1 to 3 weeks
Grade III: 4 to 6 weeks

NOTE: It is not unusual for finger swelling to persist for weeks to months.

Chapter Eight

FRACTURES/DISLOCATION

Fractures and dislocations require definitive medical evaluation and treatment. First aid is aimed at protecting the injured part from further injury. Immobilization is the principle first aid treatment. This chapter will address finger and ankle injuries. These represent the most frequent sites of fractures and dislocations.

FINGER FRACTURES/DISLOCATIONS

Definition

Forces impacting the fingers with intensity great enough to disrupt the integrity of the bones (fractures) or disrupting the integrity of joint capsule and ligaments (dislocation).

Causes

Catching balls thrown or hit with great velocity; falling, collision injuries; crush injuries (car doors).

Symptoms

Subjectively - severe pain immediately; loss of function--cannot bend, raise or lower finger.

Objectively - DEFORMITY - finger is out of its normal alignment, angled abnormally; bones no longer end-to-end, or joint appears to have extra lump. Swelling and discoloration start within a few minutes increasing significantly over next two to three hours.

Treatment

PROTECTION of finger, ice and elevation; DO NOT ATTEMPT TO STRAIGHTEN FINGER OR JOINT; KEEP IN POSITION ASSUMED AFTER

INJURY. ICE and wrap hand in towel, or leave unwrapped; go to hospital for x-rays, splinting or casting. Unless otherwise instructed by provider, continue elevation and ice for 24 hours to reduce swelling and pain. Sling may be used to elevate hand and finger when standing or walking. Pain medication may be prescribed.

Complications. Permanent deformity, dysfunction of finger.

ANKLE FRACTURE

Definition

Extreme forces generated against bones of ankle when in an abnormal alignment. Forces generated cause ankle "knobs" on outer and/or inner sides of ankle to be cracked or sheared off; central bone of ankle complex fractures or dislocates when a tremendous force is generated through the foot to the ankle (falling, jumping from a height).

Causes

Jumping and landing on side of foot (volleyball); sliding and catching foot (softball - sliding); running and "turning ankle over" (softball, soccer, flickerball).

Symptoms

Subjectively - severe pain immediately; unable to walk (SHOULD NOT TRY). Loss of normal movement.

Objectively - swelling starts within an hour; discoloration starts within three hours.

Deformity - ankle angulated, twisted.

Treatment

REMOVE SHOE CAREFULLY; IMMOBILIZE, ELEVATE, ICE. DO NOT WALK - go to hospital immediately. X-rays, CASTING required; surgery may be required. Ankle fracture casted for approximately three months; physical therapy is mandatory post casting. Complete recovery often requires nine to twelve months. Pain medication will be required (prescription). Ice and elevation continued for 24-48 hours.

Complications

Decreased mobility; stiffness; joint more likely to become arthritic.

Chapter Nine

HEAD/FACIAL INJURIES

Most head and facial injuries result from colliding with other players, fixed objects, and from being hit with balls. Two injuries are common in and about the head and face: concussion and lacerations. It would not be unusual to have both.

Lacerations were discussed in chapter five. Facial lacerations frequently involve the eyebrows, lips, chin, cheekbone, and side or bridge of nose. Infrequently, laceration of an eyelid occurs. In addition to the first aid techniques already outlined, facial lacerations deserve physician evaluation. Suturing or steri-strips are beneficial in preventing or minimizing scarring. Thorough cleansing is needed to prevent infection. The BOTTOM LINE is go to the hospital if a facial laceration has been sustained.

Collisions where the head impacts something causes the brain to collide with its bony casing. As a result, the brain tissue, as well as the inner linings of the skull, are injured. A blow may be hard enough to cause a sense of dizziness or lightheadedness, but not cause a loss of consciousness or loss of orientation (who, where you are).

CONCUSSION

Definition

Blow to head causing brain to move, hitting the skull. Trauma enough to cause minimal swelling of brain tissue, but no break in skull bones, or internal bleeding.

Symptoms

Subjectively - NO LOSS OF CONSCIOUSNESS OR ORIENTATION; slight sense of dizziness for a few minutes; mild headache developing within a few hours; headache usually disappears in 24 to 48 hours.

Objectively - NO skull defect, may have lump at site of impact; abrasion, laceration may be present; no bleeding from ears or loss of clear fluid from ears or nose; alertness and orientation evident from conversation, questions; no difficulty with coordination.

Treatment

Stop playing and rest; ice to impact area and compression if have laceration.

If hit with hard line drive softball or bat, should go to hospital for skull x-rays to rule out fracture.

Minor head injury - individual should be watched closely for 24-36 hours. Development of any of the following requires immediate physician evaluation:

1. Nausea and vomiting or both.
2. Confusion, sleepiness, or restlessness.
3. Severe headache.
4. Weakness of arms or legs.
5. Draining of fluid from nose or ears.

Minimal physical activity for one or two days. DO NOT use narcotics, sedatives or alcohol with a head injury.

Physician Referral

Any head injury causing loss of consciousness, confusion, or marked dizziness demands immediate evaluation by a physician.

Continued or worsening headache and dizziness requires immediate medical evaluation.

Complications

Skull fracture, hematomas (bleeding) inside skull; convulsions.

SAFETY and CAUTION are the watch words in head injuries. Therefore, seeking a physician's evaluation for even minor head injuries is prudent.

Chapter Ten

RUNNING INJURIES

Running injuries are classified as acute (sudden onset) or chronic (gradual onset). Acute injuries, muscle strains and joint sprains, have been discussed in previous chapters. This chapter will address those injuries associated with overuse and are frequently identified with running.

ACHILLES TENDONITIS

Definition

Achilles tendon is the largest tendon in the body. It connects the calf muscles and the heel bone. Tendonitis is an inflammation of the tendon sheath resulting from injury to the tendon.

Causes

Common to running or running sports; soccer, softball, flickerball. Trauma to the tendon happens when running on hills, wearing shoes with rigid soles, or running on uneven terrain. Small tears in the tendon cause it and the tendon sheath to become inflamed.

Symptoms

Subjectively-insidious onset of pain over one to two weeks; pain more intense upon arising and lessens during the day with use; after running, pain again intensifies 6 to 12 hours later; stiffness present in tendon region.

Objectively-swelling around tendon; movement of foot and ankle up and down produces a grinding sensation in tendon area.

Treatment

Stop running or exercising immediately and rest tendon for one week; ice to tendon area for 20 minutes twice a day for one week; after seven days tendon stretching exercises should be done twice daily for ten to fifteen minutes and before running or any athletic activity. Gradually return to running after one to two weeks.

Physician Referral

Frequently recurring mild tendonitis, or development of chronic and/or severe pain, a physician should be seen. Casting may be required for chronic or severe Achilles tendonitis.

Complications

Chronic tendonitis or inadequate treatment of severe tendonitis can produce disability for even daily activities such as walking and stair climbing.

HEEL SPUR SYNDROME

Definition

Arch ligament on the bottom of the foot becomes irritated from small tears in the ligament and inflammation at the site of attachment to the heel bone. It is the most common cause of heel pain in runners.

Causes

Four main causes: Sudden turns causing great pressure to tissues on sole of foot; shoes without adequate arch support; shoes with very stiff soles; and foot pronation (turn inward) causing flattening of the foot.

Symptoms

Subjectively-pain localized to back, inside area of heel; stiffness in heel in the morning or after prolonged sitting; pain and stiffness diminish with use, only to recur at the end of the run or later that day. Standing on toes or heel increases the pain.

Objectively -direct pressure over the ligament at its heel-bone junction causes pain; swelling can be felt along tendon.

Treatment

Stop running for two to six weeks; apply ice to heel(s) for 48 hours, followed by warm soaks 2-3 times daily; minimize walking on uneven surfaces, up or down stairs or on hills. Bent leg stretching exercises should be started after pain stops. Shoes should be examined for heel support and cushioning qualities, sole rigidity and uneven wear.

Physician Referral

For recurrent episodes of heel pain, or sudden severe heel pain, a physician should be seen. Running shoes should be brought to the physician for examination. Chronic or severe heel spur syndromes usually require prolonged healing time and the use of orthotic devices placed in shoes. In severe cases cortisone shots to the heel may be required.

Complications

Rare. Intractable pain may necessitate surgery if all else has failed.

SHIN SPLINTS

Definition

An overuse syndrome affecting the muscles, tendons and bone covering of the front, lower two-thirds of the leg(s). These tissues become inflamed and swollen producing pain along the inner lower two-thirds of the leg(s).

Causes

Four primary causes of shin splints: Sprain or tears to posterior tibial muscle; inflammation of the bone covering of the lower leg; interruption of blood supply to the three front leg muscles; and tibial bone stress fracture (crack). Shin splints occur to poorly conditioned runners as a result of running on hard or banked surfaces, and from improper running shoes.

Symptoms

Subjectively - pain is diffuse over three to four inches of the lower leg and extends toward the back muscles or is felt in the same area, but limited to being directly over the bone. Spasm of blood vessels in the lower front leg muscles, produces pain diffusely over the lower one-third of the leg bone, extending toward the outer part of the leg. Pain associated with blood vessel spasm occurs consistently while running, at about the same distance each time. In the other cases of shin splint, pain begins after running. If running is continued, pain is present during and after the run. Severe cases cause pain with walking and stair climbing.

Objectively - touching, pushing on the bone directly or on muscles toward the inner part of the lower leg causes pain; some swelling may be felt in the area.

Treatment

Stop running for one week. Ice to irritated area, twice daily for twenty minutes for two days, followed by warm compresses twice daily for a week. Once the pain has subsided, a gradual return to sport activities can resume. Muscle strengthening and stretching exercises should be done before restarting a running program and always stretch muscles and tendons just prior to running.

Physician Referral

If no relief after a week of rest, ice, aspirin, and stretching, see a physician. Continued pain may indicate a stress fracture or severe blood vessel constriction of the front leg muscles requiring a surgical procedure to relieve the pain.

Complication. Rare: chronic pain, stress fracture, and chronic impairment of blood flow to lower leg muscles.

STRESS FRACTURES

Definition

A small crack in the contour or surface of a bone. The most common sites are the long bones of the foot, distal fibula (small lower leg bone), and proximal tibia (large lower leg bone).

Causes

Running too much, too fast, often with improper shoes and on hard surfaces. Poorly conditioned runners are most prone to stress fractures.

Symptoms

Subjectively - stress fractures (all sites) cause dull, aching pain which gradually becomes worse with continued running. Pain is local to the site of the stress fracture and does not extend to the surrounding area.

Objectively - pressure directly over site of fracture causes increased pain; usually minimal swelling is seen.

Treatment

For all stress fractures running must stop. Rest is the only cure. With onset of pain, ice should be applied periodically for 48 hours to help reduce pain and swelling. Tibial and long foot bone stress fractures rarely require casting. Running should not be started for 4-6 weeks for a tibial stress fracture or 2-3 months for complete healing of a foot stress fracture.

Physician Referral

Local pain or tenderness to upper one third of tibia, lower fibula, or distal portion of foot (before toe joints) that persists longer than a week or increases with walking, see a physician. A stress fracture is rarely seen on x-ray until the second week after the injury.

Complications

Rare. Continued running will worsen the fracture, increase pain, and cause prolonged healing time. Casting will be required for immobilization and healing of severe stress fractures.

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Part III

Prevention of Sport Injuries

Chapter Eleven

AVOIDING AND PREVENTING INJURY

There are no guaranteed ways to prevent sport injuries. Certain factors contribute to injuries, especially if not considered when planning and preparing for sport activities.

Sound organization and planning are critical factors in establishing safe sport programs. It begins with recognizing the types of injuries most often associated with a particular sport, the physical fitness level of the players, and the total environment in which the games are played. This allows for the accident potential of each sport to be considered and a sport program developed based on the reduction of preventable injuries. (17:13)

Safety is a prime factor in the organization and planning of all sport programs. Safety consciousness must be present at all levels, from the base commander to the individual players. Good supervision, fair officiating, safe playing facilities, use of protective equipment, and sound ground rules are all essential elements of safety. Supervisors must be concerned about and plan for the safety and welfare of the participants under their control. Safety is a leadership responsibility.

Individuals charged with the responsibility of officiating should recognize their responsibility for the safe conduct of games. They must provide feedback to program administrators on hazardous playing conditions and unsafe player actions so appropriate corrective actions can be taken. Coaches and officials must assure the playing area is properly maintained if injuries are to be prevented. Surface conditions should be evaluated prior to any game. If holes, ruts, loose turf, or muddy conditions are present, it would be best to postpone or reschedule the game to another field. There is no justification for a sprained or fractured ankle because of a large hole around home plate, or long wet grass on a soccer or flickerball field.

Protective equipment is available to players. It must be worn to be effective. Coaches, officials and players are all responsible to see that protective equipment is worn. Anyone who does not wear protective equipment should not play. This should be enforced whether you are a softball catcher for an ACSC team or one of AU's intramural softball teams.

Another consideration in the organizing and planning aspects of sport safety is the development and enforcement of sound ground rules. Ground rules should provide for the orderly and enjoyable playing of any sport. Rules should also be designed for the protection of the players. Local ground rules modifying certain aspects of game play can do much to reduce accidents and injuries. The rules of play must be known and understood by all players. Rule enforcement is the responsibility of everyone associated with a sports program. Any infraction of the rules should be dealt with immediately. Coaches, officials and players must recognize and accept their responsibility for seeing to it that all rules are complied with. Anyone unwilling to play by the rules should be removed from the game and counseled before being allowed to play again. Sound judgment and common sense are as essential to safe play as are rules, safe playing facilities and good leadership.

In addition to the administrative aspects that can minimize sport injuries, there are actions that individual players can take to insure greater safety. Conditioning, skill and attitude are important individual elements in preventing or at least reducing sport injuries. Conditioning, by and large, is an individual responsibility. Air Force personnel are expected to be within weight standards and to be in good physical condition. Participation in an aerobics program is expected. Aerobics provides excellent general and cardiovascular conditioning, but does not always provide the special muscular conditioning required for particular sports. There is a considerable difference between running and jogging as part of an aerobics program and the running or sprinting associated with softball, soccer and flickerball. These sports demand different muscular strengthening and stretching programs. Prior to participating in any sport individuals must have the opportunity to condition themselves. Self-conditioning and pre-game workouts to warm and stretch muscles and ligaments are essential in reducing injuries. Also, if after warming up a player does not play immediately, he or she must warm up and stretch again. Sitting on the side line waiting to play causes the muscles to cool down, become less flexible and, therefore, more prone to injury. Coaches are responsible for overseeing the appropriate and timely warm-up of their team. Sport program administrators are responsible for assuring game schedules provide adequate time for warm-ups. They are also responsible for ensuring coaches are instructed in proper warm-up exercises and techniques. This can best be accomplished by assigning a physician or technician from Physical Medicine or Rehabilitative Medicine to instruct coaches in proper warm-up exercises. This should be done prior to the playing season.

In addition to conditioning, player skill should be considered. Individuals not routinely participating in a given sport do not possess the coordination and agility necessary to play safely. Players must be afforded the opportunity to learn and practice the skills needed to effectively and safely play a given sport. Sport and recreational accident reports continue to demonstrate that the lack of instruction and skill development are definite contributors to many injuries. Less skilled sport participants do not know how to protect themselves from falls, collisions, and the like. (17:15)

Player attitude, like conditioning and skill, is important in controlling sport injuries. Attitudes should be looked at from two perspectives, game play in general and individual conduct responsibilities. Team sports by their very nature are competitive. Military people in general are competitive by nature and indoctrination. To compete and win is expected whether on the battle field, the playing field, or in the academic arena. In playing to win, however, rules must be obeyed and enthusiasm may have to be tempered. This is particularly true when participating in sports at AU. Play is governed by rules designed to establish better and equal playing opportunities for all students. Players must demonstrate a positive attitude. Willingness to play by the rules, to avoid aggressiveness, and a willingness not to take unfair advantage of less skilled players are essential for safe and enjoyable play for all. Playing to win is important, but winning at all costs is not an acceptable attitude.

Individually, players must have a realistic attitude and perspective about their play and contribution to the team. The team sport programs at AU are not the testing ground for future professional athletes. Instead, it provides an organized social activity encompassing the goals of sportsmanship, esprit de corps, and leadership in an environment of friendly competition. Players are expected to participate to the best of their ability, contributing what they can toward a winning effort. Nothing more. Individually, players should not be pressured, overtly or covertly, to play beyond their abilities. Players must also be honest with themselves and teammates. This is particularly true when assessing physical status. Fatigue and playing when injured are two major contributors to sport injuries. Players must know what is expected of them prior to participating in any sporting event. One thing that must be stressed to all players is the acceptability of requesting a substitute if they are fatigued or injured.

In summary, the elements producing better games also reduce injuries. Planning, supervision, good officiating and playing facilities, the use of protective equipment, and enforcement of playing rules are all essential to an enjoyable and safe sport

program. A realistic and positive fair play attitude, collectively and individually, coupled with administrative safeguards, are necessary if sport injuries are to be reduced. A united effort by all concerned will provide for a healthy, safe and enjoyable sport experience.

Chapter Twelve

FIRST AID SUPPLIES AND COACH RESPONSIBILITIES

This chapter is intended to identify the first aid supplies needed by coaches to adequately provide initial treatment of sport injuries. First aid supplies need to be simple, easy to use and readily available. They can be carried in the athletic equipment bags that are issued to coaches for practice or scheduled games. Equipment maintenance personnel can replace used supplies by referring to an inventory list. Extra supplies can be maintained in the equipment room and replenished on a weekly basis from the hospital supply department. Suggested first aid supplies are:

1. Ace bandages - for compression of muscle strains and sprained joints; to hold ice packs in place.

- 6" Ace bandage (#4) - large body areas (thigh; ankle-foot).

- 4" Ace bandage (#2) - small body areas (hand, wrist).

2. 4x4 gauze pads (#6) - abrasions and lacerations.

3. Abdominal pads (#2) - larger wounds.

4. Gauze roll - "Kling" (#2) - wrap, cover abrasions, lacerations.

5. Adhesive tape 1" roll (#1) - to secure gauze dressings and ace wraps.

6. Plastic bags - 10-1/2" x 12" self seal (#6) - for ice pack application to all injuries (sprains, strains, bruises, lacerations).

7. Disposable scissors (#1) - to cut adhesive tape and gauze roll.

The supplies can be held in a small container within the athletic equipment bag. The coach or a designee will be responsible for administering first aid treatment and maintaining the first aid supply inventory list. As supplies are utilized,

the first aid supply inventory list. As supplies are utilized, the coach (designee) will annotate the inventory list, turning it in with the equipment so used items can be replaced by the equipment maintenance personnel. This procedure insures first aid supplies will be available to the next coach picking up the equipment bag. It will also ensure that the equipment personnel can effectively and efficiently maintain their replacement supplies.

Recommendations for first aid supplies are based on a common sense approach. First aid, to be effective, must be simple and timely. To meet these criteria, first aid supplies must be readily available and appropriate to the anticipated injuries. The quantity suggested is adequate for supporting one or two teams.

First aid, ideally, should be administered by someone with a medical or nursing background. Coaches should poll their teams for someone with this experience, if he/she does not have that experience in his/her own background. In addition, first aid principles should be taught to coaches before the start of practice sessions and scheduled games. This is in keeping with my previous assertion that coaches need instruction to safely carry out their responsibilities (Chapter Eleven).

If sport injuries are to be reduced in frequency and severity at AU, sport program administrators at SOS and ACSC must prepare the individuals tasked with coaching responsibilities. Coaches need instruction in proper conditioning and stretching exercises, as well as instruction in administering first aid for sport injuries. This is not currently done at either SOS or ACSC. The facilities and personnel resources are available at AU. Future considerations should be given to developing a teaching program for athletic coaches.

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Appendix I
(Figures)

APPENDIX I

(Figures)

<u>SPORT</u>	<u>DISABLING INJURIES</u>	<u>% OF TOTAL INJURIES</u>
SOFTBALL	1421	19.3
VOLLEYBALL	242	3.2
SOCCER	67	1.0
FLICKERBALL	51	0.6
TOTAL	1781	24.1

Figure 1. Air Force sport related disabling injuries (1965-1969)

Total disabling injuries - 7,352.

<u>SPORT</u>	<u>MAN-DAYS LOST</u>	<u>AF COST (\$)</u>
SOFTBALL	14,246	762,892
VOLLEYBALL	2,072	101,616
SOCCER	631	31,550
FLICKERBALL	338	16,650
TOTAL	17,287	912,708

Figure 2. Cost of sport injuries to the Air Force (1965-1969).

<u>SPORT</u>	<u># INJURIES</u>	<u>MAN-DAYS LOST</u>	<u>COST (\$)</u>	<u>% OF TOTAL INJURIES</u>
SOFTBALL	4	16	4,445	14.8
VOLLEYBALL	1	8	3,160	3.7
	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
TOTAL	5	24	7,605	18.5

Figure 3. Air University (Jan-Jun 83) reportable sport injuries.
Total injuries - 27.

<u>SPORT</u>	<u># INJURIES</u>	<u>% OF TOTAL INJURIES</u>
SOCCER	157	25.7
SOFTBALL	149	24.4
VOLLEYBALL	91	14.9
FLICKERBALL	80	13.1
	<u>-</u>	<u>-</u>
TOTAL	477	78.1

Figure 4. Air University sport/recreational injuries (year 1983).
Total non-reportable injuries - 610.

<u>1983</u> <u>MONTH</u>	<u>TOTAL SPORT/ REC. INJURIES PER MONTH</u>	<u>SCHOOLS</u> <u>ACSC</u> <u>SOS</u>		<u>TOTAL # INJURIES OF SCHOOLS</u>	<u>PERCENT OF INJURIES</u>
JAN	21	3	4	7	33
FEB	48	3	25	28	58
MAR	45	4	11	15	33
APR	61	1	32	33	54
MAY	50	1	12	13	26 **
JUN	57	1	22	23	40
JUL	49	0	24	24	49
AUG	46	2	10	12	26 **
SEP	75	2	46	48	64 *
OCT	49	11	9	20	41
NOV	72	4	40	44	61
DEC	37	2	17	19	51
<u>TOTAL</u>	610	34	252	286	46%

(Key: ** low %; * high %)

Figure 5. Air University (year 1983) sport/recreational injuries by schools per month.

<u>SPORT</u>	<u>HEAD</u>	<u>TRUNK</u>	<u>ARMS</u>	<u>LEGS</u>	<u>TOTAL</u>
SOCCER	7	5	17	128	157
SOFTBALL	22	8	60	59	149
VOLLEYBALL	5	2	39	45	91
FLICKERBALL	5	3	23	49	80
TOTALS	<u>39</u>	<u>18</u>	<u>139</u>	<u>281</u>	<u>477</u>
PERCENT	8	4	29	59	
% of TOTAL sport/ rec. injuries, 610					<u>78%</u>

Figure 6. Body areas injured in various sports played at Air University. Number and percent of injuries for year 1983 (Jan-Dec).