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Bloomington, Ind. 47401

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The views and opinions expressed in the articles in the Journal of the National Athletic Trainers Association are not necessarily the views or opinions of the National Athletic Trainers Association.

The NATA Journal editors welcome the submission of articles which may be of interest to persons engaged in or concerned with the progress of the athletic training profession. The following suggestions are offered to those submitting articles for consideration:

1. All manuscripts should be typewritten, double-spaced, on ordinary typing paper, 1500-2000 words.

2. When references are made to other published works, include superscript numerals and appropriate footnotes giving author, title of book or article, periodical or volume number, pages, and date of publication.

3. Photographs must be black-and-white prints, preferably on glossy paper. Graphs, charts, or figures should be clearly drawn on white paper, in a form which will be readable when reduced for publication.

4. It is the understanding of the Journal editors that any manuscripts submitted will not have been published previously.

Unused manuscripts will be returned when accompanied by a stamped, self-addressed envelope. Please address contributions to the Editor.
How To Prevent Heat Stroke
In Football Players

ANDERSON SPICKARD, M.D., Assistant Clinical Professor of Medicine Vanderbilt School of Medicine and JOE WORDEN, Athletic Trainer, Vanderbilt University*

Heat stroke is a serious form of heat illness which results in a significant number of deaths in athletes. Football players who are not acclimatized to the heat or the vigorous demands of football practice are particularly vulnerable to this catastrophe. Under the present rules of the NCAA, college coaches and trainers have approximately three weeks to condition their players before the first game. In that brief period, players must become physically fit and mentally trained to carry out their position assignments. If the weather is hot during this strenuous period and proper precautions not taken, serious heat illness and even fatal heat stroke may occur.

Prevention of heat stroke is now possible. A technique has been devised in the Armed Forces to predict hazardous heat conditions during physical training exercises. Here, we will review this technique now in use at Vanderbilt University. Another method, currently used by other teams for prevention of heat illness in their players, will also be described.

Heat cramps and heat exhaustion are mild forms of heat illness and may precede the fully developed picture of heat stroke. Heat cramps are painful spasms of the calf and thigh muscles relieved by rest and extra salt intake.

The symptoms of heat exhaustion are similar to those of heat stroke, namely giddiness, weakness and nausea. Rest and replacement of salt and water is usually sufficient therapy for this condition.

Heat stroke, the severest form of heat illness, is a medical emergency. Diagnosis and treatment must be given promptly or irreversible changes in vital organs or even death occurs. A player who suffers from early symptoms of heat stroke complains of giddiness and nausea. Occasionally he notices an inability to cool off completely after a very hot practice. Usually he has lost considerable weight during the practice. He may collapse and when examined is unconscious, has hot dry skin, a fast pulse and rapid rate of respiration. His oral temperature may be elevated to 108°F or 110°F. If a player develops this condition, the uniform should be removed and the body cooled with towels soaked in ice water. Additional therapy includes replacement of salt and water which is best accomplished with intravenous salt solutions given under the direction of a physician.

The number of heat stroke fatalities in football players seems to be increasing. In the period 1933-1963, 15 players died from heat stroke; in the three year period 1963-1966, 11 players succumbed to this illness. Many players have been ill with heat stroke each year, but the prevalence of the non-fatal illness is not known.

We have reviewed the previous cases of heat stroke to determine possible causes and ways to prevent them. From this review we have made the following observations:

First, heat stroke cases occur most often in the first week of football practice. Of nine fatalities in high school football from 1953 to 1963, five occurred on the first day of practice and two on the second day. The remaining two occurred later in the week. 2

Second, the value of heat acclimatization is not recognized by coaches and trainers. A player may be physically fit for practice in cool weather but very susceptible to heat illness if the weather is hot and humid. Studies on military personnel during World War II, have shown the 10 to 14 days are necessary for complete heat acclimatization. 3 The function of the heart, kidneys and other vital organs undergo profound alterations in hot weath-

* From the Department of Medicine Vanderbilt University School of Medicine and Athletic Department, Vanderbilt University. Supported by the John B. Howe Fund Vanderbilt University School of Medicine.
er and must be conditioned slowly to function efficiently in the heat. For example, studies have demonstrated that a heat acclimatized individual loses less salt in the sweat and will require less salt tablets to maintain adequate salt content in the body than an unacclimatized person. The stress imposed by excessive heat and the physical demands of a football practice can be such that the unacclimatized person cannot lose heat effectively because of inefficient sweat glands.

Third, football uniforms are heavy and restrict evaporation of sweat. Sweating is the body’s most efficient means of heat elimination.

Fourth, players are anxious to please coaches and are reluctant to report early symptoms of heat illness. Many authorities believe that heat stroke begins with the earlier symptoms of heat cramps or heat exhaustion and can be prevented if salt and water replacement is instituted early and adequate rest provided. Players must be encouraged to report danger signs of heat illness in themselves or their fellow players.

Fifth, many coaches and trainers incorrectly believe that the only way to prevent heat stroke is to take enough salt tablets. Although salt and water depletion contributes to the development of heat stroke, this is not the major factor. Heat stroke occurs when the player cannot lose heat into a hot and humid atmosphere.

Therefore, the most important part of any program of heat illness prevention is the determination of dangerous levels of heat and humidity. The technique used by the Army and Marines to measure these dangerous levels is now available and can be easily adapted for use by football teams.

A Heat Index (HI) is calculated twice in each practice. Practice routines are then altered if the HI is in the danger zone. The HI is calculated from three thermometer readings: a wet bulb thermometer, a dry bulb thermometer and a black globe thermometer (Figures 1 & 2). The wet bulb is a thermometer attached to a wick in water. The temperature recorded by this thermometer depends on the moisture content of the air. A low moisture content permits evaporation from the wick which low-
ers the wet bulb temperature. The dry bulb thermometer measures air temperature unaffected by moisture content. The black globe thermometer records heat from the rays of the sun. The HI is the sum of 70% of the wet bulb reading, plus 10% of the dry bulb reading, plus 20% of the black globe reading. A sample calculation of the HI is as follows:

<table>
<thead>
<tr>
<th>Wet bulb reading</th>
<th>Dry Bulb reading</th>
<th>Black Globe reading</th>
<th>Heat Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>75° x 0.7 = 52.5</td>
<td>88° x 0.1 = 8.8</td>
<td>111° x 0.2 = 22.2</td>
<td>83.5</td>
</tr>
</tbody>
</table>

This is not an unusual HI on some days in late August or early September. In the Armed Forces when the HI is below 80, no precautions against heat illness are taken. Between HI readings of 80 and 85, training routines for unacclimatized recruits are lightened. When the HI is 85 or above, exercise by all recruits is prohibited.

The following adaptations of these procedures are recommended for use by football teams.

**HI below 80** — No precautions against heat stroke are necessary.

**HI 80 to 85** — Drills in full uniform should not be allowed during the first week of practice. Practice in shorts and T-shirts is preferred. After heat acclimatization is complete, limited drills in full uniforms can be conducted safely.

**HI above 85** — All drills in full uniform are cancelled. If the HI is above 85 during the first week of practice, indoor sessions are preferred.

Other teams measure heat and humidity by use of a sling psychrometer (Figures 3A & 3B). This instrument measures only the wet bulb and dry bulb temperature. The relative humidity is read by matching these two temperatures on a scale. Practice procedures are altered according to the guidelines suggested by Dr. Murphy of Ohio State University.

<table>
<thead>
<tr>
<th>Wet Bulb Temperature</th>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 60°F</td>
<td>None necessary</td>
</tr>
<tr>
<td>61°F to 65°F</td>
<td>Alert observations of all squad members, particularly those who lose considerable weight.</td>
</tr>
<tr>
<td>66°F to 70°F</td>
<td>Insist that salt and water be given on field.</td>
</tr>
<tr>
<td>71°F to 75°F</td>
<td>Alter practice schedule to provide rest period to every 30 minutes in addition to above precautions.</td>
</tr>
<tr>
<td>76°F and Higher</td>
<td>Practice postponed or conducted in shorts. (Whenever the relative humidity is 95% or higher, great precautions should be taken.)</td>
</tr>
</tbody>
</table>

In both the calculation of the HI and use of the sling psychrometer readings the wet bulb is considered the most important indicator of dangerous heat levels. The HI calculation includes an additional measurement of radiant heat (the black globe temperature). We prefer the HI method for this reason. Radiant heat can be substantial even on cloudy days and sufficient to elevate the HI above 80.

Other measures to prevent heat stroke include adequate replacement of salt and water. A player who loses 6.6 lbs. of weight after a practice perspires about a quart of water and the amount of salt in twenty-one 0.5 gram salt tablets. We have observed that most players tolerate this amount of water and salt loss without difficulty if the weather is cool. This is not true if the weather is hot. The player who loses over five pounds of weight after a practice in hot weather usually complains of
giddiness and weakness and his mental and physical performance is poor. These are the first symptoms of heat stroke.

At Vanderbilt two salt tablets taken before and after each practice are required of each player. An unrestricted amount of water is allowed after practice and during rest periods. Recently a new grapefruit drink, Wink, has been introduced. It is cooled with ice. Salt is added. Gater-Ade and other fruit drinks have a low salt content and should be used only as a source of liquid.

SUMMARY

Heat stroke in football players can be prevented by use of the following procedures:

1. Football practice in hot weather should be conducted in the very early morning or late afternoon. Dangerous levels of heat should be determined by use of the HI calculation or sling psychrometer. Practice routines are then adjusted by use of the guidelines given.

2. Summer workouts by players before regular practice begins should be done in the sun when it is hot and humid. This will gradually begin the process of heat acclimatization.

3. Uniforms should be lightweight for players who practice in hot environments (Figures 4 & 5).

4. Coaches and trainers should observe their players for early symptoms and signs of heat illness especially the first week or ten days of practice. Players should be encouraged to report early symptoms of heat illness in themselves or fellow players.

5. Two or three 0.5 gram salt tablets before and after each practice should be required of each player. Frequent rest periods and as much water as a player needs to quench his thirst should be provided. Any player who loses over five pounds after a practice in the heat is a likely candidate to develop heat stroke and requires more rest, more salt and more water replacement than outlined above.

FIGURE 5—Hand under "fish-net" jersey to demonstrate size of mesh. (Published with permission of the Southern Medical Journal).

BIBLIOGRAPHY


Request for Reprints should be sent to Anderson Spickard, M. D. 432 Medical Arts Building, Nashville, Tennessee 37212.
1968 CONVENTION NOTES

The nineteenth annual convention of the N.A.T.A., held in Houston, Texas, was another tremendous one, thanks to Program Chairman Logan Wood and all his helpers from host district #6.

According to Joe Blankowitsch, Registration Chairman, there were more than 350 registered for the convention and more exhibitors than ever before. Porky Morgan, presented 25 year awards to: Joseph Abraham, Hobart College, New York; J. C. “Dutch” Reinhardt, University of Southwestern Louisiana; and to Dwayne “Spike” Dixon, Indiana University. Our congratulations to these men for their outstanding work in the field of athletic training.

Honorary awards this year were given by Don Pauls to: Jim Gill, Frank McCue, M.D., Jack Cramer, E. T. Smith, M.D., Dave Thomas, and Joe School. Our thanks to these men for helping the N.A.T.A. to grow into the organization it now is.

The Highlight of the Awards Banquet was the naming of 4 new men to the Helms Hall of Fame. Those inducted were: Carl “Bud” Jorgensen, Green Bay Packers, and Ernest Biggs, Ohio State University, both from District #4; Ken Rawlinson, Oklahoma University, and Bob Bauman, St. Louis Cardinal Baseball Club, both from District #5. Our congratulations to these men for their outstanding work, service and contributions in the athletic training profession.—EDITOR.

THREE NEW INDUCTEES INTO THE HELMS HALL OF FAME—(L. to R.) Carl Jorgensen, Green Bay Packers; Ernest Biggs, Ohio State University; and Ken Rawlinson, Oklahoma University. The fourth inductee, not present, was Bob Bauman, St. Louis Cardinal Baseball Club.

CONGRATULATIONS TO HALL OF FAMERS—(L. to R.) Steve Witkowski, Wesleyan University (previous inductee), A. C. “Whitey” Gwynne, West Virginia University (previous inductee), Carl “Bud” Jorgensen, Green Bay Packers (inductee), William Newell, Purdue University, Executive Secretary N.A.T.A., Mrs. Ernest Biggs, Ohio State University (inductee), Ken Rawlinson, Oklahoma University and Mrs. Ken Rawlinson (inductee).
With this issue the Journal of the National Athletic Trainers Association initiates another regular column. This one, to be called "National Notes," will be written for each issue by the Association's Executive Secretary. For this issue the column is written by William "Pinky" Newell, in succeeding issues the column will be prepared by Jack Rockwell.

In June, the Board of Directors discussed methods of providing for better communication between the National office and the individual members. It was suggested that the Executive Secretary, through a column in the Journal, present a report reflecting an analysis of current activities of the Association and a projection of developments for the near future. It is hoped that this emphasis and discussion of the issues in greater depth will provide for better understanding and maintenance of continuity among the districts and the district leaders. It should also provide an opportunity for developing a more substantially constructive reaction to the basic issues. Executive Secretary, Jack Rockwell, has asked that I provide the first column for the Journal since most of the issues originated during the past.

Most controversial of the issues has been the need for a change in the dues structure. Every association is faced with the task of assuring the membership with a continuing program. The number and types of activities entered in by the Association, then reflect more clearly the monetary needs. The NATA volume of business in the last three years has not increased three fold, but to five times as much as it was in 1965. Dues should be the greatest source of revenue for the operating budget. With NATA this is not true. Approximately one-third of our total income is from dues. This is not realistic. The Association has three real sources of income, namely; dues, the Journal ads and exhibiting at our National program. The latter two are not reliable for budgetary purposes.

Our search for a part time or full time man to fill an Executive Secretary position in this Association, indicates that the need is becoming greater. We must be able to assure the applicant that this Association can meet his salary month after month and year after year and that he may expect to increase his salary at a rate as great or greater than the cost of living index.

Each member has the privilege and obligation to share in this Association's responsibility. It is difficult for anyone to determine directly how much an Association membership is worth but indirectly there are many benefits shared equally by all.

Of special interest to the membership should be a resolution coming out of the meeting in Houston of the Joint Commission on Competitive Safeguards and Medical Aspects of Sports. The membership of the Commission includes representatives of the NATA, the American College Health Association, the NCAA, and the National Federation of State High School Athletic Associations. After a thorough discussion, the Commission resolved that all summer time High School All-Star football games be frowned upon and eliminated and specific reasons be presented. Donald Cooper, M.D. was asked to write the resolution. The following is a copy of the Cooper resolution:

"Be it resolved that the Joint Commission on Competitive Safeguards and Medical Aspects of Sports feels that the High School All-Star games occurring in July and August in many states should be discontinued. From a medical point of view it is very unsound to take a high school football player, who has not participated in football since the previous November or December and in just a few short days, approximately nine or ten months after his regular season is finished, expect him to go into a competitive contact condition. This is not wise from a sound conditioning view point. From the standpoint of injuries that occur, it has been the policy not to allow the college athletic trainers, who are the most capable available, to participate in the care of these All-Star teams. Many times good athletes are injured and prevented from ever playing a 'down' of college football due to the misfortunate injury occurring during such an All-Star affair. Many times the sponsoring agencies have not provided adequate and competent medical insurance for these injuries that occur and the follow up care has fallen to either the college that recruited the athlete or to his parents. Many states do not allow this exploitation of the recently graduated seniors from their high schools and they are much the wiser and safer for this policy. It is paradoxical to note that most Collegiate coaches, Athletic directors, Team Physicians and Athletic trainers are opposed to this concept of All-Star games but they still persist. It would be our desire to have the State High School Associations, as well as the NCAA, to critically evaluate this entire problem and concur with us on this matter of phasing this unhealthy form of exploitation out of the sports scene."

Fred Hoover, NATA representative to the NFSHSSAA, included the above resolution in his remarks to that body recently. He was well pleased with the enthusiastic response to and acceptance of the resolution.

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BITS AND PIECES

Clyde Stretch

Although announced to the contrary, “Bits and Pieces” will continue. It was felt that with the fluctuation of material available from the executive secretary that the membership could be better served by including the material from the office of the executive secretary within the framework of the existing column.

It should be remembered that this column is still in the experimental stages concerning the materials for its content. Listing of job openings was attempted and rejected. Membership response to the providing of useful training techniques and currently the question of shin splints has been small enough to consider the elimination of items such as these as well. However, the column was initiated as an attempt at some form of professional communication on the national level between the June meetings, and its continuation stands upon that basis.

* * *

Since there has been the confusion about the column and some people may have expressed an opinion dealing with the issue of shin splints discussed in the June issue. If you do have an opinion on the shin splints issue, let’s discuss it.

* * *

A temperature chart for prevention of heat illness in football players has been issued by the Joint Commission of the Ohio State Medical Association for state high schools. The chart simplifies detection of dangerous weight loss in the athlete during hot-weather practice. It suggests field precautions for various ranges of wet bulb temperature, with instructions for use of the sling psychrometer to record heat and humidity on the football field. Suppliers and approximate costs are listed. Single copies or large quantities of the chart are available from WGR Offset, 941 St. Clair, Columbus, Ohio 43201 at 10¢ each.

* * *

Martin E. Blazina, M.D. and “Ducky” Drake of UCLA have prepared a brochure demonstrating “Taping and Wrapping of the Ankle in Athletics,” in 21 large step-by-step photos. These are available from Dr. Blazina, UCLA Department of Intercollegiate Athletics, University of California at Los Angeles.

* * *

Some excerpts from a questionnaire conducted by districts one and two dealing with “Becoming an Athletic Trainer.” The questionnaire was undertaken to aid in the drafting of a proposal regarding the educational, certification and experience requirements toward becoming a “qualified” trainer. The questionnaire was mailed to all holding membership in districts 1 and 2 of the NATA. Seventy-one questionnaires were returned. The responses to three questions were of special interest.

1. “Should trainers approach certification licensure by?”
27% responded to state boards of education; 25% responded to the American Medical Association; 18% responded to state board of licensure; 8% felt no licensure should be required.

2. “Suggested minimal educational background for certified, licensed or qualified trainer.” The four preferred educational areas were: Bachelor’s degree in physical education; specialized schools or curriculums with degree in athletic training; physical therapy degree or certificate; and no specific major, but take a certification or licensure by a qualified group.

3. “How can more persons be qualified as trainers?” Although the suggestions varied, everyone responding felt that there was indeed a real need to develop more qualified trainers.

* * *

Excerpt from “Traumatic Myositis Ossificans,” by Alexius Rachun, M.D. From Journal of the American College Health Association 16:131-134; December, 1967. “The contusion that initiates the process of myositis ossificans traumatica is often so severe and painful as to cause immediate and protracted disability. Perhaps more often the athlete may continue to play for a variable period of time until mounting pain and impaired performance bring about a cessation. During this period he may have sustained several additional blows to the area which has led some observers to conclude that multiple contusions are an etiologic sine qua non of myositis ossificans. That this thesis is doubtful is demonstrated by the large number of these lesions that have been observed to result from single blows. Once the exostosis-like lesion has developed, it may become a source of recurrent pain from repeated trauma.”

CALENDAR

1) The American Academy of Orthopedic Surgeons Postgraduate Course in Sports Medicine meets October 7 to 9 in Niagara Falls, New York. The program is directed toward orthopedic surgeons, but general physicians and others interested are eligible. Information: Mr. Bruce Pattou, Public Information Department, American Academy of Orthopedic Surgeons, 29 E. Madison St., Chicago, Illinois 60602.

2) Tenth National Conference on the Medical Aspects of Sports meets in conjunction with the AMA clinical convention on December 1 in Miami Beach, Florida. Information and reservations: Committee on the Medical Aspects of Sports, American Medical Association, 535 North Dearborn Street, Chicago, Illinois 60610.
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Recent Athletic Training Literature

This list is generally restricted to those areas of specific interest to the athletic trainer. Topics belonging to the broad areas of athletics, physical education and physical therapy will usually be omitted.


“Football Players Quench Thirst; Beverage That Matches Body Fluids,” *Science Digest* 63-41; May, 1968.


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Dr. Charles Barnett is deceased

Dr. John Charles Barnett, 37, associate director of student health service at Clemson University, Clemson, S. C., since July, 1959, died at his home Aug. 10th, from a sudden attack, although he developed a kidney disease several years ago and had been using an artificial kidney machine for the past 18 months.

Dr. Barnett, in addition to his duties with the student health service, was also associate team physician to all of Clemson's athletic teams.

A native of Marietta, S. C., Dr. Barnett was a graduate of Clemson University, receiving his BS in pre-medicine in 1952. He then attended the Medical College of South Carolina where he graduated with a doctor of medicine degree in 1956.

He served one year internship at Greenville General Hospital, Greenville, S. C., after graduation from medical school. He was in private practice two years at Slater, S. C., before joining the Clemson staff.

Dr. Barnett was a member of the American Medical Society, the South Carolina Medical Association, the Anderson County Medical Society, the American Academy of General Practitioners, the National Athletic Trainers Association, the American College Health Association and the Clemson Baptist Church.

He was a Master Mason of the Clemson Lodge and a member and past president of the Clemson Lions Club.

Dr. Barnett was also an advisory member to the National Athletic Trainers Association.

Dr. Barnett was the son of Jesse Barnett of Marietta. Also surviving are his widow, Mrs. Jean Chapman Barnett; a daughter, Miss Allison Barnett, 10; a son, Charles Scott, 8, all of the home; two brothers, Dr. James E. Barnett of Travelers Rest, and George Wheeler Barnett of Greensboro, N. C.; and a sister, Mrs. Lawrence Buchanan of Greensboro, N. C.

The Clemson staff member for the past nine years, was born at Marietta, S. C., April 17, 1931. He graduated from Slater-Marietta High School where he lettered in football. During his stay at Clemson he served as assistant team physician for the Tigers when they played in the inaugural Bluebonnet Bowl game in 1959 in Houston, Texas, when Clemson defeated Texas Christian, 23-7.

Funeral services were conducted Aug. 12th at the Clemson Baptist Church by the Rev. Charles A. Arrington. Burial was in Grandview Memorial Garden in Travelers Rest.

Dr. Barnett's family requested that flowers be omitted at the funeral and that anyone desiring to do so could make a memorial gift to the Atlanta Artificial Kidney Center, Emory University, Atlanta, Ga., in care of Dr. John Sadler, director.
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Something that I feel will prove vitally important and mutually beneficial to the dissemination of information to and from the National office concerns the District meetings. Not all Districts now have meetings separate and apart from our annual National meetings. These definitely should be encouraged. It means so much to those unable to attend the National. Jack Rockwell feels as I do that your district meeting should be attended by an official representative of the National office. It should be a wonderful opportunity for an up-to-date exchange of ideas to help Jack do a better job for you, and will help the districts receive factual information when it is needed most. Be sure to include Jack in your notification materials of your next district meeting. He or Tom Healion would like to be with you.

This is the first column written from the National Office. In the issues to come, Jack will have an opportunity to express to you his desires for the Association. It would help, I am sure, if you have a question concerning Association activity to let Jack know so that he may better serve you and the other members through this media.

I want to take this opportunity on behalf of my family and myself to thank you all for the wonderful gifts presented to us at the Honorary Memberships and Awards Banquet. We have enjoyed them so much.

If we can be proud of our having achieved some of our goals, we have only to remember that they are just milestones along the way.

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