Log of Meeting
Sudden Cardiac Death in the Athlete
Keystone, Colorado
February 10 - 12, 1997

Date of Log Entry: March 24, 1997

Source of Log Entry: Susan Kyle, Ph.D., EHHA SBK
Project Manager
Sports and Recreation

CPSC Participants: Susan Kyle

Non-CPSC Participants: See attached brochure with faculty list

Summary of Meeting:

Susan Kyle, CPSC, gave a speech which included a short description of CPSC's data collection systems and a brief summary of the Youth Baseball Protective Equipment Project Final Report, with emphasis on the findings concerning chest impact death data and mechanism. A copy of the speech is attached.

Sponsored by:
FUTURA MEDIA SERVICES, INC.

Sudden Cardiac Death in the Athlete

Keystone Resort, Keystone, Colorado

February 10-12, 1997

Director

N.A. Mark Estes III, MD
Professor of Medicine
Tufts University School of Medicine, and
Director, Cardiac Arrhythmia Service
New England Medical Center
Boston, Massachusetts

Co-Directors

Deeb N. Salem, MD
Professor of Medicine
Tufts University School of Medicine, and
Chief Medical Officer
New England Medical Center
Boston, Massachusetts

Paul J. Wang, MD
Associate Professor of Medicine
Tufts University School of Medicine, and
Associate Director
Cardiac Electrophysiology & Pacemakers Laboratory
Director, Adult Heart Station
New England Medical Center
Boston, Massachusetts

A Futura Clinical Symposium

FUTURA MEDIA SERVICES, INC.
135 Bedford Road, PO Box 635
Armonk, New York 10504-0635
Telephone: 914-273-1047 · Fax: 914-273-2559
E-mail: media@futuraco.com
Web Site: http://www.futuraco.com

FACULTY

Sudden Cardiac Death in the Athlete

Keystone Resort · Keystone · Colorado · February 10-12 · 1997

Saroja Bharati, MD
Rush Medical College, Chicago, IL

David S. Cannom, MD
UCLA School of Medicine, Los Angeles, CA

Lon W. Castle, MD
North Ohio Heart Center, Lakewood, OH

Melvin D. Cheitlin, MD
University of California San Francisco, San Francisco, CA

Domenico Corrado, MD
University of Padua, Padova, Italy

Richard O. Cummins, MD, MPH, MSc
University of Washington, Seattle, WA

N.A. Mark Estes III, MD
New England Medical Center, Boston, MA

Gerald Fletcher, MD
Mayo Medical School, Jacksonville, FL

Caroline B. Foote, MD
New England Medical Center, Boston, MA

Paul C. Gillette, MD
Cook Children's Heart Center, Ft. Worth, TX

Mary Fran Haznski, RN, MSN
Vanderbilt University Medical Center, Nashville, TN

Carey D. Kimmelstiel, MD
New England Medical Center, Boston, MA

Robert A. Kloner, MD, PhD
University of Southern California, Los Angeles, CA

Andrew D. Krahn, MD
University of Western Ontario, London Ontario, Canada

Susan Kyle, PhD
US Consumer Product Safety Commission, Bethesda, MD

Ralph Lazzara, MD
University of Oklahoma City Health Science Center, Oklahoma City, OK

Mark Link, MD
New England Medical Center, Boston, MA

Frank I. Marcus, MD
University of Arizona, Tucson, AZ

Barry J. Maron, MD
Minneapolis Heart Institute Foundation, Minneapolis, MN

Christopher A. McGrew, MD
University of New Mexico, Albuquerque, NM

Michael E. Mendelsohn, MD
New England Medical Center, Boston, MA

Matthew J. Mitten, JD
South Texas College of Law, Houston, TX

(continued)

FACULTY *(continued)*

Robert J. Myerburg, MD
University of Miami School of Medicine, Miami, FL

Natesa G. Pandian, MD
New England Medical Center, Boston, MA

John C. Richmond, MD
New England Medical Center, Boston, MA

William C. Roberts, MD
Baylor Cardiovascular Institute, Dallas, TX

Sanjeev Saksena, MD, FACC
UMDNJ - New Jersey Medical School, Millburn, NJ

Deeb N. Salem, MD
New England Medical Center, Boston, MA

John J. Smith, MD, PhD
New England Medical Center, Boston, MA

Paul D. Thompson, MD
University of Pittsburgh Medical Center, Pittsburgh, PA

Geoffrey H. Tofler, MD
Harvard Medical School, Boston, MA

James Udelson, MD
New England Medical Center, Boston, MA

Paul J. Wang, MD
Changed

Richard A. Williams, MD
UCLA School of Medicine, Los Angeles, CA

COURSE OVERVIEW

Sudden Cardiac Death in the Athlete is a two and a half day symposium organized for individuals including team physicians, pediatricians, family practitioners, internists, cardiologists, sports medicine physicians, trainers, and other health professionals with an interest in sports medicine. A multidiciplinary faculty consisting of over thirty internationally recognized experts will participate in lectures, panels, and informal discussions aimed at educating the attendee as to the strategies for identifying the athlete at risk for sudden cardiac death. A broad range of topics including specific conditions associated with instantaneous death in the athlete, legal considerations, and strategies for the prevention of catastrophic unexpected death in the athlete will be addressed. The attendee will complete the symposium with a comprehensive, practical knowledge of the medical, legal, and organizational issues related to the prediction and prevention of sudden cardiac death in the athlete.

EDUCATIONAL OBJECTIVES

- **To understand strategies for identifying the athlete at high risk for sudden cardiac death**
- **To recognize potential mechanisms of sudden cardiac death in the athlete**
- **To learn strategies for the prevention of sudden cardiac death in the athlete**

CME CREDITS

Futura Media Services, Inc. is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians.

Futura Media Services, Inc. designates this continuing medical education activity for 15.0 credit hours in Category 1 of the Physician's Recognition Award of the American Medical Association.

PROGRAM

SUNDAY, FEBRUARY 9, 1997

pm

4:00 - 6:00 Preregistration

MONDAY, FEBRUARY 10, 1997

am

6:30 Registration, Continental Breakfast & Visit Exhibits

SUDDEN CARDIAC DEATH IN THE ATHLETE - Mechanisms of Sudden Death and Identification of the Athlete at Risk
Session Moderators:
N.A. Mark Estes III & Barry J. Maron

7:30 Welcome & Introductory Remarks
N.A. Mark Estes III

7:35 Mechanisms of Sudden Death
N.A. Mark Estes III

7:50 Epidemiologic Considerations
Robert J. Myerburg

8:15 Risk Profiling and Screening Strategies
Barry J. Maron

(continued)

MONDAY, FEBRUARY 10, 1997 *(continued)*

8:40 History and Physical Examination
Deeb N. Salem

8:55 The Athlete's Electrocardiogram: Distinguishing Normal from Abnormal
Caroline B. Foote

9:10 Ambulatory Monitoring in the Athlete
Gerald Fletcher

9:25 Exercise Stress Testing in the Athlete
Paul J. Wang

9:40 Panel Discussion

10:00 Refreshments & Visit Exhibits

10:30 Adjournment

pm

3:30 Refreshments & Visit Exhibits

STRATEGIES FOR IDENTIFICATION AND RESPONSE

Session Moderators:
Deeb N. Salem & Richard O. Cummins

4:00 The Role of the Echocardiogram in Identifying Athletes at Risk for Sudden Cardiac Death
Natesa G. Pandian

4:20 Cardiac Imaging Techniques
James Udelson

4:40 Public Access to Defibrillation: Response to emergencies at athletic events-economic, training and cost implications
Richard O. Cummins & Mary Fran Haznski

5:10 Racial and Gender Consideration in Sudden Death in the Athlete
Richard A. Williams

5:40 Triggers of Sudden Cardiac Death in the Athlete
Geoffrey H. Tofler

6:10 Panel Discussion

6:30 Refreshments & Visit Exhibits

7:00 Adjournment

7:00 - 8:00 Reception

TUESDAY, FEBRUARY 11, 1997

am

7:00 Continental Breakfast & Visit Exhibits

ARRHYTHMIAS IN THE ATHLETE: Evaluation and Management

Session Moderators:
Paul J. Wang & Ralph Lazzara

7:30 Wolff-Parkinson-White Syndrome and Supraventricular Tachycardia
Andrew D. Krahn

7:50 Ventricular Arrhythmias and Syncope
N.A. Mark Estes III

8:10 Long QT Syndrome
Ralph Lazzara

8:30 Right Ventricular Dysplasia
Frank I. Marcus

8:50 Sudden Death in the Athlete: The European Perspective
Domenico Corrado

9:10 Hypertrophic Cardiomyopathy
Barry J. Maron

9:40 Panel Discussion

10:00 Refreshments & Visit Exhibits

10:30 Adjournment

pm

3:30 Refreshments & Visit Exhibits

STRUCTURAL HEART DISEASE AND ILLICIT DRUG USE

Session Moderators:
Melvin D. Cheitin & David S. Cannom

4:00 Marfans Syndrome
Deeb N. Salem

4:15 Dilated Cardiomyopathy and Myocarditis
John J. Smith

4:35 Congenital Heart Disease
Paul C. Gillette

4:55 Anomalous Origin of the Coronary Arteries
Melvin D. Cheitin

5:15 Atherosclerotic Coronary Artery Disease
Paul D. Thompson

(continued)

TUESDAY, FEBRUARY 11, 1997 ***(continued)***

5:35 Valvular Heart Disease
Carey D. Kimmelstiel

5:55 Illicit Drugs and the Athlete
Robert A. Kloner

6:15 Lessons Learned from the Death of High Profile Athletes -
The Perspective of a Cardiologist
David S. Cannom

6:35 Panel Discussion

7:00 Refreshments & Visit Exhibits

7:30 Adjournment

WEDNESDAY, FEBRUARY 12, 1997

am

7:00 Continental Breakfast & Visit Exhibits

PATHOLOGIC OBSERVATIONS AND COMMOTIO CORDIS

Session Moderators:
William C. Roberts & Paul J. Wang

7:30 Molecular Biology and Genetics of Cardiac Disease associated with Sudden Death
Michael E. Mendelsohn

7:50 The Cardiac Conduction System in Sudden Death
Saroja Bharati

8:10 Sudden Death in the Athlete -
Lessons Learned from the Necropsy
William C. Roberts

8:45 Commotio Cordis
Mark Link

9:00 Observations of the US Consumer Product Protection Agency
Susan Kyle

9:20 Panel Discussion

LEGAL, MEDICAL, AND ORGANIZATIONAL CONSIDERATIONS

Session Moderators:
N.A. Mark Estes, III & Deeb N. Salem

9:40 Legal Considerations in Evaluation of the Athlete
Matthew J. Mitten

(continued)

WEDNESDAY, FEBRUARY 12, 1997 ***(continued)***

10:10 The Role of the Team Physician:
An Orthopedist's Perspective
John C. Richmond

10:30 The Role of the Team Physician:
A Cardiologist's Perspective
Lon W. Castle

10:50 The Role of Athletic Organizations
Christopher McGrew

11:20 Sudden Death in Athletes -
Research Imperatives and Future Directions
Sanjeev Saksena

11:40 Panel Discussion

12:00 Closing Remarks

12:10 Adjournment

REGISTRATION FEES

Register early and save!

Physicians and Industry Representatives	*$445.00*
After December 15, 1996	*$495.00*
Fellows-in-training, Nurses and other Allied Personnel	*$375.00*
Single-day rate	*$170.00*

The fee includes the reception; continental breakfast and breaks daily.

ROOM RATES

Keystone Lodge Rooms (single occupancy)	*$165.00*
Keystone Lodge Rooms (double occupancy)	*$180.00*
Village 1 Bedroom Suite	*$190.00*
Village 2 Bedroom Suite	*$265.00*
Resort 1 Bedroom Suite	*$172.00*
Resort 2 Bedroom Suite	*$242.00*

Futura Media Services, Inc. has negotiated the above nightly room rates with Keystone Resorts. All rates are subject to the state and local taxes and surcharges equaling 10.2%. There is no additional charge for children under the age of 12, when sharing with adults. Additional persons in the room over the age of 12 will be charged $15.00 per person/per night. The maximum room occupancy is four persons.

Observations of the Consumer Product Safety Commission Staff

Susan B. Kyle, Ph.D.
Project Manager, Sports and Recreation
U.S. Consumer Product Safety Commission
4330 East West Highway
Bethesda, MD 20814
301 504-0470 x 1210
fax 301 504-0124

Background[1]

The Consumer Product Safety Commission (CPSC) is an independent federal regulatory agency created in 1972 to protect the public from unreasonable risk of injury from consumer products. As an independent agency, CPSC is not under any Executive branch Cabinet department. The agency has jurisdiction over approximately 15,000 types of consumer products found in and around the home, such as toys, children's nursery products, power tools and hand tools, furniture and appliances, and sporting equipment.

CPSC has the authority to ban or order the recall of hazardous products as well as to set mandatory safety regulations for products within its jurisdiction. The agency also works with manufacturers and other interested parties to develop voluntary standards for many of the products within its jurisdiction. In addition, CPSC develops and disseminates safety information.

To support these activities, the agency collects data on consumer product-related deaths and injuries. Some of this data may be useful to researchers interested in sudden cardiac death in athletes.

---

[1]The opinions expressed in this paper are those of the author and do not necessarily represent the views of the Commission. This material is in the public domain and may be freely copied or reprinted.

Data Collection Activities

CPSC collects information on deaths and injuries associated with consumer products to determine the extent and nature of the associated hazards. These data are used to determine which products are hazardous, what the magnitude of the hazard is, what the nature of the hazard is and how the hazard should be addressed.

All CPSC raw data and completed data analyses are available to the public upon request and can be obtained from the CPSC's National Injury Information Clearinghouse, Washington, D.C. 20207 or by calling (301) 504-0424.

CPSC has five major sources of data: NEISS (the National Electronic Injury Surveillance System), death certificates, MECAP (Medical Examiners and Coroners Alert Project), consumer complaints and news clips, and investigations.

NEISS. The National Electronic Injury Surveillance System is a network of 101 hospital emergency rooms across the country. These emergency departments report daily on injuries associated with some 800 consumer product categories. More than 300,000 cases are reported annually.

The emergency departments in the NEISS system are a stratified, statistical sample, allowing national estimates to be made of the number of injuries associated with any one of the 800 product categories. The NEISS cases are also used for follow-up investigations to get more detail on particular types of injuries.

Information held in the NEISS system includes the following: the product involved in the injury, the age and sex of the injured person, the diagnosis (such as fracture, contusion, abrasion...), the body part injured (arm, leg, head), the disposition (whether the injured person was hospitalized, or treated and released), the location at which the injury occurred (home, school, work, farm...) and up to two lines of text comment, which can provide useful insights into some of the circumstances of the injury.

Death Certificates. Deaths certificates are purchased from all 50 states and the District of Columbia. Only those E-codes which are generally associated with consumer products within CPSC's jurisdiction are purchased. For example, a motor-vehicle-related death certificate would not be purchased, but a bicycle-related death certificate would be purchased. About 8,000 death certificates are purchased annually. Information includes age, sex, date of death, place of death and cause of death. Death certificates are used to determine actual counts of deaths (rather than statistically derived estimates). They are also sources for potential follow-up investigations. It generally takes from one to two years from time of death until the death certificate is received by CPSC.

MECAP. The Medical Examiners and Coroners Alert Program is an informal, voluntary reporting system whereby some 2,500 coroners and medical examiners across the country report product-related deaths to CPSC. This can be a source of extremely timely information in contrast to the death certificates. CPSC receives

approximately 2,400 such reports annually. They are used to identify emerging hazards.

Consumer Complaints and News Clips. Consumers can report complaints or incidents involving consumer products directly to CPSC via the CPSC telephone hotline (800 638-CPSC), or by written complaint. Approximately 4,000 hotline complaints were received in 1996. An additional 4,000 written complaints are also received each year. CPSC's clipping services provide about 6,000 newspaper articles annually about consumer product-related issues. All these sources are used to identify emerging hazards and/or follow-up cases which could provide more information on how injuries occur.

Investigations. In selected areas of interest follow-up investigations are conducted, either by telephone or on-site. These follow-up investigations are used to obtain more information about how the accident occurred so that remedial strategies can be devised. Approximately 4,000 follow-up investigations are conducted each year.

Example: Youth Baseball Protective Equipment

Introduction. In June 1996, CPSC released the results of a project on Youth Baseball Protective Equipment. The aim was to develop information for the general public about what types of available protective equipment could prevent or reduce the severity of baseball-, softball-, and tee-ball-related injuries and deaths to children ages 5-14.

Methods. Data on baseball-related (defined to include baseball, softball, and tee-ball) deaths and injuries to children ages 5-14 were collected and analyzed from all CPSC databases. In addition, a special study was conducted to determine the specific ways in which children were injured while playing baseball. A random sample of injuries to this age group was chosen from the NEISS cases for a telephone follow-up survey to determine whether the injury occurred in circumstances where protective equipment might reasonably have been expected to prevent the injury. A review of the published scientific literature evaluating currently available protective equipment was conducted. Existing (voluntary) standards for protective equipment were evaluated. Types of protective equipment under consideration were softer-than-standard baseballs and softballs, face guards for batting helmets, modified "safety" bases, and chest protectors for batters.

Findings. There were an estimated 162,100 baseball-related emergency room-treated injuries to children ages 5-14 in 1995. Results of a special study of baseball injuries to children indicated that the most common cause of injury was ball impact, which accounted for 88,700 injuries, 55 percent of the total injuries. 88 baseball-related deaths to children ages 5-14 were identified between 1973 and 1995, an average of about 4 deaths per year. 68 of these deaths were due to ball impact. Of these 68, 38 were ball impact to the chest, and 21 were ball impact to the head, and 9 were to other areas.

Softer-than-standard baseballs and softballs are intended to reduce the risk of ball impact injury, particularly ball impact injury to the head. Ball impact to the head/neck region accounted for 54 percent of the emergency room-treated ball impact injuries in the CPSC special study, or 47,900 injuries. A CPSC-funded expert review of the applicable industry standard (National Operating Committee on Standards for Athletic Equipment (NOCSAE) "Standard Method of Impact Test and Performance Requirements for Baseball/Softball Batter's Helmets, Baseballs and Softballs") concluded that softer-than-standard balls which meet the standard are generally safer than traditional balls in terms of risk of ball impact head injury. Limited findings from the special study tended to support the effectiveness of softer balls in reducing the risk and severity of head impact injury.

The available scientific literature on the ability of softer-than-standard balls to protect against chest impact death has been controversial. The only published articles (a series of three articles) concluded that softer balls (and chest protectors for batters) increased the risk of chest impact death. CPSC funded an expert review of these articles which concluded that the biological and biomechanical models used to mimic chest impact death in children were not accurate. Therefore, CPSC staff concluded that the effect of chest protectors and softer balls on the risk of chest impact death remains undetermined at this time.

Face guards for batting helmets are intended to protect the batter's face from being hit by the ball. There were an

estimated 59,400 emergency room-treated facial injuries to children ages 5-14 associated with baseball in 1995. Facial injuries constituted 50 percent or more of total injuries for each year of age through age 9. Overall, about 74 percent of the facial injuries to 5-14 year olds were ball-impact injuries (44,000 injuries). Within this group, about 80 percent (35,200 injuries) occurred during organized play; 11 percent of these (or 3,900) injuries occurred to batters. Although no published scientific studies were found evaluating face guards, staff review of the consensus voluntary standard for face guards (ASTM F910 "Standard Specification for Face Guards for Youth Baseball") concluded that products meeting this standard would be effective in preventing facial injuries. Findings from the CPSC special study supported this: none of the injured players who was wearing a face guard reported a facial injury.

Modified or "safety" bases are intended to reduce the risk of injury due to sliding into the base. About 8 percent of the emergency room-treated baseball injuries in 1995 were due to sliding (13,000 injuries). Of these, about 63 percent (8,200 injuries) were due to contact with the base. Of these, about 80 percent (6,600 injuries) occurred during organized games or practices. About 53 percent of all base-contact sliding injuries occurred to girls, compared to 36 percent of overall baseball injuries. Two published scientific studies found that the safety bases tested reduced the risk of injury. One of the safety bases tested and found effective is available in varying grades based on age, sex and skill level. CPSC staff concluded that safety

release bases would be effective in reducing base contact sliding injuries in children. Because the proportion of girls injured sliding into base was higher than expected, staff concluded that an age- and sex-graded release base may provide the highest level of protection.

Chest protectors for batters are intended to protect the heart (and, in some designs, the chest wall and other internal organs) from ball impact injury. Ball impact to the chest was the most frequently reported cause of baseball-related death in children, accounting for 38 of the 88 reported deaths from 1973 through 1995. Expert review of the available scientific literature indicated that the way in which baseball impact to the chest causes death is unknown at the present. As mentioned above, CPSC staff concluded that the effect of any equipment on the risk of chest impact death remains undetermined at this time.

Conclusions of the Protective Equipment Project. There were an estimated 162,100 baseball-related injuries to children ages 5-14 treated in hospital emergency rooms in 1995. About one-third of these injuries (more than 58,000 injuries) occurred in circumstances where available protective equipment could be expected to help reduce the severity of the injury, or eliminate it altogether. The 47,900 injuries that involved ball impact to the head/neck area might have been lessened in severity or prevented by the use of softer balls. The 3,900 facial injuries that occurred to batters in organized play could have been prevented by the use of face guards. And the 6,600 base-contact sliding injuries that occurred in organized play might have been

lessened in severity or prevented by the use of safety release bases.

Discussion and Conclusions

In considering how to address the estimated 162,100 annual injuries and 3 to 4 deaths per year to children ages 5-14 associated with playing baseball, softball and tee-ball, the CPSC staff relied on its data collection and analysis capability to describe the nature and extent of the hazards associated with this sport in this age group. Relevant product standards and published scientific literature on the available protective equipment were evaluated to determine whether currently available equipment would address the hazard patterns seen in the death and injury data.

CPSC data are available to any researchers interested in similar hazard analyses. CPSC staff is also interested in collaborating where possible to help in reducing deaths and injuries in sports.