NOCSAE

REPORT

Fall 2003

FAQs and Facts

How often must a helmet be reconditioned or recertified?

There is no requirement in our helmet standards for the frequency of recertification or reconditioning. The NOCSAE seal on a new helmet means that the manufacturer has certified that the new helmet meets the standards when it was manufactured. The need for reconditioning will vary due to usage and wear. It is recommended that each school or organization utilize a system to inspect their helmets on a regular basis and make their reconditioning decisions based on that schedule.

Isn't there a special standard for youth helmets?

No. The NOCSAE standard is the same for all helmets in the same sport; it does not distinguish between youth and adult helmets. Junior high school player's helmets meet the same standard as those used by the pros.

Which helmet is the best for preventing concussion?

The NOCSAE standard uses pass/fail criteria so there is no determination as to which helmet is "better." The NOCSAE standards (as well as all helmet standards in the world) were developed to reduce the risk of severe brain injury and were not created as concussion prevention standards. We believe the standard does substantially reduce the number and severity of concussions. We continue to research and study the mechanisms of concussion in order to understand better how they occur and what may be done to reduce the likelihood of a concussion.

Who are the members of NOCSAE?

NOCSAE is comprised of a board of directors from all areas of sports, including sports medicine, school administration, athletic training, equipment reconditioning, and manufacturing. These directors serve without charge or pay, and receive only their expenses for attending meetings. Most of the directors are selected by their respective organizations such as the American College Health Association, Orthopedic Society for Sports Medicine, National Athletic Trainers

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INSIDE

Test Equipment

For those who do not have occasion to use the NOCSAE test equipment on a regular basis it may seem quite strange when you explain that the process involves dropping, or impacting a humanoid headform to see how well a piece of protective equipment performs. The NOCSAE humanoid headform is among the most advanced human head surrogates available in the world today. The latest version of the NOCSAE headform updates the facial anthropometrics to more closely mimic a living human and to agree with the latest scientific data available. This was not a trivial matter, and at the same time new molds were created that allowed for an increase in durability of the head without giving up biofidelity, or it's ability to perform under impact loads as much like a living human as possible. This biofidelity comes in part from the materials used to create the fluid filled inner core (brain), the skull bones, and the skin to give the NOCSAE head

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Research News

NOCSAE funds research studies on a wide range of topics that are focused on the mechanism and epidemiology of sports injuries as related to athletic equipment. All institutions in the US are eligible to submit grant proposals. After review by a panel of national experts, the grant proposals are considered for funding by the NOCSAE Board based upon their scientific merit, as judged by the reviewers, and on the Board's areas of interest. To date NOCSAE has funded over 30 grants for a total of more than $900,000. To submit a proposal for consideration of funding refer to the NOCSAE web page and contact the Research Director.

Currently, Dr. Frederick Mueller, University of North Carolina, is retrospectively analyzing the database from the National Center for Catastrophic Sports Injury Research. He will focus specifically on spinal and brain injuries to determine if there are gross patterns in the data that suggest avenues of prevention. Dr. Barry Maron, Minneapolis Heart Institute Foundation, is continuing his work to develop a better understanding of the precise circumstances and broad clinical spectrum of commotio cordis through the maintenance of the United States Commotio Cordis Registry. In the third currently funded study by NOCSAE, Dr. Erik Swartz, University of New Hampshire, is determining the efficiency of football helmet facemask removal following injury in various styles of helmets, facemasks and loop straps with three facemask removal tools.

NOCSAE has previously supported a variety of studies focused on concussions and the management of the concussed athlete. Cerebral concussions are seen in male and female athletes at all levels of competition. Head injury can result in fatality via Second Impact Syndrome (SIS) if an athlete experiences another blow to the head before the symptoms of the first injury are resolved. Approximately 300,000 sport-related concussions occur annually. The highest incidence rates have been reported in football, soccer, wrestling, and lacrosse. Concussions account for 30 percent of all injuries in ice hockey, and in some sports, women have significantly higher injury rates than men.

Dr. Ruben Echemendia, Pennsylvania State University, has evaluated the effectiveness of computer programs for detecting neurocognitive changes following cerebral concussion. Computer programs specifically designed to assess sports-related concussion may prove quite useful by providing an easily administered, reliable and efficient method of assessing concussion and criteria for return-to-play. If successful, these programs will then be used widely among high schools and colleges at minimal expense.

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Dr. Kevin Guskiewicz, University of North Carolina, has conducted a randomized controlled trial to evaluate an intervention designed to improve the detection and management of mild head injury in athletes. The intervention is comprised of applying two new, objective diagnostic tools: the Balance Error Scoring System (BESS), which assesses postural stability (balance) and the Standardized Assessment of Concussion (SAC), which assesses cognitive function. The study extends laboratory research and takes advantage of new technologies for testing. It is designed to validate a safe, practical and cost-effective method for assessing concussion and

preventing the serious effects of subsequent head injuries among high school athletes.

While the cause of concussion has been associated with the acceleration/ deceleration of the head, the exact mechanism and levels of acceleration that result in concussion are unknown. A recent study lead by Dr. Stephen E. Olvey, University of Miami, was aimed at developing the use of triaxial accelerometers to measure head motion and energy exposure in automotive racing. If successful, it is hoped that this technology could be applied to sports such as football and ice hockey.

Commotio Cordis is the phenomenon by which relatively innocent appearing chest blows produce instantaneous cardiac arrest without structural injury to the chest wall or heart. With NOCSAE funds, a national database has been developed and the actual cause of this tragic injury has been identified. The US Commotio Cordis Registry, developed and managed by Dr. Barry Maron of the Minneapolis Heart Institute Foundation has now compiled an extensive (128) case review of commotio cordis events, most which have occurred in young athletes aged 3 to 18. Of note is that seven cases involved goalies and catchers wearing chest protectors.

In 1998, with support from NOCSAE, Dr. Mark Link of the New England Medical Center discovered the cause of commotio cordis. He and his coworkers found that if an impact occurs during a 20-millisecond window on the up-slope of the T-wave of the cardiac cycle, ventricular fibrillation (VF) can result. Dr. Link has since demonstrated that safety baseballs (softer than standard baseballs) decrease, but do not eliminate, the risk of commotio cordis. Currently, with NOCSAE support, Dr. Link is evaluating whether and what type of chest wall protective devices will protect youths from commotio cordis. In addition, these researchers hope to ascertain whether automated external defibrillators (AEDs) may be appropriate for use in the pediatric population. This study will add much needed public health information regarding the utility of chest wall protectors and AEDs in pediatric sports.

Nationally, there is an on going dispute regarding the safety of wood versus metal baseball bats. This debate is based primarily on anecdote, as there is little scientific data available on the many aspects of the issue. One of the central questions in this debate is whether or not fielders have enough time to react to the increased batted ball speeds associated with metal bats. A recent study by Dr. Mark Grabiner, University of Illinois, is designed to determine the maximum, safe ball exit velocity for boys and girls in the age group 8-16 years based on physiological criterion. Their approach to achieving this purpose is to experimentally determine the expected minimum response times of young athletes performing a simulated baseball-fielding task. ▮

Further details on these and other research studies supported by NOCSAE can be found at http://www.nocsae.org.

NOCSAE Standards

NOCSAE standards and proposed standards are available on the Web site (http://www.nocsae/.org) and can be easily downloaded. The NOCSAE standards are broken out into test methods and performance criteria based on the activity. If you want to know how a helmet is tested to a NOCSAE standard you need at least two documents. For example, to get the NOCSAE standard for football helmets, you will need document ND001-00m03-00 STANDARD DROP TEST METHOD AND EQUIPMENT USED IN EVALUATING THE PERFORMANCE CHARACTERISTICS OF PROTECTIVE HEADGEAR and document ND002-98m03 STANDARD PERFORMANCE SPECIFICATION FOR NEWLY MANUFACTURED FOOTBALL HELMETS. To provide a test lab with instructions to insure that they are doing the testing as intended, document ND 003-96m03 LABORATORY PROCEDURAL GUIDE FOR CERTIFYING NEWLY MANUFACTURED FOOTBALL HELMETS would also be helpful. The logic of this approach is that a small number of basic test methods can be applied to a large variety of product with minor modification.

The number system for naming the NOCSAE standards is an indicator of the standards vintage. NOCSAE Document ND 001-00m02 means it is document number 001, revised in or created in 2000 and modified in 2002. At the back of each document is a revision and modification history. Revisions include substantial changes in the intent of the standard and require Board approval, whereas modifications are purely technical issues or clarifications.

Currently NOCSAE is in the final stages of a major revision to the Lacrosse headgear documents, a new Hockey headgear document series and has proposed standards for shin guards used in Soccer, headgear used in Polo and a new method for testing baseballs and softballs.

While in proposed status, NOCSAE invites and encourages written comments from all interested parties regarding the scientific or technical aspects of the proposed standard. Questions about NOCSAE standards can be directed to the Technical Advisor. ▮

Highlights from Board Summer Meeting

General

• Date and location of future Board Meetings will now be posted on the web site.

• A list of NOCSAE licensees will now be provided in the web site.

• NOCSAE goes abroad! The Board approved a request for a foreign licensee.

• Licensees' fees will be increased as earlier proposed on January 2004. Penalties will be levied against late licensee payments. Contact the Executive Director for details.

• The January 2004 meeting will be held on January 16 and 17, 2004 in Orlando, FL. Consult Web site for updates.

Standards

• The Board reiterated that unassembled products bearing the NOCSAE logo can not be distributed outside the manufacturer's facility.

• A governing body has requested Softball/baseball batters' facemask standard and NOCSAE will move forward in developing a proposed standard.

• The Soccer shin guard and Hockey helmet standard will move forward in proposed status, and as such, will be voted into final status at the January, 2004 Board Meeting.

• The Lacrosse helmet standard will remain in proposed status for an additional six months to allow further consideration and comments on the level of multiple impact tests.

• Lacrosse helmet facemasks may be certified separately from the helmet, but must identify the specific models of helmet with which the facemasks can be used. This implementation is similar to that required for baseball/softball catchers' helmets.

Research

• Three preliminary applications were voted to submit full proposals for consideration of funding at the January 2004 Board Meeting.

Testing

• Funding to produce additional NOCSAE headforms with the capabilities of measuring both linear and rotational accelerations was approved.

• The new data acquisition system HITS is now available. Contact the Technical Advisor for details. ▮

FAQs and Facts

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Association, American Medical Society for Sports Medicine, American Football Coaches Association, Sporting Goods Manufacturer's Association, Athletic Equipment Managers Association, and the National Athletic Equipment Reconditioners Association.

How is NOCSAE funded and what happens to the money it receives?

NOCSAE is a charitable non-profit organization under IRS section 501(c) (3). It receives funding through gifts and grants, as well as from royalty fees paid from license agreements it has with manufacturers of equipment that meet the NOCSAE standard. These license agreements allow licensees to use our logos, seal and name on their products in exchange for their agreement to follow our standards and certify their products to our standards. The fees received are used to fund research in the areas of sports injury and prevention and to fund operating expenses associated with the research program, education (e.g. Newsletter and Web Site), technical support for licensees, development and maintenance of the NOCSAE Standards, legal and daily operations. NOCSAE does not underwrite the development of new products. Since 1994, NOCSAE has committed more than $900,000 in research grants and contracts. The results of this research can be found at the NOCSAE Web site, www.nocsae.org.

What's next for NOCSAE?

We are working on the details of a new cooperation with the National Football League for research into football concussions and related standards. An extensive multi-year investigation into concussions in the NFL has recently been completed and has generated some new and exciting impact data. We are looking forward to investigating how this new information might best be utilized in our standards and testing protocol.

In addition, we have published proposed standards for soccer shin guards, hockey helmets, and a revision to the lacrosse helmet standard (refer to the section on Standards in this newsletter and to the Web page). ▮

Recertification/ Reconditioning

NOCSAE standards for several types of headgear include test methods, performance criteria and procedural guides for use by reconditioners who recertify headgear. The National Athletic Equipment Reconditioners Association (NAERA) has a long and close relationship with NOCSAE that fosters ongoing compliance with NOCSAE standards as equipment is subjected to the rigors of use season after season. The reconditioners follow a version of the NOCSAE test that is similar to the manufacture's protocol, but a shortened version. They maintain a database of information indicating how helmets have been maintained as outlined in the NOCSAE manual, available by contacting the Executive Director.

NAERA members have been beta testing new software and hardware used for data acquisition called HITS (Helmet Impact Test System). These custom-made computer based setups have shown themselves to be reliable and repeatable. While some beta sites have experienced some hardware issues and one site found a major software bug, all reported problems have been addressed and the system is ready for wider distribution. To learn more about NAERA visit their Web site at http://www.NAERA.net. If you have technical questions regarding NOCSAE recertification contact the Technical Advisor. ▮

Test Equipment

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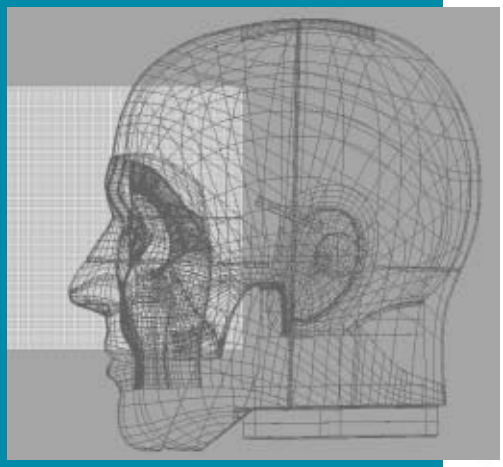
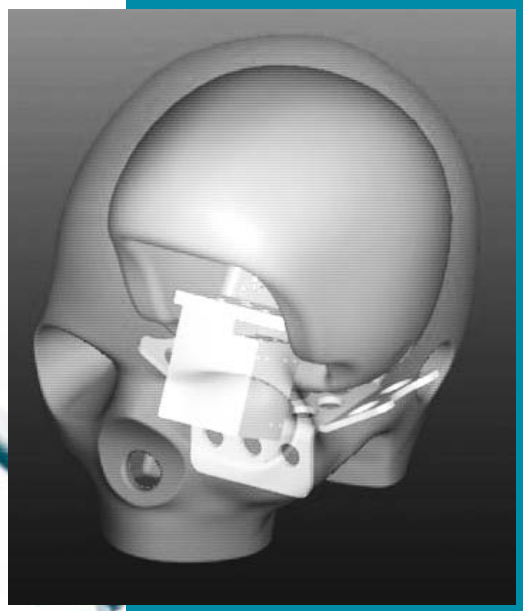
not only a realistic look but realistic performance as well.

The NOCSAE headform is available in three sizes and is used by NOCSAE licensees when certifying or recertifying products as meeting the NOCSAE standards. This range of sizes makes the headform even more unique when compared with other headforms that can be instrumented with up to nine accelerometers to predict the performance of various products in a wide range of test scenarios.



In addition, the headform is completely computer documented and as such has become a very useful design aid for those who build helmets. NASA and the US military are using this CAD data and the actual head to improve helmet performance, so are manufacturers of other types of helmets. NOCSAE licensees have long used the unique properties of even the earliest NOCSAE test heads to improve headgear performance.



The NOCSAE test criteria with its relatively high energies and lower pass fail limits make the NOCSAE standard one of the most demanding in the world.

NOCSAE continues to work with others including the NFL to further develop test protocols that it is hoped will lead to headgear with even higher performance.

The NOCSAE test system, and other technical issues relating to testing will appear in the Newsletter on a regular basis. If you have technical questions on the proper use or set up of any of the NOCSAE test systems please contacts NOCSAE's Technical Advisor. ▮

REPORT
is a publication of the
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Our mission: Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries.

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