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Face mask removal time of four face mask extrication devices

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FACE MASK REMOVAL TIME OF FOUR FACE MASK EXTRICATION DEVICES

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ABSTRACT

FACE MASK REMOVAL TIME OF FOUR FACE MASK EXTRICATION DEVICES

By Eric J. Fuchs

The problem of the investigation was to measure four football face mask removal devices on two types of face mask mounts to determine if any significant difference in time of extrication existed. The purpose of the investigation was to evaluate the effectiveness of face mask removal devices with respect to time required to remove a face mask. A pilot study was conducted to test and evaluate all procedures. A group of seven participants consisting of six certified and one non-certified athletic trainers were utilized in the actual study. The results, indicated the Kra-Lite IV® mount was harder to cut than the RS-System mount, the power screwdriver was better at removal of the Kra-Lite IV® mount than the anvil pruner, and the anvil pruner was better in removal of the RS-System, when compared to its removal time of a Kra-Lite IV® mount.

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CHAPTER 1

INTRODUCTION

The first step in any injury assessment is the primary survey, which consists of checking the victim's Airway, Breathing, and Circulation (ABC's) (American red cross standard first aid, 1991; Arnheim, 1989; Driscoli & Skinner, 1990; Grant, Murray, & Bergeron, 1990; Hafen & Karren, 1989; Halpern, 1991; Hochbaum, 1986; National safety council first aid and cpr, 1991; Putman, 1992). In football the possibility of needing to perform Basic Life Support (BLS), which consists of mouth to mouth resuscitation and/or cardiopulmonary resuscitation (CPR) (Grant et al., 1990; Hafen & Karren, 1989; Halpern, 1991; Hochbaum, 1986) could arise. The collision nature of football places athletes at risk to high impact forces capable of causing serious injuries. The equipment worn by football players is designed to protect and help prevent the athlete from sustaining injury, but not all injuries can be eliminated (Ellis, 1991). This protective equipment may become the cause of potential lethal conditions.

There are many causes of airway compromise other than a head or neck injury, i.e. heatstroke, asthma, anaphylactic shock, pneumothorax, punctured lung, and crushed/fractured

pharynx, which require supervised airway management. (Arnheim, 1989; Ellis, 1991; Halpern, 1991; Magee, 1992; Roy & Irvin, 1983). The football helmet face mask originally designed to protect the player becomes a possible death trap, in an injury requiring the establishment of an airway.

In most normal injury situations, the injured football player's ABC's can be assessed with the face mask on. The problem arises when the assessment reveals that the victim's airway is no longer functioning. This situation requires the primary care individual to establish an airway and start BLS. Time is crucial, since respiratory distress will lead quickly to cardiac failure, irreversible brain damage in four to six minutes, and even death (Grant et al., 1990; Hafen & Karren, 1989). For this reason, the athlete's face mask must be extricated rapidly.

A life threatening injury requiring airway management could occur at any time on the football field and a need to plan for it exists. Putman (1992) stated that all athletic trainers should "become familiar with all types of helmets that your teams use and learn how face masks are attached to various helmets" (p. 172). Knight (1992) felt that a coach, an athletic trainer, a team physician or other medical care professionals covering football games have a moral and

professional obligation to know how to remove the face mask quickly in order to administer BLS services.

Justification for Study

Putman (1992) provided several possible devices to consider for football helmet face mask removal: 1) an electric cordless screwdriver, 2) an electrician wire cutter to cut plastic face mask clips, and 3) a manual phillips head screwdriver. Based on his article, several professionals responded with their own views regarding possible face mask extrication devices. Scheiss (1992) advocated the use of an anvil pruner. Baker (1992) stated a special wrench was needed for the removal of her high school's football face masks. The use of bolt cutters has been advocated by many sports medicine professionals (Arnheim, 1989; Halpern, 1991; Magee, 1992; Roy & Irvin, 1983). Putman (1992) stated that bolt cutters are still needed on older single and double bar face masks. Helmet removal is an option, however, Long, Reid, Sweeney, and Johnson (1980) stated "never remove a helmet before or during transport to the hospital" (p. 119). The American Academy of Orthopaedic Surgeons (AAOS) (1987), Denegar and Saliba (1989), and Hafen and Karren (1989), stated that in most instances the helmet itself does not require removal

except when adequate airway management cannot be maintained or the helmet fit is too loose for proper cervical spine immobilization.

There are many devices and techniques for football helmet face mask removal in the current literature. However, no studies were found to provide information regarding the effectiveness of the devices (i.e., time for removal with the device and the versatility of each device with regard to different football face masks) on various types of helmets and face masks.

Statement of Problem

The problem was to measure four football face mask extrication devices on two types of face mask support fasteners to determine if any significant difference in time of face mask extrication exists. The primary purpose of this investigation was to provide information regarding face mask extrication device's capabilities with respect to time required to remove a face mask. The secondary purpose was to provide data to enable an athletic trainer to make an informed and appropriate selection of a proper face mask extrication device based on the helmets utilized by his or her football team.

Statement of Hypotheses

The study was designed to test the following null hypotheses:

1. No significant difference in face mask extrication time will be found between any face mask removal device when tested.

2. No significant difference will be found in face mask extrication time between the Kra-Lite IV® and Schutt® ArmourGuard™ face mask support fastener(s).

Assumptions

The following assumptions were made in order to complete this study:

1. All participants gave maximum efforts equal to those performed in the event of an actual injured athlete.

2. All participants answered the questionnaire form accurately and honestly.

3. The data collection procedures were equal on the basis of random assignment of the devices.

Delimitations

The following delimitations were imposed by the study:

1. Four face mask extrication devices were selected for testing: 1) Manual screwdriver 2) Anvil pruner 3) Trainer's Angel™ and 4) Electric cordless screwdriver.

2. Only six certified athletic trainers and one non-certified athletic trainer were used in device testing.

3. Two face mask support fastener types were utilized: 1) the Schutt® RS-System and 2) theKra-Lite IV® mounting system.

4. The study was conducted from February, 1994 through May, 1994.

5. There was no individual wearing the football helmet when the extrications were performed

Limitations

The following limitations were identified with regard to this study.

1. Previous personal experience of the participants with any of the devices was not controlled.

2. The hand strength of each individual was not controlled.

3. Seven participants were used.

Definition of Terms

The following terms were defined to ensure consistency of interpretation throughout the study.

Athletic Trainer - An individual who has obtained certification by the National Athletic Trainers Association (NATA).

Biological Death - Grant, Murray, and Bergeron (1990) defined biological death as "when the brain cells begin to die" (p. 112).

Cardiac Arrest - Grant, Murray, and Bergeron (1990) defined cardiac arrest as the state "when the heart stops circulating blood or stops beating entirely" (p. 138).

Clinical Death - Grant, Murray, and Bergeron (1990) defined clinical death as the state "when breathing and heart action stop" (p. 112).

Face mask Removal/ Extrication - Face mask removal and /or extrication is the freeing of the lateral support fasteners of the face mask and flipping it away from the face.

Kra-Lite IV® face mask mount system - a hard rigid plastic polymer used to mount a Kra-Lite IV® face mask to a helmet.

Non-Certified Athletic Trainer - An individual who is currently working toward fulfillment of the **NATA** Board of Certification requirements to become eligible for the **NATA** exam.

Schutt® ArmourGuard™ RS-System - is a specially designed, molded polyurethane loop strap used with thread locking screws to mount a face mask to a helmet.

Summary

The literature discussed clearly provided examples of several plausible devices for face mask extrication. No studies were found which dealt with the effectiveness and capabilities of the various face mask extrication devices. This study tested four proposed extrication devices to see if there was no significant difference in face mask removal time when using the devices to remove two specific support fasteners the Schutt® RS-System and the Kra-Lite IV® system.

CHAPTER 2

REVIEW OF LITERATURE

This chapter contains a review of literature pertaining to the study and it is presented in the following sections: 1) Emergency airway management, 2) Physiological reasons for rapid emergency airway management, 3) The face mask and support fasteners, 4) Face mask extrication, and 5) Summary.

Emergency Airway Management

The American Red Cross (1991) stated that the first step in assessing any victim is the primary survey consisting of the ABC's (A= Airway, B= Breathing, and C= Circulation). This is crucial, since an adequate airway assessment of an injured victim is vital for the determination of the appropriate method to resuscitate a patient (Arnheim, 1993; Grant et al., 1990; Hafen & Karren, 1989; Halpern, 1991; Hochbaum, 1986; Roy & Irvin, 1983).

The airway is assessed by the "Look, Listen, and Feel method" according to the American Red Cross (1991). If the victim is not breathing the evaluator must secure an airway using the head tilt-chin lift maneuver or the jaw thrust maneuver (Arnheim, 1993; Grant et al., 1990; Hafen & Karren, 1989). The American Red Cross (1991) recommended the

initiation of artificial respiration immediately and CPR if no pulse was found.

Artificial respiration requires the rescuer to open the patient's airway and provide ventilation. Other more advanced airway management techniques like mouth to mask, bag-valve mask, mask to endotracheal tube resuscitation may be performed by properly trained, certified, and/or licensed medical practitioners. These procedures were not discussed in full detail since only a trained or certified individual should perform mouth to mouth resuscitation, CPR, BLS, or Advanced Life Support - (ALS) procedures (Grant, et al., 1990; Hafen & Karren, 1989).

Halpern (1991) stated that "in any traumatic incident, especially one that occurs on the playing field, rapid evaluation, and management are necessary for a good prognosis ... The initial evaluation and treatment determines the [patient's] ultimate outcome" (p. 833). He described a step-by-step assessment plan for an injured athlete that used the pneumonic "A.B.C.D.E." This stands for Airway, Breathing, Circulation, Disability, and Exposure. This primary survey method incorporates the ABC's with an assessment for any D - disability or E - exposure. A limited neurological exam by assessment of consciousness, i.e., pupils to see if they are PEARL - Pupils Equal And

Reactive to Light, and motor responses for assessment of disability (Halpern, 1991). Exposure calls for the assessment of the torso and extremities for bleeding, fractures, and contusions. The vital signs (blood pressure, respiration, pulse rate and character, and temperature) are assessed at this time (Halpern, 1991).

The American Red Cross, a division of the National Red Cross, teach the same emergency airway management techniques world wide (Personal communication, American Red Cross San Jose Chapter, 30 November, 1992). These techniques would be performed the same on a football player as any other patient. These airway management techniques, CPR, BLS or ALS could not be implemented on a football player until, the football face mask is extricated.

Physiological Reasons for Rapid Emergency Airway Management

Cells depend on the circulatory system to provide oxygen and remove waste products in the human body. The respiratory system provides and removes the oxygen and waste products in the circulatory system respectively. The heart circulates the blood through an extensive network of arteries, veins, capillaries, and venules (Donatelle, Davis, & Hoover, 1991; Grant et al., 1990; Hafen & Karren, 1989; Insel & Roth, 1988). Lack of oxygen results in a rapid

dysfunction of the body's vital organs (Grant et al., 1990; Hafen & Karren, 1989).

According to Hafen and Karren (1989) and Grant et al. (1990), within seconds of respiratory failure, the blood becomes deprived of oxygen and all remaining oxygen in the lungs is depleted. The lack of oxygen results in the body's tissues and organs, critically the heart and brain, from receiving an adequate supply for their normal function.

Grant et al. (1990) and Hafen and Karren (1989) indicated that brain cells begin suffering from ischemia in seconds and die in minutes. The cardiac control centers in the brain are among the first cells affected by this ischemia. This causes the cardiac muscle to lose rhythmic control combined with a lack of oxygen and nourishment of the cardiac muscle leading to cardiac arrest. In four to six minutes of cardiac arrest irreversible brain damage occurs and within ten minutes biological death can result

Hafen and Karren (1989) stated that "the smooth functioning of each organ [Brain, Heart, and Lungs] is crucial to the other two, and ultimately the whole system. If one organ fails, the other two will follow" (p. 115). The intervention of CPR, BLS, and/or ALS all attempt to provide an oxygen supply to the brain and vital organs. This artificial ventilation of the lungs and mechanical

pumping of the blood are administered to sustain life, limit the amount of secondary injury to body tissues, and prevent brain damage. These methods must be rapidly implemented in order to be successful.

In the case of an airway compromised football player, a rescuer must rapidly implement artificial life support techniques to prevent clinical or biological death (Hafen & Karren, 1989). The football face mask must therefore be extricated within seconds, since in only minutes cardiac arrest will occur and irreversible brain damage or biological death could result.

The Football Face Mask

The concept of a face mask was around and developed prior to the development of the football helmet. The mask was used initially as a protective device after an injury to the face. This section provides a review of the evolution of the mask, face mask types and their structure, and support fasteners used to secure face masks to helmets.

The earliest face mask utilized was a simple nose guard used in the early 1900's ("Evolution", 1980). The article stated, "during the 1940's and 1950's lineman often hand-crafted their own masks" (p. 56). During the 1950's the single bar lucite face mask was regularly employed by

players as facial protection. Dr. Marietta made a full-face lucite mask in 1948 and it was utilized in 1954 when a player broke his jaw ("Evolution", 1980). The lucite face mask was outlawed during the 1950's, since the mask shattered often on impact, lacerating tacklers and ball-carriers. Following the ban on lucite masks, players switched to a single bar mask, which was the common mask worn in the 1950's and 1960's ("Evolution", 1980).

According to "Evolution" (1980), the bird cage mask was developed and designed for use by lineman. The single and double bar at the time were worn by receivers, ball-carriers, and/or quarterbacks. The article stated that "no rule exists that a player must wear a mask; however, the clubs themselves usually require all players to use one" (p. 56).

There are three face masks marketed for football players at the present the Kra-Lite IV®, Schutt® ArmourGuard™, and the Z-Bar™ face masks (Schutt®, 1993; AIR®, 1992 & Riddell®, 1993). Each mask was developed specifically for either a Riddell® or an Athletic Helmet Incorporated (AHI) helmet.

The Kra-Lite IV® and the Z-Bar™ masks are manufactured by Riddell® for their helmets. The Kra-Lite®

mask was designed in three models: 1) MB-2 primarily worn by quarter backs, receivers, and defensive backs, 2) MB-5 utilized by full backs, tail backs 3) MB-7 utilized by lineman and nose guards (Riddell®, 1993). The Kra-Lite IV® mask is an engineered thermoplastic. This mask eliminates metal exposure problems, lightens the player's helmet system by a half pound, and maintains its structural integrity under the severest usage (Riddell®, 1993). The Kra-Lite IV® mask is secured to a helmet specifically developed for this face mask, which must be double strapped on both side mounting locations (Figure 1) (Riddell®, 1993). The support fasteners used are constructed out of a hard rigid plastic polymer (Figure 2).

Figure 1: A Mounted Kra-Lite IV® Face Mask.

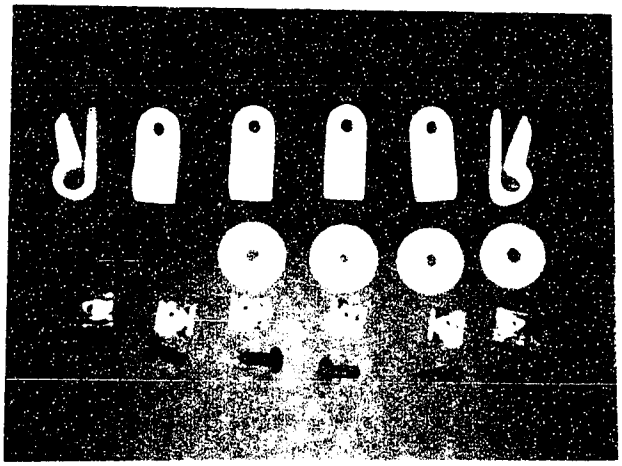

Figure 2: The Riddell® Kra-Lite IV® Support Fastener and Hardware.

Riddell® stated the Z-Bar™ mask contains "the toughest carbon core mask ever made" (Riddell®, 1993, p. 10). This mask is constructed of super strength carbon steel coated with Riddell's® exclusive DuraTuff™ plastic polymer (Riddell®, 1993). The DuraTuff™ "increases impact and abrasion resistance by as much as 100% over conventional vinyl coatings" (Riddell®, 1993, p. 10). This face mask is designed in eleven models. This face mask utilizes a single support fastener for its lateral attachments and superior attachments.

Athletic Helmet Inc. utilizes the Schutt® Manufacturing Company's RS-System with the AIR® Helmet. The

RS-System consists of a face mask and a patented attachment mechanism (Figure 3) (AIR®, 1992). The face mask is constructed from steel wire welded into specifically designed frames and coated with vinyl to resist chipping and abrasions (AIR®, 1992). The Schutt manufacturing company makes forty different face mask models: sixteen for oral protection only, four for nose and oral protection, sixteen for jaw and oral protection, and four for nose, jaw, and oral protection. The RS-System (Figure 3) face mask support fasteners are made of molded polyurethane. These support fasteners are placed backwards to secure the face mask to the helmet (Figure 3). This placement and the molded polyurethane structure of the support fastener allow it to attenuate impact forces (AIR®, 1992; Schutt®, 1993). The hardware utilized in the RS-System is shown in Figure 4.

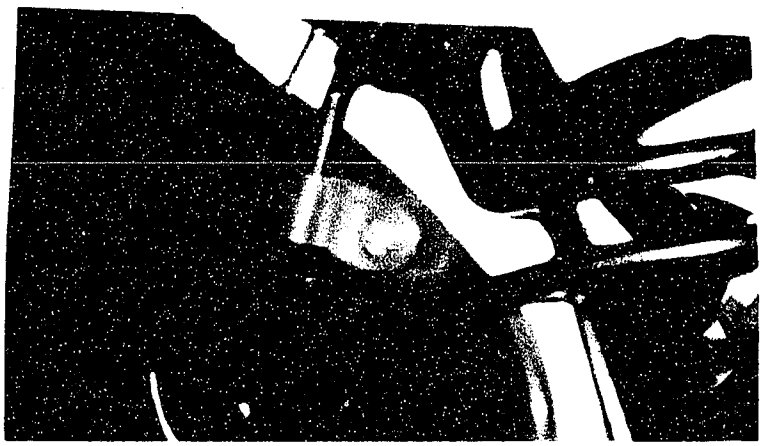

Figure 3: The Schutt® RS-System.

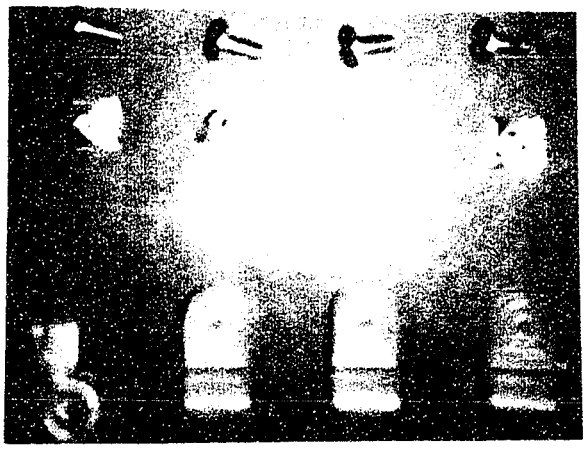

Figure 4: The RS-System Hardware.

The face mask was first conceived in the 1900's to either protect an area of the face from injury or prevent re-injury of a current facial injury. Today's face mask in addition to protecting a player from facial trauma helps to attenuate forces decreasing stresses placed on the head and neck. The face masks are designed strong, yet light in weight to decrease fatigue of neck muscles resulting in better performance. This facial protector developed by medical practitioners early on can become a potential death trap. The reviewed literature demonstrated face mask and support fastener systems currently provide no manual release mechanism for rapid access to a football player's airway.

Face Mask Extrication

Ellis (1991) stated the football face mask is unique in that it attaches either directly or indirectly to the helmet and does not provide a manual release mechanism. Ice hockey helmets are designed to be released manually and swing away or do not have a face shield making rapid airway management simple. The lacrosse helmet is similar to the football helmet in that the mask is fixated to the helmet shell. Denegar and Saliba (1989), Hafen and Karren (1989), and Long et al. (1980) recommended that a football helmet or any helmet not be removed until the patient is in the hospital unless the helmet fit is too loose for adequate spinal immobilization or an adequate airway cannot be established. If the helmet is not removed, the face mask must be extricated to allow for adequate airway management.

For many years the use of bolt-cutters has been recommended for face mask removal (Arnheim, 1993; Magee, 1987; Roy & Irvin, 1983). Recently, Arnheim (1993) and Magee (1992) advocated the uses of a manual screwdriver or cordless electric powered screwdriver as acceptable alternatives to bolt-cutters. This new line of thought is probably most associated with the development of newer face mask support fasteners. The face masks are no longer bolted

to the helmet. Plastic clips fasten the face mask to the helmet and may be removed with a screwdriver (Putman, 1992).

Putman (1992) stated that removal of the football face mask "is the first step in providing emergency care of an athlete who requires rescue breathing or cardiopulmonary resuscitation [CPR]" (p. 170). He found bolt-cutters and other sharp instruments are used by current sports medicine practitioners for face mask extrication.

According to Putman (1992), the use of sharp instruments presented two hazards: 1) The device could slip and cut the rescuer or 2) cut the patient. The alternative methods proposed by Putman (1992) were based on the removal or cutting of the face mask support fasteners. A manual or rechargeable screwdriver with the appropriate tip or heavy duty electrician wire cutters are advocated. Putman (1992) pointed out several associated problems with the manual screwdriver, electrician's wire cutters, and the electric screwdriver. Either screwdriver may not work, since often the metal hardware used in attaching the plastic clip to the helmet rusts together due to the harsh environmental conditions faced by a football helmet. The plastic clips are very difficult to cut especially as they, "become harder and less pliable as a result of exposure to weather, sweat, and dirt" (Putman, 1992, p. 107).

Putman (1992) mentioned four advantages of using either screwdriver or heavy duty electrician wire cutters: 1) minimal instruction time is required for learning and practicing face mask extrication with the devices; 2) there is minimal chance of cutting the athlete, athletic trainer, or other rescuer; 3) the tools are available at low cost, and 4) all are portable.

Putman (1992) recommended the following face mask extrication technique:

> 1. Correctly position the athlete on his or her back.
> 2. One athletic trainer must stabilize the athlete's head and neck by securing the helmet. To do this, place the index fingers or thumbs in the helmet earholes and hold tightly...
> 3. With the head and neck stabilized another athletic trainer uses the screwdriver or wire cutters to free the face mask from the attachments next to the helmet earholes...
> 4. Free the face mask completely from its attachments to the helmet.
> 5. Swing the face mask away from the athlete's face for airway management... (p. 107)

Putman's 1992 article drew several responses from other professionals in the field of athletic training. In response to Putman's 1992 article, Knight (1992) and Clover (1992) agreed that every athletic trainer should be capable of removing a face mask in thirty seconds or less. Both Knight (1992) and Clover (1992) felt that the skill should be practiced several times a year by athletic trainers and non-certified athletic trainers in mock drills. Knight

(1992) pointed out that "the greatest CPR technician is of no value to a non-breathing player if the technician cannot get to the football player's mouth to administer rescue breathing" (p. 197).

Knight (1992) felt that every athletic trainer covering football is morally obligated to know how to remove a football face mask rapidly to administer BLS when needed. Knight (1992) called for athletic training programs to ensure non-certified athletic trainers are given hands-on experience at rapid face mask extrication. Clover (1992) concurred with Knight (1992) that face mask extrication should be taught, practiced in drills, and be performed in thirty seconds or less.

Neither Knight (1992) nor Clover (1992) gave a rationale for the thirty second time frame they proposed. The two authors provided no data or information with regard to whether any of the extrication devices mentioned by Putman (1992) are capable of achieving face mask extrication in thirty seconds or less. Putman (1992) provided no data with regard to her advocated or non advocated devices' capabilities, performance time, or versatility.

Baker (1992) mentioned that a special face mask attachment device was found on her high school's helmet. The mechanism uses a rectangular-shaped washer/bolt to hold

the helmet screws in place and a special rectangular wrench is needed to hold the washer still during face mask removal. Baker (1992) suggested that "every athletic trainer be familiar with the removal procedures for their school helmets" (p. 198).

Scheiss (1992) in response to Putman's 1992 article, agreed that rapid face mask removal is an extremely important skill to know. Scheiss (1992) reiterated the potential problems limiting the performance of the proposed extrication devices stated in Putman's 1992 article. Scheiss (1992) stated one problem regarding the proposed extrication devices effectiveness not mentioned by Putman (1992). He discovered the manufactures, during reconditioning of the university's helmets, had added an additional reinforced rigid plastic clip over the standard rubber clip. Scheiss (1992) and his colleagues tried to extricate this type of face mask with the methods mentioned with no success. Scheiss (1992) recommended the use of an anvil pruner, which is portable, inexpensive, and easy to operate.

Summary

The need for rapid extrication of a football face mask in any kind of respiratory distress is supported by the literature. The literature showed the need for quick establishment of an airway and ventilation in an individual suffering from respiratory distress in order to prevent brain damage, clinical and/or biological death from occurring. Putman (1992), Knight (1992), Baker (1992), and Clover (1992) concurred that without the removal of the football face mask life support measures in the most basic or advanced forms cannot be implemented by even the greatest medical technician. The review of emergency airway techniques provided no examples or suggestions regarding methods to manage an airway on any patient whose airway is obstructed by any item, other than to remove the obstruction.

The literature provided several plausible face mask extrication devices recommend for use by several sports medicine practitioners (i.e. anvil pruners, electrician wire cutters, Trainer's Angel™, and etc...). The literature lacked data regarding the extrication devices' capabilities (i.e., face mask extrication time, reliability, and/or device versatility). This information would seem critical

for the establishment of an adequate extrication time, like the thirty-second time frame proposed by Clover (1992) and Knight (1992).

An athletic trainer could select a proper face mask extrication device and make an informed scientifically based selection of an appropriate extrication device. This study investigated five devices selected from the previously reviewed literature and the Trainer's Angel™ to see if any significant difference exists between each devices' extrication time capabilities with regard to two face mask support fasteners.

CHAPTER 3

METHODS OF STUDY

The problem of the investigation was to measure four football face mask extrication devices on two types of face mask support fasteners to determine if a significant difference in time of face mask extrication exists. In this chapter, the methodology and testing procedures used in the study are presented in the following sections: 1) Participant and model selection, 2) Participant and model instruction, 3) Instrumentation, 4) Pilot study, 5) Data collection, 6) Treatment of data, and 7) Summary.

Participants

A group of ten participants was recruited and consisted of five certified athletic trainers and five non-certified athletic trainers. Due to lack of funding two participants were eliminated from the study. One participant chose to voluntarily withdraw from the study. The certified athletic trainers were volunteers from the graduate athletic training curriculum program at San Jose State University. The non-certified athletic trainers were volunteers from the San Jose State University's graduate athletic training program. A sign-up sheet (Appendix A) for volunteer non-certified

athletic trainers was posted in the San Jose State University Athletic Training Room. A sign-up sheet (Appendix B) for volunteer certified athletic trainers was circulated in the graduate athletic training classes with the permission of the course instructors.

Participant Instruction

All participants were contacted in person or via phone by the investigator and asked to attend a forty-five minute instruction seminar given by the investigator. All participants who agreed to attend the seminar were asked to read and sign an informed consent form (Appendix C).

A biographical data collection form (Appendix D) was distributed to the participants at the seminar. The participants were given an opportunity to view each device tested. A demonstration and explanation of the operation of each device and its proper application was presented during the seminar. The participants were required to perform three practice face mask removals with the four devices on each support system prior to testing. The participants was given a five minute rest period between each extrication attempt. Each participant was then informed he or she would perform three timed extrications with each device on two

face mask support systems for the study and was again given a five minute rest between.

Instrumentation

The following six devices were obtained for evaluation in the study: 1) Electric powered phillips head screwdriver (Figure 5a), 2) Manual phillips head screwdriver (Figure 5b), 3) Bolt-cutters (Figure 6a), 4) Heavy duty electrician wire cutters (Figure 6b), 5) Anvil pruner (Figure 7a), and 6) Trainer's Angel™ (Figure 7b).

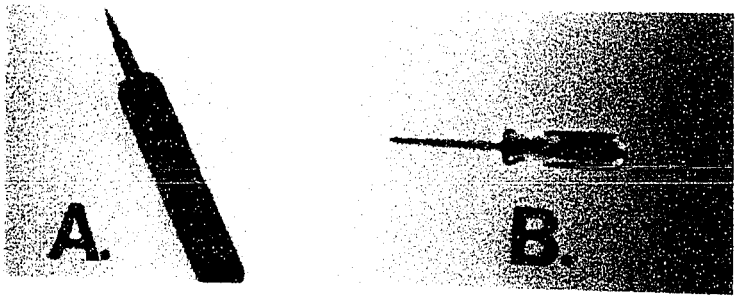

Figure 5: A) Electric Powered Screwdriver, B) Manual Screwdriver.

Figure 6: A) Bolt-Cutters, B) Electrician Wire Cutters.

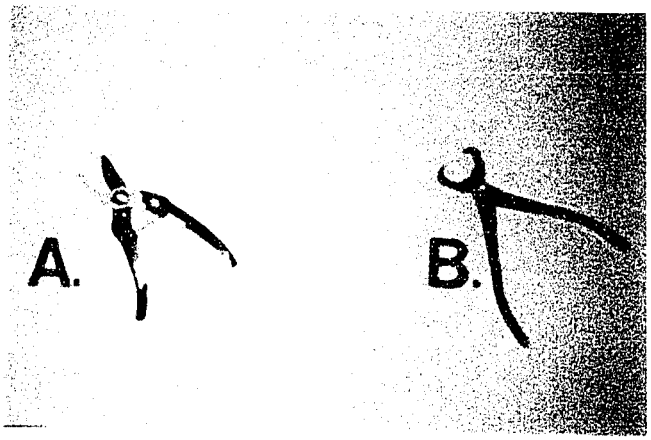

Figure 7: A) Anvil Pruner, B) Trainer's Angel™.

Two face mask support fastener systems were utilized in the study. The Schutt® ArmourGuard™ RS-System (Figure 8) to attach face masks to the Air® helmet. The Riddell® helmets were fitted with the Kra-Lite IV® face mask utilizing the Riddell® face mask support fastener (Figure 9) The support fasteners manufacture mounting instructions were followed for each attachment of face masks after an extrication was performed.

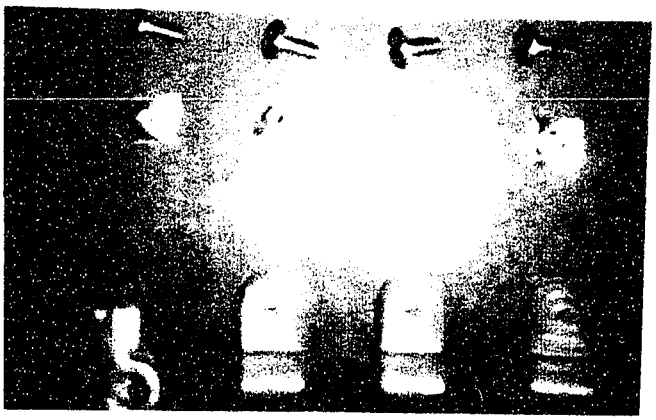

Figure 8: Schutt® ArmourGuard™ Fastener Hardware.

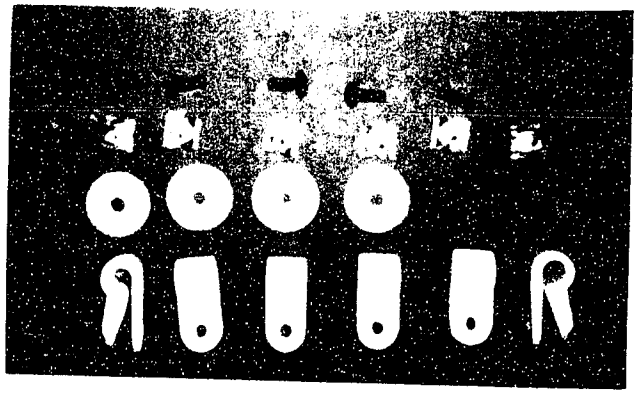

Figure 9: Riddell® Kra-Lite IV® Support Fastener Hardware.

Pilot Study

A pilot study was conducted for the purpose of becoming familiar with the test equipment and sequence. The investigator also attempted to determine the number of practice extrications a participant must perform prior to the actual data collection. This was to establish an equal level of proficiency among all participants with the six face mask extrication devices prior to actual data collection.

Participants were recruited from Sports Therapy Associates in Burlingame, CA. A volunteer sign-up sheet (Appendix E) was posted at Sports Therapy Associates in Burlingame, CA. Two participants, a male non-certified

athletic trainer and a female certified athletic trainer participated in the study. The participants were contacted in person by the investigator and asked to attend a twenty-minute study instruction seminar. The participants agreed to attend and completed a consent form (Appendix C). The participants were given an explanation and demonstration of the proper use of each device during the seminar. All participants completed a biographical data collection form (Appendix D).

Prior to conducting the study, the order of using the six devices was randomly assigned to each participant with a random number table (Thomas & Nelson, 1990). Each participant performed ten extrications with each device on both the Riddell® Kra-Lite IV® face mask support system and the Schutt® RS-System for face mask attachment. The RS-System was attached to an AIR® helmet and the Kra-Lite IV® to a Riddell® Kra-Lite IV® helmet shell according to the manufacture's guidelines. The helmet was stabilized by the investigator for extrication (Figure 10). The investigator timed each extrication attempt to the tenth of a second. The participant number, device, helmet type, support fastener type, and time to the 1/100 of a second was recorded on the pilot study data collection form (Appendix F). These were repeated for both participants.

Figure 10: Stabilization Technique Used to Perform Extrication.

The pilot study found the bolt-cutters and heavy duty electrician wire cutters were ineffective in extrication of the Kra-Lite IV® and the Schutt® ArmourGaurd™ RS-System. Neither participant extricated either face mask with the aforementioned devices in ten trials. It must be noted that the bolt-cutters were tested for their ability to extricate the face mask by cutting the face mask support fasteners and not the mask. The bolt-cutters may provide adequate face mask extrication if the face mask itself was cut. Due to the ineffectiveness of the bolt-cutters and wire cutters the devices were eliminated from the study.

A trend analysis was performed on the four devices, for which ten trial face mask extrication times were recorded.

The mean combined extrication times of all four devices for both face mask support systems for trials 1, 2, and 3 were 41:33, 34:89, and 31:53 seconds respectively. Trials 4, 5, 6, and 7 mean extrication scores remained consistent at 33:49, 33:24, 31:69, and 31:27 seconds respectively. Trials 8, 9, and 10 extrication mean scores were 25:40, 27:13, and 26:17 seconds respectively.

The results of the trend analysis support the following test protocol. Three face mask extrication trials were deemed adequate control for any learning effect. Each participant was required to perform three face mask extrications with the four devices on both face mask support systems prior to the timed test. The participants having completed the required three pre-test trial extrications were timed for three extrications with each device on each face mask support system. The mean score of the three timed extrications was used in the final statistical treatment for determination of the effectiveness of the four extrication devices. This was repeated for all participants who took part in the study.

Data Collection Procedures

Prior to the test, all participants for the study were randomly assigned the order in which they were to utilize the four extrication devices. A random number table was utilized for the assignment (Thomas & Nelson, 1990). The helmet was stabilized by the investigator between his legs in preparation for extrication. Each participant used each of the four devices to extricate a face mask by cutting the two lateral support fasteners in the case of the Schutt® RS-System and the four with the Riddell® Kra-Lite IV® face mask.

The investigator timed the participants' extrication with a Cronus Pro Survivor stop watch. Each participant took three timed trials and the time to the 1/100 of a second was recorded. The time was started once the helmet was stabilized. The time was recorded without rounding up the thousandth decimal place. The participant number, device, helmet type, support fastener type, and time were recorded on the data collection form (Appendix H). This procedure was repeated until all participants had completed three extrications with all four devices.

Statistical Treatment of Data

In this study there were two independent variables, the extrication device and the face mask support fasteners, and one dependent variable, extrication time. The study required the repeated trials of each device on two different face mask support fasteners. A two-factor (extrication x face mask fastener) analysis of variance (ANOVA) was utilized to analyze the data. A 4 x 2 factorial design with repeated measure was used. The level of significance for the data analysis was set at the .05 level. When statistical significance was found, a Tukey Post Hoc procedure was performed.

Summary

This chapter outlined the steps and procedures undertaken to evaluate whether a significant difference in extrication time among four face mask removal devices existed. The methods employed by this study tried to simulate real life situations when possible. These methods were employed to provide scientific information and evaluation of four face mask extrication devices with regard to the Schutt® ArmourGaurd™ and Riddell® Kra-Lite IV® face mask support fasteners and removal time.

CHAPTER 4

ANALYSIS AND DISCUSSION OF DATA

The effectiveness of four face mask extrication devices (anvil pruner, power screwdriver, Trainer's Angel™, and manual screwdriver) on two face mask mounting systems (Schutt© ArmourGaurd™ RS-System and the Riddell® Kra-Lite IV® system) were investigated. The literature provided no evidence of scientific examination of face mask extrication instruments. A 4 x 2 factorial design with repeated measure was applied. The null hypotheses were examined at the .05 level of significance. Additional descriptive statistics were calculated to provide demographic background for the study.

Participants

Seven of ten participants were included in the final data collection. One participant dropped out and funding ran out prior to the testing of two participants. Four participants were female and three were male. The participants' mean age was 24.71, each with a mean of 1.29 years of NATA certification. Six participants were certified, while one was a non-certified athletic trainer.

The mean number of football seasons worked by the participants was four. Five participants were graduate students and two were full-time athletic trainers. All participants were familiar with the Riddel® Kra-Lite IV® face mask and the Schutt® ArmourGuard™ RS face mask mounting systems. One participant had past experience removing a football face mask for an airway emergency. The testers demographic data was presented in Table 1.

Table 1: Participant Demographic Data.

ID#	Sex	Age	ATC	Years ATC	Worked Football	Years of Football
1	M	25	Yes	2	Yes	4
2	M	24	No	0	Yes	3
3	M	26	Yes	1	Yes	6
4	F	24	Yes	1.5	Yes	5
5	F	25	Yes	1.5	Yes	4
6	F	24	Yes	2	Yes	3
7	F	25	Yes	1	Yes	3
x		24.71		1.29		4

Statistical Analysis

A two-way ANOVA with repeated measure was performed to determine if any significant difference in face mask

extrication time existed between any of the four face mask removal devices and if any significant difference existed in face mask extrication time between the Kra-Lite IV® and Schutt® Armourguard™ face mask support fasteners. The means and standard deviations for each extrication tool across both face mask mounts are presented in Table 2.

Table 2. Means and Standard Deviations of Removal Devices and Face Mask Mounts.

	Kra-lite® Mount (1)	RS-System Mount (2)	Row Total
Power Screwdriver(D1)			
Mean	24.5271	13.9814	19.2543
Standard Deviation	5.1801	1.6161	6.5979
Trainer's Angel (D2)			
Mean	32.4671	11.3557	21.9114
Standard Deviation	34.4873	4.5359	26.0467
Manual Screwdriver (D3)			
Mean	42.1200	26.2900	34.2050
Standard Deviation	8.0569	3.6646	10.1796
Anvil Pruner (D4)			
Mean	56.9543	5.2043	31.0793
Standard Deviation	42.7108	2.9345	39.5845
Column Total	39.0171	14.2079	26.6125
	29.0093	8.4283	24.5899

Table 2 provides the mean extrication time in seconds for each device against both face mask mounting systems. The row total provides the mean extrication time in seconds for each device across both face mask mounting systems. The column total provides a mean extrication time for all devices against the Kra-Lite IV® mount and one for the RS-System mount.

The mean scores suggest the Kra-Lite IV® mount was more difficult to remove than the RS-System. The power screwdriver had the fastest mean extrication time with respect to the Kra-Lite IV® mount. The power screwdriver had the third fastest mean removal time, within eight seconds of the anvil pruner, when extricating the RS-System mount. The anvil pruner has the fastest mean extrication time with respect to the RS-System mount. The anvil pruner had the slowest mean removal time when used to extricate the more difficult Kra-Lite IV® mount.

The manual screwdriver mean extrication time was the slowest removing the RS-System and the second slowest removing the more difficult Kra-Lite IV® mount. The Trainer's Angel™ had the second fastest extrication time of the Kra-Lite IV® mount and the RS-System mount.

The mean extrication times must be viewed with caution since they are based on seven scores for each device across each mount.

The results of the two-way ANOVA on face mask removal devices and the face mask mounts are presented in table 3.

Table 3: Summary of the Two-Way ANOVA of Extrication Devices and Mounts.

Source of Variation	SS	DF	MS	F	P Value
Device (D)	2153.78	3	717.93	1.93	.161
Error 1	6696.52	18	372.03		
Mount (M)	8617.01	1	8617.01	20.64	.004
Error 2	2504.54	6	417.42		
D X M	3582.44	3	1194.15	3.65	.032
Error 3	5882.00	18	326.78		

The two-way ANOVA reported no statistically significant differences $p=.161$ with respect to the extrication devices. As a result, the null hypothesis that no significant difference in face mask removal time exists between any face mask removal device was accepted.

The analysis observed a statistically significant difference $p=.004$ with respect to the Kra-Lite IV® mounting system and the RS-System. Therefore, the null hypothesis

that there was no significant difference in extrication time between the two face mask mounting systems was rejected.

The analysis observed a statistically significant interaction within device and mount $\underline{p}$=.032. Therefore, simple main effect analyses were performed.

Table 4 provides the results of the simple main effect analysis. This analyzed the mean score of each device within the mount 1 column of Table 2 against one another and repeated the same procedure for the scores in the mount 2 column of Table 2.

Table 4: Simple Main Effect Analysis of the Devices Mean Score within Each Mount.

Sources of Variation	SS	DF	MS	F	Value
Device* w/in Mount(1)**	4089.62	3	1363.21	3.66	.032
Device* w/in Mount(2)❶	1646.60	3	548.87	1.48	.255
Error 1	6696.52	18	372.03		

* All four devices mean scores
** Mount one is the Kra-Lite IV® system
❶Mount two is the Schutt® ArmourGuard™ RS-System

The simple main effect analysis of devices within mount indicated an observed $\underline{p}$=.032 for all devices with respect to the Kra-Lite IV® face mask mount. The result showed a statistically significant finding with respect to the

extrication devices applied to the Kra-Lite IV® mount; however, none was found with respect to the RS-System.

A Tukey Post Hoc comparison was performed to determine where the significance was observed. The results of the post hoc comparison indicated that the power screwdriver was significantly better than the anvil pruner when extricating a face mask attached with a Kra-Lite IV® face mask mount. This would suggest an athletic trainer whose team utilizes the Kra-Lite IV® mount should consider carrying a power screwdriver on the field. The device must be charged daily to ensure proper peak capabilities. The harsh weather conditions often played in by football players may cause rusting of the face mask mounting stystem.

A simple main effect analysis was performed between mounts within each level of extrication device. Table 5 provides a summary of the analysis.

Table 5: Two-Way ANOVA Simple Main Effect Analysis with the Mean Score of Mount 1 Compared to Mount 2 within Each Device.

Source of Variation	SS	DF	MS	F	P Value
Mount w/in Power Screwdriver	389.24	1	389.24	.93	.372
Mount w/in Trainer's Angel™	1559.92	1	1559.92	3.74	.101
Mount w/in Screwdriver	877.06	1	877.06	2.10	.197
Mount w/in Anvil Pruner	9373.22	1	9373.22	22.45	.003
Error 2	2504.54	6	417.42		

The mount with anvil pruner comparison represents statistical significance $p=.003$. A comparison of means within the anvil pruner observed a faster extrication of a RS-System mount versus extrication of a Kra-Lite IV® face mask mount. As a result, an athletic trainer whose team wears helmets utilizing the RS-System should consider an anvil pruner for use in an emergency situation requiring face mask extrication.

Discussion

The two-way ANOVA with repeated measure resulted in a $p=.004$ with respect to the face mask mounting systems, while a $p=.161$ was found with respect to the extrication devices. This resulted in a failure to reject the first null hypothesis and the rejection of the second null hypothesis. The simple main effect analysis observed a $p=.032$ with regard to the devices cutting the Kra-Lite IV® face mask mount. The extrication of a face mask mounted with a Kra-Lite IV® system is harder than a RS-System mount.

In considering these findings, it is important to note the reviewed literature provided no statistical or other information regarding any face mask extrication device. The lack of data in the literature did not allow for a comparison of findings. Prior to establishing and/or recommending a universal face mask extrication time to be practiced (i.e., 30 second protocol recommended by Clover (1992) and Knight (1992)), a scientific evaluation must be performed.

The finding that the Kra-Lite IV® mount was more difficult to extricate could be attributed to two major factors. The Kra-lite IV® mount requires the extrication

of two mounts on each side for a total of four clips per extrication. The Schutt® RS-System requires only the removal and/or cutting of two mounts, one on each side of the helmet. The fact that no difference was found between each device and its extrication capability with respect to time is difficult to explain. It was surprising that no significant difference was found between the four devices when one considers the mean observed extrication time for the devices. The mean scores suggested a large difference existed in extrication capabilities between the devices. The low number of scores analyzed may affect the results of the study.

New face mask mounting systems for both types were utilized for the study. Mounting systems may become more rigid, due to exposure to the elements and/or the hardware may tend to rust causing the mounts to become very difficult to remove. Putman (1992) stated that plastic clips become harder and less pliable and the metal hardware utilized in the mounting systems rusts together due to harsh environmental conditions faced by a football helmet. This must be remembered when selecting an extrication device based on the study.

The Trainer's Angel™ an instrument marketed for emergency face mask removal was found to have no significantly better performance than the other devices utilized. The anvil pruner, which showed significance has two cutting edges. The Trainer's Angel™ may prove to be more effective if both edges were cutting surfaces. More research must be conducted and a two-edged Trainer's Angel™ should be developed for testing.

This study was conducted without a live subject wearing the football helmets. The presence of an actual head in the helmet may alter the performance of the devices or the participants'actions and/or approach to the removal. This should be considered when interpreting the results. Future research in the area of face mask extrication should be performed with participants wearing properly fitted helmets.

The data provides athletic trainers, coaches, physicians, and other medical personnel responsible for primary coverage of football related activities with information regarding face mask extrication. The results do provide information that aids in the selection of an extrication tool to carry during practices and games. The power screwdriver is recommended for use on helmets employing the Kra-Lite IV® mount. The anvil pruner is

recommended for use on the RS-System mount. The study provided important data in documenting the difficulty in extricating a face mask attached with a Kra-Lite IV® mount versus one attached with a Schutt® RS-System mount.

CHAPTER 5

SUMMARY

The problem of the study was to measure four football face mask extrication devices on two types of face mask mounting systems to determine if no significant difference in time existed. The primary purpose of the investigation was to provide scientific information regarding face mask extrication devices' capabilities with respect to the time needed to extricate a face mask. The secondary purpose was to provide data allowing an athletic trainer to make an informed and appropriate selection of a proper face mask extrication device for his or her situation. This chapter contains a summary of the testing procedures, statistical analysis, conclusions, and recommendations for future research.

Testing Procedures Summary

Seven participants consisting of certified and non-certified athletic trainers from San Jose State University's graduate athletic training program participated in the study. All participants who participated received written explanation of the study and signed a human subjects consent form. All participants filled out a biographical data

information sheet prior to testing. Participants conducted three trial and three timed face mask extrications with four devices on two different face mask mounting systems. A helmet was stabilized and the participant's extrication time for each device was timed by the primary investigator.

Statistical Analysis Summary

A two-way ANOVA with repeated measures was utilized to analyze the data. A 4 x 2 factorial design was used to statistically measure interaction between the four devices and the two mounting systems. The level of significance was set at .05. The null hypothesis which stated no difference would be found between any face mask extrication device and removal time was accepted, since a $p=.161$ was observed. The second null hypothesis stating no difference existed during an extrication time between the Kra-Lite IV® and Schutt® ArmourGuard™ face mask mount system was rejected.

Conclusions

Based on the findings of this study, and within the limitations of the study, the following conclusions were made:

1. The Kra-Lite IV® face mask mounting system was harder to extricate than the Schutt® ArmourGuard™ RS-System.

2. The power screwdriver was significantly better at removal of the Kra-Lite IV® face mask mount than the anvil pruner.

3. The anvil pruner was significantly better in removal of the Schutt® ArmourGuard™ RS-System, when compared to its removal time of a Kra-Lite IV® face mask.

Recommendations for Future Research

The following recommendations were identified for future research on face mask extrication devices:

1. Other plausible extrication tools be evaluated for their capability.

2. A replication of the study should be conducted using a larger number of participants.

3. The four devices' performance be researched on other face mask mounting systems.

4. Other face mask mounting systems should be used in replications of this study.

5. Sports medicine professionals, coaches, and equipment manufacturers should be educated that much research and development is needed with respect to face mask mount extrication tools.

6. Manufacturers should provide suggestions and procedures for the most effective rapid removal techniques of the mounting systems they produce for emergency situations requiring airway access.

Summary

The results of the study conclude that an obvious need for continued research and development is needed in the area of football face mask extrication devices. There may be very few times that face mask extrication is needed; however, the consequences of not having the capability to rapidly extricate a face mask one time could and probably would result in the loss of life or permanent morbidity at best. It is the responsibility of athletic trainers, coaches, team physicians, helmet manufactures, and face mask

manufactures to insure that life support measures in the most basic or advanced forms can be implemented if the situation would present itself. In order to ensure the previous statement one must be able to extricate a football face mask for rapid airway access.

The results showed the Kra-Lite IV® system to be significantly harder to cut than the RS-System. The anvil pruner was shown to be significantly better at removal of the RS-System when compared to itself in removal of a Kra-Lite IV® system. The power screwdriver was significantly better than the anvil pruner in removal of the Kra-Lite IV® mounting system. The results of the study provide some insight into the effectiveness of the four extrication devices and their capabilities. Much further research in the area of face mask extrication must be performed before a good comprehension of different devices' capabilities will be understood and known.

REFERENCES

AIR teamed for excellence: football baseball/softball. (1992). (Catalog). Knoxville: Athletic Helmet, Inc.

American Academy of Orthopaedic Surgeons. (1987) Emergency care and transport of the sick and injured. (4th ed.). Menasha, WI: George Banta Company.

American red cross standard first aid. (1991). (Rev. Ed.). The American National Red Cross.

Aprahamian, C., Thompson, B. M., Finger, W. A. & Darin, J. C. (1984). Experimental cervical spine injury model: evaluation of airway management and splinting techniques. Annals of Emergency Medicine, 13(8), 584-587.

Arnheim, D. D. (1989). Modern principles of athletic training. (7th ed.). St. Louis: Times Mirror/Mosby College.

Arnheim, D. D. (1993). Modern principles of athletic training. (8th ed.). St. Louis: Times Mirror/Mosby College.

Baker, D. (1992). Letter to the editor: removing football face masks. Journal of Athletic Training, 27(3), 198.

Clover, J. (1992). Letter to the editor: removing football face masks. Journal of Athletic Training, 27(3), 198.

Denegar, C. R. & Saliba, E. (1989). On the field management of the potentially cervical spine injured football player. Athletic Training, 24(2), 108-111.

Donatelle, R. J., Davis, L. G., & Hoover, C. F. (1991) Access to health (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Driscoli, P. & Skinner, D. (1990). Initial assessment and management-I: primary survey. The British Medical Journal, 300, 1265-1267.

Ellis, T. H. (1991) Sports protective equipment. Primary Care, 18(4), 889 - 921.

Evolution of the facemask. (1980). Young Athlete, (12), 56-57.

Grant, H. D., Murray, R. H., Jr., & Bergeron, J. D. (1990). Brady emergency care. Englewood Cliffs, NJ: Brady, Prentice Hall Division.

Hafen, B. Q. & Karren, K. J. (1989). Prehospital emergency care & crisis intervention. (3rd ed.). Englewood Cliffs, NJ: Brady, Prentice-Hall Division.

Halpern, B. C. (1991). Down man on the field. Primary Care, 18(4), 833-849.

Hochbaum, S. R. (1986). Emergency airway management. Emergency Clinics of North America, 4(3), 411-425.

Insel, P. M. & Roth, W. T. (1988). Core concepts in health (5th ed.). Mountain View, CA: Mayfield Publishing Co.

Knight, K. L. (1992). Editorial: Removing football helmet face masks. Journal of Athletic Training, 27(3), 197.

Long, S. E., Reid, S. E., Sweeney, H. S., & Johnson, W. W. (1980). Trainers corner: removing football helmets safely. The Physicians and Sports Medicine, 8(10), 119.

Magee, D. J. (1987). Orthopedic physical assessment. (1st ed.). Philadelphia: W.B. Saunders.

Magee, D. J. (1992). Orthopedic physical assessment. (2nd ed.). Philadelphia: W. B. Saunders.

National safety council first aid and cpr. (1991). Boston: Jones and Bartlett.

Putman, L. A. (1992). Alternative methods for football helmet facemask removal. Journal of Athletic Training, 27(2), 170-172.

Riddell catalog. (1993). Chicago: Riddell

Roy, S. & Irvin, R. (1983). Sports medicine prevention, evaluation, management, and rehabilitation. Englewood Cliffs, NJ: Prentice-Hall.

Scheiss, P. K. (1992). Letter to the editor: removing football facemasks. Journal of Athletic Training, 27(3), 198.

Schutt catalog. (1993). Litchfield, IL: Schutt Athletic Sales Co.

Thomas, J. R. & Nelson, J. K. (1990). Research methods in physical activity. (2nd ed.). Champaign, IL: Human Kinetics Books.

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APPENDIX A

STUDENT ATHLETIC TRAINER SIGN-UP SHEET

STUDENT ATHLETIC TRAINERS NEEDED

FOR

RESEARCH PROJECT IN ATHLETIC TRAINING

Title of Study: Face Mask Removal Time of Four Face Mask Extrication Devices.

Investigator: Eric J. Fuchs

You are invited to participate in a Master's Thesis research study designed to test the effectiveness of four face mask extrication devices. **The study will be conducted during the month's of February and March of 1994.** The study will test these devices on two face mask support fasteners and determine the most effective device in removal of the support fasteners. The purpose is to provide athletic trainers and coaches with information regarding, which face mask removal devices are the most effective. This will allow them to carry a tested reliable face mask extrication tool during practices and games. This will allow for very effective and rapid airway access in the event of a medical emergency requiring such access arises during a game or on the practice field.

If you are interested in participating in this study, please print your name, address, and phone number. You will be contacted via phone, in person, or you can contact the investigator at (415) 692 5633 or (408) 252 7636 regarding exact meeting dates and times.

Name (print)	Address	Phone #

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APPENDIX B

CERTIFIED ATHLETIC TRAINER SIGN-UP SHEET

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RESEARCH PROJECT IN ATHLETIC TRAINING

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APPENDIX C

HUMAN SUBJECT CONSENT FORM

San Jose State University
Research Subject Consent Affidavit

Investigator: Eric J. Fuchs

Title of Protocol: FACE MASK REMOVAL TIME OF FOUR FACE MASK EXTRICATION DEVICES

You are invited to participate in a research study designed to test the effectiveness of four face mask extrication devices. The study will test these devices on two face mask support fasteners and determine the most effective device in removal of the support fasteners. The purpose is to provide athletic trainers and coaches with information regarding, which face mask removal devices are the most effective. This will allow them to carry a tested reliable face mask extrication tool during practices and games. This will allow for very effective and rapid airway access in the event of a medical emergency requiring such access arises during a game or on the practice field.

I understand that:

1) I have volunteered to participate as a **PARTICIPANT** in the study, which will investigate four plausible football face mask extrication devices, to determine if a significant difference in removal time exists between the devices and/ or with regard to two face mask support fasteners.

Participant Initialize:___

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2) I will be asked to attend a twenty minute pilot study instruction seminar on a date and time convent and agreeable to all volunteers during February, 1994. This seminar will demonstrate the proper method of face mask removal with the extrication tools listed below and the study conducted immediately following. A basic overview of the studies procedures will be given and a biographical data information form will need to be filled out at this time.

3) I will be asked to participate in the research field test on a convenient date set during the instruction seminar. At this time I will perform three trial face mask extrications on two different face mask support fasteners with each device.

4) there are no risks or discomforts anticipated or foreseen for the participants.

5) the possible benefits of the study for the participants are: they may gain insight into proper and effective means of football face mask extrication techniques that they could utilize in their future as sports medicine professionals.

6) the results from this study may be published, but any information from this study that can be identified with me will remain confidential and will be disclosed only with my permission or as required by law.

7) any questions or concerns with respect to this study may be addressed to Eric J. Fuchs (investigator) by calling (408) 252 7636. Complaints regarding the research may be presented to James Bryant, Ph.D., Chairman of the Department of Human Performance at (408) 924 3010. Questions or concerns about research, participants' rights, or research related injury may be presented to Serena Stanford, Ph.D., Associate Vice President of Graduate Studies and Research, at (408) 934 2480.

Participant Initialize:____

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8) my consent is given voluntarily and free of any coercion. As a participating participant I may refuse to participate in the study or in any part of the study. I am free to withdraw at any time without prejudice to my relations with San Jose State University, any other participating institutions and/or individuals.

9) I have received from Eric J. Fuchs a signed and dated copy of this consent form.

HAVING READ THE INFORMATION PROVIDED ABOVE, I HAVE MADE A DECISION WHETHER OR NOT TO PARTICIPATE. MY SIGNATURE INDICATES THAT I WILL PARTICIPATE.

_____ _____

Participant's Signature **Date**

_____ _____

Investigator's Signature **Date**

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APPENDIX D

PARTICIPANT BIOGRAPHICAL DATA COLLECTION FORM

Name:_____ Age:_____ Participant # _____

Sex (Circle one): Male Female

N.A.T.A. Certified: Yes No

If yes, number of years certified? __

If no, number of years as a non-certified athletic trainer?_

Are you currently a graduate student? Yes No

Are you currently an undergraduate student? Yes No

If a graduate student and/ or certified athletic trainer

what setting are you currently working in:

High School Clinic Clinic/H.S.

University/College Junior College Other:_____

Have you worked with football: Yes No If yes, continue

Number of seasons: ___

Type of football helmets you are familiar with:

Air® Riddell® Both Other _____

Have you ever had to remove a football face mask for an airway emergency?

Yes No

If yes, number of times: ___

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APPENDIX E

PILOT STUDY VOLUNTEER SIGN-UP SHEET

PARTICIPANTS NEEDED

FOR

PILOT RESEARCH PROJECT IN ATHLETIC TRAINING

Title of Study: Face Mask Removal Time of Four Face Mask Extrication Devices.

Investigator: Eric J. Fuchs

You are invited to participate in a Master's Thesis research study designed to test the effectiveness of four face mask extrication devices. The study will test these devices on two face mask support fasteners and determine the most effective device in removal of the support fasteners. The purpose is to provide athletic trainers and coaches with information regarding, which face mask removal devices are the most effective. This will allow them to carry a tested reliable face mask extrication tool during practices and games. This will allow for very effective and rapid airway access in the event of a medical emergency requiring such access arises during a game or on the practice field.

If you are interested in participating in this study, please print your name, address, and phone number. You will be contacted via phone, in person, or you can contact the investigator at (415) 692 5633 or (408) 252 7636.

Name (print)	Address	Phone #

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APPENDIX F

PILOT STUDY DATA COLLECTION FORM

Participant#___

Face mask extrication device utilized: (Circle One)

Manual Screwdriver Electric Screw Driver Bolt Cutters

Trainer's Angel™ Electrician Wire Cutters Anvil

Pruner

Helmet Type: (Circle One)

AIR® or Riddell®

Type of football face mask support fastener in place:

ArmourGuard™ or Riddell® Kra-Lite IV® fastener

Time for complete football face mask extrication:

Trial 1: _____ Trial 6: _____

Trial 2: _____ Trial 7: _____

Trial 3: _____ Trial 8: _____

Trial 4: _____ Trial 9: _____

Trial 5: _____ Trial 10: _____

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APPENDIX G

DATA COLLECTION FORM

Participant#_____

Time for complete football face mask extrication:

DATA COLLECTION TABLE			
Device	Trial	Removal Time Kra-Lite IV®	Removal Time RS-System®
Power Screwdriver	#1		
	#2		
	#3		
Trainer's Angel™	#1		
	#2		
	#3		
Manual Screwdriver	#1		
	#2		
	#3		
Anvil Pruner	#1		
	#2		
	#3		