UNH Faculty Member Researches Face Mask Removal For Injured Football Players

Cordless Screwdriver Most Effective in Managing Cervical Spine Injuries

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DURHAM, N.H. -- This fall, as more than a million high school football players take to the gridiron, University of New Hampshire's Erik Swartz is focused on the worst-case scenario.

No, not losing the big game, but cervical spine (c-spine) injuries that, while less frequent than muscle strains or concussions, can result in paralysis or even death. Swartz, assistant professor of athletic training, has become a leading authority on the speedy, effective removal of face masks from players who sustain c-spine injuries. His recent research, published in the American Journal of Sports Medicine in August, points athletic trainers to the best tool for this delicate job.

"If somebody has a neck injury, you want to leave the helmet on but remove the face mask in case there's a breathing emergency. You want to do it as fast as possible, but you need to do it very carefully," Swartz says. With any spine injury, he notes, motion can compound the damage.

Swartz's research-- conducted with the assistance of UNH and local high school certified athletic trainers and football players as well as a six-camera video motion analysis system that provides a three-dimensional view of the subjects--indicates that a cordless screwdriver is the athletic trainer's best tool for the speediest, most still removal of an injured player's face mask. Compared to two specialized cutting tools, the Face Mask Extractor and a bolt cutter look-alike called the Trainer's Angel, a cordless screwdriver removed a variety of face masks in nearly half the time with the least amount of motion.

Although it focuses on a small set of screws on a football helmet, Swartz's research could have a broad impact. Football remains the nation's most popular high school sport, according to the National Federation of State High School Associations; in New Hampshire, 3,305 students played football in 2004-05. Cervical spine injuries are among the most serious, sometimes resulting in paralysis or even death. "As an athletic trainer, they were my greatest fear," Swartz says.

When Swartz began his research as a Ph.D. student at the University of Toledo in the late 1990s, cutting tools were athletic trainers' implement of choice for face mask removal. A redesign of a popular football helmet style in 2002 rendered these cutting tools virtually ineffective in removing some face masks. So Swartz returned to the lab for a series of studies funded by the National Operating Committee on Standards for Athletic Equipment (NOCSAE). His first study compared tools on eight different styles of helmets with a variety of face mask and loop-strap

combinations. “No matter what the condition was, the screwdriver was what we recommended as the best tool,” he says.

Next, Swartz set out to explore anecdotal evidence that screwdrivers can fail on the field when faced with well-worn helmets and rusty screws. Working with helmet reconditioning plants around the country, his research group collected face mask removal data on 2,584 helmets from 44 high school teams at the end of a season of wear and tear, sweat, and foul weather.

“Some schools, all the face masks came off with the screw driver. Some teams, we had a failure rate as high as 40 to 50 percent,” Swartz says. “It really opened our eyes to what the state of helmets can be.”

Swartz’s current research takes his group out of the lab and onto the field of Saint Anselm College in Manchester, where they are removing the face masks of players selected at random throughout the season to discern whether the screwdriver’s effectiveness diminishes as the season progresses.

His research on face mask removal may allow NOCSAE to set standards or guidelines for football helmet design, screw composition, and helmet maintenance, and for athletic trainers to select the best tool for the delicate job of removing a face mask from a player with a c-spine injury. “My hope is that we’re able to convince people that their first choice should be a cordless screwdriver,” Swartz says.