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Hockey helmets miss the mark on concussions

A recent study on the concussion-protection capacities of hockey helmets produced significantly negative results. Researchers at Virginia Tech tested all 32 helmets that can be purchased on the market and found that across the board, hockey helmets are poor in their ability to protect players from the risk of concussions.

In preparation for the study, the researchers discovered that male and female hockey players — bantam level through college — sustain an average of 227 hits to the head per season.

The study was developed to simulate the direction and the velocity of typical hits absorbed during hockey games. In laboratory settings, each helmet underwent 48 impact shots while the researchers analyzed the ability of the helmets to slow the acceleration of the head and brain.

To record the results, the researchers developed a five-star ranking system. Each star level is designed to relate to a predicted number of concussions players wearing a helmet would receive during a season. The highest ranking, five stars, corresponds to less than one concussion per season. On the other end of the spectrum, players wearing a zero-star helmet would be expected to incur an average of six to eight concussions per year.

The study results were heavily distributed on the low end of the grading scale. Researchers discovered that nine helmets did not register a single star. A single helmet received three stars, while the other 22 received just one or two.

These results are not a novel message of the threat of concussions in hockey. The Centers for Disease Control and Prevention previously announced that hockey players incur concussions at a higher rate than any other sport.

One concerning feature of the study is that all 32 helmets were previously certified as safe by the Hockey Equipment Certification Council (HECC). The NCAA, NHL and USA Hockey all require that players use helmets that are certified by the HECC. In addition, the NHL also mandates that players' helmets meet the requirements of the Canadian Standards Association (CSA).

Part of the discrepancy can be explained by the fact that while both the HECC and the CSA require helmets to withstand G-force levels that will prevent skull fractures and other serious brain injuries, research has revealed that a majority of concussions occur at far lower levels of force.

The Virginia Tech researchers conducted a similar study on football helmets in 2011. While the football helmets fared better than their hockey counterparts, the tests indicated that the helmets still provided substantial risk for future concussions. Despite initial outcry from the football helmet industry — including legal threats from some helmet manufacturers — the study led to significant change across the industry. In a recent follow-up test of football helmets, 20 of 26 helmets received four stars or above.

In hope of tempering any backlash to their new findings, the researchers invited hockey helmet manufacturers into their lab in an effort to explain the science behind the rating system and the study results.

Many of the largest manufacturers have provided statements expressing concern and caution with regard to the findings. Further, manufacturers such as Bauer and Reebok note that they are already working with research institutions to study concussions in preparation for future helmet designs.

The concussion-protection results are revealed at a very relevant time in hockey. Recently, the federal judge overseeing the class-action case brought by retired NHL players denied the league's motion to dismiss. The plaintiff class has alleged that the NHL both concealed from its players risks of repeated head trauma and promoted on-ice violence.

In its defense, the NHL contended that the action should be dismissed for pleading and jurisdictional insufficiencies. Judge Susan Richard Nelson, however, was unconvinced of the league's arguments. The denial of the motion to dismiss increases the likelihood that the NHL will reach a financial settlement with the plaintiff class. Such a settlement would allow the league to avoid substantial trial costs.

In Canada last November, the leading hockey helmet manufacturer, Bauer, was involved in a regulatory investigation based on its concussion-protection performance claims. The Canadian Competition Bureau examined claims that Bauer had been making about the enhanced protection qualities of its Re-AKT helmet.

After the investigation illustrated that Bauer's claims were unsubstantiated, the company agreed to remove the claims from advertisements and to donate $500,000 worth of hockey equipment to charity. Interestingly, the Bauer Re-AKT helmet, which is sold in two styles that are among the most expensive on the market, received a single star in the Virginia Tech study.

This result is consistent with a larger trend of price indifference throughout the hockey helmet study. The researchers admitted surprise in finding that their study produced no correlation between price and level of protection that helmets provided against concussions.

Conversely, former NHL referee Paul Stewart explained that the findings are unsurprising for those who are close to the game. To correct the concussion dangers, Stewart suggests that the league and the NHL Players' Association need to take the lead to ensure that all levels of the game become safer.

Because helmets are subjected to top-down popularity from the NHL to youth hockey players, the researchers aspire for their results to provide substantive change throughout the industry for the benefit of the future of the game.

Youth hockey safety has been a growing concern, and other protective measures have already been taken. These changes include the reduction of helmet-to-helmet collisions, education of proper checking techniques, the elimination of fighting and the development of a warning track around the boards.

In his reflection on the results, Stefan Duma, the head of the Virginia Tech biomedical engineering and mechanics department, acknowledged that the study is not meant to provide a panacea and recognized that "there will never be a perfect helmet that will prevent all concussions."

Instead, he said the study was seeking increased awareness and offers a different perspective.

"It's about risk reduction," Duma said.

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