The combined benefits of motorcycle antilock braking systems (ABS) in preventing crashes and reducing crash severity

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Objective:
Several studies have reported the benefits of motorcycle antilock braking systems (ABS) in reducing injury crashes, due to improved stability and braking performance. Both aspects may prevent crashes but may also reduce the crash severity when a collision occurs. However, it is still unknown to what extent the reductions in injury crashes with ABS may be due to a combination of these mechanisms.

Methods:
Swedish hospital and police reports (2003–2012) were used. The risk for permanent medical impairment (RPMI) was calculated, showing the risk of at least 1 or 10% permanent medical impairment. In total, 165 crashes involving ABS-equipped motorcycles were compared with 500 crashes with similar motorcycles without ABS.

The analysis was performed in 3 steps. First, the reduction in emergency care visits with ABS was calculated using an induced exposure approach. Secondly, the injury mitigating effects of ABS were investigated. The mean RPMI 1+ and RPMI 10+ were analyzed for different crash types. The distributions of impairing injuries (PMI 1+) and severely impairing injuries (PMI 10+) were also analyzed. In the third step, the total reduction of PMI 1+ and PMI 10+ injured motorcyclists was calculated by combining the reductions found in the previous steps. An additional analysis of combined braking systems (CBS) together with ABS was also performed.

Results:
The results showed that emergency care visits were reduced by 47% with ABS. In the second step, it was found that the mean RPMI 1+ and RPMI 10+ with ABS were 15 and 37% lower, respectively. Finally, the third step showed that the total reductions in terms of crash avoidance and mitigation of PMI 1+ and PMI 10+ injured motorcyclists with ABS were 67 and 55%, respectively. However, PMI 1+ and PMI 10+ leg injuries were not reduced by ABS to the same extent. Indications were found suggesting that the benefits of ABS together with CBS may be greater than ABS alone.

Conclusions:
This article indicated that motorcycle ABS reduced impairing injuries, mostly due to fewer emergency care visits but also due to a reduction in crash severity. This may seem reasonable as the improved stability and braking performance provided by ABS could prevent some crashes but would also decrease crash severity if a collision still occurs. As suggested by previous studies, however, the lower extremities would be more exposed in a crash with ABS. It is recommended that future research should follow up these results with additional data.