

Who should take the blame: multi-level modelling and horse racing injuries in National Hunt racing in GB

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Over the past 20 years many studies have investigated risk factors for a number of injuries in horse racing. However, the incidence of injury has not reduced significantly over the same period. The aim of this work was to identify which sectors of the racing industry should be the focus of renewed efforts to minimise the risk of equine injury. The structure of the data associated with racing is complex and highly clustered. For example, several horses are trained by the same trainer and races are clustered within course. We created multi-level multivariable logistic regression models for a number of injury outcomes. For each outcome several models were produced that accounted for different hierarchies. Known risk factors were included in models where there was a significant degree of higher-level of clustering to identify how much of that variance can already be explained. Variance was estimated at the level of the horse, sire, dam, trainer, jockey, course, race and race day. More than 200,000 race starts were included in the data set representing all National Hunt starts in GB between 2001 and 2009. The largest unexplained variance estimates were associated with the horse (56% when modelling hind-limb fracture in steeplechasing; 42% – epistaxis in hurdling; 33% – tendon injury in steeplechasing). Higher variance estimates were calculated at the level of the race than race day. For example, when modelling hind-limb fracture in steeplechasing: at the level of the race there was 24% unexplained variance compared to <0.1% at the level of the race day. No single hierarchical level was significant across all outcomes but race and horse were significant in most models. These analyses enable prioritisation of future research funding to target the sectors of the racing industry that are most likely to produce significant reductions in the incidence of injury in the Thoroughbred.