Reducing injury risk in National Hunt racing

The horse is a superlative athlete, revered for its speed and beauty. However, there is an inherent risk of injury to those horses involved in racing. Since 2000, the Horserace Betting Levy Board (HBLB) has invested over £27 million on veterinary research and education.

Prevention of musculoskeletal disease and injury in thoroughbreds and improvement of the training environment, racecourse design and surfaces – along with riding strategies, tack, and equipment – to enhance the safety, health, and well-being of racehorses are two of five key strategic research priorities. The risks of horse injury and fatality in National Hunt racing are higher than those in flat racing and as such, a recently completed HBLB-funded project has focused on National Hunt racing.

The project was coordinated by a team from the University of Glasgow and the British Horseracing Authority, who gave the researchers unique access to data held on their computerised Equine Welfare Database. The aims of the HBLB National Hunt study were to:

1. Define the risk of injuries occurring during National Hunt racing on racecourses in Great Britain;
2. Identify factors that increase and decrease the risk of injury;
3. Make suggestions about how to reduce the risk of injuries in National Hunt racing in Great Britain.

The Equine Welfare Database

The Equine Welfare Database contains details of fatalities and all horse problems dealt with by racecourse vets in the UK. The data collected between 2000 and 2009 were analysed to determine the frequency of fatality, as well as epistaxis (i.e. visible bleeding from the nostrils) and some of the most common injuries in each of the three types of National Hunt racing: Hurdle, Steeplechase and National Hunt Flat.

Identifying risk factors

Epidemiology is the branch of science
involved in quantifying risk of health problems. Epidemiologists work in the world of advanced mathematics, which may seem a long way from racehorse health but for epidemiologists, determining whether the presence of a potential risk factor results in an increased risk of injury is a mathematical task. Here’s a simple example in humans: From 100 people followed through their entire lives, say there are 50 who smoke cigarettes and 30 of them develop lung cancer, and the other 50 don’t smoke and only three of them develop lung cancer. From this example it would seem likely that smoking cigarettes is a risk factor for lung cancer and it appears that smoking cigarettes makes you 10 times more likely to develop lung cancer than if you don’t smoke.

**An interconnected web**

Risk factors can be grouped into those associated with the horse; the racecourse; the trainer; the jockey; and the individual race. Within and between these categories there is considerable interconnection: for example, going is related to season of the year and weather which in turn might influence the pace of the race. Specific jockey restrictions in a specific race might in turn be connected to the weight and experience of the jockey.

These interconnections between multiple different factors create challenges in risk factor analysis, such as the risk of lower limb fracture increasing with age. But specific age groups run in specific types of races and horses in steeplechase racing are typically older than most of those running in flat racing. If we analysed the association between type of racing (steeplechase compared to flat) and lower limb fracture without taking into account horse age, we might incorrectly conclude that that type of racing is a risk factor for lower limb fracture. Fortunately, with modern computers epidemiologists can account for multiple interconnecting factors to identify true associations. In this example, there was no link between type of racing and lower limb fracture, and it was age that was the risk factor for that specific injury type.

**Risk does not equal cause**

A risk factor is simply something that makes injury more or less likely. It can be associated with an adverse outcome (i.e. increase the risk of injury) but specific factors can also be protective (i.e. decrease the risk of injury). It is important to understand that when scientists talk of risk factors, they mean there is an association or link between the factor and the outcome they are studying, but they do not mean that the risk factor is necessarily the specific cause. For example, age and race type are associated but one does not directly cause the other.
The HBLB National Hunt Study
Data from the Equine Welfare Database and Weatherbys were combined to allow investigation of more than 100 potential risk factors for fatality and the most common injury types. To allow thorough examination of previous start history, analyses were performed on injury data from 2001 to the end of 2009.

The researchers were very pleased to find that injury rates in British National Hunt racing were low – although we would all like to see them become lower still. Rates for most of the common veterinary problems were higher in steeplechasing than hurdling, with a notable exception of lacerations and wounds, which occurred at very slightly higher rates in hurdling. As many trainers know only too well already, injury to tendons and ligaments was the most prevalent problem and, of course, it is important to point out, that for this study, only injuries attended by vets on the racecourse were recorded. Different patterns of veterinary problems would be expected from training records.

The researchers didn’t only look for risk factors associated with the veterinary problems, they also defined the strength of the associations to quantify how much more likely was a horse to suffer a specific problem if that risk factor was present. The scientists considered multiple injury types to minimise unintended consequences and avoid making recommendations that could potentially reduce the risk of one outcome but increase the risk of another.

Having identified associations in one time period, it is important to be sure that they apply in other time windows. For this study, the factors identified in the first phase of the study were tested against the injury data from years subsequent to 2009, to see if they were also significant in those years and thus could be used to help predict injury in future.

What factors were linked to injury in National Hunt horses?
Season, ground firmness, and race distance
were “race-related” factors found to be associated with a lot of the outcomes investigated. Only a few “racecourse-related” risk factors were identified, one of which was that courses that had more race starts were associated with increased likelihood of fatal injury in hurdle racing, but decreased likelihood of hind limb fracture in steeplechase racing when compared to racecourses with fewer starts.

Horse age was associated with increased risk for a number of different veterinary problems. Having sustained a specific injury previously increased the risk that the same injury would occur again, as is well known for tendon injury. Fascinatingly, horses that had spent a higher percentage of their previous careers in flat racing were at increased likelihood of all the outcomes that were looked at, suggesting that horses that had not had many previous jump starts, or those that had a large number of previous flat starts, were at increased risk of injury compared to other horses. But horses that had had a greater number of starts over a year previously were less likely to suffer many of the injuries.

While it is very tempting to come up with theories for why these associations with previous start histories were found, it is important to bear in mind that the actual start histories may simply be a reflection of something else that predisposes to injury.

Can we make use of the results to reduce injury?
The ultimate goal of this HBLB research is to make the sport safer for our horses. Deciding which risk factors should be the focus of potential modifications is complex. A number of factors must be considered:
1. A successful intervention should impact upon as many different outcomes as possible. There is no point in imposing major changes if the injury that might be prevented as a result involves very few horses;
2. The “importance” of the injury on the horse. For example, a fatal injury might be considered a more “important” outcome than a limb injury that the horse is very likely to recover from after a short period of rest;
3. The size of effect of the specific risk factor: completely removing the impact of a risk factor with a very large effect will have a much greater impact on the prevalence of the outcome than removing the impact of a risk factor with a smaller effect;
4. How common is the risk factor? Modifying the more common risk factors will impact on the greatest number of horses.

When these factors were taken into account, the Glasgow team concluded that the risk factors most likely to result in the most significant impact on the injuries that were studied were:
1. Firmer going
2. Previous injury
3. Proportion of career to date spent in flat racing
4. Longer races
5. Summer jumping
6. Maiden, novice, selling, and claiming races
7. Older horses
8. Number of years in racing
9. Horses with the following racing profiles:

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Fewer starts in the period more than one year prior to the current race;
- Fewer starts in the period between 10 and 12 months prior to the current race;
- Fewer starts in the three months prior to the current race.

Balancing cost and benefit
While it might seem a simple statement, remove these risk factors and veterinary problems will disappear completely! The reality is that change might bring relatively modest gains. Because British National Hunt racing already has a fairly low injury rate, removal of even those risk factors which have strong effects may only be beneficial for the health of very few horses.

Every injury is regrettable, but benefit has to be weighed against cost. Consider summer jump racing – which is a risk factor for several outcomes including fatality and tendon and ligament injury. While preventing summer jump racing for the period studied would have resulted in 260 fewer fatalities and 379 fewer tendon injuries, it would also have resulted in 36,014 fewer race starts, with potential knock-on consequences for the number of horses maintained in training. The HBLB National Hunt study, for the first time, has provided robust statistics that racing needs to make evidence-based decisions on the balance between cost and benefit.

Conclusion
Following extensive examination of the common injuries that occur in National Hunt racing in Britain, it is clear that injury risk is already very low. The work of all of the veterinary surgeons, racecourse staff, members of the BHA, the Jockey Club, and all those involved in maintaining the health of racehorses should be highly commended. That is not to suggest that this research is not important; quite the opposite, as it provides an audit of the current situation, focuses attention on potential problems, guides further policymaking, and very importantly provides continued justification for jump racing in Britain.

“Horses that had spent a higher percentage of their previous careers in Flat racing, that had not had many previous jump starts, or those that had a large number of previous Flat starts, were at increased risk of injury compared to other horses.”