

# Accidents and injuries in professional horse racing, a prospective 2 year complete registration of jockey injuries in Norwegian race horse sports

Ole Reigstad<sup>1,2\*</sup>, James Eide MacPherson<sup>1,4</sup>, Marte Myhre Reigstad<sup>1,3</sup>

<sup>1</sup>Oevrevoll Race Track/Norwegian Jockey Association, Jar, Norway

<sup>2</sup>Division of Orthopedic Surgery, Oslo University Hospital, Norway

<sup>3</sup>Women and childrens Divison, Oslo University Hospital, Norway

<sup>4</sup>Department of Ophthalmology, Vestre Viken Hospital Trust, Norway

\*Corresponding author: Ole Reigstad, Oevrevoll Race Track/Norwegian Jockey Association, Jar, Division of Orthopedic Surgery, Oslo University Hospital, Norway, Tel: +4790770648; E-mail: [ole.reigstad@gmail.com](mailto:ole.reigstad@gmail.com)

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## Abstract

Injuries are common in professional race horse sports, serious accidents result in permanent disabilities and death. Safety measures have been undertaken to reduce the injuries of jockeys and horses. A prospective 2 year complete registration of all falls and injuries in Norwegian race horse sports was completed during 2014 and 2015 (April to November), as well as registration of serious injuries during the 2016 and 2017 to identify fall and injury patterns to implement preventive measures. 34 falls and 13 injuries were recorded during the first 2 seasons (530 races, 4987 individual runs), no serious injuries were seen the last 2 seasons, giving an overall fall frequency of 1/16 races, 1/147 runs. Hurdle race had the highest fall frequency, but no injuries were recorded after these falls. Except for a proximal ulna fracture, all injuries were minor and the jockeys returned to the sport. Amateurs had more injuries than professional jockeys. Most injuries were attributed to uneasy or uncontrollable horse. Overall we registered one serious injury during the 4 seasons (ulna fracture) giving an overall frequency of about 1/1000 races and 1/10000 individual runs. In conclusion, Norwegian race horse sport is safe and demonstrates a low frequency of injuries.

## Introduction

Horse riding is popular, both in leisure and sport. Horse related injuries are common, often resulting in fractures and head injuries. These injuries may present a significant burden

on the health care system in areas where horse riding is a common activity [1,2]. In traditional horseback riding, injuries are reported to occur in about 1 per 2000 hours of riding or affect 4 in 10000 inhabitants annually [3]. Professional horse racing is a popular sport worldwide, and is a large spectator sports as well as an important economic industry in many countries [4,5]. The combination of high speed, thoroughbred horses and hurdle races renders a high risk of serious injuries. In important race-horse countries like Australia it is estimated that jockeys fall every 240 rides, injuries occurring in 1 out of 3 of these falls [4,6]. Fatalities are common, annual jockey casualties are reported [7]. Norway (5 million inhabitants) is a small country in the international race-horse sport. There is one racetrack in the country, Oevrevoll Race Track, in the suburbs of the capital Oslo. The races are completed from April through November (closed during the winter season). Oevrevoll has both a dirt and grass track, all hurdle races are performed on grass. The last fatal injury occurred more than 40 years ago, but less serious injuries occur regularly. The emergency medical service at the races is regulated by Oevrevoll Galopp/Norwegian Jockey Association and Norwegian Rikstoto (the latter are in charge of the bookmaking). A medical doctor and a two-person ambulance are obligatory present on all race days, no races run unless both are in place. As a consequence of numerous injuries afflicting both horses and jockeys, injury preventive measurements have been implemented over the previous years. These have included new and lower hurdles (94 cm) with softer edges and an "escape" opening on the outer perimeter (Figure 1), water jump fences has been removed, and steeplechase fences (higher fences, often with open ditches) are never used. Obligatory safety equipment for the jockeys is demonstrated in figure 2. In addition, strict adherence to the rules were implemented, and include jockeys having to remain in their track during the race, distraction is not accepted, whips are not permitted (special Norwegian rule) [8] and violation of rules leads to a penalty fee or even a ban). Furthermore, a



**Figure 1:** The hurdles at Oevrevoll Race Track. Escape routes on the outer perimeter if the horse or jockey has problems with the jump. The hurdles are lower and have soft upper edges



**Figures 2a and 2b:** The jockeys use obligatory safety equipment including helmets, glasses, torso protection and racing boots

thorough evaluation of the tracks are performed prior to and during race days, resulting in cancellation of races if the track is too wet, slippery or otherwise deemed unsuitable for use.

The main purpose of this study was to document all falls and injuries occurring during racing at Oevrevoll Race Track. Secondary as responsible doctors we wanted to categorize and identify injury patterns in order to implement preventing measures where possible.

## Materials and Methods

All falls and injuries occurring during the race track season 2014 and 2015 were registered prospectively by the responsible doctor, comprising 530 races on 68 race days. The races vary from 900 to 3650 meters in length, and around 100 jockeys rode 4987 individual runs, giving a total of 8300 km of race kilometers. The jockeys did from 1-186 runs at Oevrevoll race track (many of them are active on other Scandinavian tracks as well; therefore experience cannot be calculated from their race records in Norway alone). We recorded jockey status (professional/amateur), race type (dirt, grass, jump), race length (race lengths were adjusted for other reasons during period giving a large number (18) of different lengths although the

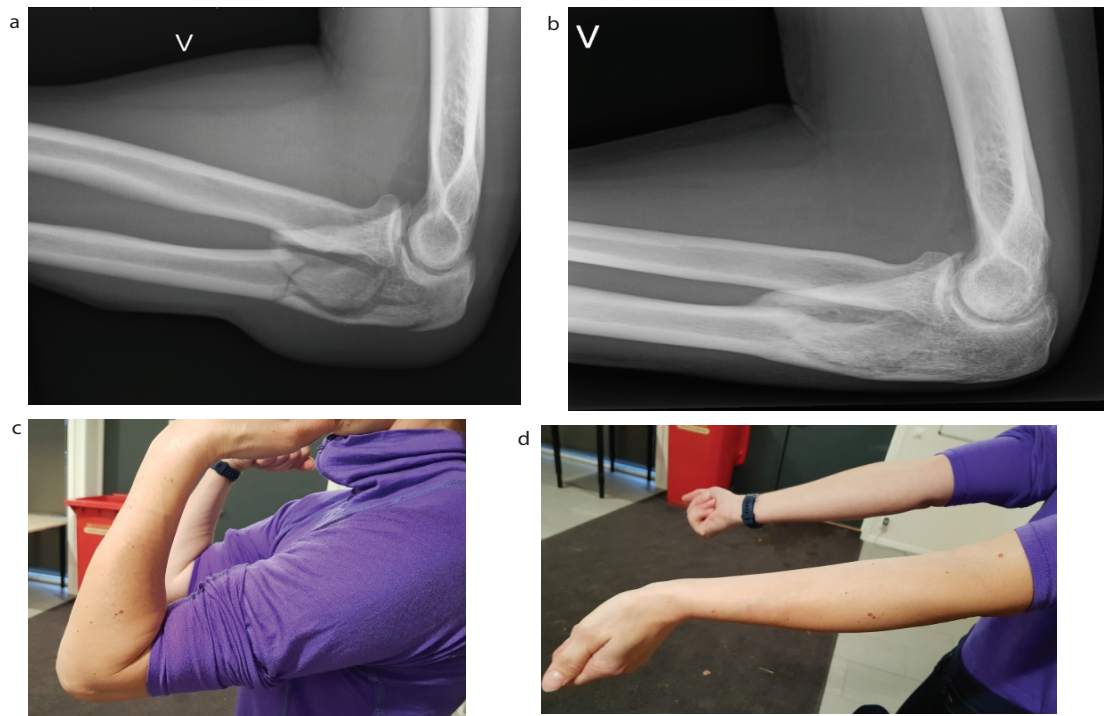
difference could be as little as 20 m), and identified where the fall occurred, the possible cause of fall. All injuries were examined and diagnosed by the attending doctors; serious injuries were admitted to the local hospital/emergency department. The jockeys were followed up by the race track doctor to disclose permanent problems/disabilities. The injuries were categorized as fractures, contusions/soft tissue injuries and bruises. For the last two seasons (2016 and 2017) the registration was limited to serious events (injuries ending in hospital admission or giving longer term (more than a month) sick leave or permanent disabilities).

The numbers are presented in frequency tables. We compared occurrences of incidents and injuries, using comparison of proportions, with the chi squared test between the groups. Comparisons of proportions were carried out in bivariate analyses for jockey status (amateur/professional), for race type each two groups were compared, similar for race length three common lengths (1100, 1600 and 2400 m) were compared to each other. A p-value <0.05 was considered statistically significant. Statistical analysis was performed using the SPSS<sup>®</sup> for windows.

## Results

During the two seasons with complete registration there were 34 registered falls, giving an overall incidence of 1/16 races, 1/147 individual runs. The falls were attributed to uneasy/uncontrollable horses (18), horses slipping (8), start box problems (3) and other miscellaneous reasons (5). Races with hurdles had the highest rate of falls (6/16 races) compared to dirt track (13/261 races) and grass (15/253 races),  $p < 0.05$ . We registered 13 injuries during the two seasons. No injuries (0/16) were recorded after the falls during hurdle races, and injuries were equally distributed between dirt (7/261) and grass (6/253) races. The injuries comprised fractures (2); two costal fractures in one patient and one comminuted proximal ulna fracture in another patient. The latter was the most serious injury, rendering the jockey on sick leave for 3 months. The fracture healed without residual problems (Figures 3a-3d).

The other injuries were 5 cuts/bruises and 6 contusions. The accidents were attributed to uneasy/uncontrollable horse (8), horses slipping (1), problems in the start box (2) and other (2). All the injured jockeys returned to the sport (longest sick leave, 2.5 months until racing for ulna fracture jockey). Amateurs and professionals experienced the same rate of falls, but there were a higher rate of injuries in amateurs races compared to professional races (5/50 versus 8/480 races,  $p < 0.05$ ). Race length had no impact on the injury frequency; the most frequent lengths (around 1100, 1600 and 2400 meters) saw almost all of the injuries with a similar frequency. We registered no serious injuries/events during the latter two seasons, but falls without injuries and minor incidents were not recorded. We saw in total one serious injury during the four year period (ulna fracture), giving an incidence about 1/1000 races. The injured jockey was a professional athlete.



**Figures 3a- 3d:** 3a) Radiograph of a professional jockey acquiring a proximal comminuted ulna fracture. 3b) Follow up radiographs after 3 months (conservative treatment in an above elbow cast for 6 weeks). 3c) and 3d) Good elbow function at follow-up

## Discussion

Norwegian race track sport is safe and demonstrates a low incidence of falls and injuries. Safety measures have been followed strictly, thereby reducing accidents to a minimum. We registered a higher number of falls, but lower number of injuries as compared to Australian race tracks. Hitchens et al [7] performed a retrospective review, detecting a higher frequency of serious injuries as compared to ours. This may be due to the retrospective design where a recapitulation of injuries was done, rendering results subject to recall bias. The design is likely to be accurate for the more serious injuries (easy to recall/remember) while falls without consequences or with minor injuries like bruises and contusions probably were underestimated. The authors also evaluated injuries and insurance claims, observing a frequency of 6/10000 rides for flat races, and 65/10000 rides for hurdles races. The frequency of injuries as recorded by insurance claims were different than ours, with higher frequencies of limb fractures (1/3 injury claims) among the athletes. Norway has a public welfare system that covers sick leave and health care expenses, which means insurance companies rarely are claimed for neither sick leave nor medical treatment. Therefore it is difficult to compare these numbers. Overall we only registered one limb fracture in approximately 1000 races (for the whole four season period), sustaining a very low incidence of these common race track injuries. The frequency of falls during hurdle races in our material was substantially higher than during flat races. This in line with previous studies from horse racing internationally; hurdles are

consistently found to result in 10-15 times the number of falls [5,6] compared to flat races. Internationally, injury frequency is similar, also occurring much more frequently in hurdle races. The explanation for the relatively few injuries in Norwegian hurdle races is likely to be multifactorial. Hurdle races comprise a small proportion of the total number of races in Norway (16 hurdle races as compared to 514 flat races per 2 seasons), jockeys are carefully selected for these races and amateurs never partake in hurdle races in Norway. Finally, the implementation of modern injury-preventing lower hurdles and removing of water fences is likely to reduce injuries; staple chase is a major contributor to accidents in other countries [5]. Not surprising, we found a higher risk of injury among amateurs as compared to professional jockeys, implying the importance of experience as an injury preventive measure. This is in line with existing literature from around the world, which reports a higher incidence of injuries among apprentices and amateurs [9,10]. Since one has to crawl before one can walk, it is difficult to do specific prevention to reduce the amateur injuries. Increasing the hours of training on the track prior to racing could reduce some of the injuries. Hitchens et al [7] found that younger horses (inexperienced) and horses that had taken part in fewer races were risk factors for falls and injuries [10]. Subsequently, a more thorough selection of experienced race track horses for amateur/inexperienced jockeys may be a measure with which to avoid uneasy or uncontrollable horses and thereby reduce injuries. Overall, we could not identify high risk areas where measures could be implemented to reduce the amount of injuries. In the setting where the risk of falls and injuries is

relatively low, it is our experience that the jockeys have been hesitant to employ more extensive safety equipment. Measures such as helmets protecting the face, cervical and lumbar spine protection, hip protectors and more advanced safety boots are likely to be perceived to impact their riding abilities. Horse sport is an international sport, where both jockeys and horses change their working location and environment frequently. The health of the jockeys is important to keep attention on, and injury prevention must not be forgotten, especially in order to be able to identify risk factors and injury patterns for early intervention.

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