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A Cross Sectional Survey of International Horse-Racing Authorities on Injury Data Collection and Reporting Practices For Professional Jockeys

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ABSTRACT

Jockey injuries are common in professional horse-racing and can result in life-threatening or career-ending outcomes. Robust injury data are essential to understand the circumstances of injury occurrence and ultimately identify prevention opportunities. This study aimed to identify jockey injury surveillance practices of international horse-racing authorities (HRAs) and the specific data items collected and reported by each HRA. A cross-sectional survey of representatives (e.g. Chief Medical Officer) from international HRAs was conducted. An online and paper questionnaire was designed comprised of 32 questions. Questions considered the barriers and facilitators to data collection within each HRA, and where available, what data were collected and reported by HRAs. Representatives from 15 international racing jurisdictions were included, of which 12 reported collection of race day injuries or falls, using varied definitions of medical attention and time loss. Six HRAs did not have a definition for a jockey injury, and eight HRAs had no parameters for describing injury severity. Race day exposure was collected by two HRAs. Results were commonly presented by HRAs as the number of injuries (n = 9/15) or proportion of injured jockeys (n = 6/15). The lack of a designated role for collection, collation and reporting of data was the main barrier for injury surveillance. Twelve HRAs agreed that mandatory collection would be a strong facilitator to improving practice. Enhancement and standardization of international jockey injury surveillance is required to move forward with evidence informed prevention. Concurrent investigation of how reporting practices can be best supported within existing HRA structures is recommended.

1. Introduction

Jockey injuries are common in professional horse-racing and can result in career-ending outcomes, including fatalities and permanent disability [1,2]. Over the last ten years, injury surveillance data has been published for professional horse-racing in Ireland [3], UK [4], France [4], Australia [5], New Zealand [6], Japan [7], California [8] and Maryland [9]. In professional flat racing globally, there are a reported 1.6 to 4.4 falls and 0.5 to 1.8 injuries for every 1000 race rides [10]. The number of falls and injuries is substantially higher in jumps racing, with 47.4 to 91.4 falls and 5.1 to 14.7 injuries per 1000 race rides [10]. Reasons for differing injury rates across countries is attributed to the tendency for using different definitions of injuries, study designs and reporting methods.

Jockey injury prevention is an important priority because their injuries can lead to fatal, serious and permanent outcomes, tend to impact a young-adult age group who will live many years with the consequences of injury and occur in a workplace setting where they should be protected [11]. Several measures towards protection of jockeys are in place addressing policy and regulations (e.g. restrictions on racing on firm tracks and restrictions on apprentices) through to mandatory safety equipment (e.g. helmets and body protectors, padded hurdles and mouthguards). These measures can

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be different across jurisdictions [12–16]. A critical step in protection of jockeys is to review the effectiveness of these measures by continuing to monitor the injuries that occur.

Not all countries that participate in professional horse-racing have publicly reported injury data for jockeys and where it is available, these data are not always clear or comparable across settings. In 2012, a consensus statement was published for European Thoroughbred racing with the aim of developing consistent injury data collection and reporting across this form of professional horse-racing [17]. However, despite these efforts toward uniformity of data, variations have remained in the applied definitions of injury, the methods used to collect data and what is ultimately reported from the information. Based on knowledge from other sport settings [18–20], some reasons that might contribute to the limited collection and reporting of injury data in horse-racing include: a lack of funding to support the process; not having a designated role in the organization to complete or collate injury surveillance information; a lack of understanding or prioritization of injury surveillance; or inconsistent attendance of medical professionals at events or lack of skill or training to record the data. It is also possible that injury data are collected but not reported as the horse-racing authorities (HRAs) or other agencies, may not wish to disclose these injuries publicly. This may be due to concern over public perception or its impact on insurance. Social license to operate regarding horse-racing has mainly been discussed regarding animal welfare [21], but jockey health and well-being is also related.

An understanding of why injury data for professional jockeys is or is not collected and reported is an important step to improving global surveillance opportunities. Therefore, the primary aim of this study was to identify potential barriers or facilitators for HRAs in collecting and reporting injury information for jockeys. Where information was being recorded, we sought to understand the definitions used for jockey injuries, the activities in which data were being collected (race, training and non-riding activities) and how these data are collected and used.

2. Materials and Methods

This study used a cross-sectional survey design to collect data from international horse-racing authorities (HRA). Ethical approval was granted by the human research ethics committee at Dublin City University. Plain language information was provided to potential respondents before participation and informed consent was implied by proceeding with the online questionnaire and final submission of responses.

2.1. Participants

Horse racing authorities that govern professional horse-racing in different global jurisdictions were identified from the membership base of the International Federation of Horse Racing Authorities website (https://www.ifhaonline.org) and through the personal contacts of author AM. Representatives were initially contacted by email to invite their organization to take part in the study. Where a Chief Medical Officer was available in the HRA, this was the preferred respondent to complete the questionnaire. If there was no Chief Medical Officer role, then the Chief Executive Officer (or equivalent) was asked to complete the questionnaire or designate to the most relevant person in the organization. No exclusion criteria were applied. In total, there were 25 organizations contacted.

2.2. Questionnaire

A questionnaire was developed by the research team based on pre-existing research that explored research priorities and injury collection in horse-racing [15,19]. Several iterations of the questionnaire were drafted and shared amongst the research team until agreement was reached on the combination of questions asked and terminology used, with consideration to maintaining a reasonable (20–30 min) duration for completion.

The final questionnaire comprised 32 questions, presented as a mix of open and closed format responses (supplementary material). Questions 1 and 2 sought basic information on the HRA and the role of the individual completing the questionnaire. Questions 3 to 23 explored if, and what, data on injury and exposure (time at risk) are collected for race-day, training and non-riding related activities. Further, these questions looked at who collected the data, and how the data were collected and recorded. Information was then asked about how data were used (Q24–28). This included whether reports were published, how they were published and shared and how the findings were used in practice. Finally, respondents provided information on perceived barriers and facilitators to the collection of injury data and its reporting, the current research priorities of the HRA and any other views on current jockey injury surveillance and practice (Q29–32).

2.3. Procedures

The questionnaire was administered online using SurveyMonkey (SurveyMonkey Inc, San Mateo, California, USA, www.surveymonkey.com) with responses collected between August to September 2018. The survey link was sent directly to the contact person of all HRA, with two reminders sent in the weeks following. A paper-based questionnaire was available to be posted to the HRA on request, with one HRA requesting this option.

2.4. Data Analysis

Data were downloaded from SurveyMonkey directly into an SPSS file (IBM Corp, IBM SPSS Statistics for Windows, Version 25.0, Armonk, NY) and the hard copy results inputted into this SPSS file. Information on any missing responses is included in tables. No participants were removed due to missing data. The frequency (n and %) of responses for each question was calculated. Multiple answers were allowed in response to 7 questions.

3. Results

A total of 17 responses were received from 11 jurisdictions. Three representatives from organizations in South Africa completed the survey, on behalf of the HRA and a national academy; only the response from the HRA was included in the study. Thus, 15 responses were included in the study. Eleven representatives completed the survey on behalf of the HRA for their jurisdiction, and 4 representatives from a regional HRA within a jurisdiction responded. Most respondents were medical professionals in the HRA such as Chief Medical Officers (Table 1).

3.1. Injury Surveillance

Eighty percent (12/15) of the responding HRAs capture data on race-day jockey injuries. Fewer HRAs collect this same data for training and non-riding activities (n = 6, 40.0% and n = 4, 26.7% respectively) (Table 2). For race-day injuries, 58.3% (n = 7) of HRA collected this information from multiple sources, but most frequently relied on physicians (75.0%) (Table 2). Insurance reports (50.0%) were the most common method used to obtain data from training, while varied information sources were used to identify injury during non-riding activities (Table 2). Race-day and training injuries were primarily published in an HRA internal document

Table 1
Jurisdiction, region and role of representatives who completed the survey (n=15).

Jurisdiction	Region	Role
Australia		Health and safety officer
	Victoria	Chief Medical Officer/physician/allied healthcare professional
Channel Islands		Secretary
France		Chief Medical Officer/physician/allied healthcare professional
Great Britain		Chief Medical Officer/physician/allied healthcare professional
Hong Kong		Manager/advisor/steward
Ireland		Chief Medical Officer/physician/allied healthcare professional
Japan		Manager/advisor/steward
South Africa		Chief Medical Officer/physician/allied healthcare professional
Sweden		Manager/advisor/steward
United States of America	The Jockey Club	Manager/advisor/steward
	Maryland	Chief Medical Officer/physician/allied healthcare professional
	Kentucky	Researcher
	Pennsylvania	Chief Medical Officer/physician/allied healthcare professional
New Zealand		Chief Medical Officer/physician/allied healthcare professional

Table 2
Jockey injury surveillance practices from international horse-riding authorities (n=15) across race-day, training and non-riding activities.

Jockey injury surveillance practices		Race-Day	Training	Non-Riding Activities
		n (column %)	n (column %)	n (column %)
Does your organization collect jockey injury data?	Yes	12 (80.0)	6 (40.0)	4 (26.7)
	No	1 (6.7)	7 (46.7)	11 (73.3)
	Unsure	2 (13.3)	2 (13.3)	-
Who is responsible for informing the HRA that there was a jockey injury? (multiple responses possible)	Physicians	9 (75.0)	2 (33.3)	2 (50.0)
	Self-report from jockeys	3 (25.0)	2 (33.3)	2 (50.0)
	Steward reports	3 (25.0)	2 (33.3)	1 (25.0)
	Allied healthcare professionals	1 (8.3)	2 (33.3)	2 (50.0)
	Track manager reports	1 (8.3)	2 (33.3)	1 (25.0)
	Insurance claims	1 (8.3)	3 (50.0)	2 (50.0)
	Trainer reports	-	-	2 (50.0)
Is there a summary of jockey injuries prepared at the end of the season?	Yes (internal document only)	7 (58.3)	4 (66.7)	1 (25.0)
	Yes (published publicly e.g. annual report)	1 (8.3)	-	-
	No	4 (33.3)	2 (33.3)	3 (75.0)

(58.3% and 66.7%, respectively). Where collected, injuries in non-riding activities were generally not published (75.0%) (Table 2).

Internally-standardized jockey injury data collection forms were used to record information by 7 (46.7%) HRAs. A basic form, consisting primarily of free-text boxes, was used by 4 HRAs (26.7%), while 3 HRAs (20.0%) did not use any specific form. One HRA used a standardized form for race-day injuries only. Table 3 presents the data items that respondents stated were included in these forms.

3.2. Definitions of Injury and Falls Reported by the HRAS

Two definitions for jockey fall were most commonly reported: any event of the jockey being dislodged from the horse, after the jockey had mounted to begin race proceedings (n = 5, 35.5%); and a rider being dislodged from a horse regardless of the outcome (n = 4, 28.6%). Five (35.5%) HRAs did not have a definition for a jockey fall.

Definitions most commonly applied for jockey injuries included (more than one response was possible) a jockey/rider requiring medical treatment from a physician/allied healthcare professional (n = 7, 46.7%) or the European consensus statement definition of injury (n = 6, 40.0%) which is "any physical complaint sustained by a person that results from competitive riding, training or other recognized activity that brings a person into contact, or in close vicinity and with the potential for contact, with one or more thoroughbred racehorses, irrespective of the need for medical attention or

Table 3
Jockey injury data items reported as being included in data collection forms of international Horse Racing Authorities.

Data Item (Number of Responses)	Yes	No	No Response Provided[a]
Personal identifier for the injured jockey/rider	8 (88.9)	1 (11.1)	6
Date of injury	9 (100)	-	6
Time of injury	8 (100)	-	7
Race meeting name/activity when injured	9 (100)	-	6
Injury location	7 (77.8)	2 (22.2)	6
Cause of injury	8 (88.9)	1 (11.1)	6
Protective equipment worn	3 (33.3)	6 (66.7)	6
Nature of injury (new/recurrent)	5 (55.6)	4 (44.4)	6
Body region/body part injured	8 (88.9)	1 (11.1)	6
Type of injury (fracture, sprain, strain etc)	9 (100)	-	6
Side of injury	10 (100)	-	5
Weather conditions	3 (33.3)	6 (66.7)	6
Outcome (e.g. examination only, first aid treatment, days lost from riding due to injury, fatal injury etc)	8 (88.9)	1 (11.1)	6
Date of return to riding (estimated or true return)	2 (22.2)	7 (77.8)	6
Identifying information for the horse the jockey was riding or working with when injured	2 (22.2)	7 (77.8)	6
Injury outcomes of the horse (when the jockey or rider was injured)	2 (20.0)	8 (80.0)	5
Confirmation of swab sample if taken from the horse	-	9 (100.0)	6
Free text for additional notes	3 (42.9)	4 (57.1)	8

[a] number of valid responses differ – some HRAs reported results as a no, while some HRAs did not provide a response.

time loss from horse racing activities." Other definitions of jockey injury included: unable to ride at the next race meeting (n = 4, 26.7%), transported to hospital (n = 4, 26.7%), self-report that they are injured (n = 3, 20.0%), submit an insurance claim (n = 2, 13.3%) and unable to ride in the next race at the same meeting (n = 2, 13.3%). Six (40.0%) HRAs did not have a definition of injury.

Injury severity was described according to the need for: treatment from a physician/allied healthcare professional (n = 4, 26.7%), submission of an insurance claim (n = 3, 20.0%), surgery (n = 3, 20.0%), and an end to their career (n = 2, 13.3%). Eight (53.3%) HRAs had no parameters for injury severity.

3.3. Exposure

Race day exposure was collected by 2 HRAs (14.3%). A further two HRAs (14.3%) stated they could obtain these data from other sources, if required. No HRAs collected information on exposure for training or non-riding activity.

3.4. Use of Collected Injury Data

Injury data reports were prepared at different time intervals including: annually (n = 4, 28.6%), ad hoc (n = 3, 21.4%), monthly (n = 2, 14.3%), weekly (n = 1, 7.1%) and in real-time, such as after each race (n = 1, 7.1%).

Injury surveillance data were not reported or published by 7 HRAs (46.7%). Three HRAs (20.0%) reported that they present injury data at national/international sport and exercise medicine conferences, 2 (13.3%) prepare industry publications/reports, and 2 (13.3%) published their data in a peer-reviewed journal.

In total, 10 HRAs (71.4%) have reported race-day injuries, followed by catastrophic injuries (n = 5, 35.7%), career ending injuries (n = 5, 35.7%), jockey mortality in horse-racing (n = 4, 28.6%), training injuries (n = 2, 16.7%), non-riding activity injuries (n = 1, 7.7%), and costs associated with injuries (n = 1, 7.7%).

Jockey injury data were reported to be presented as: an absolute number (n = 9, 64.3%), percentage of all jockeys/riders (n = 6, 42.9%), percentage of licensed jockeys (n = 5, 35.7%), per ride (n = 4, 36.4%), per fall (n = 5, 35.7%), per 1,000 rides (n = 3, 21.4%), per 1,000 falls (n = 2, 14.3%), per race meeting (n = 2, 15.4%), and per 1,000 race meetings (n = 1, 7.7%).

Most HRAs stated that they have made changes within their organization based on their own jockey injury data (n = 11, 73.3%) or based on data reported by other groups (n = 3, 20.0%).

3.5. Barriers and Facilitators Towards Collecting Collating and Reporting Injury Surveillance Information

Half of respondents agreed/strongly agreed that the lack of a designated role or person assigned to collect, collate and report injury information and limited resources to fund trained personnel to collect the jockey injury information were barriers for injury surveillance (Fig. 1). The most common facilitators reported were: introducing mandatory jockey injury information collection by the

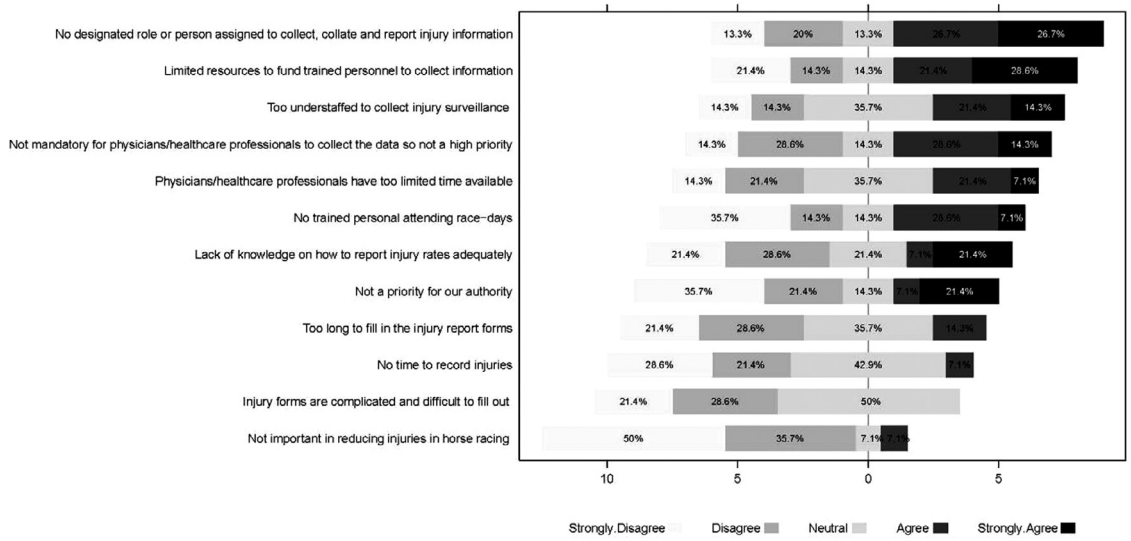

Fig. 1. Percentage of respondents and level of agreement with 12 barriers to collecting and reporting jockey injury surveillance data (n = 15).

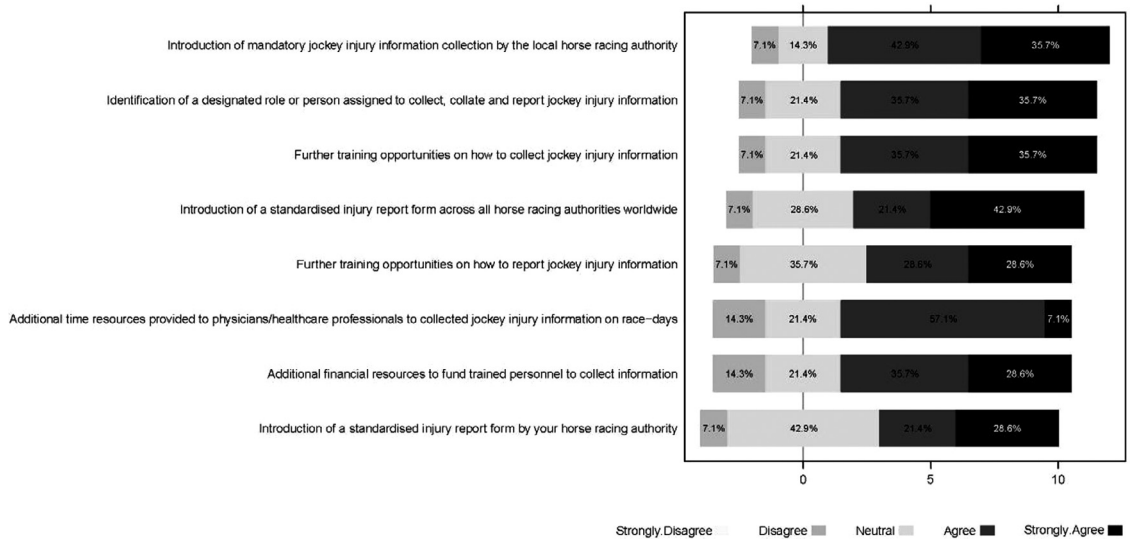

Fig. 2. Percentage of respondents and level of agreement with 8 facilitators to collecting and reporting jockey injury surveillance data (n = 15).

HRA (78.6%), identification of a designated role or person assigned to collect, collate and report jockey injury information (71.4%) and further training opportunities on how to collect jockey injury information (71.4%) (Fig. 2).

3.6. Priorities

Determining the causes of injuries (35.7%, n = 5) and developing strategies to prevent injuries (28.6%, n = 4) were the most common injury prevention and health protection priorities for authorities.

4. Discussion

For jockeys in professional horse-racing, serious and life changing injury is a real risk of their occupation. Thus, it is critical that HRAs have strategies and policies in place that seek to control risk of injury occurring and to minimize consequences if an injury does occur. The collection of consistent injury data is one part of developing these strategies, an idea that was formally proposed for thoroughbred horse-racing in 2012, at least within Europe [17] and recently proposed in North America [10]. Our study found that most HRAs understood injury prevention to be important and the need for standardized injury information. In fact, many HRAs reported that they had made changes within their organization based on their own injury surveillance data (73.3%), or from the results of other HRAs (20.0%). However, despite these positive applications, the collection and reporting of injury data is not yet routine practice.

Twelve HRAs reported the routine collection of race day jockey injury data, with six collecting the equivalent for training and four for non-riding related activities. However, within these collections, the guidance provided by the European Consensus [17] has not been adopted, with the majority of respondents either lacking a definition, or using their own definition, for jockey falls, for jockey injuries or for both. The two main reasons provided for not collecting data more often were firstly, a lack of a designated role or person that was responsible for this information and secondly, there being no mandatory requirement by the HRA for physicians/healthcare professionals to collect the data. In addition, health privacy laws or personal information requirements in some countries (such as the Health Insurance and Portability Account-

ability Act in the USA and General Data Protection Regulation in the EU) may pose certain challenges to HRAs in terms of their ability to securely store, manage and report their injury data.

Information was generally collected for the jockey and injury event (e.g. date, time and race meeting, activity the injury occurred in, race type), the injury diagnosis (e.g. type, side, body region injured) and the outcome of the injury (e.g. first aid provided, days missed from riding). These data items can be used to quantify basic information in relation to how many cases occur, the burden and types of injuries that need to be considered for prevention.

To move from reporting the number of cases to actionable prevention measures, further detailing of the injury event is required [22]. Such items were less commonly recorded, including whether protective equipment was being worn or the conditions that may have contributed to the injury. Previous Australian research has found that the horse (e.g. younger or inexperienced horses) and the environment (e.g. drier turf tracks, shorter race distances, grade of races) are particularly important risk factors to consider for jockeys [23]. In addition, if these risks occur in combination, the overall risk could be exacerbated [24]. Differences in injury rate also occur between flat and jump racing, with jump racing jockeys more at risk of sustaining an injury and a fall during a race [10]. Furthermore, more experienced jockeys [25], and those with longer careers [26] have been found to be less likely to fall in a race. Space for free text descriptions, which can be a useful adjunct to support narrative information or be used to validate the coded data items [27], were also rarely included. Thus, even where collected, a detailed understanding of the circumstances in which an injury occurred is not yet possible from the data available through most HRAs. Recognizing patterns in injury occurrence such as the type of injury and the location on the track they occur, are important in order to identify and develop targeted injury prevention strategies with the best chance of success. For example, if falls and injuries are frequently reported at the starting gate, then HRAs and track management could introduce mandatory training of the starting gate crew, and additional starting gate padding as useful preventative strategies [10].

Information on jockey exposure was rarely captured across HRAs, with less than a third of responding HRAs capturing race day data, and none capturing training and non-riding activities. Measuring exposure for jockeys, particularly outside of races can be difficult, due to varying participation of individual jockeys in activities (e.g. work riding, jump versus flat racing). However, not capturing this information is problematic as seasonal and race length can vary greatly so comparing the injury burden across settings and across time is impeded. Cohesive reporting with comparable measures of exposure at the lowest possible exposure level (such as falls and injuries per 1,000 race or trial starts and injuries per 1,000 falls, or injuries as a percentage of falls) is important for all HRAs to complete to ensure comparisons can be made between jurisdictions. This is because exposure at the race, race-day or race meeting level differ considerably due to the varied number of starters (field size) in each race, and the number of races per race day or race meeting, respectively. The European consensus statement [17] also recommends that training and non-riding activities should be measured according to the hours of exposure. It states that training exposure should be reported as hours mounted on the horse and sub-categories on the type of training and jockey should also be incorporated. Alternatively, number of horses worked may also be a potential easy measure to calculate and could be reported per 1,000 horses worked. Thus, reporting injuries per 1,000 hours of exposure or per 1,000 horses worked may be useful methods for reporting injuries during training activities. The varying organizational structures of racing in different jurisdictions is also import to consider, as it may impact on the feasibility of collecting training data. For example, in some regions (such as the USA), training and racing mostly take place on the race track, some may take place primarily in yards (such as in Ireland) and others (such as Australia) can take place on a race track, training track or a private facility. The European consensus statement naturally reflects their jurisdiction, so expanding this to incorporate other international contexts would be welcome.

Reporting of data was also not common place, with limited HRAs presenting and publishing their findings. There was also considerable overlap of those that did publish their findings in different methods (conferences, reports, research papers). Dissemination of this information to others in the industry is critical, so this information can be used globally to enhance the safety and injury prevention strategies across all HRAs worldwide. Conferences, such as the International Conference for the Health, Safety and Welfare of Jockeys, supported by the International Federation of Horseracing Authorities, can play an important role in dissemination of emerging findings relating to jockey health and safety and HRAs should be encouraged to collaborate and attend strategic meetings such as this. To enhance further engagement, subsidies or online availability of the sessions could be useful for jurisdictions with limited funding. The development of a contact list for those involved in the health and wellbeing of jockeys associated with each member organization would also be useful to ensure dissemination of important findings relating to jockey welfare

It is generally well accepted that sports organizations have a duty of care for protecting athletes. International Sports Federations, such as World Rugby and FIFA (Fédération Internationale de Football Association) together with leading agencies such as the International Olympic Committee (IOC) have supported global cooperation to improve routine surveillance of injury and illness [28]. The protection of athletes in horse-racing requires this same strategic and cooperative approach, not only for collection of injury information but also its reporting and subsequent action on key findings. Consistent collection of information is particularly important in professional horse-racing as jockeys commonly compete internationally across different race seasons and locations. Our findings highlight that consistency in definitions, data collection and reporting are not yet evident across HRAs, with variation precluding our ability to place findings from each HRA into the broader global context. Exploring the reasons why this is the case is an important contribution of our study, towards the goal of consistent surveillance practices.

Our findings are based on responses from representatives of several international HRAs who are well placed to provide insight to the injury data collection and reporting practices we sought to understand. To minimize respondent burden, our survey was kept short and focused on questions directly linked to jockey injury. The survey was designed by the research team and reliability was unable to be tested given the potential for respondent burden. There are a number of important racing jurisdictions not represented in the current study (such as South America, Turkey etc.). The International Federation of Horseracing Authorities currently has 59 members and the inclusion of more diverse settings and HRAs from other regions not represented in this study should be incorporated in future research. Another limitation of the study is that we included both the national representative body for two countries (USA and Australia) and some jurisdictional racing authorities within these countries (Maryland, Pennsylvania, Kentucky; Victoria).

To achieve change, and better protect jockey health, we propose the following recommendations be considered by both the International Federation of Horseracing Authorities and each HRA in the international racing community. First, and perhaps foremost, standardization of the information recorded and reported, both internal and external to the organization, should be a goal of all HRAs. One option to achieve this could be to update the European Consensus

Statement [17] so as to encompass horse-racing globally ('International Consensus Statement'). The generation of a standardized injury report form for use across all HRAs would greatly support the data collection process and should be strongly considered as part of any international guidelines. As jockeys take part in related activities outside of race day, data collection should ideally support an understanding of injury and risk across all activities, not only those directly from race events. Finally, there should be discussion and investigation of the feasibility for mandatory reporting within HRAs, and how best to support this process. For example, is it possible to have a designated role for injury surveillance within existing structures? How can training and education be leveraged to ensure best practice is consistently available and supported in all settings?

5. Conclusion

This study shows that guidelines alone are insufficient to support surveillance, with considerable variation in the injury data collected and reported for jockeys in international horse-racing. Information currently available enables some quantification of the injury problem but is insufficient for understanding the injury cause or contributing conditions. To move forward with evidence informed injury prevention, the international horse-racing community needs to work together towards standardization of practices across jurisdictions.

Data Availability Statement

Data are not able to be shared due to the necessary inclusion of identifying information.

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