

Supplementary information

Form S1 The British Horse Society Road Incident Form

Reporting of Equestrian Incidents Road Incident Form



Please fill in the form below circling the most suitable answer when required

* - Denotes a required field – this information **MUST** be included to enable the incident to be added to our website and database.

Incident Details

Date and Time of Incident *	
County *	
Specific Location of incident (Please include nearest post code) *	
Was the incident reported to the police?	Y / N
Police incident report number (if applicable)	
Is any further police action being taken?	Y / N
Do you have public liability insurance?	Y / N

Personal Details

Forename	
Surname	
BHS Membership Number	
Address	
Telephone Number	
Email Address	
Involvement with incident	Rider / Motorist / Witness / Friend / Police / Other
If 'Other' please give details	

Circumstances

Type of Road	Trunk / Main / Secondary / Minor / Unknown / Other
Type of Area	Urban / Suburban / Rural / Wooded / Other
Speed limit where incident happened	20mph / 30mph / 40mph / 50mph / 60mph / 70mph / unknown
Weather Conditions	Dry / Wet / Icy / Snowy / Fog / Bright
Road Surface conditions	New / Worn / Damaged
Visibility Conditions	Good / Fair / Poor
Drivers Road Rage	Y / N
Loss of control of vehicle	Y / N
Vehicle exceeding speed limit	Y / N
Vehicle passing too close to horse and rider	Y / N
Loss of control of horse	Y / N
Please give further details of the incident here:	

Horses

(Please complete the following for the main horse involved. There will be space below to detail any other horses present)

Number of horses involved	
Age of main horse involved	
Frequency of main horse involved ridden on roads	More than once a week / weekly / monthly / other
Horse	Ridden / driven / leading / loose
Horse fall	Y / N
Severity of horse's injury	None / mild / moderate / severe / fatal
Veterinary assistance required	Y / N
Veterinary practice contact information	
Collision with vehicle	Y / N
Area of horse struck by vehicle	Front / side / rear

Humans

(Please complete the following for the main rider / handler involved. There will be space below to detail any other humans present)

Number of people involved	
Experience of rider / handler on the road	0-5years / 5-10years / 10 -15years / 15 years +
Had rider / handler passed BHS Riding and Road safety Test?	Y / N
Age of main rider / handler	
Gender	
Rider fall	Y / N
Severity of rider / handler injury	None / Mild / Moderate / Severe / Fatal
Medical help sought	None / GP / Hospital / Ambulance / Air Ambulance

Details of other parties involved. Where possible use the questions above as a guide

Safety Equipment

(Please complete for the main handler/ horse partnership involved. There will be space below to detail any other partnerships present)

Hi – viz	Y / N
Type of hi – viz worn	
Age of hi - viz	
Hat	Y / N
Was the hat displaced	Y / N
Hat type	PAS015 / BSEN1384 / ASTM F1163 / Other

Age of hat	
Body protector worn?	Y / N
Type of body protector	BETA level 1 / BETA level 2 / BETA level 3 / BSEN13158
Age of body protector	
Items of tack worn e.g. saddle/bridle	
Type of tack worn	Leather / synthetic / other
Approximate age of tack	

Please detail any safety equipment worn by other partnerships involved

Any Other Information

Please give any other relevant information?

Data Protection

Are you happy to receive occasional emails from the BHS about its work?	Y / N
Are you happy to receive emails from other organisations that are supportive of the BHS?	Y / N

The BHS will retain your details on a database. The BHS and its subsidiaries may like to contact you with information about our charitable activities and how you could help us. Are you happy for your details to be used in this way?	Y / N
Are you happy for the BHS to share your information with other organisations that are supportive of the BHS?	Y / N
We will share statistical and incident data we collect with other appropriate governing bodies and organisations. This data will be anonymous: your name, home address or other identifying information, or the details of anyone else that you have given us, will not be passed on to anyone outside the BHS without your consent	
Are you happy to let us pass on your identifying details on to other organisation, carefully selected by the BHS for the purposes of improving equestrian safety	Y / N

Signature

Date

Table S2. Detailed outputs of significant clusters from the space-time permutation model. Detail includes the location and time period in which the cluster occurred and includes aggregated area and period calculations.

Clusterid	Centroid	Radius (km)	Timeframe start	Timeframe end	Time span (days)	Incidents observed	Incidents expected	P-value
1	50.609306 N, 3.487826 W	13.35	03 March 2018	02 April 2019	395	116	24.91	<0.001
2	53.837829 N, 1.710986 W	4.23	03 August 2016 03 December	02 June 2017	303	35	4.47	<0.001
3	51.685382 N, 0.150335 E	36.63	2010	02 July 2013	942	58	20.63	<0.001
4	51.592563 N, 0.702228 W	4.92	03 October 2018	02 January 2019	91	13	1.12	<0.001
5	52.613346 N, 0.232983 E	9.9	03 March 2015	02 May 2016 02 November	426	13	1.2	<0.001
6	58.204757 N, 6.281633 W	0.27	03 October 2019 03 December	2019 02 January	30	7	0.18	<0.001
7	51.445423 N, 0.767927 W	11.34	2012	2013	30	6	0.13	<0.01
8	54.134967 N, 2.655514 W	4.68	03 August 2016 03 September	02 September 2016 02 October	30	5	0.062	<0.01
9	51.756583 N, 2.485708 W	0.59	2019	2019	29	6	0.14	<0.01
10	53.311592 N, 2.677969 W	23.71	03 September 2019	02 June 2020 02 September	273	35	11.741	<0.05
11	53.800219 N, 2.824627 W	10.39	03 August 2020	2020	30	7	0.29	<0.05
Mean		11 km	Mean		234 days			
Median		9.9 km	Median		91 days			
Range		0.27 - 36.63 km	Range		29 - 942 days			

Table S3. Univariable mixed-effects logistic regression modelling, including reporter as a random effect, of incident-, horse- and rider/handler-related variables associated with higher odds of vehicle collisions in incidents reported to the British Horse Society between 2010 and 2020.

Variable	Coefficient	Standard error	Odds ratio (OR)	95% confidence interval (OR)	Wald P-value
Incident details					
Incident month					0.057
January	0.8	0.4	2.2	1.05, 4.4	0.037
February	0.9	0.4	2.4	1.2, 4.9	0.016
March	0.3	0.3	1.3	0.7, 2.5	0.448
April	0.7	0.4	2.1	1.03, 4.1	0.04
May	0.2	0.3	1.3	0.6, 2.5	0.494
June	0.1	0.3	1.2	0.6, 2.3	0.669
July	Reference				
August	0.7	0.3	1.9	1.01, 3.7	0.048
September	1.1	0.4	3.1	1.5, 6.3	0.002
October	0.7	0.4	2.0	1.0, 3.9	0.06
November	0.6	0.4	1.7	0.9, 3.5	0.113
December	1.0	0.4	2.8	1.3, 6.1	0.007
Incident season					0.012
Winter (Dec – Feb)	0.6	0.2	1.8	1.2, 2.8	0.005
Spring (Mar – May)	0.1	0.2	1.1	0.8, 1.7	0.553
Summer (Jun – Aug)	Reference				
Autumn (Sep – Nov)	0.5	0.2	1.6	1.1, 2.4	0.017
Incident year					<0.001
2010	3.6	0.5	37.0	13.4, 102.0	<0.001
2011	2.0	0.3	7.5	3.8, 14.5	<0.001
2012	2.7	0.4	14.3	6.7, 30.4	<0.001
2013	1.9	0.3	6.8	3.5, 13.5	<0.001
2014	2.0	0.3	7.3	3.9, 13.5	<0.001
2015	1.2	0.3	3.3	1.8, 5.9	<0.001
2016	0.8	0.3	2.3	1.3, 3.9	0.003
2017	0.6	0.3	1.9	1.1, 3.3	0.03
2018	0.4	0.2	1.4	0.9, 2.3	0.143
2019	Reference				
2020	-0.2	0.3	0.9	0.5, 1.5	0.589
Incident year category					
2010-2015	1.8	0.2	5.9	4.0, 8.7	<0.001
2016-2020	Reference				
Time of incident					0.022
>7pm-5am	1.0	0.6	2.7	0.8, 8.4	0.096
>5am-9am	0.4	0.2	1.5	1.0, 2.4	0.052
>9am-2pm	Reference				
>2pm-7pm	0.4	0.2	1.5	1.1, 2.0	0.012

Incident region					0.007
South West	0.9	0.3	2.5	1.3, 4.7	0.004
South East	1.1	0.3	2.9	1.5, 5.4	0.001
West Midlands	0.7	0.3	1.9	1.02, 3.6	0.043
East	1.3	0.3	3.6	1.9, 7.1	<0.001
Yorkshire & Humber	0.8	0.3	2.2	1.1, 4.3	0.022
North West	Reference				
Wales	1.1	0.4	2.9	1.4, 6.2	0.006
Scotland	0.5	0.4	1.7	0.8, 3.7	0.152
East Midlands	0.4	0.4	1.5	0.6, 3.7	0.341
North East	0.8	0.5	2.2	0.8, 5.8	0.114
Northern Ireland	1.9	0.8	6.4	1.2, 33.5	0.028
Isle of Man	-2.3	1.6	0.1	0.005, 2.4	0.155
London	3.3	1.1	27.2	3.2, 229.6	0.002
Incident road type					0.433
Minor	-0.1	0.2	0.9	0.6, 1.4	0.802
Secondary	-0.3	0.3	0.7	0.4, 1.2	0.180
Main	Reference				
Trunk	1.0	1.0	2.8	0.4, 21.7	0.318
Other	-0.2	0.4	0.8	0.4, 1.6	0.549
Unknown	-0.5	0.3	0.6	0.3, 1.3	0.193
Incident area type					0.542
Rural	0.1	0.2	1.1	0.7, 1.6	0.712
Urban	0.2	0.4	1.2	0.6, 2.5	0.574
Suburban	Reference				
Wooded	0.7	0.5	2.1	0.8, 5.1	0.115
Other	0.4	0.5	1.5	0.6, 4.0	0.424
Road speed limit in miles per hour					0.01
20	0.7	0.4	2.1	1.01, 4.4	0.048
30	0.3	0.2	1.3	0.9, 1.9	0.129
40	0.4	0.3	1.6	0.9, 2.6	0.091
50	0.4	0.3	1.6	0.8, 3.0	0.197
60	Reference				
70	1.0	0.7	2.7	0.7, 10.3	0.142
Unknown	0.8	0.2	2.2	1.5, 3.3	<0.001
Weather condition					0.042
Bright	0.5	0.2	1.6	1.1, 2.3	1.1, 2.3
Dry	Reference				
Fog/Ice/Snow	0.1	0.8	1.1	0.2, 5.6	0.2, 5.6
Wet	-0.3	0.3	0.8	0.5, 1.3	0.5, 1.3
Road surface condition					0.117
Damaged	-0.4	0.4	0.7	0.3, 1.6	0.35
New	0.3	0.2	1.3	1.0, 1.8	0.08
Worn	Reference				

Visibility condition						0.186
Good	Reference					
Fair	-0.1	0.3	0.9	0.5, 1.5	0.696	
Poor	0.9	0.5	2.5	0.9, 6.9	0.076	
Incident included road rage						
No	Reference					
Yes	-1.8	0.2	0.2	0.1, 0.3	<0.001	
Did driver lose control of vehicle?						
No	Reference					
Yes	0.005	0.3	1.0	0.6, 1.7	0.985	
Was vehicle driver exceeding the speed limit?						
No	Reference					
Yes	-1.3	0.2	0.3	0.2, 0.4	<0.001	
Did the vehicle driver pass too close?						
No	Reference					
Yes	0.3	0.2	1.4	0.9, 2.1	0.097	
Vehicle speed and passing distance						<0.001
Speeding & passing too close	1.1	0.5	3.0	1.2, 7.5	0.021	
Speeding only	Reference					
Passing too close only	2.3	0.5	10.3	4.0, 26.6	<0.001	
Neither speeding nor passing too close	2.1	0.5	7.8	2.8, 21.5	<0.001	
Did the rider/handler lose control of the horse?						
No	Reference					
Yes	-0.03	0.2	1.0	0.7, 1.4	0.855	
Details of the main horse involved in the incident						
Horse age in years (continuous)						
	-0.04	0.01	0.96	0.94, 0.99	0.009	
Horse age category in quartiles						0.136
up to 7 years	0.5	0.2	1.6	1.04, 2.4	0.029	
8-11 years	0.4	0.2	1.5	1.0, 2.2	0.065	
12-15 years	0.2	0.2	1.2	0.8, 1.9	0.359	
>15 years	Reference					
Frequency of road use						0.176
More than once/week	Reference					
Weekly	-0.2	0.2	0.8	0.6, 1.2	0.26	
Monthly	0.3	0.4	1.3	0.5, 3.1	0.549	
Other	0.7	0.4	2.0	0.9, 4.6	0.088	

Horse use					<0.001
Ridden	Reference				
Horse-drawn vehicle	1.1	0.4	3.1	1.3, 7.3	0.009
Leading	-0.3	0.3	0.7	0.4, 1.4	0.345
Loose	7.5	1.2	1732.6	174.0, 17250.1	<0.001
Details of the main rider/handler involved in the incident					
Rider/handler experience on the road					0.034
0-5 years	0.7	0.3	2.1	1.1, 3.9	0.027
6-10 years	0.3	0.3	1.3	0.8, 2.2	0.251
11-15 years	0.4	0.2	1.6	1.05, 2.5	0.031
15 years+	Reference				
Rider/handler age in years (continuous)					<0.001
	-0.02	0.005	0.98	0.97, 0.99	
Rider/handler age category in quartiles					0.0002
up to 27 years	0.9	0.2	2.4	1.6, 3.7	<0.001
28-40 years	0.3	0.2	1.3	0.9, 1.9	0.231
41-50 years	0.1	0.2	1.1	0.7, 1.8	0.541
>50 years	Reference				
Rider/handler gender					<0.001
Female	Reference				
Male	1.4	0.3	4.0	2.1, 7.6	<0.001
Unknown	1.6	0.3	4.9	2.6, 9.1	<0.001
High visibility clothing worn by the rider/handler or horse?					
No	Reference				
Yes	-2.3	0.3	0.1	0.06, 0.17	<0.001

Table S4. Univariable logistic regression modelling of incident-, horse- and rider/handler-related variables associated with higher odds of horse fatality road incidents reported to the British Horse Society between 2010 and 2020.

Variable	Coefficient	Standard error	Odds ratio (OR)	95% confidence interval (OR)	Wald P-value
Incident details					
Incident month					0.001
January	2.0	0.6	7.2	2.1, 24.9	0.002
February	1.4	0.7	4.2	1.2, 15.3	0.028
March	1.5	0.6	4.6	1.3, 15.9	0.016
April	Reference				
May	0.5	0.7	1.7	0.4, 7.0	0.442
June	0.6	0.7	1.9	0.5, 7.6	0.372
July	1.4	0.6	4.3	1.2, 14.8	0.023
August	0.8	0.7	2.2	0.6, 8.4	0.245
September	1.7	0.6	5.7	1.6, 20.1	0.007
October	1.0	0.7	2.8	0.8, 10.5	0.137
November	1.5	0.6	4.4	1.3, 15.7	0.021
December	1.9	0.7	6.6	1.8, 23.6	0.004
Incident season					0.003
Winter (Dec – Feb)	0.9	0.3	2.4	1.4, 3.9	0.001
Spring (Mar – May)	Reference				
Summer (Jun – Aug)	0.1	0.3	1.1	0.7, 1.9	0.687
Autumn (Sep – Nov)	0.5	0.3	1.7	1.0, 2.8	0.05
Incident year					<0.001
2010	3.1	0.4	21.9	9.2, 51.8	<0.001
2011	2.1	0.4	8.6	3.8, 19.4	<0.001
2012	2.3	0.4	10.1	4.4, 23.3	<0.001
2013	1.7	0.5	5.4	2.2, 13.3	<0.001
2014	1.3	0.5	3.5	1.4, 8.7	0.007
2015	1.2	0.5	3.4	1.4, 8.4	0.009
2016	1.6	0.4	4.8	2.1, 10.9	<0.001
2017	0.6	0.5	1.9	0.7, 5.2	0.201
2018	0.5	0.5	1.6	0.7, 4.0	0.275
2019	Reference				
2020	0.3	0.5	1.4	0.5, 4.0	0.514
Incident year category					
2010-2015	1.3	0.2	3.6	2.5, 5.1	<0.001
2016-2020	Reference				
Time of incident					<0.001
>7pm-5am	2.8	0.4	16.8	8.0, 35.4	<0.001
>5am-9am	0.7	0.3	2.1	1.2, 3.7	0.014
>9am-2pm	Reference				
>2pm-7pm	0.7	0.2	2.0	1.3, 3.1	0.002

Incident region					
South West	0.3	0.4	1.3	0.6, 2.9	0.539
South East	0.7	0.4	2.1	1.0, 4.5	0.058
West Midlands	0.1	0.4	1.1	0.5, 2.6	0.803
East	0.6	0.4	1.8	0.8, 4.2	0.148
Yorkshire & Humber	Reference				
North West	0.3	0.5	1.3	0.5, 3.2	0.571
Wales	1.1	0.4	3.0	1.3, 6.8	0.009
Scotland	0.5	0.5	1.6	0.6, 4.1	0.316
East Midlands	0.1	0.6	1.1	0.3, 3.8	0.821
North East	0.2	0.7	1.3	0.3, 4.8	0.712
Northern Ireland	0.5	1.1	1.7	0.2, 14.0	0.617
London	2.4	0.7	11.1	2.7, 45.6	0.001
Incident road type					
Minor	Reference				<0.001
Secondary	0.7	0.2	2.0	1.3, 3.1	0.003
Main	0.7	0.2	2.0	1.3, 3.2	0.003
Other	-0.2	0.5	0.9	0.3, 2.4	0.762
Unknown	-1.8	1.0	0.2	0.02, 1.2	0.081
Incident area type					
Rural	-0.4	0.4	0.7	0.3, 1.4	0.294
Urban	Reference				
Suburban	-0.2	0.4	0.8	0.4, 1.9	0.646
Wooded	-0.6	0.8	0.6	0.1, 2.7	0.467
Other	0.5	0.6	1.6	0.5, 5.0	0.428
Road speed limit in miles per hour					
20	1.2	1.0	3.4	0.5, 25.3	0.231
30	2.0	1.0	7.2	1.0, 54.7	0.056
40	1.7	1.1	5.6	0.7, 45.6	0.11
50	1.2	1.0	3.4	0.5, 25.4	0.227
60	Reference				
70	2.5	1.2	12.2	1.2, 120.2	0.033
Unknown	2.3	1.0	9.5	1.3, 69.3	0.027
Weather condition					
Bright	0.6	0.2	1.8	1.1, 2.9	0.02
Dry	Reference				
Fog/Ice/Snow	1.6	0.6	5.2	1.5, 17.6	0.008
Wet	0.1	0.4	1.1	0.5, 2.4	0.752
Visibility condition					
Good	Reference				<0.001
Fair	0.6	0.3	1.8	0.9, 3.4	0.074
Poor	2.0	0.4	7.6	3.5, 16.5	<0.001
Incident included road rage					
No	Reference				

Yes	-2.3	0.4	0.1	0.04, 0.2	<0.001
Did driver lose control of vehicle?					
No	Reference				
Yes	1.1	0.3	2.9	1.7, 4.8	<0.001
Was vehicle driver exceeding the speed limit?					
No	Reference				
Yes	0.2	0.2	1.2	0.8, 1.9	0.337
Did the vehicle driver pass too close?					
No	Reference				
Yes	-1.0	0.2	0.4	0.2, 0.6	<0.001
Vehicle speed and passing distance					<0.001
Speeding & passing too close					
	0.7	0.3	2.0	1.2, 3.6	0.013
Speeding only	0.6	0.6	1.9	0.6, 5.5	0.256
Passing too close only	Reference				
Neither speeding nor passing too close					
	1.7	0.3	5.5	3.0, 9.9	<0.001
Did the rider/handler lose control of the horse?					
No	Reference				
Yes	0.2	0.2	1.2	0.8, 1.9	0.411
Details of the main horse involved in the incident					
Horse age in years (continuous)					
	-0.01	0.02	0.99	0.9, 1.0	0.523
Horse age category in quartiles					0.113
up to 7 years	0.1	0.3	1.1	0.6, 1.9	0.836
8-11 years	-0.4	0.3	0.6	0.3, 1.2	0.166
12-15 years	-0.6	0.4	0.5	0.3, 1.1	0.086
>15 years	Reference				
Frequency of road use					<0.001
More than once/week	Reference				
Weekly	-0.99	0.4	0.4	0.2, 0.8	0.014
Monthly	0.3	0.6	1.4	0.4, 4.5	0.58
Other	1.7	0.3	5.3	2.7, 10.5	<0.001
Horse use					<0.001
Ridden	Reference				
Horse-drawn vehicle	1.5	0.3	4.7	2.4, 9.0	<0.001
Leading	-0.3	0.5	0.7	0.3, 1.9	0.505
Loose	4.6	0.3	100.0	51.4, 194.5	<0.001
Did horse fall?					
No	Reference				
Yes	3.0	0.2	19.5	12.9, 29.5	<0.001

Collision between the horse, rider/handler or horse-drawn vehicle and driver of vehicle					
No	Reference				
Yes	5.2	0.6	188.2	59.7, 592.9	<0.001

Details of the main rider/handler involved in the incident

Rider/handler experience on the road					0.180
0-5 years	0.7	0.4	2.1	0.9, 4.7	0.072
6-10 years	0.1	0.4	1.1	0.5, 2.6	0.74
11-15 years	0.6	0.3	1.7	0.9, 3.3	0.081
15 years+	Reference				
Rider/handler age in years (continuous)					0.221
	-0.01	0.008	0.99	0.97, 1.0	
Rider/handler age category in quartiles					0.096
up to 27 years	0.3	0.3	1.3	0.7, 2.3	0.394
28-40 years	-0.4	0.3	0.7	0.3, 1.3	0.262
41-50 years	-0.4	0.4	0.6	0.3, 1.3	0.218
>50 years	Reference				
Rider/handler gender					<0.001
Female	Reference				
Male	1.6	0.3	5.0	3.0, 8.3	
Unknown	2.3	0.2	9.7	6.3, 14.7	
Severity of injury to rider/handler					<0.001
None	Reference				
Mild	1.5	0.3	4.5	2.6, 7.8	<0.001
Moderate	2.2	0.3	9.0	5.5, 14.9	<0.001
Severe	3.3	0.3	26.5	15.5, 45.3	<0.001
Fatal	3.6	0.6	36.3	12.2, 108.3	<0.001
High visibility clothing worn by the rider/handler or horse?					<0.001
No	Reference				
Yes	-2.7	0.2	0.07	0.05, 0.1	