Dr. Tim Parkin

Equine Injury Database
A Safety Initiative of The Jockey Club
Initial analyses of the Equine Injury Database

Potential impact of data analysis - examples from Hong Kong and UK
Introduction

• Scratching the surface
• Complex analyses to follow
  – Rely on complete, comprehensive and accurate data
  – Will take time – no quick answers
  – Previous experience with data from Hong Kong, Australia, Japan, UK…
    • Fatality, tendon injury, fracture…
• Today
  – Individual factors potentially associated with fatality during racing
  – Thoroughbreds only
Questions

- Surface type
- Mares and fillies in open races
- Age
- Gender
- Change of racing surface
- Surface condition
  - Turf
  - Dirt
- Race distance
- Weight carried
Take Home Messages

• No statistically significant difference in the risk of fatality on different surfaces
• Females were not at increased risk of fatality when racing against males
• 2-year-olds were less likely to sustain a fatal injury than older horses
• Females were less likely to sustain a fatal injury than intact males
• There was no increase in risk when races were moved off the turf
Detail
Surface Type

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Incidence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>2.04</td>
<td>1.90 – 2.19</td>
</tr>
<tr>
<td>TURF</td>
<td>1.78</td>
<td>1.43 – 2.21</td>
</tr>
<tr>
<td>DIRT</td>
<td>2.14</td>
<td>1.97 – 2.32</td>
</tr>
<tr>
<td>SYNTHETIC</td>
<td>1.78</td>
<td>1.47 – 2.16</td>
</tr>
</tbody>
</table>

p = 0.12

p = 0.09

p = 0.12
Mares & Fillies in Open Races – All Surfaces Combined

<table>
<thead>
<tr>
<th>Incidence</th>
<th>OPEN</th>
<th>RESTRICTED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.14</td>
<td>1.79</td>
</tr>
<tr>
<td>95% CI</td>
<td>0.83 – 5.49</td>
<td>1.59 – 2.0</td>
</tr>
</tbody>
</table>

p = 0.84
Age (Year of Birth) – All Surfaces Combined

Relative Risk (RR) = 0.65
(95% CI = 0.45 – 0.94)

p = 0.03

Incidence

<table>
<thead>
<tr>
<th>Year</th>
<th>Incidence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEFORE 2007</td>
<td>1.91</td>
<td>1.67 – 2.18</td>
</tr>
<tr>
<td>2007</td>
<td>1.36</td>
<td>0.95 – 1.94</td>
</tr>
</tbody>
</table>
Gender – All Surfaces Combined

| Incidence | 3.37 | 1.79 |
| 95% CI    | 2.9 – 4.0 | 1.6 – 2.0 |

RR = 0.53
(95% CI = 0.43 – 0.65)

p < 0.001
Change of Racing Surface

| Incidence | 1.75 | 2.08 |
| 95% CI    | 1.09 – 2.81 | 1.93 – 2.25 |

p = 0.55
# Surface Condition – Turf (and Synthetic)

<table>
<thead>
<tr>
<th>Surface Condition</th>
<th>Incidence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm</td>
<td>1.99</td>
<td>1.58 – 2.51</td>
</tr>
<tr>
<td>Good</td>
<td>1.37</td>
<td>0.72 – 2.61</td>
</tr>
<tr>
<td>Yielding</td>
<td>0.54</td>
<td>0.10 – 3.07</td>
</tr>
<tr>
<td>Soft</td>
<td>0</td>
<td>0 – 2.75</td>
</tr>
<tr>
<td>Fast (Synthetic)</td>
<td>1.78</td>
<td>1.47 – 2.16</td>
</tr>
</tbody>
</table>
Surface Condition – Dirt (and Synthetic)

<table>
<thead>
<tr>
<th>Surface Condition</th>
<th>Incidence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAST</td>
<td>2.07</td>
<td>1.89 – 2.27</td>
</tr>
<tr>
<td>WET FAST</td>
<td>2.93</td>
<td>1.68 – 5.12</td>
</tr>
<tr>
<td>GOOD</td>
<td>2.13</td>
<td>1.53 – 2.96</td>
</tr>
<tr>
<td>SLOPPY</td>
<td>2.68</td>
<td>2.13 – 3.38</td>
</tr>
<tr>
<td>MUDDY</td>
<td>1.99</td>
<td>1.34 – 2.96</td>
</tr>
<tr>
<td>FAST (SYNTHETIC)</td>
<td>1.78</td>
<td>1.47 – 2.16</td>
</tr>
</tbody>
</table>
Race Distance – All Surfaces Combined

<table>
<thead>
<tr>
<th>Incidence</th>
<th>&gt;2F ≤4F</th>
<th>&gt;4F ≤6F</th>
<th>&gt;6F ≤8F</th>
<th>&gt;8F ≤10F</th>
<th>&gt;10F ≤18F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.09</td>
<td>2.10</td>
<td>2.0</td>
<td>1.91</td>
<td>2.24</td>
</tr>
<tr>
<td>95% CI</td>
<td>1.42 – 6.73</td>
<td>1.91 – 2.32</td>
<td>1.75 – 2.27</td>
<td>1.62 – 2.26</td>
<td>0.76 – 6.56</td>
</tr>
</tbody>
</table>
Weight Carried (lb) – All Surfaces Combined

<table>
<thead>
<tr>
<th>Weight Carried (lb)</th>
<th>Incidence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤115</td>
<td>2.14</td>
<td>1.74 – 2.63</td>
</tr>
<tr>
<td>116 ≤ 120</td>
<td>1.95</td>
<td>1.77 – 2.14</td>
</tr>
<tr>
<td>121 ≤ 125</td>
<td>2.17</td>
<td>1.92 – 2.46</td>
</tr>
</tbody>
</table>
Summary

• No statistically significant difference in the incidence of fatality
  – On different surface types
  – In mares and fillies in open or restricted races
  – In races that have been moved off turf
  – On different surface conditions
  – In different race distances
  – In horses carrying different weight
Summary

• Starts made by females were 50% less likely to end in fatal injury than starts made by intact males ($p < 0.001$)

• Starts made by 2-year-olds were 30% less likely to end in fatal injury than starts made by older horses ($p = 0.03$)
What are the next steps?

Movement from identification of “risk factors”

to

The identification of the “at risk” horse
Acknowledgments

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  – Lynn Hillyer
  – Peter Webbon
  – Tim Morris
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• AHT
  – Richard Newton
  – Katherine Rogers
• Weatherbys
  – Gayle Preston

UNIVERSITY of GLASGOW
Faculty of Veterinary Medicine
Hong Kong & UK

• Hong Kong
  – Risk factors for retirement due to tendon strain injury
  – Management strategies to reduce the incidence of serious tendon injury

• UK
  – Targets for future research
  – Policy advice documents for the racing industry
Career-ending tendon injury in Hong Kong

Ken Lam, Chris Riggs & Kenton Morgan
HKJC Data

- Detailed training and race data
  - Daily records for every horse
  - Differences in training regimens
- Detailed veterinary histories
  - 1200 horses stabled at Sha Tin
  - All veterinary needs provided by HKJC
- 1992 - Racing Information System (RIS)
  - 3700 fields in >400 tables
Exercise Intensity

- Distance raced – per 1000m
- Days after import

High risk period for long-term increased risk of tendon injury

Encourage trainers to work horses with less intensity soon after import
Exercise Intensity

- No. of fast pace episodes (gallop, barrier trial, race)
- Days leading up to case date

Monitor training intensity and conduct veterinary examinations

Significantly reduced exercise intensity as much as six months before retirement
Management Tools

• Vet exams and exercise history
  – “On Watch” system introduced
    • Based on exercise patterns and medical histories
    • “At risk” horses are then monitored more closely

• Process control charts
  – Potential in data rich environments
  – Identify “abnormal” patterns

• Identify at-risk horses BEFORE retirement
Fatal and non-fatal injuries in jump racing in the UK

Richard Newton, Anthony Stirk, Tim Morris, Lynn Hillyer, Peter Webbon
Data

• BHA Welfare and Injury database since 2000
• More than 200 potential fields for all race starts on all UK racecourses
• To date more than 900,000 race starts
• ~ 1500 tendon strain injuries
• Clean and accurate
• We can be very speculative
  – No preconceptions about factors that may increase the risk of tendon injury
• Account for the effect of all variables together
Inter-relationships between variables

**Trainer**
- Owner
- Age
- Gender
- Horse rating
- Racing history
- Training history
- Prior tack usage
- Veterinary interventions

**Jockey Factors**
- Weight
- Experience

**Race Factors**
- Year
- Season
- Weather
- Distance
- Pace of race
- Class of race
- Race type
- Age restrictions
- Field size
- Jockey restrictions

**Course Factors**
- Going
- Location
- Card number
- Course design
- Course surface

**Outcome**
- Fatality
- Injury

**Type of injury**

Veterinary decision to subject to euthanasia

Boden et al. 2006
Firmer Going on Turf

- Particular focus of current research
  - Racetrack management strategies
    - Watering, moving running rails/fences, etc.
• Summer jump racing
• Ability to accurately measure surface condition
  – Effect of track maintenance throughout the year
Previous Tendon Injury

• Horses with a previous (racecourse) tendon injury were 40 times more likely to sustain another tendon injury during racing

• Greater emphasis on accurate recording of previous medical histories

• Need for multiple data platforms
  – Harmonisation of data recording and analysis
    • International
    • National
Benefit of Multiple Data Platforms
EID – Take Home Messages

- **No** statistically significant difference in the risk of fatality on different surfaces
- Females were **not** at increased risk of fatality when racing against males
- 2-year-olds were **less** likely to sustain a fatal injury than older horses
- Females were **less** likely to sustain a fatal injury than intact males
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The Next Steps?

• Use what we have learned from Hong Kong and UK to better predict fatality in the USA
  – Validate Hong Kong and UK models on EID data
• Conduct multivariable analysis of EID data to identify factors that increase the risk of
  – Fatality
  – Non-fatal injury
• Identify factors that improve “durability”
• Will take time and requires quality data