Do children and young people with ADHD have an increased risk of injuries compared to people without? A population-based cohort study.

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Introduction

• Injury
• ADHD
• ADHD and injuries:
  – Fractures (including long bone)
  – Thermal injuries
  – Poisonings
Objective

• To explore whether children and young people with ADHD are at an increased risk of:
  • Fracture
  • Thermal injury
  • Poisoning
  - compared to those without ADHD
Participants

• CPRD:
  • 15,943 with ADHD
  • 301,550 without ADHD
  • Aged between 3-19 years at (pseudo)diagnosis
  • Followed for a median (interquartile range) of 2.5 (0.8 to 5.6) years
• Linked hospital medical records from HES
Outcomes

- First fracture (including long bone)
- First thermal injury
- First poisoning
  - In people with ADHD compared to those without
Allocation of dates and age

- Pseudodiagnosis date:
  - Randomly assigned for non-ADHD people
  - From 3 months after the start of GP record to the end of the GP record
- Age:
  - Age at (pseudo)diagnosis
  - From 1\textsuperscript{st} January 1998 to 30\textsuperscript{th} March 2012
Main inclusions/exclusions

- Participants with an injury prior to follow-up excluded
- Participants followed until the injury code after diagnosis
- Separate analyses conducted for each injury outcome (or injury subgroup)
Confounders

- Age
- Sex
- Strategic health authority region
- Practice level quintile of deprivation (IMD)
- Calendar year of entry into study
- Also adjusted for the following if there was a change of >10% in HR:
  - Learning disability
  - Epilepsy
  - Cerebral palsy
- Separate analysis adjusted for behaviour disorder
Analyses (Cox model)

- Unadjusted analyses
- Adjusted analyses
Results – Study population
Risk of fractures, thermal injuries and poisonings in children & young people with ADHD compared to those without

<table>
<thead>
<tr>
<th>Injury category</th>
<th>ADHD or non-ADHD</th>
<th>Events (n)</th>
<th>pyar (per 1000)</th>
<th>Rate (95% CI)</th>
<th>HR (95% CI)</th>
<th>Adjusted HRa (95% CI)</th>
<th>Adjusted HRb (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any fractures</td>
<td>Non-ADHD</td>
<td>18905</td>
<td>1,011,032</td>
<td>18.7 (18.4 -19.0)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>1895</td>
<td>63,916</td>
<td>29.5 (28.2 -30.9)</td>
<td>1.59 (1.52 -1.67)</td>
<td>1.29 (1.23 -1.35)</td>
<td>1.19 (1.13 -1.26)</td>
</tr>
<tr>
<td>Thermal injuries</td>
<td>Non-ADHD</td>
<td>2322</td>
<td>1,070,895</td>
<td>2.2 (2.1 -2.3)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>316</td>
<td>69,924</td>
<td>4.5 (4.0 -5.0)</td>
<td>2.09 (1.86 -2.35)</td>
<td>2.04 (1.81 -2.31)</td>
<td>1.67 (1.45 -1.91)</td>
</tr>
<tr>
<td>Any poisonings</td>
<td>Non-ADHD</td>
<td>2,129</td>
<td>1,072,756</td>
<td>2.0 (1.9 -2.1)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>469</td>
<td>69,875</td>
<td>6.7 (6.1 -7.3)</td>
<td>3.35 (3.03 -3.70)</td>
<td>3.95 (3.55 -4.40)</td>
<td>2.64 (2.33 -3.00)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Injury sub-groups:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Long bone fractures</td>
<td>Non-ADHD</td>
<td>12133</td>
<td>1,034,559</td>
<td>11.7 (11.5 -11.9)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>1199</td>
<td>66,582</td>
<td>17.9 (16.9 -19.0)</td>
<td>1.54 (1.45 -1.64)</td>
<td>1.23 (1.16 -1.31)</td>
<td>1.14 (1.07 -1.22)</td>
</tr>
</tbody>
</table>

(pyar: Person years at risk (in years)

HR: Hazard ratio

*a* HRs were adjusted for age, sex, SHA region, deprivation and calendar year at study entry

*b* HRs were adjusted for age, sex, SHA region, deprivation and calendar year at study entry and behaviour disorder
Absolute risks of injury in the first 5 years of the study in people with ADHD and without ADHD

<table>
<thead>
<tr>
<th>Time since diagnosis</th>
<th>Total at risk (n)</th>
<th>Events (n)</th>
<th>Injuries per thousand (95% CI)</th>
<th>Total at risk (n)</th>
<th>Events (n)</th>
<th>Injuries per thousand (95% CI)</th>
<th>Excess injuries per thousand (95% CI)</th>
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<tbody>
<tr>
<td>Any fractures</td>
<td></td>
<td></td>
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<tr>
<td>Up to 5 years</td>
<td>78,668</td>
<td>14,664</td>
<td>95.1 (93.5 -96.8)</td>
<td>4,971</td>
<td>1,418</td>
<td>147.7 (139.7 -156.1)</td>
<td>52.6 (46.2 -59.3)</td>
</tr>
<tr>
<td>Thermal injuries</td>
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<tr>
<td>Up to 5 years</td>
<td>86,003</td>
<td>1,714</td>
<td>10.6 (10.0 -11.1)</td>
<td>5,625</td>
<td>233</td>
<td>23.2 (20.2 -26.5)</td>
<td>12.6 (10.2 -15.4)</td>
</tr>
<tr>
<td>Any poisonings</td>
<td></td>
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<tr>
<td>Up to 5 years</td>
<td>86,181</td>
<td>1,445</td>
<td>9.2 (8.7 -9.7)</td>
<td>5,645</td>
<td>347</td>
<td>31.9 (28.6 -35.7)</td>
<td>22.7 (19.9 -26.0)</td>
</tr>
<tr>
<td>Injury sub-groups:</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Long bone fracture</td>
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</tr>
<tr>
<td>Up to 5 years</td>
<td>81,516</td>
<td>9,464</td>
<td>60.2 (59.0 -61.5)</td>
<td>5,260</td>
<td>888</td>
<td>91.2 (85.1 -97.8)</td>
<td>31.0 (26.1 -36.3)</td>
</tr>
</tbody>
</table>
Discussion

- Greater risk of injuries compared to those without ADHD
- Greatest risk from poisonings
- Opportunity to educate people about the risk of medicinal poisonings at:
  - Diagnosis
  - ADHD reviews
  - Prescribing or dispensing medication
- Future work: aetiology/circumstances of injuries/effect of treatment
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