The epidemiology of hospital-treated injuries sustained in the health and fitness sector

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Background

• Leading an active lifestyle can help prevent numerous preventable diseases and contribute to overall health
• The fitness industry provides a service enabling the public to increase their physical activity (PA)
• However, as with all forms of sport and PA, there is a risk of injury
• No comprehensive published Australian data on injuries in the health and fitness sector
What do we know about injury risks in the fitness industry?

• Some US studies have been undertaken into weight-training and aerobics injuries (Garrick, Gillien & Whiteside, 1986; Jones, Christensen & Young, 2000; Kerr, Collins & Comstock, 2010)

• Only 1 published Australian study of injuries sustained in the fitness industry and this only looked at aerobics injuries (Garnham, Finch & Salmon, 2001)

• Safety is a concern for facility managers, but not systematically addressed (Finch, Donaldson, Mahoney, Otago, 2009)
Aim

• To provide the first epidemiological study of injuries sustained in the health and fitness sector in Australia, based on hospital admissions and emergency room presentations in Victoria

• To identify the types and causes of common injuries associated with fitness activities
  • 15+ year olds
  • 2003-2010
Methods – Injury Data

- **Victorian Admitted Episodes Dataset (VAED)**
  - 100% hospital coverage state-wide
  - coded to ICD-10-AM
  - case selection using activity and place of occurrence codes

- **Victorian Emergency Minimum Dataset (VEMD)**
  - 38 Victorian public hospital emergency departments
  - coded to the Victorian Emergency Minimum Dataset (VEMD)
  - case selection on basis of targeted text searching
  - subsequent admissions excluded

- **Excluded**
  - children and cases at home
Methods – Participation Data

• **Source: Exercise, Recreation and Sport Survey (ERASS)**
  • conducted on an annual basis
  • collects information on the frequency, duration, nature and type of activities participated in
  • limited to persons aged 15+ years
  • exercise, recreation or sport during the 12 months before interview

• **Limitations**
  • only 2 categories for relevant participation data
    • weight training
    • aerobics/fitness
  • includes all locations (not limited to fitness facilities)
# Results

## TOTAL NUMBER OF CASES, 2003 - 2010

<table>
<thead>
<tr>
<th></th>
<th>VEMD ED presentations</th>
<th>VAED hospital admissions</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1979</td>
<td>259</td>
<td>2238</td>
</tr>
</tbody>
</table>

- 11.6% of all fitness-related ED presentations are hospitalised
- For every hospital admission, there were 7.6 ED presentations (1:7.6)
Types of fitness activities

- **Resistance training** includes all exercise involving free weights, weight machines, resistance bands or medicine balls.

- **Aerobics** includes boxercise, pump, step, taibo, Zumba, and other group exercise classes.

- **Other equipment** includes all fitness equipment not mentioned above such as treadmills, exercise bikes, cross-trainers, fitness balls, steppers etc.
Results – ANNUAL TRENDS

Incidence rate per 100,000 participants aged 15+ years

Calendar year

Resistance Training
Aerobics & Other Equipment
Overall

+215.7%, p<0.001
+67.5%, p<0.001
+56.0%, p<0.001
# Results – AGE AND GENDER

<table>
<thead>
<tr>
<th>FREQUENCY AND INCIDENCE PER ACTIVITY</th>
<th>NUMBER OF CASES</th>
<th>INCIDENCE PER 100,000 PARTICIPANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resistance training</td>
<td>Aerobics</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>647</td>
<td>59</td>
</tr>
<tr>
<td>Female</td>
<td>183</td>
<td>193</td>
</tr>
<tr>
<td>Persons</td>
<td>830</td>
<td>252</td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24 years</td>
<td>302</td>
<td>49</td>
</tr>
<tr>
<td>25-34 years</td>
<td>271</td>
<td>89</td>
</tr>
<tr>
<td>35-44 years</td>
<td>168</td>
<td>52</td>
</tr>
<tr>
<td>45-54 years</td>
<td>58</td>
<td>33</td>
</tr>
<tr>
<td>55-64 years</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>65+ years</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>
### Results – BODY REGION

<table>
<thead>
<tr>
<th>PERCENTAGE OF EACH ACTIVITY CATEGORY</th>
<th>Resistance training</th>
<th>Aerobics</th>
<th>Other equipment</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 830</td>
<td>n = 252</td>
<td>n = 1156</td>
<td>n = 2238</td>
</tr>
<tr>
<td>Ankle &amp; foot</td>
<td>15.2</td>
<td>29.4</td>
<td>22.1</td>
<td>20.4</td>
</tr>
<tr>
<td>Shoulder &amp; upper arm</td>
<td>23.4</td>
<td>5.6</td>
<td>14.1</td>
<td>16.6</td>
</tr>
<tr>
<td>Wrist &amp; hand</td>
<td>16.6</td>
<td>19.8</td>
<td>11.8</td>
<td>14.5</td>
</tr>
<tr>
<td>Knee &amp; lower leg</td>
<td>4.8</td>
<td>27.4</td>
<td>17.0</td>
<td>13.7</td>
</tr>
<tr>
<td>Abdomen, lower back, lumbar spine &amp; pelvis</td>
<td>11.3</td>
<td>4.8</td>
<td>8.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Head</td>
<td>8.6</td>
<td>1.2</td>
<td>8.9</td>
<td>7.9</td>
</tr>
</tbody>
</table>
# Results – NATURE OF INJURY

<table>
<thead>
<tr>
<th>INJURY TYPES</th>
<th>Overall</th>
<th>% of overall</th>
<th>% hospitalised*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dislocation, sprain &amp; strain</td>
<td>1015</td>
<td>45.4</td>
<td>6.3</td>
</tr>
<tr>
<td>Injury to muscle &amp; tendon</td>
<td>357</td>
<td>16.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Fracture</td>
<td>323</td>
<td>14.4</td>
<td><strong>23.2</strong></td>
</tr>
<tr>
<td>Open wound</td>
<td>160</td>
<td>7.1</td>
<td>15.0</td>
</tr>
<tr>
<td>Superficial injury</td>
<td>120</td>
<td>5.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Crushing injury</td>
<td>52</td>
<td>2.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Intracranial injury</td>
<td>25</td>
<td>1.1</td>
<td>20.0</td>
</tr>
</tbody>
</table>

* of those specified
**Results – CAUSE OF INJURY**

<table>
<thead>
<tr>
<th>PERCENTAGE OF EACH ACTIVITY CATEGORY*</th>
<th>Resistance training n = 830</th>
<th>Aerobics n = 252</th>
<th>Other equipment n = 1156</th>
<th>Overall n = 2238</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>13.6</td>
<td><strong>57.9</strong></td>
<td><strong>57.6</strong></td>
<td>42.2</td>
</tr>
<tr>
<td>Hit/Struck/Crush</td>
<td><strong>71.4</strong></td>
<td>29.6</td>
<td>33.4</td>
<td><strong>46.3</strong></td>
</tr>
<tr>
<td>Overexertion and/or strenuous movements</td>
<td>14.1</td>
<td>12.5</td>
<td>6.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Other</td>
<td>0.9</td>
<td>0.0</td>
<td>2.4</td>
<td>1.5</td>
</tr>
</tbody>
</table>

* of known causes

Note: ‘Other’ includes machinery, cutting/piercing, poisoning and electricity
Summary

• **Resistance training**
  - highest population-adjusted rate
  - majority males
  - most common to upper limbs
  - hit/struck/crush

• **Aerobics**
  - lowest when population-adjusted
  - majority females
  - most commonly lower limb injuries
  - falls

• **Fitness equipment**
  - commonly to lower limbs
  - falls
  - Dislocation, sprain & strain injuries most common overall

• **Fractures** are the most hospitalised
Conclusions

• Can now prioritise which activities and users require the most intervention attention

• Further research within fitness settings in order to devise targeted interventions to prevent injury
  • types of participants for each activity
  • reasons for their choice of activity
  • safety beliefs and practices of participants and service providers
References


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