Edinburgh Cyclists’ Tram Injuries

Prof Chris Oliver

@CyclingSurgeon CyclingSurgeon.Bike

Julian Maepel, Paul Stirling, C McCann, Sam Mackenzie, Tim White, Chris Oliver
Edinburgh Orthopaedic Trauma Unit, Royal Infirmary of Edinburgh
IFF Three Horizons Model: three forms of innovation

Prevalence

First horizon - sustaining innovation
H1

Second horizon - disruptive innovation
H2

Third horizon - transformative innovation
H3

Time

http://www.internationalfuturesforum.com/
Edinburgh Orthopaedic Trauma Unit

- Serves 800k in Lothian
- Per year
  - A&E 120k+ RIE
- Trauma Orthopaedic
  - 7k inpatients
  - 6k operations
  - 42k outpatients
  - > 1,000 hip fractures
  - 12 consultants
- Regional & military training
- National Trauma Centre
- Academic program
- International Trauma Symposium

http://www.ed.ac.uk/clinical-sciences/orthopaedics-trauma/clinical/trauma
Prof Chris Oliver
Section Editor Trauma:

- Multiple injury
- Skin Loss
- Burns
- Skeletal injury
- Conflict & Military
- Head injury
- Chest injury
- Abdominal injury
- Vascular injury
Do 20mph speed limits reduce casualties and increase cycling, walking, and liveability in the general population?

- National Institute Health Research – NIHR
- £890k grant
- Lead by
  - Scottish Collaboration for Public Health Research & Policy
  - Physical Activity for Health Research Centre, The University of Edinburgh
  - Centre for Public Health, Queen’s University Belfast
- August 2020
- Prof Chris Oliver - Study Steering Committee Member

http://www.isrctn.com/ISRCTN10200526
Some Cycling Safety Facts

• Life years gained due to the health & fitness benefits of cycling in Britain outweigh life-years lost through injuries by a factor of around 20:1
• 2011-2015, one cyclist was killed on Britain’s roads for every 29 million miles travelled by cycle = 1,000 times around the world
• Unlikely to be killed cycling as walking
• UK has a good road safety record
• Cycle safety in is one of the poorest in Europe
Cycling deaths in Great Britain

deads/year

Source: Department for Transport
Pedal cyclist casualties by severity and road type, 2013

- **Seriously injured**
- **Killed**

**Urban areas**
- 2,262 seriously injured
- 46 killed

**Rural areas**
- 880 seriously injured
- 63 killed

Source: Department for Transport
Chart 10: Annual number of cyclists and all road users killed in Scotland

Chart 11: Annual number of cyclists/all road users seriously injured in Scotland
Cyclists seriously injured in Great Britain

Source: Department for Transport
All Cycling injuries in Lothian PreTram

Cycling accounted for 11% of sports fractures (n=104).
  • Mountain Biking 73, Road 25, BMX 6

Mean Age: 31 years. 88% ♂ : 12% ♀

Upper Limb 91%: Lower Limb 8%: Axial 1%.

Commonest Upper Limb Fractures:
  Clavicle (22%), Distal Radius (14%), Metacarpal (12%)
  Proximal Radius (12%), Finger Phalanx (10%).

Commonest Lower Limb / Axial Fractures:
  Toe Phalanx (2%), Ankle (1%), Pelvis (1%).

Greg Robertson EOTU
Return Rates and Return Times to Sport for Middle-Third Clavicle Fractures

Important knowledge for management of these injuries in athletes.

Clavicle fractures are the 4th most common sport-related fracture.

Of all sport-related fractures, clavicle fractures take the 3rd longest time to return to sport.

All undisplaced middle-third fractures should be managed conservatively.

For displaced middle-third fractures, surgical management can offer improved return times to sport over conservative management.

The choice of surgical technique for middle-third fractures is guided by the fracture configuration; the optimal surgical technique remains to be defined.

Return to Sport Rate

Undisplaced Non-Surgical

95%

Return Time:
11 weeks

Displaced Non-Surgical

93%

Return Time:
22 weeks

Displaced Surgical

98%

Return Time:
9 weeks

Robertson, G.A., Oliver, C.W. and Scott, H., 2017. Infographic: Return Rates and Return Times to Sport for Middle-Third Clavicle Fracture: Important knowledge for management of these injuries in athletes.

Greg Robertson, Hilary Scott, Chris Oliver

Br J Sports Med 2017
doi:10.1136/bjsports-2016-097445
Edinburgh Tram Inquiry

http://www.edinburghtraminquiry.org/
Retrospective review Tram related Injuries

• 7 years
• 41.4 years +/- 16 years
• 24% weekends
• All to A&E in Lothian; RIE, SJH, WGH
• >1000 x-rays, 10 CT/MRI scans, blood tests
• 156 soft tissue injuries
• 64 fractures
• 29 operations
• Mean length of hospital stay 1.7 days
• Economic impact unknown
Mechanism of cycling tram injuries

- 143 wheels caught in tram track
- 32 wheels slipped on tram track
- 1 collision with tram
- Forced by other vehicle to change path and forced towards tram track
- Pedestrians
## Tram related injuries Lothian Post Tram

<table>
<thead>
<tr>
<th>Anatomical region</th>
<th>Soft tissue injury</th>
<th>Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head injury - minor</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Head injury - serious</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Thorax</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Abdomen</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Clavicle</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Acromioclavicular joint</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Proximal Humerus</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Humeral shaft</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Elbow</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Forearm</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Wrist</td>
<td>26</td>
<td>11</td>
</tr>
<tr>
<td>Hand</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Finger</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Hip</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Thigh</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Knee</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Leg</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Ankle</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Foot</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Toe</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>156</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>
## Tram related injuries Lothian Post Tram

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Hip Screw</td>
<td>1</td>
</tr>
<tr>
<td>Cannulated Hip screws</td>
<td>1</td>
</tr>
<tr>
<td>Midfoot ORIF</td>
<td>1</td>
</tr>
<tr>
<td>Distal radius ORIF</td>
<td>6</td>
</tr>
<tr>
<td>Olecranon ORIF</td>
<td>2</td>
</tr>
<tr>
<td>Distal radius ex-fix</td>
<td>1</td>
</tr>
<tr>
<td>Phalanx ORIF</td>
<td>1</td>
</tr>
<tr>
<td>Distal Humerus ORIF</td>
<td>1</td>
</tr>
<tr>
<td>Emergency Carpal Tunnel Decompression</td>
<td>1</td>
</tr>
<tr>
<td>Rotator cuff repair</td>
<td>1</td>
</tr>
<tr>
<td>Nasal fracture MUA</td>
<td>1</td>
</tr>
<tr>
<td>Wound suturing in ED</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
</tr>
</tbody>
</table>
Hip fracture after tram cycling injury - Dynamic Hip Screw
Tram Injury Cycling - Complex elbow injuries
Professor
Physical Activity for Health

BRAIN AFTER SITTING QUIETLY

BRAIN AFTER 20 MINUTE WALK

Research/scan compliments of Dr. Chuck Hillman University of Illinois
Sit Less
Walk More
MRI Cross Sectional Leg Scans

40-year-old triathlete

74-year-old sedentary man

70-year-old triathlete
## Risk reduction associated with physical activity

<table>
<thead>
<tr>
<th>Chronic condition</th>
<th>Risk reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cause mortality</td>
<td>30% risk reduction</td>
</tr>
<tr>
<td>CVD, stroke</td>
<td>20-35% reduction</td>
</tr>
<tr>
<td>Diabetes</td>
<td>30-40% reduction</td>
</tr>
<tr>
<td>Hip fractures</td>
<td>36-68% reduction</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>30% reduction</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>20% reduction</td>
</tr>
<tr>
<td>Loss of function</td>
<td>30% reduction</td>
</tr>
<tr>
<td>Depression/dementia</td>
<td>20-30% reduction</td>
</tr>
</tbody>
</table>
Best Investments for Physical Activity

1. Communication and public education
   Consistent public education, including use of mass and social media

2. Transport and the environment
   Transport policies and systems that prioritise walking, cycling and public transport

3. Urban design and infrastructure
   Provide safe and equitable access for recreation and physical activity across the life course

4. Healthcare and health education
   Ensure assessment and advice about physical activity is a routine part of healthcare services

5. Education
   Make regular physical activity in schools and places of learning normal

6. Community-wide programs
   Work with communities to provide appropriate local solutions, aiming to mobilise large numbers of people

7. Sport and recreation
   Sport systems and programs that promote "sport for all" and encourage participation across the life span

We need action to achieve the goal of 10% increase in participation by 2025

C Schiphorst, A Murray, P Kelly, C Oliver, F Bull

Br J Sports Med
doi:10.1136/bjsports-2016-096999
@PlayonPedals
7k preschool riding in Glasgow
The sustainable travel hierarchy looks like this:

- Walking
- Cycling
- Public Transport
- Taxi
- Pool Car
- Private Car
- Air

But the actual infrastructure spend since 2007 is like this:

- **Active Travel** (£0.189bn*)
- Buses (£1bn)
- Ferries & Planes (£1.5bn)
- Railways (£5bn)
- Trunk Roads & Motorways (£6.5bn)

Sustainable travel hierarchy graphic and infrastructure spend numbers from *Scottish Government National Transport Strategy, January 2016*

* Active travel spend pro-rata for period 2011-15, which may be an over-estimate
World Health Organisation to develop Global Action Plan to Promote Physical Activity

http://blogs.bmj.com/bjsm/2017/05/22/world-health-organisation-develop-global-action-plan-promote-physical-activity/
CROSS TRACKS
CLOSE TO A
RIGHT ANGLE

Cyclist blaming
Cycling Action Plan for Scotland: 2017-2020
Transport Scotland

"the long term trend is rising"

"achieving the 10% vision will be challenging"

Looks like the 10% vision can be achieved by 2350.
- Yes, over 300 years!

Cycle to work (SHS)
What to do?

Policy change
Cycling Action Plan

New Active Travel

Infrastructure

Reverse engineer
Shims
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