The epidemiology and continued monitoring of burn injury in England and Wales

Ken Dunn - burn surgeon
Rachel Armfield - research registrar

International Burn Injury Database (iBID)

www.ibidb.org
Prevention

• Define and quantify the problem
• Establish a target population
• Establish a means of measurement
• Instigate a change
• Measure the effects of change
• Measure the effective timeframe
• Revise and enact that revision

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Nothing happening...
IDB Data set

- Sex
- DoB (YYYYYMMDD)
- Date of Injury
- Time of Injury
- Date of Attendance
- Time of Attendance
- Date of Discharge
- Treatment and Follow-up

- Place of Occurrence
- Mechanism of Injury
- Activity
- Sports
- Type of Injury
- Part of Body Involved
- Product involved in the injury
- Product Causing the Injury
- Accident Description

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Burn Injury

- **Definition**
  - Fire & smoke
  - Thermal injury
  - Chemical & Electrical

- **England and Wales**

- **Filtering**
  - All ‘acute injuries’
  - All ages
  - All causes
  - All severities

- **Sources of Data**
  - various

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E&W Sources of Data

- Coroner (110)
- Emergency Dept (230)
- Non-Burn service Admission (243)
- Ambulance Service (9)
- Fire Service (53)
- Community Care – 10e3
- FDR1
- HES
- Burn Service Admission (19)

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E&W Sources of Data

- Coroner (110)
- Emergency Dept (230)
- Non-Burn service Admission (243)
- Ambulance Service (9)
- Fire Service (53)
- Community Care - 10e3
- Local

- FDR1

- HES
- Non-Burn service Admission (43)
- Burn Service Admission (19)
- iBID

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2 phase study

- Local
- Grt Manchester
  - All local sources of data for 6 years
  - Evaluate their importance
  - Use as a phase 1 estimate of the national problem

- National
- England & Wales
  - Use all national sources of data 4 years
  - Account for the important sources that are NOT national or not yet available

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### Results from a 6 year study period 2000-2005

<table>
<thead>
<tr>
<th></th>
<th>Cases of children/yr</th>
<th>child% of total cases</th>
<th>Cases of adults/yr</th>
<th>adult% of total cases</th>
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<tr>
<td><strong>All deaths</strong></td>
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<td>2449</td>
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www.ibidb.org
Greater Manchester
Coroners Data (4 offices)
over 6 years

<table>
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<th>plus FireService</th>
<th>plus ED</th>
<th>plus BurnService</th>
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<tr>
<td>Adults</td>
<td>216</td>
<td>193</td>
<td>5</td>
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Greater Manchester
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</thead>
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<td>19</td>
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<td>0</td>
</tr>
<tr>
<td>Adults</td>
<td>216</td>
<td>193</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

In global literature Burn Service figures are very often described as the burn injury picture for that region or country: This is not a valid assumption

www.ibidb.org
Phase 2:
E&W National Admissions Data

- **iBID data**
  - England & Wales
  - 21 burn services
  - 2003 – now
  - 75K cases
  - Very detailed
  - Completion good
  - Accuracy high

- **HES data**
  - England & Wales
  - All NHS hospitals
  - 1989 – 2009
  - 267K cases
  - Not detailed
  - Completion good
  - Accuracy based on coding (in ICDv9&10 and OPCSv4)

[www.ibid.org](http://www.ibid.org)  [www.hesonline.nhs.uk](http://www.hesonline.nhs.uk)
Amalgamation of HES and iBID data

• Avoid double counting
• Share a common analysis process as much as possible:
  • Definition of acute injury
  • Severity definition (BF,BU,BC)
    • Burn Facility
    • Burn Unit
    • Burn Centre
• Geographical analysis – based on postcode
• Comparison with 2001 census population data

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## Burn Injury admissions to the NHS per year in E&W (average over 4 years)

<table>
<thead>
<tr>
<th>Admissions per Year</th>
<th>0-4.9yrs</th>
<th>5-14.9yrs</th>
<th>15-24.9yrs</th>
<th>25-34.9yrs</th>
<th>35-44.9yrs</th>
<th>45-54.9yrs</th>
<th>55-64.9yrs</th>
<th>65-74.9yrs</th>
<th>75-120yrs</th>
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<td>BU</td>
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<td>999</td>
<td>744</td>
<td>588</td>
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</table>
Injury Causation Types - extrapolation of the profile from the iBID to all admission data.

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<tr>
<th></th>
<th>0-4.9yrs</th>
<th>5-14.9yrs</th>
<th>15-24.9yrs</th>
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<th>55-64.9yrs</th>
<th>65-74.9yrs</th>
<th>75-120yrs</th>
<th>Grand Total</th>
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</thead>
<tbody>
<tr>
<td>01 Flame</td>
<td>2.22%</td>
<td>21.15%</td>
<td>30.21%</td>
<td>28.46%</td>
<td>29.93%</td>
<td>28.89%</td>
<td>29.96%</td>
<td>32.73%</td>
<td>29.05%</td>
<td>20.15%</td>
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<tr>
<td>02 Flash</td>
<td>0.53%</td>
<td>12.64%</td>
<td>18.29%</td>
<td>15.17%</td>
<td>14.37%</td>
<td>12.97%</td>
<td>9.03%</td>
<td>9.09%</td>
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<tr>
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<td>21.87%</td>
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<td>16.85%</td>
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<td>14.61%</td>
<td>16.06%</td>
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<tr>
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<td>71.99%</td>
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<td>21.72%</td>
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<tr>
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<td>1.07%</td>
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<td>0.55%</td>
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<td>0.78%</td>
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<tr>
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<td>0.37%</td>
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<td>0.26%</td>
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<tr>
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<td>0.80%</td>
<td>0.61%</td>
<td>0.29%</td>
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<td>1.07%</td>
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<tr>
<td>10 Non skin burn</td>
<td>0.44%</td>
<td>0.82%</td>
<td>0.48%</td>
<td>0.58%</td>
<td>0.59%</td>
<td>0.94%</td>
<td>0.43%</td>
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<th>65-74.9yrs</th>
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www.ibidb.org
The same technique can be applied all subsets eg Burn Centre (BC) level injuries

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<tr>
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<th>_0-4.9yrs</th>
<th>_5-14.9yrs</th>
<th>15-24.9yrs</th>
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<td>8</td>
<td>19</td>
<td>57</td>
<td>59</td>
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<td>68</td>
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<td>32</td>
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<td>4</td>
<td>6</td>
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<td>3</td>
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<td>1</td>
<td>4</td>
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And can be applied to the more specific Sources of injury data from iBID

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<th>_0-4.9yrs</th>
<th>_5-14.9yrs</th>
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<th>25-34.9yrs</th>
<th>35-44.9yrs</th>
<th>45-54.9yrs</th>
<th>55-64.9yrs</th>
<th>65-74.9yrs</th>
<th>75-120yrs</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
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<td>0.06%</td>
<td>0.09%</td>
<td>0.06%</td>
<td>0.04%</td>
<td>0.22%</td>
<td>0.15%</td>
<td>0.15%</td>
<td>0.14%</td>
<td>0.11%</td>
<td>0.10%</td>
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<tr>
<td>A02 Gas hob</td>
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<td>0.77%</td>
<td>0.98%</td>
<td>1.25%</td>
<td>1.46%</td>
<td>2.21%</td>
<td>1.58%</td>
<td>2.34%</td>
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<td>1.18%</td>
</tr>
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<td>A03 Electric hob</td>
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<td>2.26%</td>
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<td>0.36%</td>
<td>0.77%</td>
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<td>0.75%</td>
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<td>0.77%</td>
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<td>0.25%</td>
<td>0.53%</td>
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<td>0.81%</td>
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<td>1.13%</td>
<td>1.05%</td>
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<td>0.11%</td>
<td>0.11%</td>
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<td>0.23%</td>
<td>0.41%</td>
<td>0.44%</td>
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<tr>
<td>A07 Camping stove</td>
<td>0.10%</td>
<td>0.43%</td>
<td>0.51%</td>
<td>0.68%</td>
<td>0.55%</td>
<td>0.54%</td>
<td>0.30%</td>
<td>0.41%</td>
<td>0.66%</td>
<td>0.39%</td>
</tr>
<tr>
<td>A08 Barbecue</td>
<td>0.49%</td>
<td>1.07%</td>
<td>1.49%</td>
<td>1.74%</td>
<td>1.39%</td>
<td>1.52%</td>
<td>0.60%</td>
<td>0.41%</td>
<td>0.11%</td>
<td>1.01%</td>
</tr>
<tr>
<td>A09 Other cooker</td>
<td>0.39%</td>
<td>0.55%</td>
<td>0.57%</td>
<td>0.71%</td>
<td>0.99%</td>
<td>0.49%</td>
<td>0.38%</td>
<td>0.69%</td>
<td>0.77%</td>
<td>0.57%</td>
</tr>
<tr>
<td>B01 Open coal fire</td>
<td>0.17%</td>
<td>0.60%</td>
<td>0.24%</td>
<td>0.43%</td>
<td>0.44%</td>
<td>0.74%</td>
<td>0.38%</td>
<td>0.83%</td>
<td>1.76%</td>
<td>0.42%</td>
</tr>
<tr>
<td>B02 Solid fuel heater</td>
<td>0.16%</td>
<td>0.04%</td>
<td>0.03%</td>
<td>0.07%</td>
<td>0.04%</td>
<td>0.05%</td>
<td>0.08%</td>
<td>0.28%</td>
<td>0.33%</td>
<td>0.10%</td>
</tr>
<tr>
<td>B03 Electric heater</td>
<td>0.65%</td>
<td>0.17%</td>
<td>0.12%</td>
<td>0.50%</td>
<td>0.37%</td>
<td>0.44%</td>
<td>1.20%</td>
<td>0.96%</td>
<td>2.41%</td>
<td>0.57%</td>
</tr>
<tr>
<td>B04 Coal effect fire</td>
<td>0.17%</td>
<td>0.04%</td>
<td>0.06%</td>
<td>0.11%</td>
<td>0.15%</td>
<td>0.15%</td>
<td>0.15%</td>
<td>0.00%</td>
<td>0.44%</td>
<td>0.13%</td>
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<tr>
<td>B05 Gas fire</td>
<td>1.44%</td>
<td>1.71%</td>
<td>0.83%</td>
<td>0.82%</td>
<td>0.88%</td>
<td>0.93%</td>
<td>1.73%</td>
<td>1.65%</td>
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<td>1.32%</td>
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<tr>
<td>B06 Paraffin heater</td>
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<td>0.04%</td>
<td>0.06%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.10%</td>
<td>0.15%</td>
<td>0.28%</td>
<td>0.11%</td>
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<tr>
<td>B07 LPG (propane) heater</td>
<td>0.01%</td>
<td>0.13%</td>
<td>0.18%</td>
<td>0.18%</td>
<td>0.18%</td>
<td>0.29%</td>
<td>0.23%</td>
<td>0.41%</td>
<td>0.00%</td>
<td>0.13%</td>
</tr>
<tr>
<td>B08 Camping heater</td>
<td>0.00%</td>
<td>0.09%</td>
<td>0.03%</td>
<td>0.00%</td>
<td>0.15%</td>
<td>0.05%</td>
<td>0.08%</td>
<td>0.14%</td>
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<td>0.05%</td>
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<tr>
<td>B09 Other heater</td>
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<td>1.75%</td>
<td>2.18%</td>
<td>1.53%</td>
<td>1.94%</td>
<td>1.92%</td>
<td>2.18%</td>
<td>1.79%</td>
<td>2.09%</td>
<td>1.97%</td>
</tr>
<tr>
<td>C01 Fat (Burning)</td>
<td>0.62%</td>
<td>1.36%</td>
<td>3.70%</td>
<td>4.91%</td>
<td>2.78%</td>
<td>2.90%</td>
<td>3.68%</td>
<td>3.85%</td>
<td>5.82%</td>
<td>2.53%</td>
</tr>
</tbody>
</table>

68 other subgroups
Estimates of the commonest Sources of injury all severities
Estimates of the commonest Sources of injury all severities

C02 Petrol ignition
F04 Garden or bonfire
C09 Other ignition
N01 Kettle spill
U04 Cement
E02 Fat (non burning)
U09 Other Chemical
C01 Fat (Burning)
U02 Alkali
N09 Other hot fluid
D09 Other inflammable
F03 Building on fire
D03 Smoking materials

Q01 Bathing immersion
N01 Kettle spill
F01 Central heating radiator
C01 Fat (Burning)
P02 Tea Cup
A02 Gas hob
D03 Smoking materials
C09 Other ignition
B05 Gas fire
F04 Garden or bonfire
F03 Building on fire
E02 Fat (non burning)
N03 Saucepan spill

35-44.9yrs
45-54.9yrs
55-64.9yrs
65-74.9yrs
75-120yrs

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Estimates of the commonest Sources of injury of Burn Centre (BC) admissions

- Q01 Bathing immersion
- C02 Petrol ignition
- N01 Kettle spill
- E02 Fat (non burning)
- B05 Gas fire
- F03 Building on fire
- P02 Tea Cup
- D04 Cigarette lighter
- N03 Saucepan spill
- N02 Kettle flex pull spill
- N05 Bowl spill
- F09 Burn : unknown
- P04 Coffee Cup

- C02 Petrol ignition
- F03 Building on fire
- C09 Other ignition
- F04 Garden or bonfire
- D09 Other inflammable
- F09 Burn : unknown
- C05 White spirit / Turpentine ignition
- V04 Discharge Flash (no electrocution)
- D03 Smoking materials
- V02 High tension circuit Electrocuton
- C01 Fat (Burning)
- A02 Gas hob
- Q01 Bathing immersion

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Estimates of the commonest Sources of injury of Burn Centre (BC) admissions

- C02 Petrol ignition
- F03 Building on fire
- C09 Other ignition
- F04 Garden or bonfire
- D03 Smoking materials
- F09 Burn : unknown
- D09 Other inflammable
- D04 Cigarette lighter
- A02 Gas hob
- Q01 Bathing immersion
- C01 Fat (Burning)
- C05 White spirit / Turpentine ignition
- C04 LPG (propane) ignition

Groups:
- 35-44.9yrs
- 45-54.9yrs
- 55-64.9yrs
- 65-74.9yrs
- 75-120yrs
Data can also be Geocoded and mapped using suitable software and reference tables

Average number of burn admissions / 10^5 / year by postcode district – all causes – all severities

<table>
<thead>
<tr>
<th>PC_D</th>
<th>PC_D_Label</th>
<th>Children</th>
<th>Adults</th>
<th>Total</th>
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<tr>
<td>NP15</td>
<td>Usk,Newport</td>
<td>22.87283</td>
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<td>NP16</td>
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<td>NP18</td>
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<tr>
<td>NR2</td>
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<td>14.89869</td>
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<tr>
<td>NR3</td>
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<tr>
<td>NR4</td>
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<td>NR6</td>
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<tr>
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</tr>
</tbody>
</table>

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Average number of burn admissions / $10^5$ population / year by postcode district – all ages – all causes – all severities
Average number of burn admissions / 10^5 population / year by postcode district – all causes – all severities
Average number of burn admissions / $10^5$ population / year by postcode district – all ages - all causes – all severities
Average number of burn admissions / $10^5$ population / year by postcode district – all ages – all causes – all severities
Conclusions

• We now have a means of analysing and interrogating burn injury data in England and Wales

• The methodology is transferable to all NHS areas, and abroad

• We have a means of evaluating the effectiveness of prevention programmes: be they local, regional or national

– and the future

• Variations in incidence rates and deaths are to be explored

• Methods of providing user defined web based analysis

• The method for estimating causation can also be used for cost of care
Prevention cost / life balance

Cost of Prevention to save a life
(or prevent an injury)

Cost of a life lost
(or of a life saved)

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Injury Costs

Incident costs:
• Property damage
• Emergency services
• Repair and Insurance

Health Care costs:
• Emergency
• Acute care
• Rehab

Community Health costs:
• Recovery and rehabilitation
• Long term sickness
• Disability

Societal costs:
• Death
• Unemployment
• Redundancy
• Re-training

Total 1.2 M

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