Fire Prevention Education Delivered by On-Duty Fire Fighters
Cluster Randomised Controlled Study

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Presenting work done in partnership with

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Dr Darryl Plecas, University of the Fraser Valley, BC, and
Dr Charles Jennings, John Jay College, NY
WHERE IS SURREY, BC?
Surrey Fire Service

- 2nd largest city in BC
- 12th largest city in Canada
- 17 Fire Halls
- 317.4 km² coverage for ≈500,000 residents
- ≈30,000 calls for service per year
Smoke Alarms Work, but *Not* Forever

1. Working smoke alarms save lives
2. Not everyone has a smoke alarm, and smoke alarms don’t last forever
3. It is possible to increase the likelihood of houses having working smoke alarms
4. This must be a process – there is no one-off quick fix

PROTOCOLS
Working Smoke Alarms Save Lives

Total sample
n = 47,555 fires and 663 deaths
from AB, BC & ON

74% increased death rate without a functioning smoke alarm

Total sample
n = 47,555 fires and 663 deaths
from AB, BC & ON
Not Everyone Has a Working Smoke Alarm

<table>
<thead>
<tr>
<th>Smoke alarm status</th>
<th>Alarm status sub-category</th>
<th># fires</th>
<th>% fires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present and functioning</td>
<td>Present and functioning</td>
<td>17,214</td>
<td>36.2%</td>
</tr>
<tr>
<td>Not present and functioning</td>
<td>Alarm present, not activated</td>
<td>8,210</td>
<td>17.3%</td>
</tr>
<tr>
<td></td>
<td>No alarm</td>
<td>10,549</td>
<td>22.2%</td>
</tr>
<tr>
<td></td>
<td>Cannot be determined</td>
<td>11,582</td>
<td>24.4%</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-total</strong></td>
<td><strong>30,341</strong></td>
<td><strong>63.8%</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>47,555</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
Smoke Alarms Stop Working With Time

Surrey fire trends 1988-2007
McCormick (2009)
The Reasons Why Alarms Stop Working

- Alarm not activated - no battery/power: AB (n = 1,324) 26.1%, BC (n = 2,575) 19.5%, ON (n = 867*) 29.4%
- Alarm not activated - unsuitable location: AB (n = 1,324) 5.1%, BC (n = 2,575) 18.2%, ON (n = 867*) 35.3%
- Alarm not activated - other reason: AB (n = 1,324) 1.8%, BC (n = 2,575) 23.5%, ON (n = 867*) 68.8%
- Alarm not activated - unknown: AB (n = 1,324) 0.0%, BC (n = 2,575) 11.8%, ON (n = 867*) 60.5%

Average: 26.1% 19.5% 29.4% 5.1% 18.2% 35.3% 1.8% 23.5% 68.8% 0.0% 11.8% 60.5%
Public Fire Education Works

- International best practices also demonstrate
  - Fire risk is non-random: high-risk people, properties, and places
    - Understand the problem in your community (e.g., McCormick, 2009, for Surrey)
    - Not a shot-gun, lucky-dip approach – data drives these decisions
  - Fire-prevention home visits and education do make a difference

- Reduce fires, reduce death, reduce loss, reduced damage
  - Portland, Oregon
  - Louisville, Kentucky
  - Rock Island, Illinois
  - Montgomery County, Maryland
  (Case studies taken from *Proving Public Fire Education Works*, TriData, 1990)

- Fundamental limitation is lack of randomised cluster control evaluation
Filling the Void

• Commenced in 2008, Surrey Fire Service undertook a series of door-to-door, on-duty fire fighter delivered, public education visits
  – Established a cluster randomised control group

• At the time of evaluation (Nov 2010) 18,473 dwellings visited
  – Increased to over 30,000 visits end 2011, and will be 40,000 by June 2012

• Fire-prevention information packages distributed and smoke alarm checks undertaken where possible
  – Letter from the Surrey Fire Chief offering a no-charge home safety inspection and installed smoke alarm upon request
  – Smoke alarms
  – Home fire escape plans
  – Children and fire
  – Senior fire safety
  – Kitchen fire safety
Visits Undertaken in Temporal Cohorts

- **Cohort 1**: October 16, 2006 - Start of pre-intervention period
- **Cohort 2**: 5-Oct-07
- **Cohort 3**: 22-Apr-08
- **Cohort 4/5**: 27-May-09
- **Cohort 6**: 13-Dec-09
- **Cohort 7**: 1-Jul-10
- **Cohort 8**: November 7, 2010 - End of post-intervention period
Risk-Based Deliveries

Top 10% for the following:

- High proportion of elderly citizens (over 64 yrs)
- High proportion of young children (under 6 yrs)
- Disadvantaged
  - Unemployed
  - Single-parent families
- High residential mobility

Combined with *hot-spots* for recent fire incidents
**Reductions in Fires**

- **Intervention**
- **Control**

<table>
<thead>
<tr>
<th></th>
<th>Pre-visit</th>
<th>Post-visit</th>
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</thead>
<tbody>
<tr>
<td>Annual rate of fires per 1,000 dwellings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>14.6% reduction</td>
<td>63.9% reduction</td>
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<tr>
<td>Control</td>
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Reduction was 4.4 times greater for the *Home Safe* group.
Increased Activation of Alarms and Reduced Fire Spread

Pre-visit
- Smoke alarm activated: 17.2%
- Confined to object of origin: 11.0%

Post-visit
- Smoke alarm activated: 46.2%
- Confined to object of origin: 38.6%
Trends Consistent with Reduced Damage

- Pre-visit Loss: $66,707
- Post-visit Loss: $33,486

14.6% reduction
Evaluation Summary

• Relative to cluster randomised controls
  – Fewer fires as a result of visits
  – When fires did occur post-visit
    • More activated smoke alarms
    • Less fire spread
    • Trends suggestive of less damage


• SFS is committed to this process in an on-going manner and is exploring new options for success
• Targeting high-risk homes, vacant houses, and indoor marijuana grow operations since 2007-ish
Broader Implications of Data-Driven Prevention in Surrey

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate per 10,000 residents</th>
<th>Rate of death/injury per 10,000 residents</th>
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</thead>
<tbody>
<tr>
<td>2002</td>
<td>0.56</td>
<td>0.56</td>
</tr>
<tr>
<td>2003</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>2004</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>2005</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>2006</td>
<td>1.39</td>
<td>1.39</td>
</tr>
<tr>
<td>2007</td>
<td>0.77</td>
<td>0.77</td>
</tr>
<tr>
<td>2008</td>
<td>0.58</td>
<td>0.58</td>
</tr>
<tr>
<td>2009</td>
<td>0.55</td>
<td>0.55</td>
</tr>
<tr>
<td>2010</td>
<td>0.55</td>
<td>0.55</td>
</tr>
<tr>
<td>2011</td>
<td>0.83</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Number of residents in the City:

- 2002: 0
- 2003: 50,000
- 2004: 100,000
- 2005: 150,000
- 2006: 200,000
- 2007: 250,000
- 2008: 300,000
- 2009: 350,000
- 2010: 400,000
- 2011: 450,000
- 2012: 500,000
Finding Time to Make a Difference

• Calls for service and workloads are clustered non-randomly across time and space

• Home Safe was undertaken by on-duty fire fighters as part of their regular duties at no additional cost
 Calls Cluster Over Time

0% 1% 2% 3% 4% 5% 6%

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Vision 20/20

MODELS IN FIRE PREVENTION

SYMPOSIUM 2012
Calls Cluster Over Time

Sunday 13%
Monday 14%
Tuesday 14%
Wednesday 15%
Thursday 15%
Friday 16%
Saturday
Risk-Driven Intervention Produces the Greatest Return

- Fire prevention education and smoke alarm interventions do work
- Focus on your highest risk areas
- Pick a methodology that works for you
- Identify opportunities within normal working routine
- Start somewhere
- There is no excuse for not doing something

- Encourage community responsibility for their own safety
  - An ideological shift that crime prevention made 20 years ago
MOVING FORWARD
Home Safe is Just the Beginning

• Generating creative approaches to ongoing testing of alarms in high-risk homes
  – Partnerships with police, city volunteers, etc.

• Monitoring cohorts as routine part of analysis

• BC Minister of Justice, BC Office of the Fire Commissioner and the Fire Chiefs’ Association of BC are spearheading a movement
  – A working smoke alarm in every Canadian home

• Coordinated, sustained, and multi-faceted approach building on the Three E’s of injury prevention
  – Education
  – Enforcement
  – Environment
Thank you to Vision 20/20 for the opportunity to present here today.

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