Using GPS Tracking to Reduce Homicides and Shootings in Trinidad & Tobago: A Randomized Trial

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Commissioner of Police (Ag.)
Trinidad & Tobago
TTPS-Cambridge Collaboration

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- Erla Christopher
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- Lucinda Rose Strang
- Neil Wain
- Molly Slothower
- Kent McFadzien
Presentation Outline

- Targeting: evidence-based analysis
- Testing: research design and experiment
- Test Results without tracking dosage
- Two Challenges in Using Results
Targeting:

Where & When is Violent Crime Clustered in Trinidad and Tobago?
All Crime in 1% of T&T

- Most violent crimes concentrated in hot spots
- 81% of Homicides in 4 Divisions
- Hot times for Homicides 6pm – 2am
- High rate of Homicides for 15 years
- Firearms used in 70% of all Homicides
- TTPS mandated to reduce violent crime by 50% over 3 years (2013-2015)
Spatial and Temporal Concentrations of Homicides in Trinidad & Tobago

n = 1354
Homicides by Time of Day (n=1354)
All Divisions

48% in 8 hours
Top 4 Divisions (81% of all Homicides)

- Port of Spain
- Northern
- North Eastern
- Western

Hour of day
HYPOTHESIS:
“More patrol time in hot spots of violent crimes will reduce harm levels from that crime.”

ORGANIZATIONAL FRAMEWORK:
40 Police station districts selected by CoP on recommendation of Cambridge team

UNIT OF ANALYSIS: Police Districts

ELIGIBILITY CRITERIA:
Districts located in Trinidad and ranked in top 40 for total number of violent crimes reported by district from Jan 1\textsuperscript{st} 2012 – July 15\textsuperscript{th} 2013
TTPS Hotspots Patrol Experiment

DESIGN:
Districts ranked in descending order from highest to lowest in pairs based on total number of violent crimes.

RANDOM ASSIGNMENT:
After pairing, one district randomly assigned within each pair.

TIMING: 90 days (Sep – Nov 2013) with June – Aug as baseline for before-after analysis.

BUFFER ZONES:
None—no room.
Strategy Tested

- All three “Triple Ts” of Evidence-Based Policing
  - Targeting – Police districts by scaling up from spots to district level
  - Testing – through Randomized Controlled Trial (RCT)
  - Tracking – with GPS fitted patrol vehicles and feeding back data to patrol officers at CompStat meetings
Over 30 Experiments Testing Hot Spots Patrols

Comparing HOT SPOTS with more or less patrol

Not one comparing entire station districts

Not one focusing on gun crime

Not one with GPS-based CompStats
Current GIS Infrastructure
Crime Hot Spots
Small clusters of high crime addresses
TRACKING WITH GPS
Shift A - Vehicle PDA2265
Barataria - Oct 31, 2013 6pm-8am

Journey map (kind used during experiment)
GPS Used as a Management Tool

- Quantitative data - Raw GPS Data

- Graphical representation of:
  - Total patrol time by officers
  - Total hotspot patrol
  - Individual hotspot patrol
  - ‘Hot time’ patrol
GPS Used as a Management Tool

- Improved crime plotting
- Historically plotted based on Officer reports, addresses etc.
- Crime scene attendants issued with handheld GPS units and take coordinates of all serious crimes which are then plotted in GIS
Feedback to patrol officers at District level

Monitor patrol levels and set priorities.
Bi-weekly COMPSTAT Meetings happened in E Stations about 85% of the time

Never in Control Stations

All E stations had hot spots maps — no C maps

No way for C stations to patrol their own

No GPS output to Controls
What We Don’t Know

- How many minutes of hot spots patrols were delivered in E vs. C stations
- How many arrivals and departures
- Mean minutes per visit
- “Koper Curve” after each patrol visit
- Total patrol minutes in E vs. C stations
But GPS data were used

- “Hawthorne experiment”
- Much like a placebo
- Even though data were problematic,
- They were used in Compstat discussions
- Informal feedback that total patrol was up in E
Station vehicle patrol time in the district and in the hot spots over the past fortnight

Vehicles PCZ9419, PCZ604, PCZ9265

Total patrol & hotspots patrol

<table>
<thead>
<tr>
<th>Time Period</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tbody>
<tr>
<td>6pm-8am</td>
<td>3970</td>
<td>1088</td>
<td>3308</td>
<td>5372</td>
<td>2343</td>
<td>3537</td>
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<tr>
<td>Total Patrol Time</td>
<td>159</td>
<td>327</td>
<td>269</td>
<td>267</td>
<td>210</td>
<td>125</td>
<td>153</td>
<td>312</td>
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<tr>
<td>Total Patrol Time in Hotspots Per Shift (Min.)</td>
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</tbody>
</table>
Team Commanders
Team A) - 14614 A/Sgt. Sooklalsingh
Team B) - 12943 A/Sgt. Mason
Team C) - 13487 A/Sgt. Morali
Team D) - 14638 W/A/Sgt. Homer
GPS Used as a Management Tool

Journey Maps were Compared with Hotspots Maps at COMPSTAT
41% reduction in Homicides and Shootings compared with the control group
Reflection on Trend

Homicides and Shootings

Quarters

Control Stations
Treatment Stations
Logic of RCT

- Before: 71 murders/shootings (Exp)  
  71 murders/shootings (Control)  

- During: 56 murders/shootings (Exp)  
  95 murders/shootings (Control)  

- RESULT 95 - 56 = 39 prevented  
  41% Less than Control
### Difference in Differences Data

<table>
<thead>
<tr>
<th>Pairs</th>
<th>Std diff in means</th>
<th>Standard error</th>
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<td>St. James-San Juan</td>
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<tr>
<td>Mon Repos-Sangre Grande</td>
<td>-0.276</td>
<td>0.150</td>
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<td>-0.570</td>
<td>0.017</td>
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<td>0.065</td>
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<tr>
<td>La Horquetta-Siparia</td>
<td>-0.255</td>
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<td>Penal-Malabar</td>
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<td>-0.222</td>
<td>0.150</td>
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<td>-1.487</td>
<td>0.137</td>
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<td>-0.463</td>
<td>0.122</td>
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#### Meta Analysis
## Half (10) Had Predicted Benefit

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Expansion of Hotspots Policing to control stations and further 5 high crime stations.

45 Station districts in total, covering 90% of Trinidad and Tobago's Homicides in 2013.

GPS technology a key feature of tracking the efficiency of patrol
Two Challenges

1. Getting the GPS data right, legitimate

2. Getting the patrol delivered with concentrations at hot times in hot spots
THANK YOU

CONTACT DETAILS:

Stephen.williams@ttips.gov.tt

1-868-703-5776 (m)