It’s in the Data: University-Police Collaborative Research

Gary Bass: Moderator

Bryan Kinney, Paul Brantingham, Dick Bent: Presenters
The ICURS-Policing Big Data Research Experience

• Joint Research using big police data sets

• Collaborative, Multi-Disciplinary

• Linked international labs

• Secure High Performance Computing Lab (CFI)
Today: Selected ICURS Themes

- Mental Health and Policing
- Complexity of policing
- Economics of policing
- Rural and Remote Policing
- Big Data
  - Crime Analysis
  - Criminal Analysis
  - Perception and Fear Analysis
Mental Health and Policing

• Emergency rooms
  ▫ Collaborative: ICURS/police/health authority
  ▫ Fraser Valley Health Authority
  ▫ E Division and independent departments
  ▫ Interviews, Big Data analysis
  ▫ Policy Alternatives

• Forensic Hospital
  ▫ 100 most violent forensic patients
  ▫ Policing and health trajectory
Preliminary Findings

• A disproportionate amount of police time required to deal with SAMI population
• This group also consumes a lot of health and social service resources and policing resources and has specific needs
• ER focal point
• Compounded by recurring contacts with police and Emergency Rooms
• “Not just a policing issue”
Analysis of 44,500 EDP Events
E-Division PIRS Data Set
2000-2006

Least prolific 59% of primary subjects accounted for only 12% of events.

Most prolific 1% of primary subjects accounted for 12% of events.
Spatial Distribution of EDP Calls for Service: Descending Order

- Alcohol-Points-of-Sale
- City Hall
- Criminal Justice Services
- Hospital
- Pharmacies
- Public Health Offices
- Mental Health, Substance Use, and/or Addiction Services (Private & Public)
- Walk-in Clinics
Economics of Policing Studies

• Government expenditures for policing service have increased but at the same pace as expenditures for other government services including health care, education and recreation.

• While the standard crime rate has declined, the volume of calls for police services has not.

• Police work has become far more complicated over time.
CFS and CRIME Calls - RCMP E-Division

Surrey Detachment
2008-2012

Events

Surrey CFS
Surrey UCR Violations
Example of complexity

- A working generation ago policing tasks were dramatically less complex than they are at present
- Handling a break and enter case then compared to now involved
  - Fewer steps
  - Fewer requirements
  - Significantly less time to “process”
B&E Former and Current Process
Northern, Rural and Remote

- Adds to complexity in police, wider CJS and governmental services
- Further study needed for pros/cons of policing outside of major population centres
- Limited (or no) availability of services
- Life-work balance, stress, always ‘on the job’
- Community expectations
Challenges

• While there are benefits to policing in smaller, rural/remote communities
  ▫ Potential for cohesive and self-sustaining ethos
  ▫ Look out for your community

• There are concerns
  ▫ Substance misuse, under employment, poverty and suicide, among others
  ▫ Standard Crime Rates suggest northern areas have more violent offense rates per capita than rest of Canada
Logistic / Economic Challenges

• Northern, Rural and Remote tend to have different:
  ▫ Response times
  ▫ Shift/scheduling
  ▫ Leaves, training (HR available strength)
  ▫ Travel costs (fuel, alternative methods)
  ▫ Geography
  ▫ Climate
Research Agenda
‘non-urban policing’

• Examine non-urban policing contexts for:
  ▫ Advantages
  ▫ Disadvantages

• Methods for capturing police work, value, performance, etc., for detachments/units with less urban populations
  ▫ Classifications of “northern”, “rural” and “remote” by population, population density, proximity to emergency care, etc.
Policing research and Big Data

• Big record counts and Big complexity of records
• Layers of data
• Types of Analysis
  ▫ Hot Spots and Journey to Crime
  ▫ Co-offending networks and gangs
  ▫ Crime Corridors
  ▫ New measures of the problem
  ▫ Predictive Policing
Layers of Big Data for Police Research
Density of Liquor Outlets and Assaults
Crime Event / Offender Home Hot Spot
(based on 213,906 data, Point Density (100m,500m) → Contour)
Arrow lines showing repetitive (10+) offenders’ home location to MT Mall
Spatio-Temporal Directionality of Crime at a Transportation Hub
Activity Nodes
Fear of Crime

Jordan Ginther, ICURS
ICURS drug network analysis

Thanks to Dr. Richard Frank, Dr. Uwe Glaesser
Crime Corridors

- Police data in many cities are reported by address or intersection
- Police are major users of crime analysis and crime analytics
- Police usually need to know what the crime history is at a specific location.
  - You can have crime very high at one location but very little or no crime in adjacent buildings.
- Crime can be very high in one block but low in adjacent blocks.
- Crime corridors allow visualization of crime data that is otherwise very difficult to absorb and use.

  - Thanks to Dr. Valerie Spicer and Mr. Justin Song
Crime Corridor for One Street

Crime counts along King George Hwy in Surrey
(PIRS [2001-2006], OSR code: AA%AD%, 8th Ave ~ Bridge Rd)
Crime corridors in a large city
Multiple Measures of Crime and Police Work

- **Uniform Crime Reports Measures**
  - The Standard Crime Rate
  - The Crime Severity Index

- **New Crime Gravity Score**
  - Developed at ICURS
  - Utilizes UCR data

- **Location Quotients of Crime**
  - Developed at ICURS
  - Identifies Local Crime Problem

\[ CGS = \frac{\sum_{i=1}^{n} C_i \times W_i}{\sum_{i=1}^{n} C_i} \]

\[ LQCI_n = \frac{C_{i_n}}{C_{t_n}} \times \frac{\sum_{n=1}^{N} C_{i_n}}{\sum_{n=1}^{N} C_{t_n}} \]
Trends in Crime Gravity, Crime Severity and the Standard Crime Rate
British Columbia
Values Indexed to 1998 = 100

Graph showing trends in CGS, CSI, and SCR from 1998 to 2014.
LCQ for Violent Crime Rate and LQC in BC: Rebecca Carleton (2014)
Future

• More Canadian Policing Research conducted collaboratively with Universities on continuing basis
• Expansion of Secure Research Data Warehouses at universities under police and ministry sponsorship
• Increased use of PhD students and Post Docs
Questions