Evidence-based Health Emergency Management: An Oxymoron?

Brian Schwartz
Chief, Emergency Preparedness and Executive Lead, Service Integration
Public Health Ontario
• No conflicts of interest to disclose
Evidence-based health emergency management

• Emergency Management & supporting evidence (IMS and surveillance)
• Myths and Realities
• Where are we headed?
“Traditions” of Emergency Management

• Health emergency response evolved from emergency responder emergency response
• Health emergency response is a relatively new discipline
• Virtually no body of evidence to support or refute what we do

for example……
Origins of IMS

- California wildfires, 1980s:
  - “FIRESCOPE”
    - Multiple fire agencies involved
      - Local, regional
    - Lack of common terminology / organizational structure / roles
    - Incompatible equipment (radios; firefighting)
Origins of IMS

• Fire protection agencies developed common organizational and response structure
  • Evolved into IMS

• Deployed across California
  • Subsequently to much of USA and Canada

• Began to expand to all pre-hospital providers (fire / ambulance / police)
  • Eventually into other areas of health sector
IMS in Health

- **1987: Hospital Council of Northern California**
  - Adapted IMS into “Earthquake Preparedness Guidelines for Hospitals”

- **1991: Orange County EMS**
  - Used IMS principles to develop Hospital Emergency Incident Command System (HEICS)
    - 2006 → Hospital Incident Command System (HICS)

- Adaptable to a variety of health sectors / environments (including public health)
Public Health Incident Command System (2006)

http://www.ualbanycphp.org/pinata/phics/guide/phics0401.cfm
Public Health Incident Command System 2006

DEPARTMENT OPERATIONS CENTER
ESF-8 Public Health and Medical

STATE CIVIL DEFENSE
State Emergency Operating Center

LIAISON OFFICER

SAFETY OFFICER

INTELLIGENCE

COMMAND Incident Commander

OFFICE of the GOVERNOR
Chief of Staff

LIAISON OFFICER

PUBLIC INFORMATION OFFICER

DISTRICT HEALTH OFFICE LIAISON

JOINT INFORMATION SYSTEM (LIS)
Department Information Center

DISTRICT HEALTH OFFICERS:
City & County of Honolulu
County of Maui
County of Kauai
County of Hawaii

PLANNING
Planning Chief

Operations Chief

ENVIRONMENTAL RESPONSE BRANCH
Hazard Evaluation and Response Unit

CLINICAL SERVICES BRANCH
Ambulatory Svcs Unit
Hospital Svcs Unit
Air Operations Unit
Psychological Svcs Unit

Document Unit

Situation Unit

Technical Specialist - Data Analysis

Technical Specialist - Special Needs

Demobilization Unit

LOGISTICS
Logistics Chief

SERVICES BRANCH
Communications and IT Unit
Clinical Laboratories Unit
Vital Records Unit
Facilities Unit

SERVICES BRANCH
SNS Support Unit
Ground Support Unit

SUPPORT BRANCH
Procurement Unit
Personnel Unit
Cost and Time Unit
Compensation and Claims Unit

FINANCE ADMINISTRATION
Finance Chief

FINANCE ADMINISTRATION
Finance Chief

Revised June 2, 2005

Public Health Incident Command System, elaborated, from PHICS, 2006; p. 17
IMS Supporting Evidence?
IMS in the health sector

- West Nile virus, Nassau County (Adams et al., 2008)
- Use of Hospital Emergency Incident Command System (HEICS) by the National Cheng Kung University Hospital (NCKUH) in Taiwan during the 2003 SARS outbreak (Tsai et al., 2005)
- Use of HEICS by Partners HealthCare System (PHS)—a large, academic healthcare system in the northeastern U.S.—after the 9/11 terrorist attacks (Zane & Prestipino, 2004)
Adams et al., 2008

- ICS used to organize a multi-disciplinary and multi-agency response to a record number of WNV cases
- Allowed for the team to alter timing of initiatives after Hurricane Gustav threatened aerial spraying
- Roles and responsibilities, chain of command clear
- Facilitated communication both internally and externally; coordinated logistics, planning and public messaging on changes in aerial spray scheduling

Tsai et al., 2005

• Tertiary hospital complex established 3 new units (SARS isolation, critical care) and 6 teams (e.g. screening, assessment) in operations section

• HEICS command and control allowed the hospital’s infection control policy to be regularly and rapidly updated; roles and responsibilities clear

IMS in health-related emergencies

• IMS addresses “who’s in charge”

• A consistent operating framework, methodology and language is necessary to respond to emergencies

• The components of the system must work together, and with other systems at local, provincial and federal levels

But…….
IMS and health

- Health care professionals are not used to working in a vertical command and control structure
- Other components (e.g. language, incident action plans) of IMS are also foreign to HCWs
- Some parts of health care (e.g. public health, primary care) do not have a first responder function
Evidence?

• “(health care organizations) are not naturally organized using ICS and rarely utilize a command decision-making structure or militaristic hierarchy”……

• We need to “aim to describe the concepts and principles of IMS….and describe ICS applications for differing incident complexities”

Kohn et al. Public Health Reports. 2010
Components of emergency management

• Incident Management
• Integration of response teams and organizations at local, provincial and federal levels
• Communication
• Leadership
• Team functioning
• Tracking of lessons learned and system improvements
Emergency Management Phases
Before we get Evidence-based Practice we need Practice-based Evidence
Creating evidence: epidemiology & surveillance in disasters
Epidemiology & surveillance in disasters

• Data: community, health delivery and public health

• Need to set up systems to collect data to perform a HIRA, identify vulnerable populations, and analyse in real time

• Syndromic surveillance may identify threats, assist in response and monitor outcomes

• Data collection systems in the community, EDs and hospitals drive response and inform evaluation in the recovery phase
Emergency Management Phases

1. Mitigation
2. Preparedness
3. Response
4. Recovery
G20 Preparedness: persons >65 living alone
Vulnerable population
> 65 living alone
Potential Destination Centres
Mitigation/Preparedness: McGuire et al, Disasters, 2007

Natural disasters and older US adults with disabilities: implications for evacuation

Lisa C. McGuire, PhD Health Scientist, Earl S. Ford, MD MPH Medical Officer and Catherine A. Okoro, MS Epidemiologist, Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, US

We analysed 2003 and 2004 Behavioral Risk Factor Surveillance System (BRFSS) data from New Orleans-Metairie-Kenner, LA to produce estimates of the number of community dwelling people aged 65 years or older with a disability and requiring special equipment. Approximately, 47,840 (31.6 per cent) older adults with a disability and 24,938 (16.6 per cent) older adults requiring the use of special equipment were community dwelling and might require assistance to evacuate or a shelter that could accommodate special equipment. Older adults who need special equipment were likely to be female, unmarried and white, and to rate their health as fair or poor. Personnel who plan and prepare for evacuations and temporary shelter during disasters need baseline information on the number of older adults with a disability or who require special equipment. A surveillance system, such as the BRFSS, gathers information that planners can use to prepare for and to deliver services.

Keywords: Behavioral Risk Factor Surveillance System (BRFSS), disability, evacuation, older adults, planning, shelter
Real-Time Surveillance for Respiratory Disease Outbreaks, Ontario, Canada

Adam van Dijk, Jeff Aramini, Graham Edge, and Kieran M. Moore

To validate the utility of a chief complaint–based emergency department surveillance system, we compared it with respiratory diagnostic data and calls to Telehealth Ontario about respiratory disease. This local syndromic surveillance system accurately monitored status of respiratory diseases in the community and contributed to early detection of respiratory disease outbreaks.

The threat of emerging infectious diseases, such as severe
Emergency Department Surveillance System

- EDSS vs. Telehealth National Ambulatory Care Reporting System (NACRS)
Acute Care Enhanced Surveillance (ACES)

- KFLA/Queen’s University
- Started in 2004-2 hospitals-200 visits a day
- 2011-47 Hospitals-4000 ED visits a day 24/7/365; 600 admissions daily
- 17 Health units
- Real time data feeds, analyzed temporally and presented spatially, fully automated
Syndromes

- Monitor data elements
- Chief complaint and or discharge diagnosis
- Age, Sex, Postal code
- CTAS and FRI when available
- Chief complaints and diagnosis are grouped into syndromes of interest to public health…
- Automatically analyzed
Niagara 2010-2011

ED Registrations - NPHU (Participating Hospitals)

Respiratory

Counts

Day


All Genders + All Ages + Hospital: GNG

All Genders + All Ages

Threshold
Response: Ice Storm: January, 1998

- 28 deaths attributed to Eastern Ontario ice storm (6 from CO poisoning)
- 50 CO patients required hyperbaric O₂ (Riddex, 2001)
  - MSK: 1.3
  - Head injury: 1.9
  - CO poisoning: 5.0
  - GI: 1.5 (Nausea/vomiting: 9.0)
  - Cardiac: 3.4
Response/Recovery:
Weather-related emergencies

Carbon Monoxide Exposures After Hurricane Ike --- Texas, September 2008

Surveillance for Illness and Injury After Hurricane Katrina --- New Orleans, Louisiana, September 8--25, 2005

Morbidity and Mortality Associated With Hurricane Floyd --- North Carolina, September--October 1999
Recovery/Mitigation: Lin & Conners, 2005

- Review of CO poisoning cases from a 2003 ice storm after implementation of recommendations from an earlier event: education and public messaging on the use of indoor charcoal grills targeted at low income minority (African American) residents.

- Decrease in identified CO cases (from 55 in 1991 to 45 in 2003, 2.1% increase in total population).

- Proportion of African Americans of total number of CO presentations decreased from 39% to 7%; affected Caucasians increased from 57% to 77%.

Epidemiology in Public Health Emergencies

• Can assist in risk assessment and planning
• Syndromic surveillance: does it really work in detection, identification and management of emergent health hazards
• May drive interventions in response
• Can be combined with ecological studies and evaluations to contribute to practice-based evidence in recovery phase
Myths and Realities
Evidence: Faulty assumptions

“assumptions are based on conventional wisdom and stereotypes rather than on systematically collected evidence. While these assumptions may be logical, what is logical is not always what is true. For example it is often assumed that disasters trigger widespread panic and leave stricken populations helpless and dependent…evidence shows that panic is extremely rare in disasters and that members of the public in the impact area will take the initiative to help themselves and others”

Noji. Epidemiology Review. 2005
Metaphors Matter: Disaster Myths, Media Frames, and Their Consequences in Hurricane Katrina

It has long been understood by disaster researchers that both the general public and organizational actors tend to believe in various disaster myths. Notions that disasters are accompanied by looting, social disorganization, and deviant behavior are examples of such myths. Research shows that the mass media play a significant role in propelling erroneous beliefs about disaster behavior. Following Hurricane Katrina, the response of disaster victims was framed by the media in ways that greatly exaggerated the incidence and severity of looting and lawlessness. Media reports initially employed a "civil unrest" frame and later characterized victim behavior as equivalent to urban warfare. The media emphasis on lawlessness and the need for strict social control both reflects and reinforces political discourse calling for a greater role for the military in disaster management. Such policy positions are indicators of the strength of militarism as an ideology in the United States.

Keywords: disaster response; disaster management; media reporting on disasters; public response to disasters

Since the inception of the field of social science disaster research in the United States, research has focused on public responses under disaster conditions. Initiated in the late 1940s
Faulty assumptions: patient behaviour

“Evidence suggests that many post-disaster visits to hospital emergency departments are for medical conditions other than injuries”

“To the lay public, the best emergency care is seen as transport as quickly as possible to the closest hospital….during the World Trade Center attack only 6.7% of the casualties were transported by ambulance… in most disasters the closest hospitals receive most of the casualties, while those slightly farther away wait for casualties that never arrive”

Noji. Epidemiology Review. 2005
Other Myths and Realities
Cone et al, 2006

Survey to hospital employees at 8 hospitals in 5 states:

- 1874 surveys sent; 1612 responses
- 86% willing to come in after Mass Casualty Incident (MCI)
- 58% willing after Chemical Biological Radiological Nuclear (CBRN) event
- Support needs identified to increase response: long-distance service (41%), email access (34%), pet care (33%), child care (30%); adult/elder care (7%)

Evidence: Secondary Contamination

Horton, 2003

- Search of Agency for Toxic Substances and Disease Registry Hazardous Substances Emergency Events Surveillance database
- Six of 44,045 events involved secondary contamination of health care workers; 15 patients in all
- “…none of the ED personnel were wearing any form of PPE…”
- None were admitted to hospital, all resolved

MMWR, 2001

- 3 HCWs contaminated by 1 patient with organophosphate toxicity
- None wore “appropriate” PPE; all recovered with treatment
Evidence: Secondary Contamination

Nozaki, 1995

- 13 of 15 physicians treating victims of the Tokyo subway sarin release incident became symptomatic
- 40 minute resuscitation of comatose patient who arrested
- No mention of PPE, although noted that physicians who helped remove patient’s clothes were most affected

Walter, 2003

- Review of 468 HazMat responses in Tucson over a 3-year period
- 85 patients from 32 incidents; 14 responders affected by response
- No reported secondary exposures
Where are we going?

• Testing interventions:
  • Health care (treatment of individuals/mass casualties)
  • Public health (populations)
  • Risk and crisis communication

• Processes: organizational research
  • Decision-making
  • Incident Management in health care
  • Integration of health and non-health sectors
Where are we going?

The Health Emergency Preparedness and Response Triad

- Emergency Management
- Competency
- Prepare
- Mitigate
- Respond
- Recover
- Healthcare Delivery System
- Capacity
- Public Health
Identified “model” communities using criteria including key linkages, use of system response, demonstrated “real life” success, and involvement of both public health and emergency response organizations.

Using a qualitative survey backed up with documentation they identified 7 communities with 7 common elements:

Organizational research: Lerner, 2007
1. Built strong working relationships between leaders of the emergency care community and public health.

2. Held regularly scheduled face-to-face meetings with personnel from public health, the emergency care community, and other possible responders including non-traditional partners.

3. Educated each other on their expertise and role during a disaster including cross-training for some services.

4. Developed response plans together and met the unique local circumstances.

5. Worked together on a day-to-day basis on disaster and non-disaster related activities.

6. Had a strong leader who drove the collaboration between the emergency care community and public health.

7. Shared resources and leveraged funding to accomplish their goals.

Organizational research: Lerner, 2007
Where are we headed?

Evaluation: Interventions & outcomes

Processes and interventions during an emergency response need evaluation

• Were target populations addressed?
• What was the impact of public messaging?
• How did the health system deliver the intervention?
• What was the incremental impact of each intervention?
Summary

• In future health emergency management will be based on a body of knowledge built by current practitioners (us)

• Evidence will mature from anecdotal reports to observational studies to assessing interventions in models, exercises and real life disasters
Summary

• Robust data and information systems, qualitative and quantitative research and evaluation methodologies are necessary to build this scientific infrastructure

• Public health and health delivery organizations, academic centres and funding sources need to partner to achieve the outcomes
References


References


