Public Health Preparedness Research

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Review of Public Health Preparedness Literature

- Covering years 2002 – 2007
- Medline + PubMed databases + *Prehospital & Disaster Medicine*
- Excluded editorials, abstracts
- 303 articles identified
- Coded research *method*: survey, case study, secondary data analysis, quasi-experimental / observational, etc.
- Coded research *objective*: descriptive, policy analysis or development, epidemiological, process or impact evaluation, hypothesis-driven, needs assessment
- Characterized each article by *hazard phase*: prevention / mitigation, preparedness, response, short- or long-term recovery
- Characterized by *unit of analysis / ecological level*: individual or clinical, organizational, social, legal or political
Findings

- More “editorial” than empirical
- One third were commentary or reviews, one quarter were case studies
- Most were descriptive or related to organizational or policy development (or protocols)
- Over 40% focused on organizational behavior during the preparedness or response phases
- It appeared that the literature was following the funding (evaluation of exercises, protocol and competency development, convenience survey samples)...
- …and experiential reports of disasters
What is Public Health Preparedness Systems Research?

- **Public health** = formal organizations and activities, informal partnerships, and legal structures to assure a population’s health.

- **Preparedness** = range of activities that prepare individuals, organizations, and communities to prevent, mitigate, respond to or recover from a disaster.

- **Systems** = represented by the potential integration, coordination, and interaction of various providers, agencies, command structures, and functional activities, internal and external to clinical and population health sectors.

- **Research** = systematic accumulation of generalizable knowledge.
Overarching research frames

- What are the (1) observed and (2) optimal disaster-related behaviors of organizations, providers (clinical / public health / emergency managers), individuals, and political actors?

- What are the specific vulnerabilities of organized response systems, populations, and policies?

- What are the optimal means for obtaining and disseminating information related to detection / surveillance, risk communication, and decision-making?

- What prevention, mitigation and preparedness factors are associated with optimal response outcomes, recovery outcomes, and resiliency outcomes?
Research building blocks

- Standardized preparedness, vulnerability, and hazard measures (similar to ICD-10 or DRG coding)
- Database of public health disasters
  - Similar to WHO EM-DAT maintained by the Centre for the Epidemiology of Disasters (CRED) in Belgium
  - Similar to U Delaware’s Disaster Research Center case series of disasters
- Stable long-term research funding
Public Health Preparedness Research Funding

- Examined funding from DHHS TAGGS database (Tracking Accountability in Government Grants System) for 2005-2007
- Keyword search on preparedness, response, disaster, emergency, Katrina, resiliency, readiness, pandemic, terrorism, or crisis
- Over $8 billion identified (including health, security, and recovery services)
- $28.7 million total distributed in scientific research, less than 1% of total disbursement
  - $589k distributed by AHRQ
  - $2.0 million distributed by CDC
  - $26.1 million distributed by NIH
Elements of Public Health relevant to preparedness research

- In the 1988 IOM report, The Future of Public Health, authors wrote that PH is led by knowledge (science) and values (politics + social interests)

- Public health agencies operate through direct services and by regulating and facilitating other sectors’ work

- Public health practice works...
  - Vertically, along command structures such as ICS and federalist relations
  - Horizontally (collaborative problem-solving with other agencies, providers, and communities)
  - Along each level of ecological hierarchy (individual to clinical to organizational to social to political / ethical / legal realms)
A Case Study of a Research Question

- What are the unanticipated consequences of non-pharmaceutical interventions secondary to a pandemic flu?

Data sources
- Research literature and policy documents
- Focus groups
- Key informant panels + pre/post tabletop “labs”
- Historical hazard data
- RDD phone survey with sub-population oversampling

Analytical methods
- Qualitative data analyses (grounded theory)
- Survey data analysis
- Impact analyses of tabletop data
- Operations research modeling (robust optimization models)
Chain of effects

- **Primary effects of a pandemic flu outbreak**
  - Specific mortality & morbidity attributable to influenza virus
  - Initiation of public health pan flu protocols
    - Medical/pharmaceutical: vaccination, antiviral medication
    - Non-pharmaceutical interventions: respiratory and hand hygiene, social distancing, increased surveillance, quarantine & isolation, closure of schools and points of mass assembly, workforce shifts

- **Secondary effects (the “unanticipated consequences”)**
  - Health system congestion, disruption of preventive / primary / and chronic care
  - Quality of life shifts as a consequence of NPI’s + direct effects
  - Potential social disorder
Literature review

- Critical infrastructure loss / disruption
  - Workforce degradation
  - Access barriers
  - Domino effects (e.g., electric leads to water pump failure)
- Social behavior during pandemic / catastrophe
  - Generally adaptive and problem-focused
  - Pro-social rather than anti-social behavior is normative
- Health and social consequences of crowding and health system congestion
  - Unattended chronic care consequences
  - Potential for stigmatization and mental health sequelae
- School closures
  - Nutritional consequences (disruption of free lunch program)
  - Educational consequences (grade promotion, maintaining standards)
  - Unsupervised children (increase in risky and criminal behaviors)
Transportation Policy Review

- Documents retrieved and compared from 7 major US cities (Atlanta, Chicago, Miami, Portland OR, Seattle, SF, DC) and 6 international cities (London, Madrid, Mumbai, HK, Tokyo, Toronto)

- Criteria for comparison included:
  - Closing/curtailment policies
  - Sanitizing or disinfecting transit environment
  - Promoting social distancing on rapid transit
  - Restricting or surveillance of passenger vehicle traffic
  - Stockpiling and/or securing transit authority supply chain
  - Public communication prior to and during crisis
Community-based focus groups

- Conducted in 6 ethnically diverse NYC neighborhoods
  - 4 in English, 1 in Mandarin Chinese, 1 in Spanish
  - Homogeneous groups included Chinese, Dominican, African-American, Jamaican/Caribbean, Greek, and Indian/Bengali

- Research focused on perceptions of neighborhood quality of life and adaptation during a pandemic, and potential response to NPI’s
  - Additional focus on trusted messengers and messages
  - Cultural beliefs and “worldviews”
Focus Group Findings

- Communities vary in trust and dependency on government, and in strength of social networks
  - Chinese community expects government to provide staples
  - Black community concerned about civic unrest
  - Jamaican and Indian communities reported strong networks, with the latter mentioning connections to medical professionals
  - All seemed reasonably optimistic about negligible impact of long-term school closures or workforce interruptions

- Trusted media varied considerably by group, although most agreed on absence of a common “face” or “voice” for local public health
**H5N1 local outbreak**

- Locality Initiates Pan Flu NPI's
  - Schools close
  - Home isolation rec’d
  - Inter-city transit curtailed
  - Public assembly curtailed
  - Health systems re-configure
  - Workforce shifts

**1st Order**

- Retail markets close or curtail
- Congestion in health care system
- Social isolation
- Crowding in home and neighborhood, decrease in structured / supervised activity
- Resources depleted and scarce (inc. $$$)
- Degradation in support for high-risk pops (e.g., institutionalized, homebound, opiate users, etc)
- Critical infrastructure degraded

**2nd Order**

- Non-flu morbidity/ mortality
- Inter-personal violence
- High-risk behaviors (drug use, unsafe sex)
- Black markets for staples, meds, contraband
- Economic productivity
- Mental health consequences: depression, stigma, etc
Research challenges

- Multi-year (community-based research is time-consuming and labor-intensive)
  - Difficult to sustain funding
- Multi-disciplinary
  - Epidemiology, sociology/survey research, operations research & mathematical modeling, policy analysis