Integrating Community Metropolitan Medical Response Systems (MMRS) with Hospital Influenza Planning – The Rhode Island Experience

David Bouslough, MD, MPH

Rhode Island State Pandemic Influenza Task Force
Providence EMA MMRS Task Force
Clinical Faculty, Brown Medical School, Department of Emergency Medicine
Discussion Objectives

- Define the Metropolitan Medical Response System
- Review the Rhode Island State Medical Disaster Preparation History
- Discuss Rhode Island’s geographical and political arrangement
- Detail the 2006-07 State-wide Pandemic Influenza planning effort
- Discuss Lessons Learned
- Provide Resources for Pandemic Influenza Planning
What is a MMRS? [1]

An operational system at the local level, which responds to incidents that create mass casualties requiring unique care:
- Emerging Infectious Diseases
- Terrorist Attacks
- Other Public Health Emergencies

This system allows a metropolitan area to manage an event until state or federal response resources are mobilized.
Example: Metropolis of 500,000 people, 3000 hospital beds: 250,000 affected by anthrax release, expecting 150,000 deaths over several weeks. (Kaufman & Meltzer)

Three approaches: expand capacity by ACS, Home Care, Evacuation

Massive, Immediate Health Care Demand
Purpose of the MMRS \footnote{\textsuperscript{[1]}}

- The Primary Focus:
  - Develop or enhance existing emergency preparedness systems
  - Effectively respond to a public health crisis
  - Originally designed for Weapons of Mass Destruction events (WMD).

- MMRS is a locally developed, owned, and operated mass casualty response system
Integrated Functional Perspective [1]
- Across the spectrum of hazards
- Among various levels of government
- Only Federal program to support local linkages
MMRS Activities

Integration is achieved through cross-functional coordination and collaboration:

- Review of existing response plans
- Development of new plans, policies, and procedures
- Conduct joint training and exercises
- Identification of existing resources and future equipment needs
- Establish and define interagency communication and organizational SOP’s
MMRS Outcomes

- Integrated medical response system
- Detailed response and operations plans
- Specially trained responders at all levels
- Specialized response equipment
- Specialized medical equipment and pharmaceutical cache
- Enhanced community-based medical treatment and transport capabilities
Spans 20 years
Original MMRS: 27 major cities
- Boston, NYC, Baltimore, Philadelphia, Washington DC, Atlanta, Miami, Memphis, Jacksonville, Detroit, Chicago, Milwaukee, Indianapolis, Columbus, San Antonio, Houston, Dallas, Kansas City, Denver, Phoenix, San Jose, Honolulu, Los Angeles, San Diego, San Francisco, Anchorage, Seattle

1999: 21 metropolitan areas added
2000: 26 areas added
2001-Present: 15-20 areas added per year
1998 - 2005: Rhode Island State
RI Emergency Management History

- 1998: PEMA Deputy Director attends Virginia Beach Conference on Domestic Preparedness.
- Sept 1999: full scale preparedness exercise in Providence.
- 1999: DHHS modifies focus, adding new biological preparation requirements.
- 2000: RIDOH and RIEMA draft state MEDS plan minimally accomplished at municipal level.
- 9/11/2001: National stimulus for planning increases
- 2001-2004: Red Cross, Community Emergency Response Team, Fire Corp, Neighborhood Watch Program, Medical Reserve Corp, Volunteers in Police Services developed.
- 2003: Statewide MEDS Exercise
- 2005: MMRS Task Force Training and Redirection
- Jan 2006: National Directives to the RIDOH for state-wide Pandemic Influenza preparation
- Mar 2006: Pilot Hospital Projects Begin
Rhode Island State Idiosyncrasies

- 39 Municipal Governments
- 88 Fire Suppression Districts
- 9 Local Emergency Preparedness Coordinators
- Multiple Independent Hospitals
- Population of 1 million
- 40 by 70 square miles
- Single Department of Health
- No local Public Health Entities
- Allows for single centralized statewide plan for most public health emergencies.
The first time one of them sneezes, cut the rope....
# Influenza Pandemics in the U.S.

## Virus Subtypes and Estimated Impact

<table>
<thead>
<tr>
<th>Year</th>
<th>Colloquial Name</th>
<th>Subtype</th>
<th>Deaths in the U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1889 - 1892</td>
<td>None</td>
<td>A (H2) or A (H3)</td>
<td>NA</td>
</tr>
<tr>
<td>1918 - 1919</td>
<td>Spanish flu</td>
<td>A (H1N1)</td>
<td>546,000</td>
</tr>
<tr>
<td>1957-1958</td>
<td>Asian flu</td>
<td>A (H2N2)</td>
<td>66,000</td>
</tr>
<tr>
<td>1968 - 1969</td>
<td>Hong Kong flu</td>
<td>A (H3N2)</td>
<td>28,000</td>
</tr>
</tbody>
</table>

Pandemic Prerequisites

- Novel virus or subtype, therefore naïve population*
- Replication competence in humans with resultant severe illness*
- Efficient human-to-human transmission leading to multiple generations of infection

*2 out of 3 conditions met with H5N1
Human H5N1 Cases: 2003-2006
(as of 30 October 2006)

- Apparent high case fatality regardless of age
- Diarrhea prominent in some cases
- Thai family cluster; probable Human-to-Human transmission

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
<th>Mortality Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azerbaijan</td>
<td>8</td>
<td>5</td>
<td>63</td>
</tr>
<tr>
<td>Cambodia</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>China</td>
<td>21</td>
<td>14</td>
<td>67</td>
</tr>
<tr>
<td>Djibouti</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Egypt</td>
<td>15</td>
<td>7</td>
<td>47</td>
</tr>
<tr>
<td>Indonesia</td>
<td>72</td>
<td>55</td>
<td>76</td>
</tr>
<tr>
<td>Iraq</td>
<td>3</td>
<td>2</td>
<td>67</td>
</tr>
<tr>
<td>Thailand</td>
<td>25</td>
<td>17</td>
<td>68</td>
</tr>
<tr>
<td>Turkey</td>
<td>12</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>Vietnam</td>
<td>93</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>256</strong></td>
<td><strong>152</strong></td>
<td><strong>59</strong></td>
</tr>
</tbody>
</table>
Avian influenza (H5N1) in humans: 1997-2006
(as of 8 March 2006)

CDC Estimates: National Influenza Pandemic

Up to 200 million persons will be affected
- Clinically Ill: 40-100 million persons
- Outpatient Care: 18-45 million persons
- Hospitalized: 300,000-800,000 persons
- Mortality: 88,000-300,000 persons*

*36,000 – 40,000 die annually with regular flu
### RI State Projections – Flu Pandemic

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Average Flu Season Estimate(^3)</th>
<th>Moderate Severity Flu Pandemic Estimate</th>
<th>Severe Flu Pandemic Estimate(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illnesses:</td>
<td>125,000</td>
<td>250,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Outpatient Visits:</td>
<td>25,000</td>
<td>100,000</td>
<td>150,000</td>
</tr>
<tr>
<td>Hospitalizations:</td>
<td>670</td>
<td>3,027</td>
<td>34,650</td>
</tr>
<tr>
<td>ICU Care:</td>
<td>50</td>
<td>425</td>
<td>5,197</td>
</tr>
<tr>
<td>Mechanical Ventilation:</td>
<td>25</td>
<td>227</td>
<td>2,599</td>
</tr>
<tr>
<td>Deaths:</td>
<td>120</td>
<td>731</td>
<td>6,661</td>
</tr>
<tr>
<td>Economic Impact:</td>
<td>$400 million</td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>
RIDOH Main Mission

- Prepare the public
- Slow transmission of disease
- Preserve functioning of basic infrastructure
Governor

Directors’ Pandemic Flu Working Group

RI Dept. of Health

Education:
- DOE
- Superintendents
- Catholic Schools
- School Nurse Teachers
- Higher Ed

Healthcare Professionals:
- RIMS, UNAP

NE Regional States

OHIC:
- Health insurers

State agency PIOs

Cities/Towns

Hospitals

Health Centers & other healthcare assets

Pandemic Flu Advisory Committee

RI EMA

Businesses

State agencies

State agency PIOs

Cities/Towns

Public Utilities

Community-Based Organizations

Media
Emergency Health Care Issues to Address

10 hospitals/six modules:
1. Emergency department surge capacity
2. Inpatient segregation
3. Inpatient surge capacity
4. Morgue surge capacity
5. Staffing
6. Communication plans (public & technical)
Healthcare Service Regions

Landmark – Burrillville, N. Smithfield, Woonsocket,
Memorial - Cumberland, Lincoln, Central Falls, Pawtucket
Fatima* – Glocester, Smithfield, Johnston, N.Providence
Roger Williams – Foster, Scituate, Cranston
Rhode Island – Providence

Miriam* – E. Prov, Barrington, Warren, Bristol

Newport* - Jamestown, Portsmouth, Middletown, Newport, Tiverton, Little Compton
Kent - Coventry, Warwick, W.Warwick, W & E Greenwich
South County *– Exeter, N & S Kingstown, Richmond, Narragansett
Westerly – Hopkinton, Charlestown, Westerly, New Shoreham

* Denotes Four Pilot Hospitals
The Miriam Hospital (TMH) Internal Planning Task Force

- Senior Vice President, Patient Care Services / CNO
- Hospital Community Liaison
- Director Infection Control
- Safety Officer
- Director of Infectious Disease
- Emergency Department Physician

- Vice President, Support Services
- Associate Director, Emergency Department
- Director, Network Services
- Department of Health, Emergency Preparedness Planner
Our Charge

- Assume responsibility for and reorganize all patient care within the confines of our geographic healthcare service region.

- Facilitate the development of a comprehensive community healthcare plan with our community partners.

- Develop an internal Hospital Plan in conjunction with the Disaster Committee.
TMH Geographic Responsibility:

Based on RI (2004) statistics, our service population is 102,702

- East Providence - 49,765
- Barrington - 16,836
- Warren - 11,360
- Bristol – 24,741
Planning Assumptions (Based on 1918) For Our Region

First 8-Week Wave Estimate

- 30,000 will become ill (30%)
- 15,000 will seek treatment (50%)
- 3,500 will require hospitalization (12%)
- 520 will require ICU level care
- 260 will require ventilation
- 700 deaths (3%)
Planning Assumptions for Severe Level of Influenza Infection

- Two, 8 week waves, 3-12 months apart
- 30% infection rate, including Healthcare workers
- Hospital staff, equipment, and capacity exceeded in 1-3 weeks
- 2-3% case fatality rate (700 persons)
“Reorganizing” the Healthcare System:

- Hospital – Internal hospital planning and planning with the community
- Establish the role of private practices and nursing homes
- Establish the role of pharmacies
- Establish the role of Home Care
- Develop morgue management
- Develop a community education plan
- Plan for additional labor pool
- Plan for logistical support
- Develop and plan for Alternate Care Sites (ACS)
- Behavioral Health Plan
- Medication Distribution Plan
“Reorganizing” Healthcare v. MMRS Development

- Hospital – Internal hospital planning and planning with the community
- Establish the role of private practices and nursing homes
- Establish the role of pharmacies
- Establish the role of Home Care
- Develop morgue management
- Develop a community education plan
- Plan for additional labor pool
- Plan for logistical support
- Develop and plan for Alternate Care Sites (ACS)
- Behavioral Health Plan
- Medication Distribution Plan

- Integrated medical response system
- Detailed response and operations plans
- Specially trained responders at all levels
- Specialized response equipment
- Specialized medical equipment and pharmaceutical cache
- Enhanced community-based medical treatment and transport capabilities
976 individuals will require hospitalization

### Number of Patients Requiring Hospital Care

<table>
<thead>
<tr>
<th>Week</th>
<th>Total</th>
<th>Non-ICU</th>
<th>ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>2</td>
<td>98</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>3</td>
<td>146</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>4</td>
<td>185</td>
<td>92</td>
<td>93</td>
</tr>
<tr>
<td>5</td>
<td>185</td>
<td>92</td>
<td>93</td>
</tr>
<tr>
<td>6</td>
<td>146</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>7</td>
<td>98</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>59</td>
<td>30</td>
<td>29</td>
</tr>
</tbody>
</table>

**Total**

- **Total** = 976
- **Non-ICU** = 59 + 98 + 146 + 185 + 185 + 146 + 98 + 59 = 976
- **ICU** = 29 + 49 + 73 + 93 + 93 + 73 + 49 + 29 = 976
Based on Computer Modeling (1918 Experience)
9,978 individuals will seek care at an Alternate Care Site

Total Regional ACS Utilization

<table>
<thead>
<tr>
<th>Week</th>
<th>0</th>
<th>200</th>
<th>400</th>
<th>600</th>
<th>800</th>
<th>1000</th>
<th>1200</th>
<th>1400</th>
<th>1600</th>
<th>1800</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>599</td>
<td>998</td>
<td>1497</td>
<td>1895</td>
<td>1895</td>
<td>1497</td>
<td>998</td>
<td>599</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total ACS Utilization Spread Across 8 Weeks
Lessons Learned

Source:
- The Miriam Hospital Pandemic Influenza Task Force: informal survey
- Personal experiences with MEDS development and University bioterrorism planning

Format:
- Themes represented by multiple illustrations
Theme 1
Develop an “ALL HAZZARD” emergency response plan!

Example:
- Internal Plan: separate topical plans revised and fused
- External Plan: information and resource share with other concurrent efforts (Hurricane Planning, Municipal MEDS plans)

- Consolidate and fuse your plans
- “Build in” and don’t “Add on.”
- If you plan for Pandemic Influenza effectively, you are developing a MMRS!
Theme 2

Perceptions and Priorities of Emergency Response Leadership are Important Predictive Factors for Ultimate Preparedness.

- Top-Down support structure, “Culture of Quality.”
- Dedicated > Qualified volunteer personnel
- Attitude of “Planning” versus “Fault Finding.”
- Barriers include:
  - Scheduling limitations
  - Competing responsibilities
  - Limitations of the concept of delegation: time delay, poor quality control, inconsistent dedication.
Theme 3

Organizational Structure and Systems Management Differences Between Agencies in Day-to-Day Operations Create Barriers to Effective Emergency Response.

- RI Challenge: linking plans for 39 municipalities, 9 Local Emergency Planning Coordinators (LEPC), and 88 fire districts
- Common Language: ICS training (100-200 level)
- Practice a “Span of Control” of 5-7 people/projects
Theme 4

**Funding Amounts and Priorities**
Create Division Between Potential Collaborators in Emergency Planning, and Limit the Plan’s Ultimate Sufficiency.

- Pilot Hospital Funding Only (limited)
- Supplies and Stockpiles: difficult to identify priority and need considering unknowns of the pandemic
- Hospital/Region self-sufficiency period unknown
Theme 5

Communication Always Fails!

Who:
- Develop a communication network with names, titles and numbers.
- Link your Hospital EOC with the Community EOC
- Hospital, Community and DOH PIO collaboration

What:
- Land lines, cell phones, radio, internet, satellite phone, smoke signals, and redundancy!
- Ardent leadership follow up during planning stages.

When: practice “early and often” during planning and exercise.
Theme 6

Limitations to immediate local supplies requires collaboration between agencies, and across municipal and county borders.

- Earnest regard for the importance of collaborative initiatives
- Genuine respect for intra/inter-agency partners
- Nurturing personal relationships = Trust building
- Pairing of hospital and community personnel
- Product: Memoranda of Understanding (MOU), Contractual Agreements
Theme 7

**Labor pool** quality, quantity, and unpredictable individual allegiances cause significant barriers to effective preparedness.

- Attitudes about Risk and Vulnerability
- Multi-Volunteerism: understand individual priorities
- Mine non-traditional reserve personnel: dentists, veterinarians, retired personnel, students
- Pre-register these personnel for immediate access to credentials
- Mechanisms to expand the “scope of practice” at every level
Theme 8

The priorities, organizational systems, and limited community relationships of Private Institutions/Educational Facilities may pose significant barriers to preparedness initiatives.

- Rich resources: teaching expertise, subject matter experts, facilities, work force
- Emphasize the importance of internal planning
- Differing priorities: education, responsibility to parents, student
- May block student volunteerism
Theme 9

Ardent Exercise and Plan Re-evaluation is Necessary to Ensure a “Culture of Preparedness” in a Given Region.

- Logical progression to exercise development: avoid “Exercise Fatigue”
- Exercise inter and intra-agency collaboration techniques
- Force individuals to “practice leadership”
Questions?

Resources
- WHO – www.who.org
- CDC – www.cdc.gov
- RIDOH – www.health.ri.gov
- HHS – www.pandemicflu.gov
- RIDEM – www.dem.ri.gov
  - “Bird Flu Line” 401-222-4080
References


