Don’t Risk It!

There’s a deadly chemical release. Why trust your safety—and the public's safety—to a product without a track record?

**AreaRAE**

*Wireless HazMat Detection*

- Remotely measures gas, vapor and radiation threats from up to two miles away
- See the entire threat from Incident Command
- With over 500 systems deployed, the AreaRAE is the standard for rapid deployment systems

Used by:
- Fire Departments
- Law Enforcement
- Industrial First Response Teams
- State and Federal Agencies

www.raesystems.com/info

Protection through Detection

RAE SYSTEMS
Are your communications systems ready for a decade of disaster?

Experts predict the next ten years will see an increase in extreme weather events. REDCOM provides the reliable, versatile platforms that restore communications during a crisis. Engineered to be interoperable and durable, the REDCOM Transportable Communications Package (TCP) is used by disaster response experts worldwide. Before disaster strikes again, make sure your command center is prepared. Make sure you’ve got REDCOM.

Talk to the experts in disaster recovery communications!
One Redcom Center, Victor, NY 14564-0995, U.S.A.
585-924.6500 PHONE sales@redcom.com E-MAIL www.redcom.com WEB

DISASTER STRIKES!
WHO ARE YOU GOING TO CALL?

EDWARDS DISASTER RECOVERY DIRECTORY

See Edwards Disaster Recovery Directory for Fire & Water Damage Restoration
See Edwards Disaster Recovery Directory for Portable Decontamination Equipment
See Edwards Disaster Recovery Directory for Data Recovery from Broken Hard Disks
See Edwards Disaster Recovery Directory for Recovery of Water-damaged Books & Documents
See Edwards Disaster Recovery Directory for Emergency Lighting

When disaster strikes you need the one resource that has all the answers...the one resource that will help you and those you protect get back to normal as quickly as possible!

Edwards Disaster Recovery Directory
Choose book or CD, or discounted book/CD combo.
For 10% discount use offer code JEM42
More information and ordering at:
www.Edwardsinformation.com 800-990-9936
Subscription Rates (Rates in US dollars):
Individual: US $172; Canada $198; Foreign $261
Institutions: US $232; Canada $272; Foreign $350
Libraries: US $239; Canada $279; Foreign $359
Single issues: US $50; Canada $60; Foreign $70

Subscription Information: Submit your complete name, address and zip code, attention: Journal of Emergency Management, Subscription Department, 470 Boston Post Road, Weston, MA 02493. Please enclose check, purchase order or credit card number and expiration date with authorization signature. Subscribers notifying the publication of an address change must submit an old mailing label and their new address, including zip code. No claims for copies lost in the mail may be allowed unless they are received within 90 days of the date of issue. Claims for issues lost as a result of insufficient notice of change of address will not be honored.

Manuscript Submittal/Author Information (See Call for manuscripts)
Quotations and Reprints: Quotations from Journal of Emergency Management may be used for purposes of review without applying for permission as long as the extract does not exceed 500 words of text, and appropriate credit is given to the Journal. Authorization to photocopy items for internal use of specific clients, is granted by Prime National Publishing Corp., provided the appropriate fee is paid directly to: Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, USA (978) 750-8400. CCC should also be contacted prior to photocopying items for educational classroom use. Multiple reprints of material published in Journal of Emergency Management can be obtained by filling out the reprint order form in the publication or by calling 781-899-2702.

Trademarks and Copyrights: Journal of Emergency Management is a registered trademark of Prime National Publishing Corp. All materials are ©2006 by Prime National Publishing Corp. All rights reserved.

Postal Information: Standard postage paid at Boston, MA, and additional offices. Postmaster: Send address changes and form 3579 to: Journal of Emergency Management, 470 Boston Post Road, Weston, MA 02493.

Disclaimer: The publisher and editors are not responsible for any opinions expressed by the authors for articles published in Journal of Emergency Management.
Emergency Management and Business Continuity working together.

For a Global Perspective, join 1,500 delegates and international authorities to discuss, debate and learn about

The Changing Face of Disaster Management

Register by April 30, 2006, Save $200.

Use Priority Code PNPC2702

16th World Conference on Disaster Management

June 18-21, 2006, Metro Toronto Convention Centre

For more information, or to register, visit: www.wcdm.org
EDITORIAL BOARD

B. Wayne Blanchard, PhD, CEM
Higher Education Project Manager, Emergency Management Institute, Federal Emergency Management Agency (FEMA), Department of Homeland Security, Emmitsburg, Maryland

H. Stefan Bracha, MD
National Center for Posttraumatic Stress Disorder-Pacific Island Division, Department of Veterans Affairs, Spark M. Matsunaga Medical Center, Honolulu, Hawaii

Michael W. Brand, PhD
Assistant Professor of Research, University of Oklahoma Health Sciences Center, College of Public Health, Oklahoma City, Oklahoma

Tee L. Guidotti, MD, MPH
Professor and Chair, Department of Environmental and Occupational Health; Director, Division of Occupational Medicine and Toxicology; George Washington University School of Medicine, Washington, DC

Peter J. Hotez, MD, FAAP, PhD
Professor of Microbiology, Tropical Medicine, Global Health and International Affairs; Chair, Department of Microbiology and Tropical Medicine, George Washington University Medical Center, Washington, DC

L. M. “Lem” Jackson
Deputy Projects Manager, Domestic Preparedness Programs, Pine Bluff Arsenal, Pine Bluff, Arkansas

E. Lynn Jenkins
Senior Scientist, Office of Research and Technology Transfer, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, West Virginia

Paul D. Kim, MD
Regional Emergency Manager, Stratton Department of Veterans Affairs Medical Center, Albany, New York, and National Disaster Medical System Coordinator, Federal Coordinating Centers, Albany, Buffalo, and Syracuse, New York

Gunnar J. Kuepper
Chief of Operations, Emergency & Disaster Management, Inc., Los Angeles, California

Scott R. Lillibridge, MD
Director, Center for Biosecurity and Public Health Preparedness, University of Texas, Houston, Texas

William L. Waugh, Jr., PhD
Editor-in-Chief
Professor, Public Administration and Urban Studies/Political Science
Andrew Young School of Policy Studies
Georgia State University, Atlanta, Georgia

T. L. Guidotti, MD, MPH
Professor and Chair, Department of Environmental and Occupational Health; Director, Division of Occupational Medicine and Toxicology; George Washington University School of Medicine, Washington, DC

Peter J. Hotez, MD, FAAP, PhD
Professor of Microbiology, Tropical Medicine, Global Health and International Affairs; Chair, Department of Microbiology and Tropical Medicine, George Washington University Medical Center, Washington, DC

L. M. “Lem” Jackson
Deputy Projects Manager, Domestic Preparedness Programs, Pine Bluff Arsenal, Pine Bluff, Arkansas

E. Lynn Jenkins
Senior Scientist, Office of Research and Technology Transfer, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, West Virginia

Paul D. Kim, MD
Regional Emergency Manager, Stratton Department of Veterans Affairs Medical Center, Albany, New York, and National Disaster Medical System Coordinator, Federal Coordinating Centers, Albany, Buffalo, and Syracuse, New York

Gunnar J. Kuepper
Chief of Operations, Emergency & Disaster Management, Inc., Los Angeles, California

Scott R. Lillibridge, MD
Director, Center for Biosecurity and Public Health Preparedness, University of Texas, Houston, Texas

Stephen J. McGrail
Director, MA Emergency Management Agency, Framingham, Massachusetts
Call for Manuscripts

*Journal of Emergency Management* is a professional bimonthly journal whose goal is to better equip all those responsible for emergency preparedness and disaster response to deal more effectively with acts of terror, weather emergencies, and catastrophic accidents. We are looking for papers to publish related to research and current issues in emergency management and disaster preparation. We will also consider guest editorials. Authors who’d like to contribute articles should feel free to contact acquisitions editor Chris Rowland (781-899-2702, x115) to discuss their ideas.

Manuscripts as well as letters to the editor can be sent by:

E-mail: jem@pnpco.com

Mail to:
Managing Editor
Journal of Emergency Management
470 Boston Post Road
Weston, Massachusetts 02493
CONTENTS

- Newsbriefs ........................................................................................................... 9
- Calendar ............................................................................................................. 10

PERSPECTIVE ON PEOPLE
- Part 2: Social dimensions of interagency collaboration—team development ........................................................................................................... 11
  Neil Simon, BS, MA

LEGAL DESK
- Incorporating volunteer resources .................................................................. 17
  William C. Nicholson, JD

FEATURE ARTICLES
- Failures of technology and systems:
  Contributing to flawed preparedness ................................................................ 19
  Saul B. Wilen, MD

- Building internal capacity for community disaster resiliency by using a collaborative approach:
  A case study of the University of New Orleans Disaster Resistant University Project .............................................................. 24
  John J. Kiefer, PhD; Monica T. Farris, PhD; Natalie Durel, MPA

- Different modes of disaster management in response to the tsunami in Southeast Asia .......................................................... 29
  Dagan Schwartz, MD; Major Adi Leiba, MD
  Colonel Issac Ashkenasi, MD, MPA, MSc
  Captain Guy Nakash, MD; Major Rami Pelts, MA
  Colonel (res) Avishay Goldberg, PhD
  Brigadier General Yeheskel Levi, MD
  Colonel Yaron Bar-Dayan, MD, MHA

- Risk communication needs in a chemical event ............................................. 37
  Janice S. Lee, PhD, MHS; Sharon L. Lee, PhD
  Scott A. Damon, MAIA, CPH; Robert Geller, MD
  Erik R. Janus, MS; Chris Ottoson, CIH; Marilyn J. Scott, CSP, ARM

- Disaster preparedness and response:
  Implications for public health nurses .............................................................. 48
  Andrea Jennings-Sanders, Dr.Ph, RN

- There is no cold zone: The hazardous materials zone model and mass terrorism chemical weapon events ........................................ 52
  Scot Phelps, JD, MPH, CEM, CBCP

- Network-centric emergency response: The challenges of training for a new command and control paradigm ......................... 57
  Lt. Col. Mark Stanovich, USMCR
You Don’t Get a Second Chance to be Prepared!

The Department of Public Sector and Critical Infrastructure Studies at American Public University offers a cutting-edge curriculum designed specifically for professionals who protect public safety.

Rigorous graduate and undergraduate degrees are offered in:

- Emergency & Disaster Management
- Homeland Security
- Public Health
- Environmental Policy and Management

Flexible weekly schedules and monthly class starts allow you to fit your academic goals into your schedule without sacrificing your professional goals.

Relevant courses: WMD Preparedness, HAZMAT, Explosive Ordnance Disposal, Terrorism, Crisis Action Planning, Epidemiology, Health Management, and more

Prepare yourself to face the challenges of tomorrow...

Apply Today to start classes in the next 60 days: www.apu.apus.edu/emergency-disaster

For questions, email info@apus.edu or call 877-468-6268 menu option 2.

American Public University - Serving Those Who Serve
What will you tell YOUR CHILDREN YOU did after 9-11?

According to the 9-11 Commission, the US is failing in its mission to protect its citizens. The current state of US security demands well-trained Homeland Security professionals – it’s one of the fastest growing security careers.

The University of Denver’s Security Program realizes that a person’s willingness to protect others is a big part of a successful response. Developing the skills to do it well is the other. That’s why we offer hands-on training with real state and local Homeland Security projects, not just hours spent sitting in a classroom.

Together, we can make homeland security a reality for the country and for those a little closer to home.

Visit us on the web at http://www.du.edu/gsis/iglos/index.html# or call us toll free at 877.474.7236

WRIGHT STATE UNIVERSITY

Master of Public Health Degree for Emergency Preparedness

The Wright State University (WSU) Master of Public Health (M.P.H.) degree program announces a new area of concentration—emergency preparedness.

- Designed to provide public health, public safety, and health care leaders of the future with the latest skills necessary to deal with an all-hazards preparedness approach facing the nation’s first responders.
- Collaborative effort between the Boonshoft School of Medicine’s Department of Emergency Medicine, the new Homeland Emergency Learning and Preparedness Center, and the WSU M.P.H. program.
- Designed for public health practitioners, physicians, registered nurses, fire officers, law enforcement officers, emergency managers, paramedical personnel, and allied health personnel.

For More Information
Call Petra Weaver at (937) 258-5547 or e-mail: petra.weaver@wright.edu

www.med.wright.edu/mph

Advertise your EM academic programs in the Higher Education Directory and reach the people who recognize the importance of education

WHEN YOU ADVERTISE IN

First: Your programs are seen by the people you’re trying to recruit! Your ad appears in a journal that’s read cover-to-cover by emergency preparedness and response professionals both in the private sector and in the public sector, nationally, on a state level, and all the way down to the smallest municipality and town. That gives you a leg up on the competition across the board.

Second: As an educational institute, the cost of this valuable advertising exposure is drastically reduced from the standard commercial rate! That means the bite out of your advertising budget is less than a nickel a contact to get your programs out there! It’s a win-win situation that will fill your classrooms!

Third: Your complimentary subscription to Journal of Emergency Management starts immediately and runs for a full year!


Call 1-800-272-3227 x144 or x107 to place your ad
EFFORT TO IMPROVE BORDER SAFETY

To help prevent violent incidents, the Secretary of Governance of Mexico, Carlos Abascal and the US Department of Homeland Security (DHS) Secretary Michael Chertoff and Eduardo Medina-Mora, Mexican Secretary of Public Safety, have endorsed a multi-step plan for bi-national coordination during emergency situations. The plan lays out a commitment to ensure immediate communications and information sharing between responsible authorities during emergency situations that may have cross border complications. The Action Plan also lays out the groundwork for ensuring coordinated investigations and detentions of persons believed to be involved with violent activity.

“Criminal networks operating at the border are increasingly emboldened and represent alarming risks to our security and public safety. Their lawlessness is intolerable, and together we will confront them with the full force of the law,” said Secretary Chertoff. “We are pledging swift and aggressive action to combat violent criminal activity at the border, and we'll continue to share critical information to target and dismantle these dangerous criminal networks.”

In addition, both nations will continue to coordinate border security efforts such as patrolling the border region, conducting regular exercise to ensure updated and consistent protocols and identifying common landmarks so the first responders can quickly arrive at the scene.

“Being good neighbors starts at the border. With these agreements on border security and public safety we strengthen our bridges of understanding and cooperation,” said Secretary Abascal. “We are aware that facing violence and crime, there are no magic overnight solutions, but we are convinced that binational systematic efforts are the best we can do to have better results.” (Source: Federal Emergency Management Association press release, March 3, 2006.)

H5N1 AVIAN FLU VIRUS VACCINE INDUCES IMMUNE RESPONSES IN HEALTHY ADULTS

Preliminary results from a study funded by the National Institute of Allergy and Infectious Diseases (NIAID) demonstrate that high doses of an experimental H5N1 avian influenza vaccine can induce immune responses in healthy adults. “These findings represent an important step forward in the nation's efforts to prepare for the possible emergence of a human pandemic of H5N1 avian influenza,” notes NIH Director Elias A. Zerhouni, M.D.

The potential for a human avian flu pandemic looms large, say experts, as daily reports indicate an increasing spread of infection in bird populations in Southeast Asia, Europe, the Middle East, and Africa. According to the World Health Organization, as of March 24, 2006, 186 people had been infected with avian flu viruses, and more than half of them had died. “We are working hard to address the many challenges that remain with regard to the development of an H5N1 vaccine,” adds NIAID Director Anthony S. Fauci, M.D. “For example, potentially protective immune responses were seen most frequently at the highest dose of this vaccine. We are investigating other options that may allow us to reduce the dosage —for example, adding an immune booster, or adjuvant, to the vaccine—so we can achieve a more practical immunization strategy.”

Generally, flu viruses are easily transmitted from person to person, but so far, the H5N1 avian influenza viruses have not demonstrated this characteristic. In the worst-case scenario, if an avian flu virus became easily transmissible from person to person, it could trigger an influenza pandemic because humans have no pre-existing immunity to these viruses. For more information go to www.nih.com. (Source: US Department of Health and Human Services press release, March 29, 2006.)
Information Systems for Crisis Response and Management (ISCRAM)

3rd International Conference
May 14-17, 2006
New Jersey Institute of Technology
Newark, New Jersey

For registration information, contact:
Murray Turoff, Program Chair
ISCRAM 2006
New Jersey Institute of Technology
University Heights, Newark, NJ 07102-1982
Tel: 973-596-3399 • Fax: 973-596-2906
E-mail: ISCRAM06@njit.edu
Web site: www.iscram.org

Emergency Management 2006
May 29-31, 2006
Crowne Plaza Hotel
Darling Harbour, Sydney, Australia

For registration information, contact:
Institute for International Research
Tel: (02) 9923-5090 • Fax: (02) 9959-4684
E-mail: info@iir.com.au

2nd Annual OSHA Emergency Preparedness and Response Conference
June 5-6, 2006
The University of Findlay SEEM
Findlay, Ohio

For registration information, contact:
Jennifer Risner
Tel: 419-434-5762 • Fax: 419-434-6542
E-mail: risner@findlay.edu
Web site: www.seem.findlay.edu

June 5-8, 2006
Emergency Management Institute
Emmitsburg, Maryland

For registration information, contact
Barbara L. Johnson
Emergency Management Institute
16825 South Seton Avenue, Emmitsburg, MD 21727
Phone (301) 447-1000 • Fax (301) 447-1052
E-mail: barbara.l.johnson@dhs.gov
Web site: http://training.fema.gov/EMIWeb/edu/

16th World Conference on Disaster Management
June 18-21, 2006
Metro Toronto Convention Center
Toronto, Ontario, Canada

For registration information, contact:
Alysone Will, Absolute Conference and Events
144 Front Street West, Toronto, Ontario M5J 2L7
Tel: 416-595-1414, x224 • Fax: 416-979-1819
E-mail: coord@wcdm.org • Web site: www.wcdm.org

National Emergency Management Association
2006 Annual Conference
September 18-22, 2006
Perdido Beach Resort
Orange Beach, AL

For registration information, contact:
Karen L. Cobuluis, Meeting Coordinator
NEMA
P.O. Box 11910, Lexington, KY  40578
Tel: 859-244-8000 • Fax: 859-244-8239
E-mail: kcobuluis@csg.org
Web site: www.nemaweb.org
INTRODUCTION

Emergency response personnel are being forced to become involved in collaborative efforts involving people outside their own specific disciplines and often outside their local communities. It is important to understand that when individuals come together from different areas of an organization or from different organizations and form a team, a complex developmental process occurs. Often, when we think of intra and/or interorganizational team development, we think of the key stages a team experiences as it evolves as an entity. However, in order for a team to achieve long-term effectiveness, it must evolve on several levels including the formation of various relationships that must be nurtured over time. This article focuses on illuminating the critical stages of team development and the associated dynamics of team evolution. Team members can manage their team’s growth and development at a more rapid pace if they are aware of these stage and dynamics.

There are several types of teams that can be called into play in a collaborative environment, each having a unique focus. Table 1 summarizes these types of teams and their common charter.

Regardless of the type of team, when people get together to work as a team, they will go through five stages of development. Often these stages need to be navigated rapidly so a team can fulfill its tasks.

STAGES OF DEVELOPMENT

There are five stages that teams follow according to COG’s Ladder of Group Development. As members of teams, leaders and response personnel need to understand each stage of development, the different dynamics that are played out, and the resulting changes in the relationships within the team. The five stages and their definitions are:

1. Honeymoon—the stage of getting acquainted;
2. Dependence—the stage of initial “take-over”;
3. Counter-dependence—the stage of rebellion and revolution;
4. Interdependence—the stage of true teamwork; and
5. Revitalization—the stage of rejuvenation of the team.

Each stage describes a phase of the development and maturity of the team. Within each of these stages, members work their way through personal and team dynamics. This ascent through the stages shows how the team matures. If a team does not progress through the stages, it becomes “caught up” in difficult personal and group dynamics, which causes the team to stagnate in a particular stage. It is not uncommon to find that teams are developmentally “stuck” somewhere within the three lowest phases (one through three). If the larger organization and/or leadership are prepared to deal with the issues which arise at
this period during the team’s development, the risk of getting stuck can be substantially reduced.

1. Honeymoon stage—getting acquainted

The “honeymoon” stage is often a period of excitement when members are focused on larger concerns. It is often seen as a “risk free” stage. At this point, the direction of the team is often unclear; members do not yet know one another, the team has not developed its ethos. Typically at this stage, people will avoid engaging in behavior that, for example, might generate conflict or reveal personal or professional agendas.

When people initially meet to form a team, their approach is polite and accommodating. They are social, they want to “get together” and share general information about themselves and what they do. Those with past team or organizational experience often tend to keep to themselves and not reveal personal agendas. They have learned through experience to remain circumspect until they are aware of the leader’s expectations, the organizational rules, and the working structure of the team.

During this stage, social and work “cliques” usually form. (Cliques are factions within a team that have similar agendas, philosophies, and/or missions.) They often initiate the formation of the team’s informal work processes. The tendency during this stage is for members to associate with others with similar interests, values, and work backgrounds (e.g., fire, police, administration, and EMS).

This stage can last anywhere from one or two meetings to many meetings. A brand new team can expect to spend more time in this stage for developing their working relationships—in fact, this is desirable and necessary to provide a strong foundation for any team’s future development. A team made up of people who have worked together in the past, however, may move through this stage more quickly. It is imperative to ensure that the group’s relationship agreements are focused on the current project and include all team members. Sometimes, members of a team that have worked together will exclude the other team members and create difficulties, consciously or unconsciously.

The transition to the next stage starts when there is pressure, either internal or external, to get down to the “real” work of the team.

2. Dependence stage—the initial “take over”

As the team moves beyond the honeymoon stage, it begins to ask questions such as: Why are we here? What is our purpose? Key team members begin to wrestle with issues such as organizational structure, roles and responsibilities, and normative behavior. Individual agendas, which were usually hidden during the honeymoon stage, begin to emerge, and some

Table 1. Types of teams and their common charter

<table>
<thead>
<tr>
<th>Team type</th>
<th>Common charter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural-work team</td>
<td>Design, develop, and/or improve work conditions and/or response productivity. For example, work-unit teams of several fire departments get together to focus on a specific challenge.</td>
</tr>
<tr>
<td>Process-improvement team</td>
<td>Review collected data and recommended processes for improved response. Outcomes are oriented to the bottom line; effects in such things as costs reductions, performance effectiveness, and efficiencies. For example, organizational representatives coming together to reduce costs of HAZMAT responses and make the emergency services more effective.</td>
</tr>
<tr>
<td>Problem-solving team</td>
<td>Identification of symptoms and their associated underlying causes culminates in a recommendation and offering to fix the problem(s), a suggestion of ways to work around it/them. For example, a collaborative effort focusing on reducing costs of transportation of resources.</td>
</tr>
<tr>
<td>Co-located team</td>
<td>Teams that are cross-functional that are physically moved to a new location to complete a project. Normally this team categorizes designs and develops new products and/or services. For example, a FEMA response to a disaster.</td>
</tr>
<tr>
<td>Cross-functional team</td>
<td>Teams composed of members from different specialized work functions across several organizations whose charter is to design, develop, and/or problem solve. An example of this is the management of a mass disaster involving, local, regional, and federal jurisdictions and divisions.</td>
</tr>
</tbody>
</table>
members may attempt to impose upon the rest of the team their particular vision and approach.

It is common during this stage for some team members to display dependence on a certain individual perceived as a “doer” who sees him/herself as “the” leader of the group. This self-proclaimed leader may attempt to “take over” the team and push it toward completing the work.

Doers can be one of two types of people. The first type is an individual who tries to force the team to create a series of goals, objectives, and rules in order to complete the task as the doer understands it. The second type of doer is a strong natural leader who has a more cooperative and collaborative approach toward working and developing a team. This leader emerges early on to direct the proper evolution of the team and then backs off when members begin working well and accomplishing the team’s goal. This second type of doer is often not recognized as a leader until the third or fourth stage of the team’s development.

To navigate successfully through this second stage, teams first need to have a thorough and shared understanding of their assignment, their team’s purpose. Next, they need to create a plan to accomplish their assignment which all members “buy into” and support. Because this stage is often stressful, teams sometimes abandon the appropriate developmental steps necessary for more holistic, sustainable development. Simply put, the team chooses to focus on concrete tasks rather than the “soft side” of relationship development. In this scenario, the leader gives out specific tasks and the members follow, creating an environment where resentments can grow and the “blame game” can develop.

During this period, some members actively participate while others quietly follow, often appearing passive. Some are silent supporters, others are gathering information (the “wait and see” contingent), while others are evaluating the group dynamics and figuring out how they want to position themselves within the team. Thus, “political camps” or “factions” form. These cliques are often based on power and control issues—who is “politically correct” can become a major concern, rather than what is the right thing to do for the team and the larger organization. One or more discontented subgroups may attempt to build strength for an “insurrection.”

In some cases, team members will attempt to avoid the discomfort of this stage by reverting back to honeymoon stage behaviors or just playing a passive role (e.g., “just doing the job”). The team may alternate between these first two stages several times, even during the same meeting, until something interrupts this counterproductive cycle.

If the team can successfully navigate through these various obstacles, they move onto the next stage.

3. Counter-dependence stage—rebellion and revolution

If the team is skillful, mature, and perhaps a bit lucky, they may progress through this stage very quickly or skip it altogether. This third stage, which clearly emerges out of the dependence stage, can often be triggered by a negative event such as the leader burning out, losing effectiveness (for reasons including credibility, accountability, and reliability), or being rendered impotent by the team’s members. When assignments are not completed and responsibilities are “dumped” on the leader—who either tries to do all the work or to take greater control of the group—you have the beginning of a revolution in the group’s relationships and structure.

During such a “junta” there is a great deal of competition around leadership: who decides, what are the roles and responsibilities, who is in control? The initial leader is repeatedly challenged. There is a flurry of behind-the-scenes activity as members try to rationalize their positions and justify their personal agendas. Unfortunately, this experience is usually negative and counterproductive to the development of the group.

On occasion a self-appointed leader may naturally begin to share leadership responsibilities with other team members. When this occurs, team members may start to understand how they fit into the larger structure and begin working with the leader and other members. This, obviously, is a healthy development for the team, which will help foster its effectiveness as it matures.

Oftentimes, personalities are the major factor determining a team’s success. Power struggles can cause members to resign or be reassigned. Individuals may complain about roles that have been defined for them or for others. It is not uncommon for these kinds of personality clashes to occur during this third stage. Too often, those “in charge” only want to accomplish what
they want completed and in the way they think it should be completed, an approach that leaves little room for substantive input from the other team members. When this happens, there is usually little appreciation of human diversity or recognition that certain tasks can be successfully completed in several different ways.

By this stage, conflicts between group factions are generally no longer polite. Strong feelings of “we” versus “they” emerge. Alliances are strengthened. Tension rises over roles and responsibilities. People become protective of their “turf”—and the chaos grows. The rebellion and revolution of this stage is usually quelled in one of two ways:

1. When a stronger leader takes over, in which case the team often regresses back to the dependence stage and can then go through this same experience again, though with different protagonists; or

2. The team realizes a new strategy and discovers “what it takes” to work together effectively. This may take some time, but they will not make the same mistakes of the counter-dependence stage.

At this point, the next stage is launched.

A team struggling in this manner may need outside assistance to help guide it through all the confusion and conflict. If the culture of the larger organization supports collaboration, understands team development, and accepts that failure is a part of learning, teams at this stage can benefit greatly. A skillful leader who understands team development will not micromanage or take over the team process but will be able to intervene quietly to coach team leadership and remove obstacles and then just as quietly step out.

4. Interdependence stage—true teamwork

Unfortunately, many teams never achieve this stage because of “party politics” or team structure, as described above. Also, the larger organization overseeing the team may not understand, or place any value on, the process of team building necessary to reach this critical stage. In addition, the organization may lack the leadership or interest to coach team members through these early stages.

Having developed as a team through the previous stages, several things occur during this interdependence stage:

- First, the overall team becomes effective.
- Next, individual and team attitudes improve.
- Team members agree on a common focus so they are working in harmony.
- True team spirit emerges, and over time the team’s initial focus is deepened and refined.
- Real progress is made toward achieving the team’s objectives.

During this stage, team members refine their roles and responsibilities. They come to understand that no one person can do it all, and that the team has to work as a whole if it is going to succeed.

Individual behavior changes as well when this stage is reached. Most notably, leadership is often shared among members. People recognize and accept each other’s strengths and weaknesses. In addition, a balance often occurs among strategy, task, and maintenance activities. Members accept and tolerate individual variances in behavior as well as personal agendas, since everyone now is focused on the same goal. A feeling of pride and accomplishment develops often along with a spirit of conviviality.

5. Revitalization stage—rejuvenation

Although the team can sustain the stage of interdependence for a long period of time, things eventually change. Personal agendas change, personnel turn over, new assignments come along, and the larger organization’s direction may shift. All of these factors are a normal part of development and evolution of a team.

Every team or organization, whether small or large, needs periodic revitalization. If this does not occur, the team will begin to lose its effectiveness and eventually stagnate or die. A team needs to continually improve
Table 2. Five stages of team development and fundamental dynamics

<table>
<thead>
<tr>
<th>Five stages of team development</th>
<th>Steps of team development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Honeymoon stage</strong></td>
<td><strong>Polite step</strong></td>
</tr>
<tr>
<td>Getting acquainted</td>
<td>People avoid risky behavior.</td>
</tr>
<tr>
<td></td>
<td>People are social and get acquainted.</td>
</tr>
<tr>
<td></td>
<td>General information is shared.</td>
</tr>
<tr>
<td></td>
<td>Personal agendas stay hidden.</td>
</tr>
<tr>
<td></td>
<td>Social and work cliques are formed.</td>
</tr>
<tr>
<td><strong>Dependence stage</strong></td>
<td><strong>“Why are we here” step</strong></td>
</tr>
<tr>
<td>A leader emerges</td>
<td>Key members deal with the “why are we here” issue and often attempt to impose their views upon the team.</td>
</tr>
<tr>
<td></td>
<td>Team goals, objectives, and rules are established.</td>
</tr>
<tr>
<td></td>
<td>Often key people participate and others follow.</td>
</tr>
<tr>
<td></td>
<td>Followers appear passive: some are silent supporters, others are gathering information, others are evaluating the dynamics and figuring out their best positioning.</td>
</tr>
<tr>
<td></td>
<td>Cliques formally grow and merge.</td>
</tr>
<tr>
<td></td>
<td>Personal agendas begin to surface.</td>
</tr>
<tr>
<td></td>
<td>Leaders push for implementation of decisions.</td>
</tr>
<tr>
<td><strong>Counter-dependence stage</strong></td>
<td><strong>Power bid step</strong></td>
</tr>
<tr>
<td>Sometimes individual personalities determine outcomes</td>
<td>Competition around leadership, who does what, who is in control.</td>
</tr>
<tr>
<td>Sometimes there is a power struggle that causes some members to drop out</td>
<td>The leader is constantly challenged.</td>
</tr>
<tr>
<td>Roles are defined for other members</td>
<td>Behind-the-scenes activity flourishes.</td>
</tr>
<tr>
<td></td>
<td>Members try to rationalize positions to justify their agendas.</td>
</tr>
<tr>
<td></td>
<td>Conflicts exist between teams, factions, and agendas.</td>
</tr>
<tr>
<td></td>
<td>The leader feels puzzled, ineffective, and tries to figure things out.</td>
</tr>
<tr>
<td></td>
<td>“We”/“they” feelings exist between the leaders and the team.</td>
</tr>
<tr>
<td></td>
<td>Cliques are strong.</td>
</tr>
<tr>
<td></td>
<td>Roles become important.</td>
</tr>
<tr>
<td></td>
<td>Decisions don’t get carried out, which leads to “dumping” on the leader.</td>
</tr>
<tr>
<td></td>
<td>Sub-teams form among leaders and members.</td>
</tr>
<tr>
<td></td>
<td>Internal personality clashes manifested.</td>
</tr>
<tr>
<td><strong>Interdependence stage</strong></td>
<td><strong>Constructive step</strong></td>
</tr>
<tr>
<td>Individuals interact as their roles permit</td>
<td>Attitudes change.</td>
</tr>
<tr>
<td>Some teams never reach this stage</td>
<td>Team spirit develops as program focuses.</td>
</tr>
<tr>
<td></td>
<td>Real progress is made toward team goals and objectives.</td>
</tr>
<tr>
<td></td>
<td>Leadership is shared.</td>
</tr>
<tr>
<td></td>
<td>A balance occurs between task and maintenance activities.</td>
</tr>
<tr>
<td></td>
<td>Most of the agendas are out in the open, “without prejudice.”</td>
</tr>
<tr>
<td><strong>Esprit de corps</strong></td>
<td>Everyone pulls in the same direction.</td>
</tr>
<tr>
<td></td>
<td>A feeling of togetherness, pride, etc. forms, often with a lot of humor.</td>
</tr>
<tr>
<td></td>
<td>Friendships develop outside meetings.</td>
</tr>
<tr>
<td></td>
<td>Roles are comfortable and understood.</td>
</tr>
<tr>
<td><strong>Revitalization stage</strong></td>
<td><strong>Rekindling of team spirit</strong></td>
</tr>
<tr>
<td>Some teams experience rejuvenation when they have new assignments sometimes even going through the whole process all over again</td>
<td>Original team wears out unless there are new challenges or new life is brought into the team.</td>
</tr>
<tr>
<td></td>
<td>Leadership may change.</td>
</tr>
<tr>
<td></td>
<td>New projects offer new challenges.</td>
</tr>
<tr>
<td></td>
<td>The mission/purpose of the team changes, and the team changes and renews.</td>
</tr>
<tr>
<td><strong>Revitalization stage</strong></td>
<td><strong>Termination step</strong></td>
</tr>
<tr>
<td></td>
<td>The team’s mission is completed, its work is acknowledged, and it is disbanded.</td>
</tr>
</tbody>
</table>

and grow, and the “esprit de corps” needs ongoing nurturing.

To remain vital, teams need to celebrate their accomplishments and continually look for new challenges. For an individual as well as for a team, learning should never end, and evolution is an ongoing process. Peter Senge’s book, *The Fifth Discipline: The Art and Practice of the Learning Organization*, focuses on creating an
environment so that the organization improves with age. Maturation is a journey, not a final destination.

If we do not attend to renewal, we lose spirit: we must acknowledge that attitudes change just as members of a team change. Change and disruption tend to push teams back into earlier stages of development. But for teams to remain vital, they must constantly recognize and grapple with the continuous challenges presented by change.

Many teams do not continue past the achievement of their initial goals; they are disbanded when their work is completed. When terminating a team, it is important to do it in a way that leaves the individual members with a sense of closure, appreciation, and satisfaction for their collective achievement. This helps to improve morale in the greater organization while setting the stage for any future teams these individuals may join.

Table 2 (pg. 5) summarizes the five stages of team development.

CONCLUSION

In today’s emergency management world, new teams are being formed at a rapid pace and with very high expectations. Prevention of disasters and the saving of lives are at stake. Understanding how teams evolve through natural stages of development has never been more important.

It serves us well to think of team development stages building on one another, each providing a footing for the next level of maturation. It is important to note that teams will traverse these stages differently and not always linearly. It is also important to remember that teams can get stuck or, at times, regress to an earlier stage. Teams may temporarily and briefly repeat earlier stages to help integrate a new member into the team. We must look at the overall progress of the team to determine how it is evolving.

It is very important that the team and its leaders are aware of the natural stages of team development in order to have the perspective to understand and overcome the inevitable challenges they will face.

Neil Simon, BS, MA, Managing Partner, Incident Mitigation LLC, Southfield, Michigan (njsimon@incidentmitigation.com).

REFERENCES


Is your emergency response system part of the fabric of your organization?
Does your emergency response system help in non-crisis time?
Does your emergency response system help your bottom line?
What can your emergency response system do for you when you are not in crisis?

Today’s environment is uncertain. Events outside of your control can impact your operations, workforce, and bottom line. This has created an environment characterized as a “New Normal.” Your viability, stability, and future success depend upon how you prepare for and respond to such events. We work with you to ensure that crisis and disaster does not mean chaos and disruption for your organization. With our unique process:
- Your incident mitigation plan will be built around your culture
- It will be accepted and used by your people because it is their plan…. they built it!
- It fits the unique needs of your organizational processes
- It does not require continuing maintenance by us to stay viable
- It is a living, active part of your daily environment
To minimize chaos and confusion on an ongoing basis your people need to take an active role in creating and maintaining a safe and productive environment. We will introduce you to our LivingProcess, a proven process for mitigating the effects of crisis and disaster. It involves employee involvement and empowerment that enables your people to work as a team to create solutions for mitigating the impact of a potential crisis.

We will assist you in...
- Assessing your vulnerability
- Planning your strategy
- Testing your plans and systems
- Scanning your environments

17340 W. 12 Mile Road, Ste. 101, Southfield, MI 48076  248-552-0821  incidentmitigation.com
Volunteers are a vital resource for emergency management. Properly managed, they can prove to be a key element in the successful response to an emergency situation. Their contributions are particularly important when funding for many types of preparedness and response activities is shrinking as terrorism becomes the obsession of our national leadership. A number of legal issues may arise in connection with the utilization of volunteer resources.

**WHO IS A VOLUNTEER?**

The first question that must be addressed is the definitional issue—who is a volunteer? The answer is more complex than it might seem. One does not become a volunteer by simply showing up at the scene of an event. Rather, a person must be a member of an accredited organization or an integrated member of the emergency response team.

**INTEGRATING VOLUNTEERS**

The most important step that can be taken to prevent liability with regard to volunteers is properly integrating them into the emergency management team. This may be done in a couple of ways. The best approach is to establish ongoing relationships with the major volunteer groups prior to a crisis. Like other emergency response groups, volunteer organizations need to be included in planning, training, and exercising. Their role should be clearly spelled out in the plan. Typically, the parent organization takes care of assuring that the individual volunteers are properly trained and provides them with the necessary documentation so they can be appropriately identified at the scene of an event. This removes a significant administrative burden from the incident commander (IC) during an event.

**EMERGENT VOLUNTEERS**

One of the IC’s biggest headaches may be the crowd of well-meaning emergent volunteers that often congregates at the scene of an event. These folks are frequently not affiliated with the groups with which the unit of government has existing mutual aid agreements. They may or may not be trained responders.

One of the IC’s major duties is scene control. The IC controls all personnel on and their actions at the scene. When trained responders arrive as the pre-arranged outcome of a mutual aid agreement, they can be a very useful addition of resources. Unfortunately, emergent responders will turn up at the location individually or as a group, despite not being asked for or even being actively discouraged. This happened both in New York and at the Pentagon after the 9/11 strikes. When this happens, the IC must demonstrate decisiveness and tact to maintain control of the site.

One of the first responsibilities for an IC is the clear definition of a perimeter, which should be controlled by law enforcement. People trying to come
into the perimeter without proper permission must be prevented from doing so and moved to a distant staging area.\(^3\) There, a potential volunteer’s training and capabilities can be assessed and their proper role, if any, can be assigned. In the event that they are found to be trained responders with needed skills, a record of the assessment must be made. They can then be officially added to the roster as approved responders. Taking these steps will protect the emergency management and emergency response entities from liability, as it shows that they are taking reasonable steps to determine the competencies of the volunteers. Of course, there is an associated duty of assigning the volunteers to duties for which they are qualified.\(^4\)

**THE VOLUNTEER PROTECTION ACT OF 1997**

Many members of Congress believe that the possibility of litigation may lessen the likelihood of people volunteering for public service. In response, they enacted the Volunteer Protection Act (VPA) of 1997 to make available statutory immunity to increase the labor pool for voluntary entities.\(^5\) The VPA pre-empts state laws providing higher levels of liability for volunteers than gross negligence. States may opt out of the VPA. In addition to shelter from negligence lawsuits, punitive damages may not be awarded against a volunteer acting within the scope of his/her responsibilities to a nonprofit organization, even when that volunteer is negligent or grossly negligent. The immunity does not apply to the volunteer’s organization.

Notably, VPA does not exempt volunteers from liability for any harm caused while driving a motor vehicle. This exclusion is important, since research indicates that half the claims involving emergency response organizations arise from vehicle accidents. While the VPA alters the basis for a lawsuit, it probably does not affect administrative actions taken on a negligence basis. Laws that name negligent conduct endangering persons as the basis for administrative penalties therefore continue to be valid.

**ACKNOWLEDGMENT**

This article was produced under a grant from the FEMA Higher Education Project.

William C. Nicholson, JD, Department of Criminal Justice, North Carolina Central University, Durham, North Carolina. This article is for information only and does not constitute legal advice. For legal advice, consult your own attorney.

**REFERENCES**

1. See, e.g., Barry D: The Search: A Few Moments of Hope In a Mountain of Rubble. New York Times. Sept. 13, 2001. “There were volunteers everywhere, arguably more than were needed.”
2. Brunacini AV: Fire Command. NFPA: 22. Police represent the community agency with the authority and ability to directly control the location and activity of the general public at an emergency scene. This capability makes them a unique support agency for the fire command system through their ability to control and manage spectators, traffic and other actions of people. The command system should integrate law enforcement functions into its operations as a matter of routine.
5. Pub. L. No. 105-19, 111 Stat. 218 (codified at 42 U.S.C.A. §§ 14501-14505 (West Supp. III 2002)). As is the case with any type of tort reform, the VPA has come in for significant criticism. See, e.g., Andrew F. Popper, A One-Term Tort Reform Tale: Victimizing The Vulnerable, 35 Harv J on Legis. 123, 130-137 (Winter 1998). “An underlying principle of tort law is that the threat of personal liability creates individual accountability and thereby enhances the quality of goods and services. Accordingly, the common law imposes a minimum level of due care on people who choose to volunteer. The Volunteer Protection Act changes that standard, and in so doing, reduces the incentive to provide quality services.” Id. at 134-35 (citations omitted).
Abstract
Preparedness has become America’s operative societal concept. We aim for educational preparedness to compete in a global economy. We invoke preparedness to deal with natural disasters. We see preparedness as the basis for security and safety of the homeland. We assume that the existing systems operating in our lives, communities, and society are solid and will not fail. We have come to believe that technology is our salvation. Systems and technologies will be explored in the context of their integral positive and negative roles in the preparedness process and continuum.

Key words: preparedness, technology, systems, disasters

Introduction
People, common sense, planning, resources, systems, and technology must function synergistically in order for problem solving to be viable and preparedness to be a successful process. For the desired outcomes to result, this admonition must become the unifying principle applied to all aspects of the preparedness continuum.

Somehow, disaster preparedness/emergency management seems to have been left to flounder by government without adequate support, guidelines, and standards for the development of plans with consistency and focused direction. The problem facing America today is finding visionary leadership that is competent to take charge and give emphasis to the necessary ongoing planning, strategic and dynamic development, preparedness to prevent and respond, education, effective communication, cooperation and innovation, that are simultaneously required. The longer it takes for us to institute these essential components the worse will be the resulting consequences. This is the loud and clear message.

The existence of multiple systems that power the American economy and guide the American way of life, and the surge of technologies that progressively pervade and dominate our daily and long-term functions, should offer us a sense of security. However, they do not. An understanding of systems, specifically what they are and how they are expected to operate, their limitations, and especially their tendency to fail, must be understood and applied in the course of decision making and action taking.

The benefits as well as the pitfalls of technology require analysis and perspective. This necessitates at least some basic operational knowledge of the specific technologies being employed.

Systems
A system is a group or series of interconnected, interdependent, or interacting elements that function together to fulfill a common purpose. The results produced are not possible to achieve by the elements operating alone. These elements act over a spectrum that leads through its sequence to an endpoint. When a significant component of the sequence is missing, changed, removed, or blocked for some reason then the system process gets short-circuited and systems failure can result.

Systems dynamics is the field that defines how systems interact with each other and produce positive, negative, neutral, inhibitory, and enhancing results. There are systems of multiple types with the most common being open, closed, and dynamic systems. In the operational environment, we are faced with complex systems interactions and the potential for further increases in this complexity.

Systems are present in every situation where interactions occur—biological, chemical, sub-nuclear...
particles, gravity, the sun, the planets and their moons (known to us as our solar system), business operations, government, war, automobiles, marriage, and poverty. Some of these systems are there spontaneously, some are deliberate and man-made, and some come into being without any apparent or deliberate intent. However, there is one critical aspect of systems: in most instances they eventually will fail, either partially or totally. This is particularly true for biological systems, man-made systems, and systems that are man-manipulated.

Biological systems, whether they involve microorganisms, plants, animals, or humans, have a built-in system closure called organism death, which is universal. There is a species level escape valve manifested through existing systems for renewal and propagation, and even genetic adaptations.

Systems play a vital role in the functions of daily living that Americans depend upon and which offer them safety and security now and in the future. It has become obvious that the complexities of interactions pose significant potential for disruptive influences (naturally occurring or deliberate) upon the sequence of a system’s spectrum, thereby resulting in some degree of failure, whether small or major, transient or permanent, chance or cumulative, momentary or lasting. Most failures can be reversed, minimized, or even prevented provided they are recognized early and readily corrected. The goal is to maintain optimum systems function.

TECHNOLOGIES

Technology is the sum total of the development and study of a technique—the methods of the procedure and the details of any process—that can be applied to a field of endeavor or knowledge to enhance function. A few examples of such technologies and fields of application include: telecommunications as applied to business, DNA analysis as applied to forensic science and law enforcement, the Internet as applied to information gathering, alternative energy sources as applied to energy conservation, and game theory as applied to global security (the subject of the 2005 Nobel Prize in economics). A pivotal question that must be contemplated and resolved is: “How addicted is America to a technology fix for its problems?”

Technology has served to “level the playing field” and create the basis for global interactions. However, the applications of technology for operational innovation and for overcoming existing problems require time and testing to produce viable results. Often the hastily produced solution does not meet the specified requirements or the desired function. This result is common in the field of technology development, no matter the application. The “quick-fix” is seldom successful and, in most instances, takes many times longer and costs many times more than the proposal and project contract specify. Innovation and technology experimentation with the establishment of core demonstration projects can support important programs for active development.

When faced with a technology-related problem, an established mechanism to obtain immediate help and start a trouble-shooting process is an absolute requirement. Qualified, physical help should be only a short time frame away. Minor and especially major potential problems involving technology as well as problems involving all other components of the preparedness continuum must be anticipated during the ongoing planning process. Education of all involved personnel will support the prompt recognition of events that may signal a problem. The initial warning signs of impending failure must be appreciated early so this information can be effectively communicated to obtain expert help. This represents yet another application of basic information analysis whereby data obtained highlights changes and trends that may suggest significant problems.

FOOTPRINTS OF FAILURE

On July 7, 2005, London experienced a serious terrorist attack on its civilian population involving several bombings of its mass transit system. A recent inquiry report analyzed the reaction to the bombings by London authorities responsible for emergency management. This report showed significant delays and gaps in the response due in part to communications devices and telephones that did not work underground. The technology failure contributed to limiting the initial reporting of the specifics and the extent of the injuries and damage. This delay resulted in hampering the allocation of appropriate and immediately
necessary resources to the proper locations. The British have always touted their long-standing and in-depth experience with terrorism, especially with the Irish Republican Army. It seems that this potential communications problem was not anticipated in their response plan.

The technology glitch, manifest immediately after the attack, contributed to a preparedness deficit. The technology problem, which could have been anticipated, occurred in the most critical time frame when any delays can cost lives.

Infrastructure technology is a significant area that often gets neglected in the pursuit of emergency management goals. The general public must be involved and educated in the areas of prevention, preparedness, response, and recovery. Coordination weaknesses among authorities and government agencies are rampant and call for serious efforts to overcome and eliminate them.

A plan is finite in nature requiring constant evaluation, reevaluation, and revision, in light of new information and experience. An examination of many existing plans for large US cities reveals major deficiencies. Los Angeles, California, is a glaring example. The city sits on top of a maze of fault lines. A major earthquake could rapidly result in widespread destruction and fires. However, there is no plan for evacuating and then sheltering the evacuees. Earthquake activity detection technology and early warning technology and systems need to be enhanced along with parallel education programs for the disaster target population.

Natural disasters in the United States seem to have evolved toward becoming more severe over the past century. Factors such as worsening weather patterns, changes in population demographics, infrastructure deterioration, deficient land use planning, and building code inadequacies have all significantly impacted outcomes. Add to this the existing expedient politics of denial and the forecast for the future becomes dismal at best. Population shifts to coastal areas have become continuous despite the well-publicized potential risks of natural disasters. Today more than half of America’s population lives in coastal areas.

Hurricane Katrina hit on August 29, 2005, but left its devastation (both property and human) to continue for decades. The more that predisaster plan documents are reviewed and the state of preparedness evaluated, the more the basic process is found to be flawed. For instance, no consideration was given to, or preparations made for, the picking up of the dead; New Orleans must have simply assumed that casualties would not occur.

Following the ravages of Hurricane Katrina, the Louisiana and Texas coast experienced the threat of Hurricane Rita, which only partially materialized. The challenges posed by Rita created stresses for the disaster preparedness/emergency management systems of Houston, Texas, and surrounding communities in evacuation planning and implementation. The existing strategies and tactics unfortunately came up wanting. Communication systems were ineffective and community education was nonexistent. Had these elements been operational and efficient and been part of the planning process, effective evacuation would have occurred.

Katrina and Rita were followed by Hurricane Wilma, which was designated the most powerful Atlantic Ocean storm in recorded history: a category five hurricane with winds up to 190 miles per hour. It was a very large storm that caused significant damage as it slowly moved across Florida, even though upon landfall it was reduced in category strength. Even with the extensive emergency management experience in Florida, significant delays in the distribution of necessary resources occurred due to avoidable personnel and practical implementation errors.

This has been one of the worst hurricane seasons ever. Is this in part due to changes or failures in climate systems? Global warming cannot be left out of the equation and may continue to contribute to future disasters through its impact on increasing weather severity. In considering this issue, the artificial distinction between naturally occurring events and man-created acts (as in terrorism) become blurred. Have natural disasters now become phenomena with human imprints? Man’s pollution of the atmosphere with greenhouse gas emissions persists in adding to climate systems failures and compounding consequences. The Journal of Climate reported in a study November 2005 that many disruptive consequences of the accumulation of heat-trapping gases,
global warming, and the progressive rapid loss of the arctic tundra will continue, with Alaska eventually becoming a temperate climate state.

Energy systems failures have been occurring in the United States for many years. The rolling energy shortages in California, now only a distant memory for most Americans, still occur. The major Northeast and Midwest United States power grid failures in August of 2003 raised the issue acutely due to the massiveness of the power outage and the shutdown of air conditioning (the comfort factor). These events represent failures of the technology in place and are reversible. Meaningful changes are yet to be instituted.

It was hoped a reassessment of American energy policy would occur and solutions that readily existed established to deal with continuing difficulties. To date little has been done to institute ongoing planning processes as part of a coherent and strategic national energy policy. America’s power grids and their consistent and successful operations are vital parts of our critical infrastructure. We again are in the phase of looking for an energy policy, and there have even been calls for consideration of constructive regulation rather than the present voluntary compliance system, which has not succeeded.

Failures of the intelligence, communication, and preparedness systems contributed to the September 11, 2001 (9/11) saga, yet progress toward reversal of these systems failures has been extremely slow and cumbersome. Failures of technology, especially in the area of communications, have had major impacts. Many of these communications technology problems are solvable and preventable. Shortly after 9/11 it was determined by the Justice Department that the Federal Bureau of Investigation (FBI) was in need of a major upgrade of its computer systems (which, in fact, were totally outdated) including the development of software that would allow for communication of information throughout the FBI network and the rapid analysis of key data categories. A technology contract was awarded and two plus years later a $300 million system was delivered that did not and could not be made to function. The conclusion was that the project could not be salvaged, and it required starting all over again for another $300 million.

American intelligence deficiencies and the offered rationalizations given to explain them, especially the statement that they “could not have been anticipated,” demonstrate the persistent failures of these information and analysis systems. The history begins even before the end of the “cold war” when US intelligence agencies could and did not predict the collapse of the Soviet Union. The end of the “cold war” resulted in a progressive dismantling of human intelligence in favor of electronic intelligence. Subsequent events including: the state of pre-9/11 intelligence; the 20-year Iranian program for enriching uranium; the sale to third world countries of nuclear technologies by Pakistan and Libya; the persistence of nuclear weapons and missile programs by North Korea; intelligence before and after the March 2003 American invasion of Iraq; the long-standing tribal structure of Iraqi society, totally unrecognized by US military leadership; the potential for the sustainable Iraqi insurgency; the subsequent sectarian violence that prevents the establishment of a national unity government; and the problems interfering with Iraqi reconstruction and the creation of a safe living environment for the Iraqi people collectively support the need for drastic further changes that will actually support safety and security.

The vital component contributed by intelligence systems has become known as “connecting the dots.” This is dedicated to assembling the components required for meaningful planning, decision making, ongoing evaluation and reevaluation, and effective outcomes. It includes analysis, communication, and planning systems. “Connecting the dots” as an assembling system can easily be short-circuited with resulting systems failures. The major quandary results when there are stovepipes, hidden agendas, turf, the unwillingness to share and/or communicate, and “the dots were there, but the will to see and connect them was not.”

The essential element for systems success is in demonstrating progress in the evaluation of the changes instituted since the problems were discovered, to determine their effectiveness in producing appropriate improvements. The frequent and ongoing reevaluation of all planning, and examination and reexamination of all assumptions must be
applied to all strategic planning and all considerations for action.

**CORRECTIONS FOR SUCCESS**

Interoperability is the state of making a process or interaction work between or among entities or definable functions. Interoperability has significant applications for bringing together such considerations as the quality, value, and practical aspects of American preparedness and resources; the changing and expanding nature of global interfaces; and the ramifications of global networks including terrorism. Just as it is counterproductive to have unrealistic expectations, it is equally counterproductive to excuse recurring errors and failures that clearly can be anticipated and prevented. The hallmark of the disaster preparedness process is ongoing planning and the anticipation of the unexpected. This approach must be incorporated into the planning and decision making functions. The consideration of contingencies and alternative needs is essential.

Ongoing planning is mandatory for the strength of all operational processes. There is a need to understand the factors and systems in play. Preparedness, the state of readiness to perform and support, is an operational goal that allows for realistic solutions. An effective planning process allows for consideration of the spectrum of possibilities and for adjusting actions deliberately as conditions change.

Problem solving and planning systems are usually focused on trying to define the “whys.” This effort is counterproductive. The large amount of time invested usually leads to divergent and contradictory conclusions. A practical perspective for planning and preparedness comes when the focus is on the “whats,” the “hows,” the “whens,” and the “wheres,” which are the operative factors.

Innovation is the natural progression in the process of human inquisitiveness that allows for practical applications in changing present circumstances. Innovation is stimulated by need, competition, and the search for “a better way,” and is fueled by enthusiasm and passion and is reinforced by success. Innovative programs, systems development, improved systems dynamics, technology enhancement, and improvement of communication effectiveness will all contribute to successful outcomes. The controlling forces in play must be supportive of the necessary risk-taking and required sacrifices for innovation to flourish. Obviously, risk entails potential adverse consequences and loses. The “sure-thing” may appear to be the better choice, but in the long run, the potential gains are always limited. As Robert Burns wrote in *To A Mouse*, “The best-laid plans of mice and men often go awry.”

**PERSPECTIVES**

A solution is goal-oriented. Change occurs in response to applying a process over time to a specific problem. There are many viable approaches to be considered and implemented to bring about significant, dynamic, and strategic outcomes. Solutions take time and effort, shared risk and sacrifice, and they all require ongoing planning processes. Prevention strategies and preparedness anchored on firm educational underpinnings that develop simultaneously with the preparedness to respond form the foundation for a realistic, long-term solution that succeeds on a practical basis.

In approaching solutions, the first requirement is to describe and understand the problem with its full range of ramifications and consequences. Clearly specifying the objectives contributes to an understanding of the purposes involved. In addition, all major alternatives and trade-offs must be identified and considered. This defines the awareness phase of the decision making process. The next is the confirmation phase, which involves clarifying uncertainties and considering risk tolerance and linked decisions. The decision point is then reached. This is followed by the fulfillment phase that requires effective implementation on all levels. And finally, we have the monitoring and evaluation phases incorporating measurable results and outcomes assessment.

With each completion of a decision making cycle, we find ourselves back again at the beginning of a new cycle. In some ways this will be different and in some ways not. The level of challenge will vary. However, one thing is certain: we can be better prepared and wiser each time around because we are able to learn from previous experiences.

Saul B. Wilen, MD, CEO, International Horizons Unlimited, San Antonio, Texas.
Building internal capacity for community disaster resiliency by using a collaborative approach: A case study of the University of New Orleans Disaster Resistant University Project

John J. Kiefer, PhD
Monica T. Farris, PhD
Natalie Durel, MPA

ABSTRACT

This paper describes the development of a disaster resistant community at the University of New Orleans (UNO). It includes the process for obtaining leadership support and “buy in,” for identifying specific expertise within the university community, and for enlisting and ensuring broad stakeholder support and participation in the plan.

In late 2004, the author’s research team at the University of New Orleans successfully sought and was subsequently awarded a FEMA-sponsored grant to develop a Disaster Resistant University (DRU). This resulted in the formulation of a comprehensive mitigation plan aimed at identifying and reducing risks throughout UNO’s campus.

Early in the planning process, the research team decided that, unlike other universities who had been awarded FEMA DRU grants, it would be important to develop local, “in-house” expertise in disaster resiliency to ensure sustainability. Rather than contracting an external agency to develop the mitigation plan, the researchers decided to leverage the disaster expertise already resident in the UNO community. At the same time, the UNO researchers considered it essential to use a methodology in developing the plan that would ensure representation from a broad range of stakeholders. To do this, the research team utilized a unique collaborative methodology in the hazard identification and mitigation process.

INTRODUCTION: A HIGHLY VULNERABLE COMMUNITY

Since 1993, the Federal Emergency Management Agency (FEMA) has awarded millions of dollars in disaster assistance to public and private universities and colleges in the United States to develop disaster-resistant campus communities. The goal of a disaster-resistant university is to create a campus with the ability to withstand the effects of probable hazard events without unacceptable losses or interruptions; in other words, to be resilient. This does not mean creating a campus where there will be no damage from disaster events. Indeed, damage from natural and technological disasters varies by the force and location of the event. A disaster-resistant university strives to mitigate the damage. Steps taken to become more disaster resistant complement the long-term sustainability of the campus and improve the overall quality of life.¹

The University of New Orleans is located in New Orleans, Louisiana, on the south shore of Lake Pontchartrain. The main campus is made up of 195 acres and consists of 20 major academic, administrative, and residential buildings, while the East Campus consists of 200 acres that include an arena with a seating capacity for 10,000 people, sports facilities, and one administrative building. UNO is a public university with an approximate enrollment of 17,000 students (13,000 undergraduates and 4,000 graduate students) resulting in its ranking as the largest university in the city and the second largest in the state. The student body is diverse, with 56 percent white, 22.3 percent black, 6 percent Hispanic, 5 percent Asian, and approximately 800 international students.²
UNO has a substantial influence on the economy of New Orleans as well as the state of Louisiana. The university employs 1,541 faculty and staff, making it the 19th largest employer in Louisiana. Overall, the university generates more than $100 million in research grants and a budget of $194,309,969.

In just the last decade, disasters have regularly affected the university campus, sometimes causing death and injury and imposing monetary losses and disruption of the institution’s teaching, research, and public service. The damage to buildings and infrastructure and interruption to the institutional mission have resulted in losses that can be measured by faculty and student departures, decreases in research funding, and increases in insurance premiums at the least, and injury and loss of life at the extreme. These losses can be substantially reduced or eliminated through comprehensive predisaster planning and mitigation actions.

In 2004, the University of New Orleans successfully sought funding from FEMA to reduce and manage vulnerability to hazards through development of a comprehensive campus mitigation plan. Although the mitigation plan targeted natural hazards, it also focused on multiple hazards including those that are man-made, whether intentional or accidental.

Lack of a comprehensive community plan

Over many preceding years, the University of New Orleans had created and implemented a variety of emergency plans to meet such general threats as hurricane, fire, chemical release, etc. However, no comprehensive, integrated, multi-hazard emergency plan existed. This had the potential of placing students, faculty, and staff in danger, and costing the university millions of dollars in lost research projects and damaged infrastructure.

It was evident that a long-term approach to reduce hazard vulnerability on the UNO campus was needed. Systematic and comprehensive advance planning was the logical solution to correcting the often fragmented and disjointed plans resident at the university. The goal was to produce a program of activities that would best mitigate the impact of local hazards. The plan would ensure that the maximum possible mitigation activities were reviewed and implemented in an efficient, holistic approach. It would ensure that activities were coordinated both with each other and with other existing goals and programs, avoiding costly and inefficient redundancies.

**METHODOLOGY: BUILDING CAPACITY THROUGH A COLLABORATIVE APPROACH**

The ability to build the capacity to conduct hazard mitigation planning and have it remain resident within the university community was an important goal of this project. Indeed, similar projects in other communities had often used a “contracting out” approach, leaving little or no internal organizational understanding of mitigation planning at the conclusion of plan development. It was recognized that a research methodology that included a high degree of collaboration by various stakeholders was essential to the development of a user-focused, comprehensive mitigation plan. This approach to hazard planning would produce several important outcomes. It would 1) develop a core cadre of interorganizational expertise in hazard planning, 2) create plan “buy in” through the involvement of a broad range of university community stakeholders, and 3) increase the validity of the plan by involving multiple data sources.

The UNO approach to developing the multihazard mitigation plan incorporated the characteristics of a “Comprehensive Vulnerability Management” paradigm, as suggested by David A. McEntire, et al. This approach calls for “holistic and integrated activities directed toward the reduction of emergencies and disasters by diminishing risk and susceptibility, and building resistance and resilience.” Comprehensive vulnerability management provides a framework for developing proactive, tangible strategies to create disaster resilient communities. Specific elements include:

- an inclusive, holistic approach based on consideration of risks and vulnerability in the physical, social, and organizational environments;
- a primary focus on vulnerability through efforts to identify and reduce all types of disaster vulnerabilities;
- an all-hazards approach that addresses all types of hazards, natural or otherwise;
- incorporation of comprehensive emergency management that incorporates and moves beyond the four elements of comprehensive emergency management; and
- participation by a wide range of stakeholders, including public sector organizations, citizens, businesses, and nonprofit organizations.

Multiple methods, multiple stakeholders

The research methodology used multiple methods, multiple data sources, and multiple stakeholders to maximize validity. These included a risk assessment, priority profiling of potential hazards, a vulnerability assessment, focus group discussions, and multiple interviews with key stakeholders. An interdisciplinary advisory team of resident experts from UNO was formed, with team members representing a wide range of offices and departments, including the Environmental Health and Safety Office; the Center for Hazards Assessment Response and Technology (CHART); the College of Urban and Public Affairs (CUPA); University Administration, including the Chancellor’s Office, Academic Affairs, Facility Services, Human Resources, University Computing and Communications; and the Lakefront Arena and Campus Police.

These people were selected for their ability to provide collaborative input, to ensure broad acceptance of mitigation strategies, and to integrate diverse viewpoints in order to create a disaster-resistant university campus. Moreover, because they were a part of the already-established UNO Emergency Preparedness Committee created by the chancellor to discuss emergency issues and strategies on campus, these professionals had the experience of a long history of campus emergency situations.

The research team consisted of five members of the UNO faculty and staff, representing CHART, CUPA, the Environmental Health and Safety Office, the College of Engineering, and two graduate students from CUPA and the geography department. This team had expertise in a broad range of disciplines that included political science, public administration, environmental sociology, environmental engineering, civil engineering, and facilities management.

A systematic process of secondary data analysis

Once the research and advisory teams were organized, the research team conducted an in-depth risk assessment, identifying potential hazards that might impact the university. The research started with analysis of secondary data. Sources included articles in the local newspaper, the Lexis-Nexis database, Internet web sites such as those of FEMA and National Oceanic and Atmospheric Administration (NOAA), claim files held in the University’s Office of Risk Management and the State of Louisiana’s Office of Risk Management, and area and regional hazard profiles compiled by the city of New Orleans and the state of Louisiana. The significant amount of data collected from these sources yielded a list of potential hazards that had historically impacted UNO and the surrounding region.

While secondary data were being compiled and analyzed, a detailed inventory of campus assets was assembled. This inventory went beyond the mapping of the asset locations; it provided the description and value of each asset on campus. The assessment helped determine the actual risk from a potential identified hazard and allowed the research team to estimate potential structural and monetary losses. At the same time, the inventory allowed for some initial degree of prioritization of risk.

The research team also identified three critical structures—the Administration Annex, the University Communications and Computing Center (UCC), and the Central Utility Plant—as particularly vulnerable because of their high concentration of occupancy and/or high-value contents. For these three facilities, detailed engineering surveys were conducted to ascertain structural vulnerability.

A unique visual component of the hazard profile was developed

Using the information generated in the analysis of secondary data as a foundation, a comprehensive Geographic Information System (GIS) map of the
UNO main campus was developed. This tool provided intricate details and descriptions of each building, facility, and infrastructure on campus. It included the location of emergency responders and emergency response equipment as well as the location of hazardous materials on campus. The resulting map graphically provided information to the research team in a user-friendly, intuitive format about campus facilities and infrastructure affected by a variety of potential hazards. In addition to its utility as a planning tool for development of the mitigation plan, the map is now used, maintained, and updated by campus emergency personnel for continuing planning, mitigation, response, and recovery operations.

**Stakeholder involvement adds depth to the mitigation plan**

Based on the secondary information gathered for the initial hazard profile and vulnerability assessment, a refinement of the research team’s understanding of campus hazards was undertaken. This was done using both a focus group and interviews with several subject matter experts. The intent of the research team was to gather additional data that would help them identify additional hazards, narrow the focus of vulnerabilities, clarify alternative mitigation strategies, develop additional strategies, and prioritize those strategies to mitigate UNO against potential natural and technological hazards.

The focus group consisted of four mid- to senior-level UNO Facility Service workers, selected because of their considerable hands-on experience of past hazards that affected the UNO campus. In addition to the focus group, eight individual interview sessions were conducted. The interviewees were a purposeful sample, selected from members of the university’s Emergency Advisory Committee. Each informant provided an important paradigm for understanding risk and vulnerability. The questions the moderator asked were open-ended questions, suggested from a FEMA template provided in their document *Building a Disaster-Resistant University*.

**Coordination with adjacent and responding agencies**

Throughout the mitigation development process, contacts were made with agencies and organizations that were adjacent to the campus and/or would be active participants in a disaster response role. These included the local fire and police departments, the city’s homeland security manager and emergency manager, and the local chapter of the American Red Cross. At the end of the planning process, each of these agencies was sent a notice requesting their review of the draft mitigation plan. They were advised that the draft could be reviewed on the university’s web site, and they were asked to provide comments or revisions as necessary.

**RESULTS: HAZARD IDENTIFICATION, ASSESSMENT, AND MULTITHAZARD MITIGATION PLAN**

As a result of the secondary data analysis, focus group and interviews, and interagency input, an extensive profile of potential hazards was created. This process had been suggested by Dan Henstra, who argued that an important step in building disaster resilience is to identify potential hazards in the community and assess the level of risk associated with them. To that end, various hazards identified through the risk assessment were then prioritized based on the likelihood of occurrence, severity of the hazard, and cost of damage to the university. This information provided a basis for mitigation planning efforts in terms of focus and allocation of resources. The hazards are shown in Table 1.

The research team, in consultation with the advisory committee, next considered a wide range of strategies that could positively affect the impact of the hazards and developed alternatives. They were organized under five general strategies that included:

1. property protection (e.g., relocation out of harm’s way, retrofitting buildings);
2. preventive (e.g., restricted access to sensitive areas, securing power plant);
3. emergency services (e.g., warning, response, evacuation);
4. structural projects (e.g., drainage improvements); and
public information (e.g., outreach projects).

These alternatives formed the basis for a university “action plan” approved by the university’s chancellor, which specified recommended projects, responsibility for implementing the projects, and a detailed timeline for project completion.

**CONCLUSION**

The development of a comprehensive, integrated, multihazard mitigation plan for UNO was successful in large part due to its usability and consensus-driven, participatory design. The internal capacity to conduct hazard-focused disaster planning will remain resident within the university community and extends to the myriad departments, organizations, and elements that make up a diverse, urban campus. To supplement the mitigation plan, the university, drawing largely on this resident expertise, conducted a broad range of multicultural community outreach activities and educational forums. For example, the university’s Environmental Health and Safety Office developed tailored programs for special needs populations on campus that include disabled students, faculty, and staff; international students; students enrolled in the Intensive English Program; children enrolled in the UNO Children’s Center; and single students with dependent children living on campus. Other outreach efforts included the development of videos, brochures, and posters containing guidelines and nonstructural mitigation techniques that continue to be disseminated campus-wide.

**AUTHOR’S NOTE**

This mitigation plan and article were completed just prior to the arrival of Hurricane Katrina on August 29th of 2005. The university, the city of New Orleans, and indeed the entire Gulf Region have only just begun the long recovery process. The University of New Orleans was the first university in New Orleans to begin offering an abbreviated Fall 2005 semester in the wake of this devastating hurricane, with classes starting only six weeks after impact. In a follow-up article, the authors will present an assessment of this new mitigation plan in light of lessons learned post-Katrina.

This paper has not been presented at any meeting. There are no commercial or financial associations that might pose a conflict of interest in connection with this article. Funding for this project provided by the Federal Emergency Management Agency.

John J. Kiefer, PhD, Assistant Professor, University of New Orleans, College of Urban and Public Affairs, New Orleans, Louisiana.

Monica T. Farris, PhD, Assistant Professor and Assistant Director, University of New Orleans, Center for Hazard Assessment Research and Technology, New Orleans, Louisiana.

Natalie Durel, MPA, Research Associate, University of New Orleans, College of Urban and Public Affairs, New Orleans, Louisiana.

**REFERENCES**

ABSTRACT

The tsunami of December 26, 2004, can be described as one of the worst disasters medical systems have ever had to face. This paper will describe the geophysical properties of tsunamis and their disastrous impact on human beings and infrastructure. Finally, we will present three different modes of response to the tsunami that were present in different provinces in Thailand. These three modes represent different strategies of disaster management, and analyzing each will help to begin understanding how best to respond to the next large-scale natural disaster.

Key words: tsunami, geophysical properties, modes of response

WHAT IS A TSUNAMI?

“Tsunami” is a Japanese word for “harbor waves,”¹ and it is used by the scientific community to describe a series of waves, characterized by long wavelength (up to several hundred kilometers) moving across the ocean. These waves can attain speeds of up to 800 kilometers per hour as they travel across the ocean and are relatively flat and similar in height to normal ocean waves (0.5 to 1.0 meters). Thus, they are barely noticeable on the ocean. Such waves are capable of traveling thousands of kilometers with minimal energy loss. In shallow water, near coastlines, the tsunami slows down to speeds of tens of kilometers per hour but, in doing so, forms large destructive waves. These waves can rise up to 30 meters in height and flood the shoreline at high speed, destroying all in their path up to several kilometers inland.²

Tsunamis are created by seabed movement, most commonly through ocean floor earthquakes, which abruptly deform and vertically displace the overlying water. This movement, ultimately, creates the huge tidal waves.

Tsunamis can be similarly produced by a sliding movement of the ocean floor. One of the best described processes capable of generating a tsunami is the eruption of methane gas trapped in the ocean floor.² The sudden release of the gas causes landslides on the ocean floor, generating tsunamis. Worldwide earthquakes are the most common cause for tsunamis. Most of them occur near tectonic “plate boundaries,” areas prone to such large vertical movements of the earth’s crust. The Indian Ocean floor is highly prone to this seismic activity, especially around Sumatra, which is at the junction of three, large tectonic plates.

Tsunamis are relatively common in the Pacific region. In the last decade of the 20th century, the following tsunamis occurred: Nicaragua (1991), Indonesia (1992), Okushiri Island in Japan (1993),³ and in Papua New Guinea (1998).⁴ In Europe, tsunamis are less frequent.⁵ One of the worst ever occurred 7,200 years ago in the North Atlantic region,
caused by an extremely large underwater landslide
(the Storegga Slide). The tsunami waves that flooded
the Norwegian coast were as high as 20 to 35 meters
above sea level, while those that flooded the English
coastline reached six meters above sea level.6 On
November 1, 1755, a strong undersea earthquake
occurred 200 km off the coast of Portugal. This was
one of the most devastating earthquakes in recorded
history. Its magnitude is estimated at 8.5 (Richter
scale), and it generated huge tsunami waves that
flooded the coastline.7

THE TSUNAMI DISASTER IN SOUTHEAST ASIA

On December 26, 2004 at 09:00 AM, an earth-
quake of 9.0 magnitude (Richter scale) struck the
area off the western side of northern Sumatra, trig-
gering massive tsunamis. The total energy released
has been estimated as the equivalent of 23,000 atomic
bombs of the type dropped on Hiroshima at the end of
World War II.8 This earthquake, the strongest record-
ed in the last 40 years, was caused by the movement
of the Indian plate under the Burma plate—a process
that has been occurring for the past 1,000 years. On
the day of the earthquake, a rupture 1,000 km long
occurred, pushing the ocean floor above it about 10
meters horizontally and several meters vertically.
This movement, of trillions of tons of rocks, generat-
ed giant waves that moved across the ocean at the
speed of a jet plane, flooding coastal areas around the
Indian Ocean rim, striking eight countries in
Southeast Asia as well as Somalia, Tanzania, and
Kenya in East Africa.9,10 The tsunami waves devas-
tated thousands of kilometers of coastline, causing a
huge number of fatalities and injuries and destruc-
tion of infrastructure. The death toll climbed stead-
ily. One month after the disaster, it was estimated at
225,000 people. Whole villages were wiped off the
face of the earth. The four countries that were most
severely hit were Indonesia, Sri Lanka, India, and Thailand. The tsunami directly affected an estimated 5,000,000 people.\textsuperscript{11,12} The estimated total number of fatalities, wounded, missing, and displaced victims is shown in Table 1.

<table>
<thead>
<tr>
<th>Country</th>
<th>Areas/people affected</th>
<th>Damage</th>
<th>Displaced peoples</th>
<th>Injured</th>
<th>Missing</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>2,200 km of coastal land; 300 m to 3 km inland and 3 million people</td>
<td>897 villages, 157,393 dwelling units, 11,827 HA of cropped area, and 1.56 B USD</td>
<td>647,556</td>
<td>6,898</td>
<td>5,551</td>
<td>10,872</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Aceh: Districts (14 out of 21); 1 million people</td>
<td>172 subdistricts, 1,550 villages, and 21,659 houses destroyed</td>
<td>417,124 living in spontaneous settlements</td>
<td>1,736 hospitalized</td>
<td>127,749</td>
<td>101,199 buried</td>
</tr>
<tr>
<td>Malaysia</td>
<td>NW states of Penang and Kedah</td>
<td>3,997 buildings, including 30 health facilities at differing levels</td>
<td>8,000</td>
<td>73 inpatient</td>
<td>694 outpatient</td>
<td>6</td>
</tr>
<tr>
<td>Maldives</td>
<td>20 atolls, 100,000 people affected</td>
<td>10,578</td>
<td>1,313</td>
<td>26</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>23 villages, 10,000 to 15,000 people affected longterm; 5,000 to 7,000 directly affected</td>
<td>592 houses of 17 villages destroyed</td>
<td>2,592 homeless/households (537)</td>
<td>43</td>
<td>3</td>
<td>61</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>12 coastal districts and 103,789 affected families</td>
<td>500,668 affected houses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>6 provinces on west Thai coast with 308 villages and 12,068 households</td>
<td>6.85 M Baht have been provided to assist victims</td>
<td>8,457</td>
<td>3,144</td>
<td>5,332</td>
<td></td>
</tr>
<tr>
<td>Somalia</td>
<td>Puntland region worst-hit, 650 km of coastline</td>
<td>600 families have lost properties; 2,600 fishing boats destroyed</td>
<td>Approx. 4,000</td>
<td>NA</td>
<td>NA</td>
<td>At least 150</td>
</tr>
</tbody>
</table>

Adapted from WHO report, February 1, 2005.

HAZARDOUS EFFECTS OF A TSUNAMI

The damage caused by a tsunami is progressive. In the first stage, it hits the coastline at pressure levels of up to 10,000 kilograms per square meter, enough to destroy any structure in its path. The flooding effect of the tsunami causes most of the damage by destroying houses, roads, and infrastructure. In the second stage, the wave retreats, inflicting additional damage by washing away soil sediments, shorelines, and eroding the foundations of buildings. Tsunamis can impair water supplies in multiple ways: damaging pipelines and pumps, and contaminating wells and ground water with salt water or sewage. Tsunamis can also cause severe damage to crops and food supplies.

While most tsunamis cause little damage, some inflict massive destruction of lives and property. In areas without warning systems or located close to the
epicenter (not allowing enough time for evacuation), a large tsunami can inflict a great number of casualties, such as the hundreds of thousands in the recent Southeast Asia tsunami. Such a disaster puts a huge burden on the affected areas, which have to deal with enormous numbers of victims in a very short time.

The profile of tsunami victims is similar to that of cyclone and hurricane victims during heavy flood damage. The major causes of death are drowning and blunt trauma. The injuries sustained by the most survivors originate from complications of near drowning such as aspiration pneumonia and blunt trauma. Another common injury following a tsunami disaster is wound infection, probably due to contaminated debris. An Australian medical team that treated tsunami victims in Papua New Guinea in 1998 described 182 surgeries performed during a 15-day period. The initial medical treatment of infected wounds includes surgery and empiric antibiotic therapy until wound culture results are available. In determining a diagnosis for such patients, one must consider organisms that are prevalent in wounds exposed to sea water, such as Aeromonas Hydrophilia and Vibrio Vulnificus.

In the weeks following a tsunami, it is important to identify rapidly and monitor closely all infectious diseases, in order to identify outbreaks and treat them in a timely fashion. The World Health Organization (WHO) and other agencies link tsunamis with large outbreaks of cholera and other epidemiological forms of diarrhea. Based on previous outbreaks of diarrheal diseases, we know that the occurrence can be as high as 87,000 to 120,000 per population of 100,000. (In Goma in 1994, many of the refugees had more than one outbreak of diarrheal disease.) Such was not the case in the recent tsunami in Southeast Asia, most likely due to the speed and size of the relief effort.

**HEALTH SYSTEM RESPONSE**

Very limited data are available in the medical literature regarding the response of health systems to tsunami risks and tsunami management, and most of the available data is anecdotal and descriptive.
important feature of tsunami disasters is selectivity. A tsunami affects some areas while sparing others at times only a few hundred meters apart. This allows both mobilization of medical staff from nearby unaffected to affected areas and evacuation of victims from the affected areas to unaffected hospitals. This is also one of the reasons for the different modes of response taken in different regions.

Multiple articles have looked at the elements which enable a system to successfully manage a crisis. Three elements were found to be crucial in managing a mass casualty natural disaster, such as a tsunami: the flow of information, overall coordination, and leadership. These three elements were found to be relevant in analyzing the Thai health system response in the recent tsunami (Figure 3).

When preparing for an unexpected emergency (such as an earthquake or a tsunami), we have to consider the role of every organization and the methods for cooperation. As Quarantelli suggests, planning should be seen as a process involving practices, interactions, and relationships.

To allow for the high level of performance required of healthcare providers in such situations, it is crucial to provide adequate support to staff and volunteers. In a study that examined support factors among Thai healthcare providers, leadership was found to be critical, as was fulfilling the basic needs of the personnel (Figure 4).

Model I: “Field”-based and primary center-based medical aid

A principle bottleneck in the Southeast Asia tsunami, as in other natural disasters, was the low availability of ambulances and air-based evacuation. For this reason, 70 percent of the casualties in Krabi province were primarily treated in the field or evacuated to primary clinics (tumbons), mostly by foot, by private cars, or boats. The primary clinics are regularly staffed by public health officers and a
nurse, who is authorized to prescribe medications and supply primary care. These clinics, which have no hospitalization capabilities, were rapidly organized with mattresses and beds in order to “hospitalize” patients until their primary care was completed and their secondary triage to an established hospital (either district-secondary or provincial-tertiary) was available. In Phang Nga district, most casualties were treated in the field or in the tambons. Tambons were reinforced with manpower and medical supplies that were sent from either district or provincial medical centers. These “reaching out” teams gave advanced life support (ALS) care, triaged casualties, informed their own hospital’s operation center, and selectively evacuated patients to hospitals. For that reason, Phang Nga’s hospitals, like Takuapa’s hospitals, got “waves” of casualties (some 990 casualties until midnight) and not one mass of casualties.30,31

After the tsunami, as after other natural disasters, most patients presented to either the primary healthcare facilities or the local hospitals within a few hours.32,33

Model II: Hospital-based response

In other provinces (e.g., Phuket), primary care organization and reinforcement were lacking. Almost all casualties in Phuket were rapidly evacuated either by ambulances, police cars, or private cars to secondary (district) or tertiary hospitals (Figure 1). Most casualties arrived at hospitals within a few hours, creating a mass casualty incident, with hundreds of casualties—a scenario that hospital teams had never trained for. Initially, there was no coordination among hospitals, and no patient allocation or secondary diversion occurred.

The Thalang district (secondary) hospital in Phuket province admitted about 200 casualties in the first three hours of the disaster. Patong hospital, also
in Phuket province, with 48 nurses and eight general physicians, admitted 700 casualties in two hours (and only 59 more in the next 20 hours). Not surprisingly, these hospitals reinforced the primary health centers (tumbons) by the second or third day, after most of their casualties had received primary treatment.33

Most victims arrived at the hospitals within six hours of the disaster. Many dead victims were brought in as well, adding to the overall burden. In some areas, the dead were diverted to temples for future identification.20 Reinforcement of medical crews and equipment started, in some instances, within a few hours. Most victims had lacerations, soft tissue injuries, fractures, or near drowning without significant respiratory distress. Thus, they were considered mild cases. Secondary distribution among hospitals, and evacuation to further inland tertiary hospitals, was started, in most cases, on the day after the tsunami hit.20 In the first two days, space and resources were severely lacking, intensive care units doubled their capacity, and operating rooms (OR) worked constantly, often with more than one patient per OR at any one time.

Model III: Mass casualty incident in a remote environment

Remote, small islands inundated by the tsunami exhibited distinctive features. One was a lack of selectivity. While in large land areas sometimes only a strip of coastline a few kilometers deep was affected, leaving a large portion of the infrastructure and manpower intact, on many of the islands the tsunami caused total flooding and destruction. This was the case on PhiPhi island in Thailand and in many of the Maldivian islands.36 Due to their remote location and limited accessibility, communication was very limited, and evacuation of victims and reinforcement of medical staff and equipment was very difficult. In these locations, often the leadership of a few caregivers, one physician, and a few nurses perhaps made it possible for some lives to be saved.36

CONCLUSION

Tsunamis can cause large-scale disasters with hundreds of thousands of casualties and severe infrastructure damage. Early warning systems and public education can mitigate the loss of lives and injuries. As in other disasters involving flooding, most of the severely wounded victims drown. Thus, survivor injuries tend to be relatively mild. Health system preparedness prior to the event, and effective disaster management following it, are crucial for providing the necessary care for the primary injuries, while preventing and, optimally managing, secondary injuries.

During the chaos of a natural disaster, one must trust those whom one is familiar with: friends, relatives, the close-by nurse from the tumbon, or the local hospital physician. It seems useless to erect new medical systems far away and significantly different from the existing ones. It seems wise to practice different modes of response and management, in different locations, depending on the relative damage, evacuation capabilities, and medical resources in each of those locations.

Dagan Schwartz, MD, Faculty of Health Sciences, Ben Gurion University, Beer-Sheva, Israel.

Major Adi Leiba, MD, Faculty of Health Sciences, Ben Gurion University, Beer-Sheva; IDF Home Front Command, Israel.

Colonel Issac Ashkenasi, MD, MPA, MSc, Faculty of Health Sciences, Ben Gurion University, Beer-Sheva; Medical Services and Supply Center, IDF Medical Corps; IDF Medical Corps, Surgeon General Headquarters, Israel.

Captain Guy Nakash, MD, IDF Home Front Command, Israel.

Major Rami Peits, MA, IDF Home Front Command, Israel.

Colonel (res) Avishay Goldberg, PhD, Faculty of Health Sciences, Ben Gurion University, Beer-Sheva, Israel.


Colonel Yaron Bar-Dayan, MD, MHA, Faculty of Health Sciences, Ben Gurion University, Beer-Sheva; IDF Home Front Command, Israel.

REFERENCES


ABSTRACT

In an effort to define the role of state and local health agencies in a chemical terrorism event and to share knowledge, materials, and resources, representatives from state, local, and federal agencies formed the Interstate Chemical Terrorism (ICT) workgroup in 2002. Working with the ICT workgroup, the Centers for Disease Control (CDC) funded a workshop effort to address the basic elements of risk communication (RC) needs in a chemical event. The primary goal of the workshop was to develop templates for chemical fact sheets destined for the general public and press, medical providers, public health officials, first responders, and impacted workers, as well as a list of core competencies and benchmarks. We summarize workshop discussion and outcomes.

Key words: risk communication, chemical event, core competencies, benchmarks

INTRODUCTION

According to the Monterey Institute’s Weapons of Mass Destruction database on worldwide reported terrorist actions, readily available chemical agents have been the most common means of delivering terror. From 2000 to 2003, of 246 incidents by criminals or terrorists, 67 percent involved chemical agents, 16 percent were biological agents, and seven percent were radiological.1 The Monterey Institute recorded 953 fatalities and 4,351 nonfatal injuries from chemical agent terrorism and only 8 fatalities and 1,059 injuries from biological agents. The most common delivery methods are consumer product tampering, water supply contamination, or contamination of food or drink. These problems fall squarely on the public health establishment (Dr. Gary Ackerman, Monterey Institute of International Studies, July 2003).

Chemical and biotoxin incidents, particularly those that leave a contaminating residue, tend to involve a wider range of governmental regulatory agencies at the local, state, and federal level than incidents involving a biological agent. This is because many different agencies have regulatory authority for different media. A terrorist attack on a train with a tank full of pesticide might involve water, soil, wildlife, and air, with each affected media having its own regulatory agencies at local, state, and federal levels. The potential for conflicting risk communication (RC) is greater when the number of responsible agencies increases.

Although any worker can be impacted during a terrorist event, first responders, healthcare workers, and construction workers are most at risk of illness and injury during response and recovery efforts. Worker health and safety is a critical consideration during emergency response but one that may be overlooked in the initial crisis and early recovery phases.2 All these complexities imply the need for unique RC strategies in the pre-event, crisis, and recovery phases of events involving chemical contamination. A Council of State and Territorial Epidemiologists (CSTE) report in April 2004 found 40.9 percent of
respondents to an assessment on state and territorial public health preparedness reporting “none” or “minimal planning” for RC pertaining to chemical and radiological terrorism. The report points out that, in the crisis and recovery phases, public health agencies would provide RC for labor, management, and community stakeholders, and facilitate development of a plan for decontamination. Public health agencies would also identify and maintain communication with community gatekeepers and opinion leaders through whom risk messages may flow in a terrorist event.

State and federal health agencies recognize that the nation’s terrorism preparedness and response activities have focused almost entirely on biological terrorism in recent years. In early 2002, health departments responded by coming together to form the Interstate Chemical Terrorism (ICT) workgroup. The ICT workgroup is currently composed of state, local, and federal health agency and response personnel representing 50 states, federal agencies, and other national health and nonprofit organizations. The goal of the ICT workgroup is the timely sharing of knowledge, materials, and resources on chemical terrorism as well as emergency preparedness/response between states and agencies. Sharing of information is accomplished via monthly teleconferences and the CDC’s web-based secure information system for public health professionals (known as the Epidemic Information Exchange or “Epi-X”). Monthly teleconferences coordinated by the ICT feature guest speakers presenting and leading discussions on topics and issues relevant to chemical terrorism preparedness.

State, local, and federal agencies also recognize that there is an immediate need to develop pre-event information and materials on a wide range of chemicals to ensure responding agencies are well prepared. The ICT workgroup’s idea to bring a multidisciplinary group together to work on RC issues led to the workshop, “Risk Communication Needs in a Chemical Event,” held in Atlanta, Georgia, February 3-4, 2004. The workshop consisted of panel presentations on audience-related (general public and press, medical providers, and local public health), occupational health, and inter-agency communication needs, followed by concurrent breakout sessions focusing on fact sheet templates and core competencies and benchmarks for the categories mentioned above. The primary goals of the workshop were: 1) to develop templates for chemical fact sheets destined for the general public and press, medical providers, public health officials, first responders, and impacted workers; and 2) to develop a list of core competencies and benchmarks. The latter are intended to assist agencies in determining if they are competent in the communication skills and resources needed to prepare for, respond to, and recover from a chemical event. Agencies may also find these products useful for subsequent efforts to formulate a model RC plan at the local or state level. Fact sheet templates and core competencies and benchmarks were drafted in preparation for this workshop.

GENERAL PUBLIC AND PRESS RISK COMMUNICATION

University of Oklahoma (UOK) researchers presented their preliminary research findings on RC needs for the general public. They found the following to be key aspects of crisis communication in a chemical agent release scenario: providing information in a consistent voice, admitting it may change, and acknowledging that such uncertainty may be frightening. UOK researchers found a desire by the public to know more about the status of any event, how to seek shelter and to take other protective action, and how to recognize symptoms of chemical exposure. Respondents in the UOK study, representing the general public, expressed concern for how to contact family members and receive constantly updated information, and shared a fatalistic belief that a chemical attack would not be survivable. Respondents also provided specific feedback regarding the form and content of messages: messages should be simple and fact-based, messages should provide action steps as well as what not to do, and messages should be provided in multiple languages. Certain populations, particularly ethnic minorities and rural people, did not trust the federal government to fully disclose, or adequately translate, relevant information. They expressed a desire that messages be communicated by a person or persons with both recognized content expertise and community trust.

Another key point, noted primarily by UOK researchers, is that communication is multidirectional.
Table 1. Model core competencies and benchmark activities

<table>
<thead>
<tr>
<th>Preparatory Phase Communication Plan explaining what is communicated to whom and by what means:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core competency</strong></td>
</tr>
<tr>
<td>1. For various modes of delivery, the agency will establish</td>
</tr>
<tr>
<td>relationships with likely partners in the crisis and recovery</td>
</tr>
<tr>
<td>phase. Agency partners will clarify their roles with regard</td>
</tr>
<tr>
<td>to risk communication. Agency partners will work with each</td>
</tr>
<tr>
<td>other and with relevant opinion leaders/gate keepers in the</td>
</tr>
<tr>
<td>community.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2. Scientific staff of agencies will be able to disseminate</td>
</tr>
<tr>
<td>information and prepare fact sheets on chemical agents</td>
</tr>
<tr>
<td>according to an agreed upon template in a timely fashion.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>3. Agencies will give priority to scenarios that also are</td>
</tr>
<tr>
<td>subject to accidental disasters.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>4. Agency scientists will have established access to ‘surge</td>
</tr>
<tr>
<td>capacity ‘assistance from others with regard to acquiring</td>
</tr>
<tr>
<td>and summarizing information.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>5. Public information officers (PIOs) will have access to</td>
</tr>
<tr>
<td>‘surge capacity’ assistance from other agency’s PIOs with</td>
</tr>
<tr>
<td>regard to their functions.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>6. Agency staff will be able to respond 24/7 to support the</td>
</tr>
<tr>
<td>state’s crisis response if necessary.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>7. Agencies will know how the public health function fits</td>
</tr>
<tr>
<td>into the ‘Incident Command’ Structure (ICS), what assets</td>
</tr>
<tr>
<td>they have to contribute, and how to communicate within the</td>
</tr>
<tr>
<td>chain of command.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>8. Agencies will know how to communicate with stakeholders,</td>
</tr>
<tr>
<td>including community leaders, the news media, and the Health</td>
</tr>
<tr>
<td>Alert Network (HAN), during the crisis and recovery phases.</td>
</tr>
<tr>
<td>9. Agency staff will cooperate with others to minimize the</td>
</tr>
<tr>
<td>prevalence of anxiety and exacerbation of existing mental</td>
</tr>
<tr>
<td>health problems.</td>
</tr>
<tr>
<td>10. With regard to the crisis and response phases, PIOs and</td>
</tr>
<tr>
<td>scientific and community spokespersons will be familiar with</td>
</tr>
<tr>
<td>risk communication concepts and techniques as they apply to</td>
</tr>
<tr>
<td>oral, written, and visual communication.</td>
</tr>
</tbody>
</table>

*Journal of Emergency Management*

Vol. 4, No. 2, March/April 2006
### Table 1. Model core competencies and benchmark activities (continued)

<p>| Preparatory Phase Communication Plan explaining what is communicated to whom and by what means: |</p>
<table>
<thead>
<tr>
<th>Core competency</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Agencies will anticipate the need to monitor and respond to rumors.</td>
<td>11. Have and practice a staffing plan to monitor media reports of rumors and a protocol for responding to them.</td>
</tr>
<tr>
<td>12. PIOs, agency leadership, and scientists will be able to convert technical fact sheets into press releases and radio spots in a timely fashion.</td>
<td>12. Have a protocol describing how the PIOs, department/agency leadership, and scientists summarize toxicological information and develop public guidance to expedite review and approval.</td>
</tr>
<tr>
<td>13. Scientific staff will use agreed-upon reference materials for summarizing information.</td>
<td>13. Have access to the agreed upon reference materials and be able to describe their appropriate use. Update reference materials regularly.</td>
</tr>
<tr>
<td>14. Agencies will have immediate electronic and nonelectronic access to risk communication facts for relevant audiences. Agencies will ensure that public communications will include information on appropriate internet access to risk bulletins.</td>
<td>14. Prepare secure web-based fact sheets and streaming audio presentations that can be downloaded or faxed for chemicals/agents of concern. Internet access information to risk bulletins is readily available in all forms of media.</td>
</tr>
<tr>
<td>15. For each mode of delivery, the department/agency should know the relevant community opinion leaders/gatekeepers on whom they can rely to help propagate risk communication.</td>
<td>15. For each mode of delivery, list the likely type of opinion leaders/gatekeepers on whom one can rely to help propagate risk communication and how to contact them (e.g., management, union, school principals, community leaders, radio, TV and internet providers of news).</td>
</tr>
<tr>
<td>16. The department/agency will communicate with non-English speakers in the community.</td>
<td>16. List the languages (including sign language) in use in the jurisdiction and the contact numbers for those able to translate verbal, written and visual messages into those languages. Establish “As-Needed” contracts with these resources.</td>
</tr>
<tr>
<td>17. Agencies will provide guidance on worker health and safety on an ongoing basis. First responders, first receivers, contractors, skilled support personnel, and volunteers in work settings most likely to be directly or indirectly impacted are a priority for receiving guidance in a practice-based timely fashion. This approach anticipates that risk communication for workers assigned duties within controlled access hazard zones at a chemical event will not only need information about a chemical agent but other essential safety and health information to make informed decisions about their own safety and well-being.</td>
<td>17. A. Risk communication needs for all workers will be determined and are consistent with OSHA hazard assessment and worker training requirements. B. Risk communication protocols and templates are used to transfer essential information to all workers in a uniform, timely fashion. C. Actively recruit/involve the regulatory agency responsible for occupational safety and health for your locale, as a technical assistance and resource asset for risk communication. D. Roles and responsibilities for worker health and safety within the ICS are defined. E. MOUs are implemented to facilitate successful risk communication across all aspects of a chemical event (pre-event, crisis, and post-event). F. Standard operating procedures will be developed with personnel trained to respond to emergency events and to worker health concerns.</td>
</tr>
<tr>
<td>18. Agencies responsible for worker health and safety will target early assistance to organizations most likely to be affected by chemical terrorism or chemical disasters.</td>
<td>18. Organizations and sites identified as potential vulnerable worksites, such as airports, subway systems, major tourist attractions, chemical manufacturing and transportation firms, hospitals, etc., have established risk communication plans in conjunction with emergency response plans. Responsible agencies will have MOUs with organizations (labor and management) about risk communication in the crisis and recovery phases.</td>
</tr>
</tbody>
</table>
and cross-cultural, not a one-way transmission of objective facts. The key to such communication is knowledge of a community, its information gatekeepers, and its ingrained and evolving cultural beliefs about both the topic at hand and the government and nongovernment agencies that are leading any emergency response.

State health department public information officers (PIO), federal participants, and nongovernment organization representatives at the workshop all emphasized two additional keys to successful crisis communication planning. They felt that agencies must 1) have a tested communication plan that identifies with whom they will communicate, internally and externally, during a terrorist event, and that ensures regular updating of information; and 2) have a team of staff trained in crisis and emergency RC.

A communication expert panel noted a number of additional preparation-related concerns. These included the relatively low importance placed on communicator training for terrorism events and wide variance in professional experience and background among communicators, minimal communication staffing at most state health departments, challenges in communicating with special populations, and the need for guidance and training in evaluating communication efforts. A crucial strategy noted by state communication officers is the establishment of a Joint Information Center (JIC), which is a central coordination point for information processing and release, accomplished through the Joint Information System (JIS). The strength of a JIC is that it creates a unified voice that can be highly responsive to both the public and the news media audiences. The JIC and JIS are required components of the National Incident Management System (NIMS) and National Response Plan (NRP), which was developed by the Department of Homeland Security (DHS) to provide a framework for interagency coordination during domestic incidents (http://www.fema.gov/nims/). The Incident Command System (ICS) has been incorporated and established into the NIMS as the standardized

<table>
<thead>
<tr>
<th>Table 1. Model core competencies and benchmark activities (continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crisis phase</strong></td>
</tr>
<tr>
<td><strong>Core competency</strong></td>
</tr>
<tr>
<td>19. Agencies will be able to convey accurate and clear information to the groups that need them in a practice-based, timely fashion.</td>
</tr>
<tr>
<td><strong>Benchmark</strong></td>
</tr>
<tr>
<td>19. In actual events, an assessment shows that risk communication is/has been accurate, timely, and understandable.</td>
</tr>
<tr>
<td>20. Agencies will be able to provide occupational health guidance to first responders, first receivers, contractors, and volunteers in a practice-based timely fashion.</td>
</tr>
<tr>
<td>20. Agencies have MOUs on who is responsible for disseminating and maintaining key occupational health information, i.e., chemical fact sheets, personal protective equipment, decontamination, etc.). This information is readily available (command centers, work sites, on the web, and for e-mailing and faxing) when needed.</td>
</tr>
<tr>
<td><strong>Recovery phase (particularly in situations in which there is residual contamination to clean up)</strong></td>
</tr>
<tr>
<td><strong>Core competency</strong></td>
</tr>
<tr>
<td>21. Agencies involved with prolonged clean up or follow-up epidemiological studies will communicate in a timely, intelligible, practice-based, and accurate way.</td>
</tr>
<tr>
<td>21. A survey or other methods for contacting stakeholders (including vulnerable subgroups) will suggest that the developed protocol is being followed and that stakeholders are satisfied.</td>
</tr>
<tr>
<td>22. Agencies will be able to provide practice-based guidance on worker health and safety on an ongoing basis.</td>
</tr>
<tr>
<td>22. First responders, volunteers, contractors, and other workers involved in the recovery phase will be shown to have avoided unnecessary risk.</td>
</tr>
</tbody>
</table>

Note: “Agency” refers to any agency or department with a responsibility for risk communication in a chemical terrorism event.
organizational structure for the management of all incidents.

PHYSICIAN AND HOSPITAL INFORMATION NEEDS DURING A HAZARDOUS MATERIALS EVENT

Any suspected release of a potentially hazardous material in a community sets many processes in motion. Workshop participants discussed how hospitals and medical staff need accurate and timely information to best meet their medical care roles. This includes information on the substance(s), exposure, victims, coordinating information center, on-scene point of contact, and spokesperson.

The exact name of the substance(s) allows the medical community to obtain the best available information about the substance’s potential toxic effects and their appropriate treatment. Workshop participants noted that it is best to provide both the chemical name and other methods of identifying each substance such as the Chemical Abstracts Service (CAS) registry number, because similar-sounding substances may have very different properties. The nature and estimated scope of a release are important in determining exposure. It is also important for medical staff to know whether or not additional release is anticipated.

Medical providers need a working estimate of the number of potential victims, the likely extent of their contamination, and severity of their injuries (if any), as well as an estimated time for arrival at an emergency treatment facility. This allows the facility to anticipate staffing needs, to muster additional resources, and to move into a disaster response mode if appropriate. Decontamination facilities may have to be set up for ambulatory and self-transporting patients who account for 80 percent or more of patients in most disasters.\textsuperscript{4,5} Even at hospitals where these facilities are utilized frequently, preparing the facility for use and getting staff dressed in personal protective equipment can require more than 20 minutes.

Frequently, more than one hospital will receive patients from a disaster. Therefore, it is desirable to have one point of coordination so that information obtained at one hospital can be shared with others involved in treatment. A regional Poison Control Center (PCC) can serve this information-coordinating role, if requested to do so, or when designated in local or regional response plans. A point of contact with an official on scene, centralized at or by the coordinating center, is essential to minimize unnecessary duplication of work for the on-scene staff. The hospital should direct all media inquiries through the designated spokesperson for the event, who may wish to involve others in the handling of inquiries, but should coordinate the flow of information to the public. Centralization reduces the risk of releasing conflicting or contradictory information.

The information needs of each hospital must be addressed in an ongoing manner. As new data become available from the scene, or as previous data are corrected or refined, revised information should be forwarded promptly to the coordinating information center. This allows new information to be shared with all involved hospitals as well as other nearby facilities which may need to become involved.

LOCAL PUBLIC HEALTH AGENCY NEEDS

Workshop participants discussed challenges that a local public health agency (LPHA) may face in achieving competencies for RC relative to chemical events. Establishing a comprehensive list of competencies that measure readiness for chemical events for LPHAs can be complicated by the basic differences among public health infrastructures. “Top-down” systems act as local extensions of an overall state public health agency while “bottom-up” systems with a network of single-county or multi-county health departments do not necessarily “report up the chain of command” to the state public health agency. These differences can pose unique challenges in standardizing training programs and measuring overall readiness. LPHAs can exhibit wide variability in their individual staff and financial resources as well as their capabilities in dealing with chemical releases (including the necessary equipment, staff, and training).

Workshop participants agreed that a more formal list of roles and responsibilities for LPHAs during a chemical event is needed for both “everyday” RC and “crisis and emergency” RC. However, assigning roles to LPHAs in those jurisdictions where resources are lacking, even when funds are transmitted to local health
agencies, can result in what is effectively an unfunded mandate for LPHAs in “bottom-up” systems. Local input and collaboration is crucial in the development of regional and statewide RC strategies. Input from LPHAs can help state agencies achieve competency. Finally, the inclusion of LPHAs in the planning process will ensure pooling (and not duplication) of efforts and resources.

Another general theme that emerged from the LPHA workshop session was the need for continuing old partnerships as well as establishing new relationships. Beyond law enforcement and emergency response organizations, the Federal Bureau of Investigation (FBI) has established a network of weapons of mass destruction (WMD) coordinators throughout the country. State public health preparedness partners should be aware of their respective FBI WMD coordinator. County emergency management coordinators (EMC) can be a wealth of information when it comes to managing, staffing, and implementing emergency response activities. Most counties also have a local emergency planning committee (LEPC) as mandated by the Emergency Planning and Community Right-to-Know Act. The Community Right-to-Know provisions help increase the public’s knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. LEPCs are required to develop an emergency response plan, review it at least annually, and provide information to citizens about any chemicals in the community.

Other potential partners discussed include state occupational safety and health organizations, groups that represent the chemical industry (such as the American Chemistry Council), and the chemical transportation industry. All of these groups have unique knowledge and skills that can contribute to a more robust sense of readiness. PCCs serve every state and rapidly respond to a high volume of calls involving chemical exposures. The idea of using PCCs as “rumor control” agencies was briefly discussed. Pre-scripted messages regarding a particular event could be developed jointly with PCCs, enabling them to spread the correct information to those who call in, prevent unnecessary anxiety, and possibly save money that would be needlessly spent on clinical testing. Ongoing relationships with all of these entities can offer a dynamic partnership in which knowledge is shared via a “lessons learned” process following exercises and real events.

**OCCUPATIONAL HEALTH**

The health and safety of first responders and first receivers is a critical component for emergency management and response planning. The focus of emergency response and site mitigation is direct intervention that involves emergency responders, skilled support (environmental cleanup contractors, construction workers, and heavy equipment operators), public and environmental health specialists, and volunteers. Other affected occupational workers may include those healthcare workers who decontaminate, transport, or treat contaminated patients; those who receive patients in hospital emergency rooms or provide housekeeping services; and personnel in work settings having a chemical release.

The workshop panel on occupational health, with representatives from state and federal government and labor, identified and discussed occupational RC needs in the pre-event, crisis and recovery phases of a chemical event. RC must address responder health and safety issues. Emergency responders need to be protected, but, unfortunately, appropriate protection is usually determined after worker exposure has occurred. Emergency worker training programs need to be improved so that emergency responders to chemical incidents know how to protect themselves, know what equipment is required, and what additional training and resources they may need.

Firefighters need uniform firefighting standards, improved methods of information delivery, and increased training at the first-responder operations level in chemical events. Increased training for healthcare workers is needed because hospital staff can be first responders and not just first receivers. Hospital workers need more education and training on personal protective equipment as well as clarification regarding privacy issues, such as what patient information does and does not need to be shared. Improved pre-event RC for chemical workers at manufacturing plants or transportation firms is also needed.
Site safety management guidance should be consistent with Occupational Safety and Health Administration (OSHA) hazard assessment and worker training requirements. The massive response to the events of 9/11 underscored the need for improved coordination of the agencies involved in site safety management at major incidents. As a result of the difficulties encountered in the safety management for first responders at the World Trade Center and the Pentagon incidents, the National Institute for Occupational Safety and Health (NIOSH) has recommended building an integrated safety function into the ICS.\(^2\)

**INTERAGENCY DISCUSSION**

Interagency communication is never more crucial than in the function of the ICS, which was developed for traditional first responders, such as firefighters. The events of 9/11 and the anthrax incidents extended the first response paradigm further into critical areas of law enforcement and public health.

Public health agencies must have an excellent understanding of the NIMS ICS. Panelists noted that the NIMS ICS does not specifically identify the role of public health in the ICS. Since response functions are dynamic and change over time, public health needs to be intimately familiar with ICS and be prepared to fill in at multiple ICS duty functions. Training and exercises were also discussed with respect to integrating the public health function into the ICS. Workshop participants suggested the development of exercise scenarios with broad public health implications so that partner agencies could have a better understanding of what public health has to offer.

For agencies which are not typically first responders, including public health agencies, the issue of operating around the clock is a significant logistical concern. While the CDC has an Emergency Operations Center that functions nonstop to manage emergency response nationwide, state public health agencies typically do not have this capacity. This is likely to require interagency cooperation, particularly in key areas such as public information and specialized scientific information. Memoranda of understanding may be required.

Agreement upon the interpretation of scientific information is a frequent stumbling block both within and between agencies. Scientific databases may post conflicting information on some points. This can further hamper timely and accurate sharing of information with the public and others. Agencies must agree upon core reference materials and methods for expediting the release of health-related information. There are multiple federal and nonfederal databases in existence. Workshop participants recommended a unified database of scientific information. Panelists discussed common databases in use by first responders, such as the NIOSH pocket guide (http://www.cdc.gov/niosh/npg) and CAMEO (http://www.epa.gov/ceppo/cameo/what.htm). Participants also identified the National Response Team, the National Guard WMD Civil Support Teams, and Regional Response Teams as well-established interagency resources for technical support during hazardous substances responses.

A key area of communication involves reducing fear and anxiety within affected communities. One panelist noted that, “Communication is actually the strongest ingredient in counter-terrorism in denying the terrorists their objectives. If you effectively communicate and dispel panic, you have denied the terrorists their goal.” This specialized area of communication necessitates preplanning among agencies, particularly coordinating with mental health agencies. Panelists noted the usefulness of local mental health planning groups and tabletop exercises. Further information is available from the National Mental Health Association at http://www.nmha.org/blueprint/index.cfm.

**WORKSHOP PRODUCTS**

**Fact sheets**

Fact sheet templates for public and press, emergency medical providers, local public health agencies, and first responders were developed, along with a matrix of high-quality information sources to consult when compiling fact sheets for chemical events. Fact sheet and information templates were developed so that they can be completed and released rapidly to the public and news media, identifying minimum necessary
elements while still being adaptable to local needs. Workshop participants agreed that determining literacy levels and the use of graphics would best be done by local health departments, but noted that common sources of scientific information for completing the templates need to be identified.

Workshop participants adopted one chemical fact sheet template for responders (emergency responders, first receivers, and other affected workers) operating under the ICS for the duration of an event. As with other community members, workers in an affected worksite would want to know what happened, how they have been affected, how to obtain access to medical evaluation and treatment options, how to protect themselves and their families, and when it is safe to return to work. Workshop participants identified several modes of distribution for fact sheets including electronic mail, fax blast, compact disc, and the internet via agency web sites and/or Health Alert Network systems.

Core competencies and benchmarks

The model core competencies (CCs) and benchmarks developed in this workshop on RC needs in a chemical event build on general public health performance standards recommended by the CDC6,7 and academic findings on public health competencies for emergency response.8-10 “User guidelines” for the core competencies/benchmarks and for assessment tools used to measure baseline knowledge, skills, and abilities and to gauge increased competency as a result of training and response to actual events remain to be developed.

Twenty-two CCs and benchmarks were developed to assist agencies in determining if they have a complete RC plan for the preparatory, crisis, and recovery phases of a chemical event (Table 1). Several CCs (CC 10, 11, 12, 14, 19) were identified as being the most germane to RC staff, medical providers, and LPHAs, including: 1) achieving a basic level of training in RC concepts, 2) being able and equipped to respond effectively to rumors in a crisis situation, 3) being able to convert complex data rapidly into information for a variety of audiences, 4) providing ready access to information for the public and media, and 5) being able to convey accurate and clear information to various audiences in a practice-based, timely fashion during all phases of response. CCs 15 and 16 address improvements in cross-cultural communication, as discussed by the UOK researchers, and the need to evaluate crisis communication efforts.

CCs 17, 18, 20, and 22 address the protection of responders and describe a continuity of actions in pre-event, initial response (crisis phase), and recovery from an incident. Pre-event CCs 17 and 18 address the safety and health guidance for all individuals directly or indirectly impacted in an event, as well as early assistance to organizations most likely to be affected by a chemical event to ensure appropriate RC and emergency response plans are established. The importance of providing guidance on worker health and safety during crisis and recovery phases is reflected in CCs 20 and 22.

Communication with affected communities and other stakeholders is a critical public health function in a crisis. Many of the workshop CCs specifically address this need (CC 1, 8, 10, 21). Panelists noted that relying solely on the media to get public health messages out is insufficient. Stakeholder advisory groups, newsletters, and other methods may be needed, particularly in a long-term recovery phase. Partner agencies must also understand each agency’s role and mandate in the overall RC process. Panelists noted that one of the key elements in RC exercises should be the public communications plan.

The interagency panel spent some time discussing CC 3, which suggests that agencies give priority to identifying and drilling for local chemical release scenarios that are also likely to be subject to accidental disasters. This CC recommends enhanced planning and preparation for local emergency response in general and was written with the understanding that terrorists may choose to use industrial chemicals in situ rather than attempt to clandestinely import a chemical agent into the target area. However, panelists noted that local industrial risks might be fundamentally different from terrorist risks. For example, industrial chemical releases usually involve an “exterior” release, while chemical terrorism is likely to involve an “interior” release, such as the sarin release in the Tokyo subway. Panelists recommended a geographical priority analysis. A first tier effort would include
discussions with LEPCs to identify their priority concerns and analysis of the US EPA Risk Management Program (RMP) database for industrial-use chemicals in the geographical area of concern (agencies can obtain the RMP database upon written request to the US EPA). Panelists agreed that an all-hazards approach or a “likely hazards” approach would both be reasonable.

CONCLUSION

CDC, in partnership with the Association of Schools of Public Health, is working intensively to identify and develop the necessary content of public health messages in anticipation of key terrorist scenarios involving chemical, biological, or radiological material.11-15 Key findings from this and other work point to the absolute necessity for public health agencies to be pro-active with communities and stakeholders in formulating education and communication strategies.16-18 For example, public focus group findings indicate that “shelter-in-place” is a confusing concept for many people, and, furthermore, many people may choose to disregard shelter-in-place instructions in favor of gathering their loved ones to flee the location.11,17 This suggests a fruitful role for public health agencies to work with communities and stakeholders to provide pre-event education around likely emergency response activities.

The public health lessons from 9/11 and the anthrax incidents include the need for public health agencies to keep abreast of the nearly instantaneous reporting by news media and how the media shapes the information they release.16 Agencies must also streamline their message development and clearance processes to keep abreast of rapidly changing events and demand for information. Communication response teams need to be more integrated with emergency response teams, even so far as accompanying field science investigation teams.16 This may do much to allay public rumors and fears.

The long-term recovery process is the arena where public health comes to the fore, and RC is a central consideration. Public health issues will almost certainly include concerns following a WMD terrorist attack, such as chronic disease (especially cancer), reproductive concerns (especially pregnancies), and psychological effects.18 Community and stakeholder involvement should be sought even in the most sensitive discussions to promote public confidence and support long-term social recovery.

Strictly speaking, there is no defined place for a “public health function” within the NIMS ICS. Historically, it has been assumed that an agency representative will coordinate with the liaison officer while individual public health functions, such as occupational health and community relations and education, will coordinate respectively with the planning section/safety officer and public information officer. However, public health has many functions that may be useful in a large or atypical incident, such as epidemiological surveillance. Some examples of incidents where public health has a major role to play in emergency response include: 1) chemical, biological, or other agents sent through the mail; 2) contamination of public drinking water systems; or 3) contamination of food or consumer products. Not only does public health need to be familiar with ICS, but ICS also needs to be familiar with public health. Cross-cultural training of both groups would be beneficial.

ACKNOWLEDGMENTS


"Risk Communication Needs in a Chemical Event," held in Atlanta, GA, February 3-4, 2004 was funded by the CDC. The opinions expressed in this article are the views of the authors and do not necessarily reflect the official position of the agencies with which the authors are affiliated.


Sharon L. Lee, PhD, California Department of Health Services, Environmental Health Investigations Branch, Richmond, California.

Scott A. Damon, MAIA, CPH, Centers for Disease Control and Prevention (CDC), National Center for Environmental Health, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia.

Robert Geller, MD, Georgia Poison Control Center, Hughes Spalding Children’s Hospital, Atlanta, Georgia.

Erik R. Janus, MS, Michigan Department of Community Health, Bureau of Epidemiology, Lansing, Michigan.

Chris Ottoson, CIH, Oregon OSHA, Enforcement Policy Section, Salem, Oregon.

Marilyn J. Scott, CSP, ARM, Portland, Oregon.
REFERENCES

To learn more about Graham Medical’s innovative disaster relief supplies or to request samples, please call our Customer Care center at 800-558-6765 or visit www.comfort-one.net

See ComfortOne™ and Graham’s full line of disposable supplies at GovSec 2006, booth #2644.
ABSTRACT
Disasters are becoming more of an integral aspect of life in the United States and in other countries. Public health nurses are in the forefront of providing health services to people affected by disasters. Thus, it is essential that all public health nurses have access to information that will assist them in disaster situations. The purpose of this paper is to illustrate how the Framework for Public Health Nurses: Interventions Model can be utilized for planning and responding to disasters. The interventions in the model are directly applicable to disaster situations and, in addition, raise questions on issues that need to be addressed by local, state, and federal public health officials.

Key words: Public health nurses, disaster situations, disaster nursing

INTRODUCTION
Public health nursing has been well defined as the practice of protecting the health of populations utilizing knowledge from a variety of disciplines such as nursing, social, and public health sciences. On the other hand, disaster nursing is an emerging specialty in nursing and only a few definitions exist. The Japan Society of Disaster Nursing defines disaster nursing as “the systematic and flexible utilization of knowledge and skills specific to disaster related nursing, and the promotion of a wide range of activities to minimize the health hazards and life-threatening damage caused by disasters in collaboration with other specialized fields.” Jennings-Sanders describes disaster nursing as a discipline in which nurses identify resources and risks in an environment in order to plan, implement, and evaluate interventions designed to effectively manage disasters.

THE FRAMEWORK FOR PUBLIC HEALTH NURSES: INTERVENTIONS MODEL
The Framework for Public Health Nurses: Interventions Model was developed by the Section of Public Health Nursing at the Minnesota Department of Health. The model focuses on analyzing health status...
within populations, establishing priorities, and planning, implementing, and evaluating public health programs.\textsuperscript{1} As Figure 1 indicates, the model has three distinct components: population-based practice, three levels of public health practice, and 17 public health interventions. Interventions are population based if they focus on entire populations possessing similar characteristics.\textsuperscript{1} The three levels of public health practice are: community, systems, and individual/family. Community-focused practice pertains to community practices that are directed toward an entire population within a community.\textsuperscript{1} Systems-focused practice examines policies and power structure systems that impact health.\textsuperscript{1} Individual-focused practice focuses on knowledge, attitudes, and beliefs about health and is directed toward individuals or families.\textsuperscript{1} The 17 public health interventions include: surveillance, disease and health event investigation, outreach, screening, referral and follow-up, case management, delegated functions, health teaching, counseling, consultation, collaboration, coalition building, community organizing, advocacy, social marketing, and policy development and enforcement.\textsuperscript{1}

The authors of the model state the framework can be specifically used for program planning, describing public health nursing’s contribution, explaining public health nursing to other disciplines, building intervention skills of public health nurses, and determining what changes may be evaluated as a result of an intervention.\textsuperscript{1} To further broaden its applicability, the framework can be used by public health nurses to explore and evaluate interventions used to prepare and respond to disasters.

**INTERVENTIONS: DISASTER PREPAREDNESS AND RESPONSE**

The following examples of selected interventions will aid public health nurses in disaster planning and response. These interventions include: surveillance, disease and health event investigation, outreach, screening, delegated functions, coalition building, and social marketing.

**Surveillance**

Surveillance includes activities that describe, monitor, and analyze health events for the purpose of planning, implementing, and evaluating public health interventions.\textsuperscript{1} For example, public health nurses should be educated about the epidemiological clues that could signal a covert bioterrorism attack. These clues may include: unusual illness in a population, failure of a common disease to respond to usual therapy, a disease with an unusual therapy, a disease with an unusual geographic or seasonal distribution, unusual or antiquated strain of an agent, and illness among people in proximity to shared ventilation systems.\textsuperscript{5} For a more in-depth perspective on surveillance, a Health Surveillance and Epidemiological Investigation Checklist is available for public health nurses for use as a surveillance and epidemiological planning tool.\textsuperscript{6}

**Disease and health event investigation**

Disease and health event investigation include activities that examine the threats to the health of populations, sources of the threat, cases at risk, and control measures.\textsuperscript{1} In a biological terrorism situation, it is critical for public health nurses to recognize Category A list agents, which have the greatest potential for adverse public health impact that can result in mass casualties. Category A agents include small pox, plague, botulism, ebola, and tularemia. Nurses also need to be prepared for chemical and radiation emergencies. In chemical emergencies, nurses should be aware of the following agents: benzene, chlorine, ricin, sulfur mustard, and sarin. In radiation emergencies, nurses should be knowledgeable about dirty bombs and nuclear blasts. An ongoing educational effort to keep public health nurses abreast of all these various threats is essential as well as regular practice disaster drills and tabletop exercises.

**Screening**

Screening involves investigating and identifying individuals with unrecognized health risk factors.\textsuperscript{1} During and after disaster situations, many people are in mental distress. Thus, it is very important that public health nurses identify those individuals that may need mental health services. The Mental Survey Instrument is one such screening tool that can provide health departments with core data useful for investigating the mental health symptoms associated with a disaster.\textsuperscript{7}

Of equal importance, performing a self-assessment prior to a disaster assignment is very important for public health nurses. The Self-Assessment: Prior to
Disaster Assignment Screening Tool can be utilized by any staff member who has been asked to respond to a disaster. The tool assesses health concerns, employment and finances, and personal and family life, and alerts the individual to any personal problems that might hinder them or others working at a disaster site.

Delegated functions

Delegated functions are direct care tasks a registered nurse implements under the authority of a healthcare practitioner or a direct care task a registered nurse entrusts to other personnel. According to the National Council of State Boards of Nursing, there are five rights of delegation that provide a basis to facilitate decisions regarding delegation. They are: 1) right task (is this a task that can be delegated?); 2) right circumstance (appropriate setting, available resources, and other relevant factors considered?); 3) right person (is the right person delegating the right task to the right person?); 4) right direction/communication (is communication clear?); and 5) right supervision (is there appropriate monitoring, evaluation, and intervention?).

In normal circumstances, all of these five rights are considered and carefully addressed by public health nurses. In disaster situations, however, public health nurses may have a difficult time adhering to all five rights of delegation. For example, during a mass casualty event it would be impossible for a nurse to monitor all individuals delegated to administer medications via injections. One would be tempted to question the legal ramifications in a situation like this; should there be special provisions to protect public health nurses from liability in disaster work? Such questions should be at the forefront in the decision-making process regarding delegation by nurses in disaster scenarios.
Coalition building

Coalition building includes activities that develop alliances and linkages to address health problems. For example, planning for a disaster that would require isolation or quarantine measures would require the cooperation of local health departments, local healthcare providers, health facilities, and emergency management personnel. Everyone involved would need to make sure that isolation and quarantine measures are followed according to established policy.

Public health’s resources are limited so there must be significant assistance from community partners when a disaster strikes. This community assistance may be in the form of providing supplies, manpower, or space for shelters. More specifically, local pharmacies may agree to provide medications and supply stores may agree to provide emergency supplies. Establishing a volunteer pool of local nurses, physicians, and other healthcare professionals is essential for public health departments to address the shortages of manpower that usually occur during a disaster. Schools and universities can be ideal spots for setting up shelters while schools of nursing can provide support with nursing students and nursing faculty.

Social marketing

Social marketing involves activities that incorporate marketing principles to influence the knowledge, attitudes, and beliefs of a specific population of interest. Public health nurses must offer optimal care to the public by providing them with the most current information about a health event or disaster. Where and how to best disseminate information must be decided based upon the disaster situation or potential disaster situation. Logical sites to disseminate critical information can include town meetings, organizational meetings, and workplace environments. The most important thing to remember here is that all messages to the public must be clear and consistent with what all other officials are saying. Also, establishing a system where the public can communicate their concerns and needs is very important, a process that can easily help reduce fear and, potentially, loss of life.

CONCLUSION

Public health nurses will be able to provide optimal care during disaster situations if they are trained and educated appropriately. The Interventions Model can be utilized by public health nurses for planning and responding to disasters. Examples of selected interventions illustrate the many resources available to help prepare nurses for disasters while serving to open up a dialogue on critical issues.

More research and dissemination of appropriate information regarding how public health nurses can best manage and respond to disasters will help greatly to develop this emerging specialty of disaster nursing.

ACKNOWLEDGMENTS

This paper was presented to public health nurses throughout the state of Ohio from June to July of 2005. It was sponsored by the Ohio Nurses Association.

Andrea Jennings-Sanders, Dr.PH, RN, Associate Professor, Cleveland State University, School of Nursing, Cleveland, Ohio.

REFERENCES
ABSTRACT

This study examined 70 after action reports (AARs) from full-scale chemical weapons exercises held in large cities across the United States by the Office of Domestic Preparedness’ Chemical Weapons Improved Response Program (CWIRP). These exercises were held to determine that, if “hot, warm, and cold” zones were established, did victims stay in the hot zone until they could be decontaminated, and did responders observe the hot-warm-cold zone demarcations? Only 35 percent of reports indicated that responders utilized the zone concept, less than 20 percent of reports indicated that victims were compliant with the zone model, and less than 15 percent of reports indicated that responders properly observed the zones that were created. Results indicate that use of the zone model for a mass terrorism chemical weapons attack (MTCWA) is not well utilized, and that responders operating in the cold zone need personal protective equipment.

Key words: chemical weapons, responders, zone model, personal protective equipment

INTRODUCTION

Around the world, response to mass terrorism chemical weapons attacks has been defined using the traditional model of nonweaponized hazardous materials response. This model includes creation of a relatively narrow contamination zone surrounded by a ring or oval-shaped contamination reduction zone, with all areas outside of that ring being considered “safe.” It is in that safe area where incident command, donning and doffing of personal protective equipment, treatment, and transport functions are located. Furthermore, the traditional model is based on an isolated chemical spill with a limited number of victims, treatment provided to victims after decontamination, a slow and deliberate process to contain the materials, and no acceptable risk of contamination to responders who are provided with the highest level of respiratory and skin protection. This traditional hazardous materials model, however, is not appropriate for a targeted mass terrorism chemical weapons attack (MTCWA).

A MTCWA is the purposeful use of chemicals designed to kill, using an efficient dispersal mechanism, in an environment designed to maximize casualties in the civilian population. In the United States, application of this traditional hazardous materials model has created a significant number of roadblocks to successfully saving the lives of those injured in a MTCWA because many axioms of the traditional hazardous materials model result in a significant number of preventable deaths. MTCWAs require responders to intervene within minutes to get victims away from the source, provide rapid, predecontamination pharmacological intervention for nerve agents and cyanide, and rapidly reduce victim’s contamination. Many of these roadblocks were partially addressed by rapid-entry-and-rescue models created by the US Army’s Soldier and Biological Chemical Command research in the late 1990s, although their field-tested research has not been widely adopted by responders. What has not been addressed, and what this paper will attempt to examine, is the concept of isolation of the scene and the use of a “zone” model that defines safe and contaminated areas in MTCWAs.

The traditional model of hazardous materials response involves identification of an event, isolating the area, and then demarcating the area into three zones: a hot zone (or exclusion zone, where contamination...
exists), a warm zone (or contamination-reduction zone, where victims and responders are decontaminated and transition to the cold zone), and the cold zone (or support zone, where no contamination exists, and victims are transported to medical care). In a typical hazardous materials event, the release of chemicals is either a transport or fixed facility event and usually involves no more than a handful of victims, and, as a result, it is easy to delineate the contaminated areas and easy to contain and decontaminate a limited number of victims. While the concept of zones is not controversial for typical hazardous materials events, during a MTCWA the model does not work for several reasons: 1) there are not enough responders to contain victims in an isolated area; 2) victims will not stay on the scene; 3) responders have difficulty rapidly identifying the types and amounts of chemicals used, which is key to determining the size of necessary zones; and 4) responders do a poor job of identifying and observing zones themselves. Using the 1995 Tokyo Sarin release as our best example of a MTCWA, there were five nearly-simultaneous releases of nerve agent Sarin on five different subway lines involving over 5,500 victims. Tokyo emergency services did not have the ability to keep people within an exclusion area, almost 90 percent of victims self-dispersed across Tokyo within one hour, responders had difficulty rapidly and accurately identifying Sarin as the agent, and there was no decontamination of victims at the scene.

If the Tokyo experience is typical, then we need to reconsider how the responders manage these types of events. The best proxy to determine general response to MTCWAs in the United States was the Chemical Weapons Full-Scale Exercise program, which was a series of large-scale functional exercises held in major cities across the United States as part of the Chemical Weapons Improved Response Program (CWIRP).

METHODS

In this study, we examined 70 after action reports (AARs) from the Office of Domestic Preparedness’ CWIRP effort that was held in cities across the United States as part of the US Domestic Preparedness Initiative required by the 1997 Nunn-Luger-Domenici legislation. Each AAR outlined results from a full-scale exercise testing the city and region’s response to a release of a chemical weapon and was written by an expert observer contracted by the Office of Domestic Preparedness. The exercises covered the first response, incident management, decontamination, secondary devices, and hospital care. The chemical released in the scenario varied but was most commonly a nerve or blister agent. Reports were analyzed to ascertain the answer to three specific questions: 1) were hot, warm, and cold zones established; 2) did victims stay in the hot zone until they could be decontaminated; and 3) did responders observe the hot-warm-cold zone demarcations? Because the reports did not follow a standardized format throughout the reporting time frame, data were not consistently reported.

RESULTS

The first question is whether responders established zones to demarcate the contaminated area. Once responders have arrived on scene, identifying zones is the second step in traditional hazardous materials response after recognition that a hazardous materials event exists. This needs to be accomplished quickly, both to contain contamination and because the initial scope of the event determines which resources will be immediately needed and where to place arriving responders in a safe area to stage rescue operations. Establishing zones is also, to some extent, based on chemical agent identification, since the edge of the hot zone is traditionally defined as the area where contamination levels drop to 0, and you can not measure what you have not yet identified. Without establishing zones, you can not limit the movement of potentially contaminated victims, can not create an area where decontamination will take place, and have no safe refuge where decontaminated victims and support personnel can be staged. When faced with a chemical weapon, multiple contaminated victims, and a chaotic scene, only 35 percent of the responders established clearly defined zones, 50 percent did not, and 15 percent were not reported.

The second question is whether, with zones established or not, the victims observed the zones. While
there is a convincing body of research that says that the public is both cooperative and clear-headed during a crisis, victims who know they have been exposed and are in a contaminated area will leave that area and seek rapid help at hospitals and other medical centers. From the individual standpoint, this is clearly logical, especially considering that, as in the Tokyo event, most cities do not have enough ambulances to respond to this type of event rapidly, do not have paramedics capable of providing medical care for victims who have not yet been decontaminated, and do not stock chemical antidotes in their ambulance. From the responder standpoint, however, these victims are spreading contamination and pose a threat both to themselves and to emergency services personnel. When faced with a chemical weapon, victims remained in a contained area in only 19 percent of the exercises, tried to leave in 61 percent of them, with 20 percent not reported (Figure 2).

The final question is whether the first responders themselves observed the established zones. During the rescue attempt, did first responders keep themselves safe and observe the zone system once a potential event was identified? This is a critical safety question, since having responders going from one zone to another potentially cross-contaminated both the responder and others in the area. Simple measures, such as posting a safety officer at the cold-warm and warm-hot zone borders would help minimize “zone hopping.” When faced with the chaos of a chemical weapons event, first responders observed the zone concept only 14 percent of the time, 50 percent did not observe the zone concept, and 36 percent were not reported (Figure 3).

**DISCUSSION**

In the CWIRP, less than 40 percent of the AARs noted that responders demarcated hot-warm-cold zones, an abysmal rate. This may be the result of the degree of confusion during these large-scale exercises where no single responder feels the authority over the whole event during the initial stages. Or it may be because victims have dispersed during the time from occurrence to responder arrival, making containment of victims impossible. Or it may be because responders evacuated victims from the scene to a staging area. Or it may be because initial responders are overwhelmed with caring for these victims and may not take the time to manage the whole event. Regardless of the reason, responders put themselves, victims, and later-arriving responders at significant risk by failing to “draw a line in the sand” and enforce some degree of discipline in defining where the hot zone is. The typical experience, both in Tokyo and in the CWIRP, was that responders who do arrive early are inundated with victims and frequently become contaminated themselves before they can identify the situation as a chemical weapon event. If it is not practical to enforce a zone concept, we need to abandon the concept before an event happens, before responders act under the assumption that there will be a line beyond which it is safe to operate.

In both controlled exercises and in real-life MTCWAs, victims did not elect to stay on the scene. In Tokyo, the percentage who self-evacuated was over 85 percent; in the CWIRP program, it was 81 percent. Victims will elect to leave the scene if they understand either that they need medical care, which is not being provided, or that there is a continued danger in staying. Even when responders immediately don protective gear and make contact with the victims,
there is almost never enough law enforcement personnel on the scene quick enough to secure an area before victims disperse. Containing 1,000 sick subway passengers leaving from four subway exits takes a massive number of law enforcement officers, in appropriate protective equipment, and on the scene within minutes. The reality is that by the time there are enough law enforcement personnel with appropriate personal protective equipment to secure a zone system, most ambulatory victims will be gone and most nonambulatory victims will probably be dead.

In a real MTCWA, as seen in the Tokyo attack, self-evacuation of victims precedes the arrival of responders by at least two to five minutes. In Tokyo (where there was no decontamination on the scene), 23 self-evacuated victims arrived at one neighborhood hospital before the first ambulance. The public will not wait for responders to arrive and set up zones and a decontamination area, all of which may take up to 15 minutes after arrival of responders. In the CWIRP, victims who were reasonably compliant volunteers had been briefed on what to expect. Even then, in more than half of the exercises, “victims,” as in Tokyo, explicitly did not stay put. In a real event, without clear direction or an early show of force, we can expect even less compliance with a zone system.

Finally, less than 15 percent of rescuers were noted to observe the zone concept when established. So, even under ideal circumstances, where zones had been established, responders who know better still did not keep themselves safe by limiting travel between the hot, warm, and cold zones. Once zones are identified, responders typically need to retreat from caring for the victims to containing a zone because most police and EMS agencies do not have protective equipment for work in a contaminated environment. To make matters worse, firefighters, who can safely enter a chemical weapon environment for a short time with their turnout gear and self-contained breathing apparatus with minor modification, frequently have policies that prohibit entry into an unknown contaminated environment without a higher level of chemical protection used only by specialized units.

In the exercises, responders explicitly violated the zone concept 50 percent of the time where compliance was reported. The real-world experience bears this out: in Tokyo, more than 10 percent of the firefighters, emergency medical technicians, and hospital staff had symptoms of Sarin exposure after the 1995 attack. This point is critical—if the responders who understand the importance of zones do not respect the zone boundaries, how can we expect an anxious group of victims to do so?

The use of the zone model—when responders can not rapidly identify and define the boundaries, many contaminated victims are already outside of the boundaries, and responders do not observe the boundaries—is clearly not a useful tool for limiting contamination. And if the boundaries do not mean anything, then the expectation that there is a safe area—where responders can work without protection, where responders can don and doff their protective equipment, and where medical treatment and transport of victims can take place—is clearly wrong.

A realistic model for managing these kinds of events requires revision of the current model, including:

- Responders need to treat all MTCWAs as uncontrolled scenes. There is no cold zone for responders anywhere in the neighborhood of the scene, only hot and warm zones.
- The scene also includes all local hospitals, and responders need to notify them and provide supporting resources for them, also. This should be part of the regular response plan.
- All responders on the scene and at the hospitals need appropriate personal protective equipment at all times.
- Victims need to be rapidly removed from the scene as far away as possible, as fast
as possible to a staging area by firefighters using taped turnout gear and self-contained breathing apparatus.

In the staging area, clothing is removed rapidly and bagged, reducing contamination by as much as 90 percent, while paramedics in appropriate personal protective equipment provide medical care.

Victims will then be decontaminated or transported to decontamination areas at local swimming pools.

All responders, especially police officers, will have appropriate use-of-force guidelines that allow them to defend both themselves against the risk of contamination and to keep victims, to the fullest extent possible, from contaminating others.

CONCLUSION

Given the results of real-world experience and large-scale exercises, responders need to abandon the assumption that the zone model will work in a MTCWA. Responders fail to establish zones much of the time, and when they do establish zones, victims and responders both violate them more than half the time. By recognizing that the current hazardous materials model is not applicable to MTCWA, and understanding that there is no cold zone and all responders need personal protective equipment, responders operating at the scene of a MTCWA will be able to work more safely and save more lives.

ACKNOWLEDGMENT

This paper has not been presented before. There were no funding sources for this article.

Scot Phelps, JD, MPH, CEM, CBCP, Paramedic, Emergency & Disaster Management Program, Graduate School of Public Administration, Metropolitan College of New York, New York City, New York.

REFERENCES

1. The Chemical Weapons Improved Response Program was funded by the US Domestic Preparedness Initiative as part of the 1997 Nunn-Luger-Domenici legislation. The program produced a variety of reports, including Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident, Guidelines for Cold Weather Mass Decontamination During a Terrorist Chemical Agent Incident, and Risk Assessment of Using Firefighter Protection Ensemble With Self-Contained Breathing Apparatus for Rescue During a Terrorism Chemical Agent Incident.


3. The Agency for Toxic Substances and Disease Registry’s 1997 Hazardous Substances Emergency Events Surveillance Report revealed that no hazardous materials release from either a fixed site or transportation spill had more than six injuries, the mode was one victim. Available at www.atsdr.cdc.gov/HS/HSEES/annual97.html. Accessed August 18, 2005.


5. Ibid.


7. Agents included hydrofluoric acid, nerve agents, blister agents, chlorine trifluoride, hydrochloric acid.


12. In the ODP Chemical Weapons Full-Scale Exercise Program, responders were contaminated in 52 of the exercises, not contaminated in eight, and there was no explicit mention of rescuer contamination in 11.

13. It is possible that victims were told to by exercise controllers to try and leave the scene. It is also possible that victims were coached to stay and be cooperative.


15. Ibid.


17. For example, in the ODP Chemical Weapons Full-Scale Exercise Program, 50 AARs reported that EMS workers had NO level “C” personal protective equipment (chemical protective suit, chemical protective respirator, chemical resistant gloves, and boots), while only six reported that they had sufficient personal protective equipment to respond to a chemical weapons event.


Network-centric emergency response: The challenges of training for a new command and control paradigm

Lt. Col. Mark Stanovich, USMCR

Abstract
The last two decades have seen technological innovations that have revolutionized the collection and transfer of information, permitting access to and dissemination of massive amounts of data with unprecedented speed and efficiency. These innovations have been incorporated into virtually every aspect of modern society, from personal communications, to commercial and business processes, to governmental function and military operations. The concept of network-centric warfare (NCW) grew out of these new capabilities and has been a prominent topic in strategic and operational discussions in the US military since the late 1990s.

In recent years, the concepts behind NCW have been increasingly applied to emergency response, particularly as responders prepare for an increasingly complex threat spectrum in a post-9/11 world. As emergency responders adopt the technological innovations and organizational concepts that enable network-centric operations, attention should be paid to the lessons learned by the US armed forces in the application of the network-centric approach to war-fighting. Emergency operations centers (EOCs), incident command centers (ICCs), and field personnel will require extensive training and experimentation to sort out the impact of this new technology. They must develop protocols and procedures to leverage maximum advantage, while avoiding the undesirable and damaging effects of that technology improperly applied. Because most emergency response organizations lack the vast training resources of the US military, they must be innovative and adaptable in taking advantage of every opportunity to train their personnel in the assimilation of this new technology.

Key words: network-centric, technological innovations, emergency response, emergency operations centers, incident command centers

Introduction
The first real tests of the concept of network-centric warfare (NCW) in Afghanistan and Iraq have shown some serious drawbacks and flaws in the theories behind NCW and its impact on traditional paradigms of command and control.

In a January 1998 article in US Naval Institute’s Proceedings, Admiral Arthur K. Cebrowski and John J. Garstka posited the concept of NCW. Expounding upon developments in business models that have applied new information technology, and considered the next great “revolution in military affairs” (RMA), NCW has at its core the concept of linking networks of sensors, decision makers, and individual soldiers with the purpose of achieving shared awareness, increased tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. Metcalfe’s Law (the power of a network is the square of the number of nodes in that network) is a governing concept of NCW, as is the leveraging of information-intensive interactions between the nodes of the network.

In theory, the small-unit soldier who can access information and intelligence from all collection sources will be able to employ combat assets such as air support, artillery, and electronic warfare (EW) with much more precision, timeliness, and effectiveness than with past capabilities. This superior situational awareness is often called “information superiority,”
which refers to a faster decision-making cycle compared to the enemy. In essence, NCW is intended to compress Boyd’s “OODA loop” in order to gain an advantage of decision-making and operational tempo over any prospective enemy.⁴

**EMERGENCY RESPONSE AND THE MILITARY PARADIGM**

There are major differences between the emergency response community and the US military. Significant distinctions exist in culture, mission, training, and jurisdictional authority, and there is a uniqueness of skill sets and expertise in the emergency response community that is not resident in the armed forces. However, the tasks of exerting command and control and building situational awareness in a dynamic and potentially hostile environment have many common characteristics for both the military and emergency response fields. Additionally, the complexity and lethality of the modern terrorist threat requires more sophisticated and effective methods of command and control. It is, therefore, not surprising that a network-centric approach to emergency response similar to that of NCW has increasingly emerged.

The adopting by emergency responders of the NIMS/ICS command and control structure and the incorporation of new information management and collection technologies are heavily rooted in military models and requirements. The National Incident Management System/Incident Command System (NIMS/ICS), currently being implemented by the Department of Homeland Security (DHS), closely resembles a military C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) hierarchy. The function and organization of both NIMS/ICS and C4ISR are designed for efficient and effective command and control of large, complex, and dangerous events.

The myriad developments of sensors and collection assets are in many instances adaptations of military technology for use by emergency responders. These include environmental sensors, vehicle tracking, robots, unmanned aerial vehicles (UAVs), chemical, biological, and nuclear materials detection, and human and animal biological monitoring. All of these sensors provide information to responders in much the same way as a military headquarters receives battlefield information.⁶

**NETWORK-CENTRIC CHALLENGES**

Recent military operations in Afghanistan and Iraq have provided the first “live-fire” critiques of NCW. The challenges faced by the Department of Defense in putting the NCW concept into practice ought to prove highly instructive for the emergency response community.

It is the human dimension of a network-centric approach to emergency response that presents the most formidable set of challenges. Technical obstacles, the size and weight of communication devices, battery life, bandwidth, signal strength, encryption and security, commonality of architecture and software, etc.—all will be overcome by continued development and technical innovation. However, the impact of a network-centric emergency response paradigm on capabilities and procedures, on decision making, and on the behavior of individuals and organizations is difficult to predict.

Given the potentially massive volume of data available in a network-centric environment, the tasks of establishing a common understanding of events and conditions and sorting out facts and situations with the appropriate level of detail to support decision making, may prove exceedingly challenging.

*Information inundation*

Theoretically, the NCW approach to information sharing should result in pertinent and timely information being provided to the “shooter” when and where he needs it. But experience has proven that when such a massive amount of data is accessible, it becomes nearly impossible to extract what is pertinent from what is peripheral.⁷ The result is “information overload,” a cascade of data that exceeds the finite limits of information that can be processed and acted upon by a human being in a stressful and complex, multi-tasking environment.

What is new is the potential for inundating all participants with an ever-increasing flow of data masquerading as information because it has been slickly packaged within the common operating picture . . . creating strong incentives for all to engage in information overload in an attempt to maintain their bearings in this overly ambitious big picture.⁸
In essence, just as a military “shooter” still needs time to shoot, a responder still needs time to do his job. Such an overload of information prevents him from making timely and effective decisions. This is true for the soldier and emergency responder alike.

After-action feedback and lessons learned compiled from US personnel in Iraq and Afghanistan highlight the problem of information overload and its effects upon operational and tactical command nodes during operations. The after-action report from the First Marine Division in Operation Iraqi Freedom stated bluntly that:

Intelligence sources at all levels were inundated with information and data that had little bearing on their mission and intelligence requirements . . . It seemed that all data, information, and products were being pushed through overburdened communications ports with little thought to who needed what and when they needed it . . . Too much time and bandwidth is wasted by employing the “information inundation” method.9

Similar observations and complaints from other units and services were common. The Center for Army Lessons Learned (CALL) noted that:

At [higher echelons], without the ability to query, the operator had to search reams of information . . . Lower echelons can be quickly overwhelmed with information overflow.10

CALL also remarked that in the theater of operations, intelligence analysis personnel were overloaded with information from all sources:

. . . conducted only minimal analysis on valuable tactical information provided by human intelligence teams because these personnel reported being so overwhelmed by input that they don’t have enough time during the day to conduct an analysis.11

The above observations are equally applicable to an emergency operations center (EOC) commander who is being bombarded with information of varying quality and usefulness in an attempt to gain situational awareness of an emergency event.

Unfiltered information: Getting the bad with the good

When every information source is treated with equal value, as Metcalfe’s Law would imply, the distinction between evaluated, processed information and raw, unverifiable information is lost. The latter can often assume the character of rumor and gossip, making it even more difficult for a commander to discern the actual situation. In practice, Metcalfe’s Law has proven overly optimistic regarding the contribution of the individual nodes to the value of the network. Network nodes of similar type and usage history flatten the value equation, and some nodes may actually reduce the overall value of the network because of the addition of undesirable elements. Thus, in a network-centric model, all sources of information are not of equal value and do not contribute equally to overall situational awareness. Some may actually hinder the accuracy of perceptions and the gaining of situational awareness.12

This distraction created by peripheral and irrelevant information often has the effect of slowing the decision-making process, as commanders must process large amounts of obfuscating and sometimes contradictory information. There is a natural tendency in such circumstances to wait until additional, clarifying information is obtained before making a crucial and time-sensitive decision.13 This “paralysis by analysis” is often made worse by the decision-maker’s perception that a key item of information is sure to be included in the next influx of data.14

Network-centric: At odds with effective command and control

The infusion of information technology into hierarchical organizations typically reduces the traditional asymmetries of information that define superior-subordinate relationships.

Empirically, the “flattening” of command hierarchy regarding information availability and distribution may have some positive effects on overall situational
awareness. However, a paradigm where all entities potentially have access to all available information can create situations that can be counterproductive to the command and control necessary for coordinated management of resources and response to an incident.

The ICS was developed in the late 1970s as a way of organizing the effort to fight wildfires in California that involved thousands of people from hundreds of diverse organizations. The ICS is a highly structured, intentionally hierarchical command and control model for response to natural and manmade incidents of all sizes and severity, including terrorist attacks.\textsuperscript{15}

NIMS/ICS acknowledges that, in dealing with a complex and dangerous situation, centralized planning and direction is essential for controlling and coordinating efforts, while decentralized execution is necessary to implement the guidance and tasks in the context of local conditions. No single commander can control the detailed actions of such a large number of people and agencies.\textsuperscript{16} The ICS is heavily bureaucratic, formalized, and structured, reliant upon policies and plans, rules, and instructions.\textsuperscript{17} But for all its bureaucracy, ICS is designed to allow subordinate organizations to adjust and adapt quickly and easily to deal with changing situations or unforeseen circumstances. The ICS retains the strengths (defined command relationships, efficiency, control) of a bureaucratic hierarchy, enabling preplanning in the more predictable aspects of disaster management, but permits the flexibility to foster and encourage a bias for action and provides leeway for local improvisation to adapt to unforeseen and often volatile conditions.\textsuperscript{18}

**Excessive control from above**

The “flattening” of the hierarchical ICS command and control structure resulting from unregulated information infusion could erode the strength of the ICS’s bureaucratic organization, negating advantages commanders have to leverage a wide range of expertise and experience in providing direction to his personnel.

The availability of such a plethora of near real-time information often creates the false impression among commanders that they have as accurate a grasp of current conditions as the responders do at the scene. Such an illusion often leads a commander to micromanage his subordinates, imposing significant restrictions on the initiative of subordinate commanders.\textsuperscript{19} Instead of offering guidance and allowing subordinates to use their expertise to adapt to changing conditions, such a commander is prone to issue overly detailed directives often irrelevant or inappropriate to the rapidly evolving situation. The infamous Vietnam War story of President Johnson personally communicating from the White House with army small-unit leaders in the field while they were in contact with the enemy reminds us that simply because a certain type of communication is possible does not mean it’s always a good idea. Such a command and control situation in emergency response is sure to stifle initiative and will greatly reduce the effectiveness of subordinate agencies.\textsuperscript{20}

**Renegade “freelancers” from below**

The illusory impression of complete situational awareness can work in the opposite direction as well. Subordinate commanders, viewing what they perceive as virtually the same information as higher-level commanders, might come to radically different conclusions about courses of action. This can result in a lower-level entity ignoring guidance from higher commands. While ICS allows for and encourages improvisation and adaptation to changing conditions, this adjusting must be done within the context of the overall guidance and objectives of the senior EOC or incident command center (ICC).\textsuperscript{21} If the lower entity’s interpretation of events is at odds with the higher command, there is the risk of “freelancing” by this individual who may ignore the guidance of his superior. “Freelancing” is generally defined as illegitimate improvisation that is not working toward the goals of senior Incident Commanders (ICs).\textsuperscript{22} It is deviation from higher intent that is both unpredictable and unexpected, an activity that undermines a unified response effort. At its least damaging, “freelancing” results in a squandering of effort and resources, while at its worst, it can create real dangers to unsuspecting personnel.

**Networking for networking’s sake**

The value of a highly networked ICC or EOC gathering real-time information is immense. So great
is that value that there is a danger that such a command structure will be employed as simply an information conduit rather than for its intended purpose of command and control of response efforts.23

Interestingly, some NCW advocates in the US military have already proposed a restructuring of command elements into something radically different from their traditional organizational responsibilities. This reorganization corresponds with the major network-centric tasks that contribute to the commander’s “image” (i.e., situational awareness); tasks such as “image maintenance,” “image validation,” and “image communication”24 will mean such a command staff will be functioning more as an information conduit rather than in the more traditional command and control function.25

In emergency response, when there is often a host of people such as elected officials, media, and higher-level emergency personnel clamoring for the latest information, the temptation is great to think of an EOC or ICC as a super-communications node. It is important to remember that the building of situational awareness, albeit important, is but one task of many for commanders and their staffs and is a secondary task to the overall purpose of command and control of the resources and people in the field.26

ADDRESSING CHALLENGES AND LEVERAGING ADVANTAGES OF NETWORK-CENTRIC EMERGENCY RESPONSE

There is much to be gained by taking advantage of the technological developments of the last twenty years regarding data collection and dissemination. Whether a network-centric approach for emergency response will be successful is difficult to say, but current and future technology has the potential to be a significant “force multiplier” for emergency responders, making for a more rapid and efficient decision cycle and a more effective deployment of people and resources to an incident.

The potential pitfalls of network-centric operations, the lessons from Iraq and Afghanistan, and the lessons learned in training exercises should all serve as the starting point for exploring the efficacy of the network-centric model in an emergency response organization.

In order to understand how a network-centric operation can be a boon rather than a bane, it is critical for ICs and other personnel to have a clear idea of their information requirements. They must understand what information is pertinent, what is peripheral, and what is extraneous. They also must determine what agencies are the most reliable sources and how those agencies can provide that information, when it is needed, and in the format required.27

Though a seemingly simple and commonsense step, identifying those requirements is a highly complex and challenging task.

Determining information requirements

Each type of incident or event has its own characteristics and its own set of critical information requirements. The type of information required by ICs depends on the specific decisions they must make. To this end, information must be presented in a form that caters to decision-making and situational needs.28 Emergency responders have trained for many years to understand the characteristics of chemical spills, fires, floods, weather events, accidents, etc., and the likely information commanders will need to know about each. Add the complexities of a modern terrorist attack such as an intentional chemical or biological release, radiological contamination, or devastating explosives, and it is obvious that the potential information requirements across a full threat spectrum are voluminous.

In recent years, emergency responders have worked through these likely terrorist scenarios, through a thorough examination of real-world events and training exercises, to study the common characteristics of such events. From this examination, they have defined the basic information an IC needs to begin building situational awareness and validated as much as possible the assumptions about decision making and resource allocation during such incidents. These basic information requirements should be incorporated into standard operating procedures (SOPs) and response plans in which agencies are made well aware of their specific roles and responsibilities.

When developing specific response plans, emergency responders consider the particulars such as terrain,
weather, road networks, population, infrastructure, vulnerable entities (e.g., hospitals, schools), proximity to other potential dangers (fuel or chemical storage, for instance), training level, equipment possessed by local responders, and availability of resources from neighboring communities. These specific conditions and factors weigh heavily in the decision-making process, generating information requirements over and above the basic requirements for that type of incident or event. These additional requirements must also be outlined in the appropriate response plan.

In responding to an event, an IC needs to be disciplined in his information requests, both to keep lower echelons from having to needlessly spend time gathering and reporting information of questionable value and to avoid an inundation of peripheral information to be processed and assimilated.

The use of technology in such complex and dynamic events that allows unfettered communications between any persons or agencies at any time can create a bewildering jumble of information, facts, and rumors that are impossible to digest or sort out. Such a situation is almost certain to obscure rather than enhance an IC’s ability to gain situational awareness and exert direction and control over the resources in his jurisdiction.

Training the decision makers and command staffs

The training of decision makers, commanders, and command staffs to operate effectively in environments of urgency and uncertainty, where imperfect information must be evaluated and acted upon, is vital to developing strong leaders who can perform in a crisis. Last year’s hurricanes in Louisiana and Mississippi and the subsequent response highlight the need to involve key decision makers in such training.

The concept of realistic and immersive staff drills is hardly a novel one. Wargaming and mission rehearsal have long been a part of the training of the military, public safety agencies, and emergency responders. Not surprisingly, a network-centric approach to emergency response will require extensive rehearsal by IC and EOC staffs. Training, exercises, and experimentation is a must, providing a forum during which new information technology and data management capabilities can be incorporated and tested in realistic and immersive environments. A large amount of training is needed to iron out questions of doctrine, technique, procedures, and best practices for a network-centric approach. What is needed is an innovative and cost-effective method of creating an immersive and powerful training experience for IC staffs and first responders.

User-friendly, realistic, low-cost training

Simulation-based training exercises furnish a low-risk, medium-fidelity environment for both individual and organizational learning. Simulation is critical for the introduction and orientation of new information technology in command and control processes. In various forms, simulation has been a part of training for a variety of disciplines for much of the last century including the military, nuclear power, business, and public safety.

However, few communities have the manpower, financial resources, or exercise design expertise to frequently conduct in-depth and meaningful staff training exercises. Large-scale, high-dollar simulations that require a great degree of technical skill or high-end computer hardware are often beyond the reach of most communities.

The concept of simulation required for training local first responders will have a different focus from the first-person, task-oriented pedagogical learning simulation, such as can be found in a virtual classroom.

In order to be a valuable training tool for IC staffs in the development of a network-centric approach to emergency response, a simulation must be able to represent accurately the variety of inputs from the different entities that would provide information in a real-world situation. Unless there is a high degree of real-world fidelity, the simulation exercise will have limited value for decision-making practice and post-event analysis.

Practice, practice, practice

The overarching question of incorporating information technology into a network-centric emergency response is: how can organizations train to integrate technology into process, determine requirements for
that technology, and train individually and collectively in the new processes that encompass the new technology?

Since decision-support systems interact with cognitive and decision-making processes, it is vital to understand the effects of new information technology on the internal function of an organization as well as between different organizations. This highly complex interaction makes discovery and invention a complicated and iterative process. Knowledge discovered in training exercises is invaluable for the development and maturation of systems, the evolution of operational processes and, ultimately, to the successful integration of new technology into the larger command and control decision system.31

Organizations must develop basic rules and assumptions for the employment of new technology based on experience and expertise. New technology must be tested and assumptions validated. These results must be used to develop and adapt procedures, and these procedures need to be practiced and rehearsed using real-world response situations and the results analyzed so that these procedures can be further refined and validated.

CONCLUSION

Cutting edge information technology is making its way into the domain of emergency response by virtue of its usefulness and adaptability. A network-centric approach is quickly coming to emergency response and is, to some degree, already present. Its impact upon command and control will be considerable. Emergency responders must be ready for it, understand it to the maximum extent possible, and account for it with mature concepts of employment and best practices developed and validated through realistic training and analysis.

Despite major differences between the US military and the emergency response community, there is considerable common ground regarding methods of command and control in highly complex and dangerous events. The lessons being learned in the use of NCW by our armed forces in Afghanistan and Iraq provide a highly instructive set of lessons for emergency responders as they incorporate the technology and philosophies of a network-centric approach to emergency response.

The challenges of integrating new information technology into an established discipline are significant. Information overload that chokes analysts and decision makers, the flattening of command hierarchies, the subordination of command and control responsibilities to information gathering and connectivity concerns—all are real and serious issues that must be resolved.

Yet, in spite of the negative effects this new technology can have upon command and control if misapplied, the vast potential such technology has for improving capabilities, awareness, and responsiveness make its implementation a virtual certainty.

It will be through extensive training, experimentation, practice, and repetition, with lessons learned properly applied, that assumptions will be validated or found faulty, concepts proven or rejected, and the theoretical molded into the practical—that process alone will yield the best practices, policies, and procedures required for the effective employment of new technology.

If history is a guide, the best practices and procedures that emerge from a true network-centric emergency response paradigm are likely as not to bear little resemblance to what was initially envisioned when the technology that drove that paradigm was developed.


REFERENCES


10. Center For Army Lessons Learned (CALL) Newsletter, October 2003, Number 03-27, United States Army.

11. Ibid.


18. Ibid.


28. Ibid.


---

Stay on the cutting edge of emergency preparedness.

**Subscription Offer: **YES! Start my subscription to Journal of Emergency Management

**Subscription Rates** (Rates in US dollars):

- Library: US $1 yr.–$239 (6 issues)
- Institution: US $1 yr.–$232 (6 issues)
- Individual: US $1 yr.–$172 (6 issues)

- Canada $1 yr.–$279
- Foreign $1 yr.–$359

- Check, money order, purchase order enclosed.
- Bill: Institution. Purchase Order No. required.
- MasterCard/Visa/Discover/AMEX No. Exp. Date
- Name on credit card
- Title
- Company/Institution
- Tel.  
- Street Address
- Fax
- City, State/Prov, Zip/Postal Code
- Country
- E-mail

To order faster call us @ 800-743-7206, ext. 108 (US & Canada)
470 Boston Post Rd., Weston, MA 02493 • 781-899-2702 • Fax: 781-899-4900

FID # 04 269 1851
12257 11/21/05 Rev. E
Are your communications systems ready for a decade of disaster?

Experts predict the next ten years will see an increase in extreme weather events. REDCOM provides the reliable, versatile platforms that restore communications during a crisis. Engineered to be interoperable and durable, the REDCOM Transportable Communications Package (TCP) is used by disaster response experts worldwide. Before disaster strikes again, make sure your command center is prepared. Make sure you’ve got REDCOM.

Talk to the experts in disaster recovery communications!
One Redcom Center, Victor, NY 14564-0995, U.S.A.
585.924.6500 PHONE sales@redcom.com E-MAIL www.redcom.com WEB

DISASTER STRIKES!
WHO ARE YOU GOING TO CALL?

When disaster strikes you need the one resource that has all the answers . . . the one resource that will help you and those you protect get back to normal as quickly as possible!

Edwards Disaster Recovery Directory
Choose book or CD, or discounted book/CD combo.

For 10% discount use offer code JEM42
More information and ordering at:
www.Edwardsinformation.com 800-990-9936
Don’t Risk It!

There’s a deadly chemical release. Why trust your safety—and the public’s safety—to a product without a track record?

AreaRAE
Wireless HazMat Detection
- Remotely measures gas, vapor and radiation threats from up to two miles away
- See the entire threat from Incident Command
- With over 500 systems deployed, the AreaRAE is the standard for rapid deployment systems

Used by:
- Fire Departments
- Law Enforcement
- Industrial First Response Teams
- State and Federal Agencies

www.raesystems.com/info
Protection through Detection