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Inside

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New guidelines for acute headaches: Here's how your practice will change

New approaches assess whether a patient's life is in danger

When a 23-year-old man driving a sports utility vehicle was rear-ended, the accident didn't seem serious: The windshield was intact, and there was no interior damage to the driver's vehicle. The man did not lose consciousness or sustain an obvious head injury, and he wasn't treated by emergency medical services at the scene.

Two weeks later, he came to the ED complaining of a headache and altered vision. The man told the triage nurse that the headache started a few hours after the accident and was intermittent for several days, but it now was persistent, according to the case study provided by **Steven D. Glow**, RN, MSN, FNP, nursing faculty at Salish Kootenai College in Pablo, MT, and an ED nurse at Community Medical Center in Missoula, MT.

Based on a pain scale of 1 to 10, the patient said that the pain ranged from a score of 3 to 7. The patient was triaged as emergent because he had a headache and neurological symptoms, and he was promptly seen by the ED physician. The screening neurological exam revealed a focal neurological deficit, and a noncontrast computed tomography (CT) scan was ordered.

EXECUTIVE SUMMARY

New guidelines from the American College of Emergency Physicians give current recommendations for acute headache management, including assessment, diagnostic tests, and treatment.

- At triage, give a neurological exam to all patients presenting with headache.
- Patients with "thunderclap" headaches and negative computed tomography (CT) scan and lumbar punctures do not need emergent angiography.
- To determine whether headaches are life-threatening or benign, patients need a history and physical exam, CT scan, and/or lumbar puncture.

"Unfortunately, a large intracranial mass was detected," says Glow. "The patient was admitted to neurology, and [magnetic resonance imaging] was ordered for the next day."

In this case, the rapid evaluation and diagnosis enabled the patient to access appropriate specialist care in a timely manner, says Glow. If these interventions were not done, and the patient somehow slipped through the cracks, treatment would have been delayed, he adds.

The above anecdote underscores the importance of appropriate triage and management of acute headaches, emphasizes Glow. Potentially life-threatening headaches may be overlooked if diagnostic guidelines are not followed, he adds.

New guidelines from the Dallas-based American College of Emergency Physicians (ACEP) give current approaches for management of acute headaches but reveal a lack of evidence-based research for this patient population, says **Rebecca A. Steinmann**, RN, MS, CEN, CCRN, CCNS, clinical nurse specialist for the ED at Northwestern Memorial Hospital in Chicago. **(For ordering information, see resource box, p. 87.)**

She notes that the ACEP guidelines contain no Level A recommendations, which indicate a high degree of clinical certainty, and that most are Level C, which are based on preliminary, inconclusive, or conflicting evidence, or in the absence of any published literature, she adds.[1]

"The recommendations, then, reflect the practice most of us have been experiencing in our own EDs," concludes Steinmann. "We obviously still have much to learn about this common entity."

Here are key points of the ACEP recommendations with suggestions for how to change your practice:

• **You should give a screening neurological exam at triage to all patients with headaches.**

Patients who present with an abnormal neurologic exam are at higher risk of having life-threatening pathology, Steinmann says.

The ACEP recommendations indicate there is not enough research to make Level A recommendations for diagnostic testing for headache patients, says Glow. Evidence supports only one Level B recommendation, for emergent CT scan when headache is combined with an abnormal neurological exam, he adds.

"The implication is that the triage nurse should perform at least a screening neurological exam on all patients with headache," he says. **(To learn how to perform a simple neurological exam at triage, see "Save lives with a rapid neuro exam," in *ED Nursing,* July 2001, p. 120.)**

If there is an abnormal neurological finding, the patient should be classified as emergent, Glow emphasizes. This classification is consistent with the Simple Triage and Rapid Treatment (START) system developed by Hoag Hospital and the Newport Beach (CA) Fire Department, he adds. That system assigns all patients who cannot follow simple commands to the "red" immediate category.

• **Patients with signs of increased intracranial pressure and/or an abnormal neurological exam should undergo neuroimaging before having a lumbar puncture, secondary to the risk of herniation.**

There is now a clear set of criteria to determine which patients should undergo a neuroimaging study prior to a lumbar puncture, says Glow. The guidelines give the following criteria: adult patients with headaches exhibiting signs of increased intracranial pressure, including papilledema, without venous pulsations on funduscopic examination, altered mental status, or focal neurological deficits.

"You may need to advocate for such testing prior to a lumbar puncture when patients meet the criteria," Glow notes. "This has the potential to protect both the patient and the physician."

Headache patients with a normal neurological exam, normal mental status, a normal funduscopic exam, and no meningeal signs are the best candidates for lumbar puncture without a neuroimaging study, says Steinmann. Patients presenting with a headache and abnormal neurologic exam and patients presenting with an acute sudden-onset headache should receive emergent neuroimaging, she adds. HIV-positive patients and patients older than age 50 should be considered for an urgent neuroimaging study even without neurological abnormalities, if presenting with a new type of headache, Steinmann says.

• **Patients who experience "thunderclap" headaches with negative CT and negative lumbar puncture do not need emergent angiography.**

These patients can be discharged to follow up with their primary care physician or neurologist, says Steinmann. Research does not suggest that this is a

COMING IN FUTURE MONTHS

- Improve care of ICU patients in the ED
- Effective interventions for substance abuse
- Update on new disaster courses
- Avoid problems when using Dermabond

SOURCES AND RESOURCE

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The American College of Emergency Physicians *Clinical Policy: Critical Issues in the Evaluation and Management of Patients Presenting to the Emergency Department with Acute Headache* was published in the January 2002 issue of *Annals of Emergency Medicine*. Single copies are available for $5, including shipping. To order a copy, contact:

- **ACEP Customer Service Department**, 1125 Executive Circle, Irving, TX 75038-2522. Telephone: (800) 798-1822, ext. 6. Fax: (972) 580-2816. E-mail: customerservice@acep.org.

life-threatening presentation requiring this level of unscheduled diagnostics, she explains.

• **Consider a patient's need for diagnostic tests.** You must continuously assess headache patients for signs of increased intracranial pressure, says Steinmann. However, the guidelines make it clear that specific diagnostic tests also are needed to determine the cause of an acute headache, says Glow.

The current approach to determining if headaches are life-threatening or benign includes a history and physical exam, CT, and/or lumbar puncture, says Glow. "So you should consider the patient's room assignment with these diagnostic options in mind," he advises.

For example, a private room would be a better location to do a lumbar puncture, and some patients may require anxiolytic medications or conscious sedation prior to the procedure, he adds.

You also should consider the patient's need for sedation and the physician's need for positioning assistance during the procedure when making nursing assignments, says Glow.

• **Pharmacologic agents with an affinity to serotonin receptors are the preferred therapy in acute headache management.** These include triptans, dihydroergotamine, prochlorperazine, and metoclopramide, says Steinmann. "However, the ability to relieve headache pain with pharmacologic agents does not exclude life-threatening pathology," she adds.

Reference

1. American College of Emergency Physicians. Clinical Policy: Critical issues in the evaluation and management of patients presenting to the emergency department with acute headache. *Ann Emerg Med* 2002; 39:108-122. ■

Case study: Don't miss subarachnoid hemorrhage

Subarachnoid hemorrhage may not be detected by computed tomography (CT) scan, or by lumbar puncture if the tap is performed fewer than 12 hours from the onset of symptoms, warns **Rebecca A. Steinmann**, RN, MS, CEN, CCRN, CCNS, clinical nurse specialist for the ED at Northwestern Memorial Hospital in Chicago.

Steinmann points to the following case study: A 23-year-old female presented to triage with the "worst headache of her life." She reported that the headache started an hour ago after she had carried groceries up three flights of stairs.

The patient related a history of migraine headaches, but said "this was different." Her vital signs were all within normal limits. She was alert and oriented, pupils were equal and reactive to light, she denied nuchal rigidity, and demonstrated no neurologic deficits.

The woman received prochlorperazine 10 mg slowly via intravenous push and a liter of normal saline. "She received complete relief of the headache within 30 minutes," says Steinmann.

A CT scan was negative, and she subsequently was discharged home to follow up with her physician. The woman returned to the ED 14 hours later stating that her headache had returned and was worse than ever.

Her vital signs remained within normal limits. She remained alert and oriented, pupils were equal and reactive, but she had mild nuchal rigidity. She again received prochlorperazine 10 mg slow via intravenous push, with complete relief of the headache.

A lumbar puncture was performed, which was positive for xanthochromia, and the diagnosis of subarachnoid hemorrhage was made. "She was admitted to the surgical intensive care unit and subsequently underwent clipping of a leaking arteriovenous malformation," says Steinmann. ■

New drug should revolutionize CHF treatment

When a 65-year-old man came to the ED in severe respiratory distress from congestive heart failure (CHF), his initial respiratory rate was 30. He was unable to talk and used accessory muscles for respiration.

"He had frothy sputum and was about to go into respiratory arrest," says **Robert Takla**, MD, FACEP, medical director of emergency services at St. John NorthEast Community Hospital in Detroit.

"I was ready to intubate him, but had wanted to try Natrecor [Scios Inc., Sunnyvale, CA], as I recently read a journal article on it,"[1] Takla says, referring to the drug that, in generic form, is named nesiritide. "So I obtained an initial arterial blood gas."

On a 100% fraction of inspired oxygen, the patient's arterial blood gas was pH 7.034, partial pressure of carbon dioxide was 62, partial pressure of oxygen was 99, and oxygen saturation was 93%. Takla treated the patient with lasix and nesiritide, and the clinical response was dramatic.

Only 75 minutes later, a repeat arterial blood gas was pH 7.36, partial pressure of carbon dioxide was 39, partial pressure of oxygen was 215, and oxygen saturation was 97%. The patient was talking comfortably. "In fact, he asked me if he could go home, and just a few minutes earlier, I was expecting to put him on life support," says Takla.

Drug is cutting edge

Nesiritide is a recombinant form of human B-type natriuretic peptide, a naturally occurring protein in the body secreted by the ventricles in response to congestive heart failure, but not in sufficient quantity to be therapeutically effective, says Takla. "Now it is synthesized and given to patients, and I have had tremendous success with it," he says. "It is cutting edge and should revolutionize the treatment of CHF."

Its mechanism of action and indication differs from traditional CHF drugs such as diuretics, nitroglycerin, and inotropic agents, which are historically used in the treatment of refractory or severe CHF, says Takla. Natrecor is used *instead* of nitroglycerine or nitroprusside, he adds.

The drug is recommended for patients who present in Class II, III, or IV acute CHF, he says. It is the only drug in a new class of medications to be approved for treatment of CHF in the last decade, adds Takla. "It should be on everyone's CHF guideline or pathway," he urges. **(See IV Nesiritide [Natrecor] Policy/Procedure, p. 89.)**

Nesiritide is a natriuretic peptide and is one of a new category of medications, according to **June Howland Gradman**, RN, MS, MBA clinical director of cardiac services at University of Chicago Hospital.

"There are a number of clinical trials going on for other agents that work by similar mechanisms," she reports. "This is a new arena in the treatment of heart failure."

Here are some things to consider about nesiritide:

• Watch for improvement of symptoms.

You should see marked improvement in the shortness of breath and dyspnea symptoms that brought the patient to the ED, says Gradman.

Expect to see patients placed on this medication improve in a very short period of time, says Takla. "Improvement is seen as quickly as 10 or 15 minutes of receiving the bolus," he says.

The dose is a bolus of 2 mcg/kg followed by an infusion of 0.01 mcg/kg per minute, he says.

"Patients do not need any invasive monitoring such as a swan or arterial line," says Takla. "In fact, they can be admitted or observed in a telemetry setting and do not need to be in the [intensive care unit]."

• Monitor urine output.

You should monitor the patient's urine output, Gradman says.

"The drug encourages salt and water excretion along with vasodilation," she says. "Expect to see a good urine output, which is a clue that the drug is working."

Takla adds that the medication is synergistic with diuretics because it works in a different area of the kidneys, so the urine output response is very good. "This is especially helpful in renal insufficient patients," he says.

• Watch for side effects.

In clinical trials, hypotension has occurred in 2% to

Continued on page 90

EXECUTIVE SUMMARY

Nesiritide is a new medication for congestive heart failure patients and should be immediately added to your guidelines, according to emergency department experts. Patients improve as quickly as 10-15 minutes after receiving the bolus.

- The drug is used *instead* of nitroglycerine or nitroprusside.
- You need to monitor urine output because the drug promotes diuresis.

CARDIAC CARE CENTER
IV Nesiritide (Natrecor)
POLICY/PROCEDURE

PURPOSE: To establish guidelines for the infusion of intravenous (IV) nesiritide on the cardiac care center.

POLICY STATEMENT: IV nesiritide may be administered on the cardiac care center according to the following guidelines:
1. IV nesiritide must be monitored by the heart failure physicians.
2. Patient must be on continuous cardiac monitoring.

ACTION: Nesiritide is a B-type natriuretic peptide used in heart failure patients. It has the balanced hemodynamic effects of vasodilating both veins and arteries, positive neurohormonal effects mainly by decreasing aldosterone, and positive renal effects by increasing diuresis and natriuresis. It improves clinical symptoms of dyspnea, fatigue, light-headedness, decreased appetite, and urinary output without increasing heart rate.

DOSAGE:

BOLUS: 2 mcg/kg IV push over 1 minute (Optional — MD may decide not to bolus first)

INFUSION: 1.5-mg vial to be reconstituted with 5 cc of normal saline or dextrose 5% in water. The 5 cc is added to 250 cc dextrose 5% in water or 0.9% saline. Invert IV bag several times to mix solution. Prime IV line with the solution before administration. Then, start an IV infusion of 0.01 mcg/kg/min. Maximum: 0.03 mcg/kg/minute. Usual infusion is eight to 48 hours and may be given in conjunction with dobutamine.

MONITOR FOR:
1. Drop in blood pressure, bradycardia, and confusion.
2. Monitor renal status including blood urea nitrogen and creatinine.
3. Rare episodes of ventricular dysrhythmias.
4. Ace inhibitors should not be administered within two hours of the IV bolus to 30 minutes after starting the IV infusion.

NURSING CONSIDERATIONS:
1. Vital signs q 15 minutes x 4, q 30 minutes x 2, q 1hour x 2, then q 4 hours during infusion.
2. Needs dedicated IV line. Not compatible with other IV medications.
3. Do not administer through heparin-coated central lines.
4. Drug does not need to be weaned.
5. If hypotension occurs, stop infusion and use general supportive measures to support blood pressure (IV fluids, body position). If drug is restarted, it may be started at 30% reduction in dose.
6. Usually given at a fixed-dose infusion, but if MD decides to increase, up-titration should be done at three-hour intervals up to 0.03 mcg/kg/min.

DRUG INTERACTIONS: None reported, except may cause hypotension in patients receiving oral ACE inhibitors.

PRECAUTIONS: Significant valvular stenois; Restrictive or obstructive cardiomyopathy; Constrictive pericarditis; Pericardial tamponade; Pregnancy

CONTRAINDICATIONS: Hypersensitivity to any of its components; Cardiogenic shock; Systolic blood pressure < 90 mm Hg; Concomitant administration of IV nitroglycerin, nitroprusside, or IV ACE inhibitors; Patients with low cardiac filling pressures

9/01

Source: Cardiac Care Center, University of Chicago Hospital.

SOURCES AND RESOURCE

For more information about the management of CHF using nesiritide, contact:

- **June Howland Gradman**, RN, MS, MBA, Clinical Director of Cardiac Services, University of Chicago Hospital, 5841 S. Maryland Ave., MC 5022, Chicago, IL 60637. Telephone: (773) 702-1894. Fax: (773) 702-4198. E-mail: jgradman @uchospitals.edu.
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For more information about Natrecor, contact:

- **Scios Inc.**, 820 W. Maude Ave., Sunnyvale, CA 94085. Telephone: (866) 262-6466 or (408) 616-8200. Fax: (408) 616-8206. Web: www.natrecor.com.

4% of patients, says Gradman. "If they don't have the ability to function and don't respond to it, you'll see a drop in pressure," she says.

If this occurs, stop the infusion and support blood pressure, says Gradman.

• Evaluate the patient's baseline functional status.

Be familiar with the following four functional classes for congestive heart failure, stresses Gradman:

— **Class I:** patients with documented heart disease of any type who are completely symptom-free;

— **Class II:** slight limitation of physical activity because symptoms (shortness of breath, chest pain) occur only with more than ordinary physical activity;

— **Class III:** marked limitation of physical activity because symptoms occur even with ordinary physical activity (e.g., eating meals);

— **Class IV:** severe limitation of physical activity because symptoms occur even at rest (e.g., in a sitting or lying position).

Knowing these functional classes for heart failure is a way to evaluate how the patient is doing, says Gradman. "Patients likely to seek treatment come into the ED in functional Class III or IV," she notes.

A patient coming into the ED in functional Class III will have marked limitations in his or her physical activity, and Class IV will be symptomatic at rest, Gradman says. "Drug therapy can move them to a Class I or II with minimal symptoms."

Gradman notes that point-of-care testing for brain natriuretic peptide levels is now available in the ED. "These levels are being used to evaluate patients coming to the ED with shortness of breath," she says. "A high level can indicate heart failure and consideration of Natrecor for treatment."

Reference

1. Colucci WS, Elkayam U, Horton DP, et al. Intravenous nesiritide, a natriuretic peptide, in the treatment of decompensated congestive heart failure. *N Engl J Med* 2000; 343:246-253. ■

Pediatric mock codes can improve care

A newborn infant is brought to your ED in full arrest. You are unable to establish venous access. What do you do next?

The above scenario does not occur often in the ED. That's exactly why you should practice in advance with pediatric mock codes, advises **Lynne G. Callahan**, RN, MICN, CNIV, pediatric liaison nurse and pre-hospital care coordinator at Cedars-Sinai Medical Center in Los Angeles.

When Callahan did a retrospective chart review, she noted that the majority of the charts did not have weights in kilograms recorded. Nor did they have a color code

EXECUTIVE SUMMARY

Pediatric mock codes can improve your confidence and skills for management of children in cardiac arrest.

- You may need to increase your familiarity with rarely used equipment and supplies, such as neonatal intubation kits.
- Medication dosages used by the hospital formulary may need to be correlated with dosages indicated on color-coded tapes.
- Scenarios to use are sepsis, fluid resuscitation, cardiac arrest resuscitation, or airway resuscitation.

CEDARS-SINAI MEDICAL CENTER

PEDIATRIC MOCK CODE OBJECTIVES

Purpose:
- To provide a standardized team approach to the resuscitation of the critically ill pediatric patient based on pediatric advanced life support guidelines and standard of care in Cedars-Sinai Emergency Department.

Objectives:
Upon completion of this program, the team will be able to:
- apply principles of initial assessment of the pediatric patient and identify appropriate treatment modalities according to scenario;
- perform in the mock code/resuscitation according to assigned roles and in coordinated manner under the defined leadership and direction.

Process:
- Review Pediatric Code Team Roles and responsibilities for each member of the team.
- All staff providing pediatric critical care during the initial phase will be required to attend and participate in the Pediatric Mock Code/Resuscitation Educational Program.
- The mock code/resuscitation may be videotaped.
- Following the mock code/resuscitation, a critique and discussion will occur.

Source: Lynne G. Callahan, RN, MICN, CNIV, Cedars-Sinai Medical Center, Los Angeles.

noted from the Broselow Pediatric Emergency Tape.

Callahan has since implemented pediatric mock codes as part of the mandatory education for nursing staff. The goal is to reduce medication errors and improve patient care by using a team approach, she says.

You must have the skills and tools to be ready for the most stressful of situations in the ED, Callahan stresses.

"Unfortunately, when a pediatric patient comes to the ED in full arrest, the outcome is poor at best and they usually don't survive," she says. "It's important for the whole team to know they have done everything they could."

The ED has held three mock codes to date.

Although pediatric mock codes have been held for years at Christiana Care Health Services in Newark, DE, they were mainly geared toward physicians. "I worked hard to get nursing involved, because pediatric codes are few and far between," says **David Salati**, RN, pediatric care coordinator for trauma, emergency, and aeromedical services at Christiana Care.

Salati says that one or two mock codes are held in the ED each month. **(See article on videotaping of mock codes, p. 94.)** Pediatric codes are "low-frequency, high-risk" scenarios, he says, adding that 20% of the ED's patient volume are children, but they only see about 40 pediatric cardiac arrests in a year.

"With the size of our staff, it's unusual for anyone to be involved in more than one a year," he says.

Here are items to consider when implementing pediatric mock codes:

• Pay special attention to dosages and equipment.

Callahan says that mock codes increase familiarity with rarely used equipment and supplies, such as neonatal intubation kits.

"Half your stress can be relieved if by the time the patient arrives, you are aware of all the tools you have to use, and everything is right there for you," she says.

During one mock code, an ED nurse was calling out medication doses using the hospital's formulary while another nurse was looking at the Broselow tape and correcting the dosages.

Callahan took the opportunity to explain that the dosages on the color-coded tape didn't correlate with the hospital pharmacy dosages. She reminded nurses that she had developed a new medication book with all the formulary dosages correlating with the Broselow tape dosages, located in the color-coded pediatric crash cart.

"This will reduce our medication errors," she says. "We can use the tape as the weight and a guideline, but we need to get our doses from the book."

Whether everything goes right during the code depends largely on the staff's comfort level with the

CEDARS-SINAI MEDICAL CENTER

PEDIATRIC MOCK CODE CHECKLIST

CODE TEAM MEMBER	CRITICAL ELEMENTS
RN Code Team Leader **Signature:** _____	• Responsible for ensuring the resuscitation room is prepared and appropriately set up. • Documents on appropriate form Code Blue or Trauma Care flowsheet
Pediatric RN Right **Name:** _____	• Ensure initial vital signs are obtained to include blood pressure or capillary refill if blood pressure unobtainable. • Establish vascular access and obtain blood samples • Administer medications
Pediatric RN Left (medication nurse) **Name:** _____	• Place Broselow tape at patient • Call out color code and weight in kilograms • Draw up medications according to Broselow • Tape Pediatric Medication Book
Clinical Partner **Name:** _____	• Assist with preparation of the resuscitation room prior to arrival of the patient • Place patient on monitor • Assist with cardiopulmonary resuscitation
Log Tech **Name:** _____	• Serve as transporter for lab work • Stand by for immediate transfer
Radiology Tech **Name:** _____	• Obtain all radiographic films/studies as ordered by the emergency department attending
Respiratory Care **Name:** _____	• Prepare appropriate size pediatric airway equipment
EDAs **Name:** _____	• Properly label charts

Source: Lynne G. Callahan, RN, MICN, CNIV, Cedars-Sinai Medical Center, Los Angeles.

equipment, stresses Salati. "Doing mock codes gives people close to a real-world experience, with using length-based resuscitation tapes and getting the right size equipment to work for a given patient," he says.

After the mock codes, Callahan often reviews the location of all supplies in the pediatric color-coded crash carts.

The top drawer contains all medications and intubation

CEDARS-SINAI MEDICAL CENTER

Pediatric Mock Code/Resuscitation Case Scenario

1. Identify team member and their assignments.
2. Describe their roles.
3. Set up mock scenario:

- State your role when giving the case scenario information.
- Describe how you will take the team through the scenario, e.g., you will provide the information regarding the physical findings, results of each procedure, etc.
- Team members are to call out what the findings are and what their interventions are.
- Feedback from the "instructor" will be clear and concise.
- All teaching points will occur during the critique/discussion session.
- Make this session as close to reality as possible.

Instructor Information:

Case Scenario: A 3-month-old male is brought in to the emergency department via paramedics in full cardiac arrest, cardiopulmonary resuscitation in progress with bag-valve-mask ventilation, intravenous access unable to be established in the field.

Physical Findings	Primary Survey (ABC)	Interventions
• Minimal air exchange with assisted ventilation • Do not proceed until proper opening maneuvers demonstrated	Airway	Opening maneuvers Neck position/cervical spine
• Endotracheal tube not initially available • Demonstrate adequate bag-valve-mask technique • Intubate patient	Breathing	Initial assessment Suction/obstruction Bag-mask-valve effective Intubation Medications Tube size Blades size Placement
• Unable to obtain intravenous • Use this time to demonstrate proper cardiopulmonary resuscitation • Give first dose of epinephrine via endotracheal access • Establish intraosseous, give next dose of epinephrine per bradycardic algorithm • May give atropine. Normal sinus develops with adequate blood pressure	Circulation	Assess perfusion Compressions Intravenous/intraosseous Medications Fluid Reassess perfusion

Source: Lynne G. Callahan, RN, MICN, CNIV, Cedars-Sinai Medical Center, Los Angeles.

supplies, and the bottom drawer contains supplies for umbilical line access, she says. "Each drawer is coordinated with the weight of the child in kilograms."

• Every individual has a specific role.

A checklist is used for every role involved in the pediatric mock code, including the ED attending physician, respiratory therapist, technicians, the neonatology attending, charge nurse, code team leader, and right and left nurses. **(See pediatric mock code objectives, p. 91, and checklist, p. 92.)**

"All the players have a role that is defined for them, with critical elements for every role," says Callahan:

— The team leader makes sure the resuscitation room is set up and that the appropriate documentation forms are used.

— The right nurse has to make sure initial vital signs are obtained and done manually as opposed to electronically, to attempt vascular access, and administer and/or draw meds.

— The left nurse is responsible for placement of the Broselow tape and calling out the color code, and/or drawing up the weight in kilograms.

• **Use scenarios that are high risk for errors**.

Callahan recommends using one of the following four scenarios for a pediatric mock code: sepsis, fluid resuscitation, cardiac arrest resuscitation, or airway resuscitation. **(See Pediatric Mock Code/Resuscitation Case scenario, p. 93.)**

"Those are the most important things we deal with, that seem to involve a high error rate in calculation of drugs," she says. ■

SOURCES

For more information about pediatric mock codes, contact:

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- **David Salati**, RN, Pediatric Care Coordinator for Trauma, Emergency, and Aeromedical Services, Christiana Care Health Services, 4755 Ogletown-Stanton Road, Newark, DE 19718. Telephone: (302) 733-6793. Fax: (302) 733-1633. E-mail: dsalati@christianacare.org.

Should you videotape mock codes?

Although opinions differ as to whether pediatric mock codes should be videotaped, experts agree the educational value of these sessions is significant.

"They are a great learning tool, especially if feedback is provided shortly afterward," says **Lynne G. Callahan**, RN, MICN, CNIV, pediatric liaison nurse and pre-hospital care coordinator at Cedars-Sinai Medical Center in Los Angeles.

Here are two ways to provide valuable feedback after mock codes:

• **Videotape the mock codes.**

At Cedars-Sinai Medical Center, every mock code is videotaped and taken into the ED conference room for review, says Callahan.

Instead of identifying mistakes made by an individual nurse, Callahan offers a hint to jump-start the discussion process. For example, she may point out that a child has lost potentially 100 cc of blood volume and ask how the integrity of the blood volume can be maintained.

"If the participants are not able to see where I am going, then I will point out that the use of bullets will draw off a much smaller amount of blood volumes than using adult tubes," she explains. The adult tubes could potentially draw off an amount of blood that could compromise the perfusion status of the child, says Callahan.

"I will hold up the adult tubes next to the bullets so that there is a visual other than the tape," she says. "This is much more effective than saying, 'Look at Nurse Lynne. She is using the wrong blood tubes.'"

Callahan includes words of praise.

"I was able to stop the tape and point out that the nurse using the Broselow Tape was correctly measuring the infant," she says. "It was a good teaching point to show that we measure from the top of the head to heel of the foot."

The videotapes are effective because they provide visual evidence for things done well and areas that need improvement, says Callahan.

• **Verbally critique the codes.**

Mock codes aren't videotaped at Christiana Care Health Services in Newark, DE, says **David Salati**, RN, pediatric care coordinator for trauma, emergency, and aeromedical services.

"Since the mock codes move around the hospital, moving the video equipment around also would be too cumbersome," he explains. "We prefer to just do an immediate recap and debriefing."

There is an immediate critique afterward, attended by everyone who participated in the mock code.

"If anything crops up during the mock code that is notable, or that we think everyone needs to be remediated on, we put out e-mails to the entire staff," he says.

A group e-mail list is used to get the message out to ED nursing staff, as well as resident and attending medical staff, says Salati.

"No response is required, but we consider it a part of one's professional responsibility to keep current," he says. "E-mail is the most efficient way to disseminate information."

The critique immediately follows the exercise, says Salati. "It is considered central to the exercise, so the expectation is that all who participated will

stay for it," he explains.

Critiques can last anywhere from five minutes to much longer, depending on the amount of discussion and remediation needed, says Salati. First, the code leader does a self-critique covering strengths, weaknesses, and opportunities for improvement, followed by the other members of the team. The facilitator concludes the critique with any observations that weren't made already, reinforcement of points discussed if necessary, and key learning points, he says.

One recent example is the potential for overventilation in patients, and the need to make sure the stomach is decompressed to facilitate good chest compression and ventilation, says Salati.

"If you have lot of air in the stomach, you can get vomiting and aspiration from that, even around an endotracheal tube potentially, if it's an uncuffed tube," he notes.

The problem of gastric distention is a recognized problem in resuscitation, which was noticed during real codes, Salati says. Mock codes were used to reinforce the need for gastric decompression, he explains.

"We discovered that gastric decompression was something that a lot of people weren't thinking about," he explains. "We needed to change the culture to include it as a routine part of the code, so we made a point of bringing it to everyone's attention." ■

Here are lessons learned from volunteers on 9/11

On Sept. 11, an unprecedented number of ED nurses volunteered their services. For readers who need information to revise disaster plans and plan for the future, here is what worked well and what didn't:

• Many nurses went directly to the disaster site.

Scores of volunteers went directly to the site without contacting anyone first, reports **Laura Giles**, RN, nurse manager of the ED at Mount Sinai Medical Center in New York City.

"It created a logistical nightmare," she adds, explaining that those in charge didn't know who was there, and the volunteers had no idea who to report to or where they were needed.

The day after the attacks, a nurse practitioner called Giles asking for supplies to set up a first-aid station at the site. "I spoke with my contacts who told me this was not authorized, and there were already too many people at the scene. So I did not provide any supplies," she says.

Going directly to the scene of a major disaster was a case of bad judgment on the part of many volunteers, says **Suzanne Pugh**, RN, ED nurse manager at Saint Vincents Hospital in New York City.

"The site may not be safe, as was the case with the World Trade Center, and may be chaotic," she says. "In this case a volunteer can do more harm than good, and may very well become a casualty."

• Hundreds of nurses came to EDs ready to work.

Off-duty nurses who lived nearby showed up at the ED almost immediately, and shortly behind them were agency and per diem nurses, and nurses who were unable to get to their regular jobs at area hospitals, says Pugh.

"One helpful thing was that they all showed up in scrubs ready to work with minimal baggage," says Pugh. "So there was no need to find them something to wear or figure out what to do with coats and bags. It sounds like a small thing, but that morning it would have been just one more thing to worry about."

These volunteers were sent to the nursing office where a "manpower pool" was established, she says. Next, human resources staff obtained on-line license verifications, says Pugh.

The ED was flooded with thousands of calls from volunteer nurses, and hundreds simply showed up.

"There was truly a deluge. We had people driving in from Maryland and Pennsylvania," says Pugh. "The nursing command made every effort to answer phones and keep track of arrivals, but it became overwhelming."

Pugh says that volunteers should make every effort to find out where and what kind of help is needed by listening to the media and contacting colleagues.

"It was difficult to get through to the hospital at times," she notes. "At one point, the nursing office phone number was given out on TV, and all bets were off from that point on."

By early afternoon, patients had stopped arriving because there were not many survivors. "Perhaps if we had continued to get patients as the night and days wore on, we would have been able to make use of the

EXECUTIVE SUMMARY

Nurses who volunteered on Sept. 11 expected to treat victims, but the vast majority wound up helping with a variety of other tasks.

- Nurses provided support for rescue workers on ferryboats, and set up eyewashing and first-aid stations near Ground Zero.
- Volunteers sorted incoming donations.
- At a family assistance center, nurses helped individuals obtain information about loved ones, make phone calls, and obtain transportation.

SOURCES

For more information on lessons learned about volunteering after the terrorist attacks, contact:

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thousands of offers of help," notes Pugh.

However, in the future, the ED will only rely on current staff and known volunteers, according to Pugh.

"It was just too difficult and time-consuming to attempt to utilize 'foreign' staff," she says.

• Some nurses became angry that they weren't assigned to the ED.

Many volunteer nurses expressed frustration that they weren't being used "where the action is," says Pugh. "For a myriad of reasons, the ED is the last place that you would utilize unknown volunteers: knowledge, lack of orientation, liability issues to name a few," she adds.

Volunteers should be ready to help in any way needed, not just in ways that are exciting, argues Pugh. "Sometimes the most helpful thing is the most unassuming thing," she says. **(See article on steps to take before you volunteer, right.)**

She gives the following example: About midnight on Sept. 11, Pugh was hungry and was directed to a box of peanut butter-and-jelly sandwiches. "Written on the wax bag was 'God bless you all, Jackie RN.' I will never know who she was, but that was all the help I could have asked for after the first day," she says.

• Volunteer nurses helped in a variety of ways.

Scores of nurses arrived expecting to care for victims, but instead helped in myriad other ways, says Pugh. "There are many areas that nurses can be helpful in that are not necessarily 'traditional,'" she says.

Here are some examples:

— Nurses provided support for rescue workers on ferryboats. "Nurses just stayed on the ferry, going back and forth in their floating first aid station," says Giles.

— Nurses set up eyewashing and first-aid stations for rescue workers near Ground Zero.

— Nurses sorted incoming donations.

— Nurses set up a family assistance unit to help families and friends looking for loved ones, make phone calls, and provide transportation to people who needed to get home.

"It was a great service they did, and they were much more useful than those who went directly to the site," says Giles. ■

Read this before you volunteer at a disaster

When disaster strikes, you may be tempted to make a beeline for the site to offer help — but there are some things you must consider first.

"You can be of great help during a disaster," says **Ann Stangby**, RN, CEN, emergency response planner for San Francisco General Hospital. "However, this needs to be planned for in advance."

Here are ways to increase your effectiveness as a volunteer:

• Go prepared.

Stangby advises bringing the following items:

— your license;

— your credentials and competencies;

— your certification cards;

— your own "work tools," such as stethoscope, ophthalmoscope, and trauma shears;

— uniform or scrubs to wear;

— enough food and medication to last 72 hours.

"Do not bring valuables with you, as storage may be an issue," says Stangby. "Be prepared to prove who you are and what you can do."

• Offer help where it is most needed.

Don't be surprised or disappointed if you do not work in the trenches, notes Stangby. "You will need to support the care of all patients, not just those who were injured in the disaster," she says.

Be ready to perform tasks that are below your scope of practice, says Stangby. "Remember that all roles in a disaster are critical," she stresses. "Hospitals will want to use their own staff in critical areas. You may be an experienced nurse who assists in giving discharge instructions or answering phones."

Two of the less obvious areas that nurses are needed are temporary shelters and refreshment areas, says **Betty Karas Bartolini**, RN, emergency preparedness coordinator at Waterbury (CT) Hospital.

"People may be dehydrated and overtired, and a nurse may insist they rest," she says. "You may also cater to the walking wounded or offer emotional support to friends and family of victims."

• Consider long-term needs.

SOURCES

For more information on volunteering during a disaster, contact:

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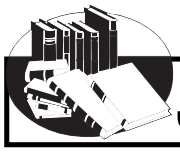
You may be needed to relieve hospital staff after several days, Stangby notes.

"After the San Francisco earthquake in 1989, our ED had with an average health care-worker-to-patient ratio of 3-to-1," she reports.

But as the night wore on and into the next day, some staff could not return, says Stangby. "So many of us who had come to the hospital at the time ended up staying for two to three days straight in order to cover the shifts," she recalls. ■



JOURNAL REVIEWS

Gibler WB, Armstrong PW, Ohman EM, et al. **Persistence of delays in presentation and treatment for patients with acute myocardial infarction: The GUSTO-I and GUSTO-III experience.** *Ann Emerg Med* 2002; 39:123-130.

According to this study, there are four groups at high risk for delays in arrival and treatment for acute myocardial infarction: the elderly, women, diabetics, and minorities.

The study looked at delays of 27,849 patients in two large trials of fibrinolytic therapy: Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries (GUSTO-I), and Global Use of Strategies to Open Occluded Coronary Arteries (GUSTO-III).

The study found that the groups not only arrived to the hospital later, they also received treatment later. Patients with higher levels of occupation, professional occupations, and private health insurance arrived to the hospital sooner and received treatment more quickly.

The researchers recommend the following:

- education of all patients with increased risk for the development of atherosclerosis and myocardial infarction, with special efforts for those at high risk for delays;
- targeting of individual patients instead of relying on mass-media education;
- further education of health care providers on atypical symptoms associated with acute myocardial infarction in elderly patients with diabetes, because this presentation can delay diagnosis and treatment. ▼

Bulloch B, Tenenbein M. **Assessment of clinically significant changes in acute pain in children**. *Acad Emerg Med* 2002; 9:199-202.

EDs should assess whether the method of pain control in children actually gives a clinically significant improvement, says this study from Children's Hospital in Winnepeg, Manitoba, Canada.

The researchers asked 121 children presenting to a pediatric ED with acute pain to rate current pain severity using two standardized pain scales:

- the Color Analogue Scale (CAS), a 10-cm scale that is shaded from white (indicating no pain) to red (indicating the worst pain) with a numerical scale on the reverse side;
- the Faces Pain Scale (FPS), a seven-point scale that uses a line of faces to indicate varying amounts of pain.

After every pain control intervention, the child was asked to rate the pain again.

Of a total of 153 pain comparisons made, only three children complained that their pain got worse. In 20 comparisons, children said it was the same, 60 comparisons reported the pain was a little less, and 71 comparisons reported the pain as much less. This process was repeated until the child was discharged form the ED or had a score of zero.

The researchers conclude that the following are criteria to use to assess whether a child's pain has been managed:

- For a child to state that pain is "a little bit better," a decrease of 2 cm on the CAS or one face on the FPS is required.
- For a child to state that pain is "much better," a decrease on the CAS of 4 cm and on the FPS of two faces is required.

"The assessment and treatment of pain in children are an important component of pediatric practice, whether in the practitioner's office or in the emergency department," the researchers assert. "This study provides health care professionals and clinical investigators the information necessary to assess whether their method of pain control in children is clinically relevant." ▼

May DD, Grubs LM. **The extent, nature, and precipitating factors of nurse assault among three groups of registered nurses in a regional medical center.** *J Emerg Nurs* 2002; 28:11-17.

According to this study from Florida State University in Tallahassee, nurses experience abuse and assaults from family members and visitors just as often as they do from patients.

Of 86 respondents to a survey given to ED, intensive care unit, and floor nurses, ED nurses reported the highest rates of these incidents. All the ED nurses surveyed reported being verbally assaulted, and 82.1% reported being physically assaulted, within the past year.

Here are key findings:

• The most common perpetrators of assault were patients with substance abuse, patients with cognitive dysfunction, and individuals who were angry because of the patient's condition.

• The most common causes of assault by family members and visitors who were angered about hospital policies, the patient's condition, wait times, and the health care system in general.

• Half of the assault or abuse incidences were never reported in writing.

Nurses reported the following interventions as helpful in prevention of future incidents:

• specially trained security staff for high-risk situations;

• training in aggression-reduction techniques and self-defense;

• use of metal detectors at the ED entrance;

• flagging charts of patients who have exhibited violent behavior.

The study also found that many nurses believed that reporting the incident would be time-consuming and not result in any action by managers.

"Nurses do not seem to believe it is necessary to report assault or abuse if there is no evidence of physical injury, as if proof of assault is needed to justify reporting the incident," wrote the researchers.

They recommend the following:

• educating nurses about assault and abuse, including techniques for self-defense, definitions of assault, and aggression-defusion training;

• having clear policies and procedures for assault and abuse against hospital employees;

• making incident reports mandatory for any incidents of abuse or assault, regardless of whether there is evidence of physical injury;

• developing employee assistance programs to provide immediate assistance to employees after an assault or abuse incident. ■

GUEST COLUMN

Here are 4 steps to handle any conflict

By **Tonia D. Aiken**, RN, BSN, JD
President
Nurse Attorney Resource Group
New Orleans

James Aiken, MD, MHA, FACEP
Assistant Professor of Emergency Medicine
Louisiana State University School of Medicine
New Orleans

Patient Smith presents to a busy ED with abdominal pain. Eventually, after delays in getting appropriate lab results, X-rays, and an on-call physician consultation, a decision is made to admit Mr. Smith for observation. Unfortunately, the hospital has no available beds. Six hours later, he is moved to the hallway to clear a bed for other patients awaiting ED evaluation.

The patient and family are extremely upset and become verbally abusive. Sound familiar?

Nurses in all areas are faced with conflict. However, as an ED nurse, you deal with far more incidences of conflict that must be resolved effectively and expediently.

Acute stressors causing conflict in the ED include daily high-acuity patient load, overcrowding, and lack of on-call backup. Other stressors include bioterrorism threats, disasters, patient deaths, and errors in the workplace. These stressors can be emotionally draining, create conflict, and interfere with your ability to function.

If you keep an open mind and attitude, you can create solutions acceptable to all. Here are four steps to resolve conflicts in the ED:

1. Find out exactly what the patients and family members want to happen.

Use the following steps to facilitate discussions:

• Identify differences in perception and interpretations of the facts.

• Have the parties discuss each of their needs.

• Have the parties imagine themselves in the other parties' shoes.

• Lay the ground rules that no one will be blamed for the problem.

• Lay the ground rule that all will be discussed.

• Encourage each side to make proposals that appeal to the other party or satisfy their interests.

• Before beginning, make sure the key players with

authority are a part of the negotiations and discussions.

• Acknowledge the other party's emotions, such as fear or anger. Do not ignore or dismiss the other's feelings.

Symbolic gestures in the form of an apology, removal of a fee for service, or a sincere expression of sympathy or understanding helps to defuse emotionally charged situations.

Maintain open communications in negotiations, mediations and discussions by listening carefully. Focus on the party speaking, and eliminate intrusions such as cell phones, pagers, or telephones.

Summarize points made by the other party and use body language that shows you are hearing what is being said; for example, lean forward, nod your head, and keep your arms in an open position and not crossed over your chest.

2. Listen to what the family and patient are saying.

Often the chaos and noise in the ED exacerbates tension and ill feelings. If possible, bring the patient and family members to a private, quiet area that will diminish anxieties. Demonstrate a true willingness to bring about a solution to the problem.

Try to identify underlying needs such as privacy, confidentiality, or respect that fuels their position. The family may identify a different need than the patient, so be sure to discuss the needs of both parties. For example, the patient in the hallway may be concerned about confidentiality, whereas the family is upset over a perceived lack of respect for their loved one.

Instead of focusing on past events or problems, concentrate on future solutions. Remain open to suggestions and proposals for solutions, such as stricter adherence to policy and procedure for stat work, revamping the system for releasing beds, or developing better communication through staff meetings. Empathize with the patient/family, who subsequently may be more willing to accept other options and solutions.

3. Brainstorm for solutions.

Everyone's suggestions should be considered for a win/win outcome. Refrain from using the terms "but," or "however" because they stop creative problem solving. For example, "I agree that Mr. Smith should be moved into the unit as soon as possible, and . . ." instead of saying, "I agree with what you are saying, *but* . . ."

4. Use objective criteria.

Base your statements on such items such as professional standards, legal precedent, and medical findings. For example: "Mr. Smith's lab work was stat and should have been drawn in 20 minutes. This is based on our policy and procedures and the medical finding that he may have a gastrointestinal bleed."

[Editor's note: The Nurse Attorney Resource Group is a medicolegal educational company that advises nursing schools in developing legal nurse consultant

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Editorial Questions

For questions or comments, call Joy Daughtery Dickinson at (229) 377-8044.

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THOMSON
AMERICAN HEALTH CONSULTANTS

CE*questions*

Please save your issues to take the semester tests in June and December.

[For more information about the CE program, please contact American Health Consultants at (800) 688-2421.]

17. Which of the following is recommended by new guidelines for management of acute headaches from the American College of Emergency Physicians?
A. Only patients with thunderclap headaches should receive a neurological examination.
B. Patients with thunderclap headaches always need emergent angiography.
C. Patients should only receive lumbar puncture if neurological abnormalities are detected.
D. Patients with "thunderclap" headaches and negative computed tomography scan and lumbar punctures do not need emergent angiography.

18. Which is true of the congestive heart failure medication nesiritide, according to Robert Takla, MD, FACEP?
A. The drug decreases urine output.
B. The drug is used with nitroglycerin.
C. The drug is only recommended for patients in Class IV acute congestive heart failure.
D. Patients may improve as quickly as 10 minutes after receiving the drug.

19. Which is true regarding volunteer nurses after the Sept. 11 terrorist attacks, according to Suzanne Pugh, RN?
A. No nurses went directly to the disaster site.
B. Nurses were needed to work in the ED.
C. Nurses set up first aid stations for rescue workers.
D. There was a shortage of qualified nurses to treat patients.

20. Which of the following is true regarding assaults on nursing staff, according to a study published in the *Journal of Emergency Nursing*?
A. Nurses are assaulted by family members and visitors as often as patients.
B. Nurses are mainly assaulted by patients and rarely by family members or visitors.
C. Incidents should only be reported if physical injury occurs.
D. Reporting of incidents should be optional.

programs nationwide. The authors can be contacted at: 81 Yosemite Drive, Suite 100, New Orleans, LA 70131. Telephone: (504) 392-2927. Fax: (504) 392-3298. E-mail: tdaiken81@cox.net.] ■

CE objectives

After reading this issue of *ED Nursing,* the CE participant should be able to:

1. Identify clinical, regulatory, or social issues relating to ED nursing. (See *New guidelines for acute headaches: Here's how your practice will change; New drug should revolutionize CHF treatment; Here are lessons learned from volunteers on 9/11; Journal Reviews* in this issue.)
2. Describe how those issues affect nursing service delivery.
3. Cite practical solutions to problems and integrate information into the ED nurse's daily practices, according to advice from nationally recognized experts. ■

BIOTERRORISM WATCH
Preparing for and responding to biological, chemical and nuclear disasters

Traumatized health care providers may need stress counseling in horrific aftermath of bioterror attack

A severe test for a mentally tough profession

In a finding that is likely relevant to many other states, a recent tabletop exercise in Columbus, OH, found that the health care system may be better prepared to deal with bioterrorism victims than the traumatized frontline providers who give them care.

The exercise was conducted by the Ohio Senior Interagency Coordinating Group in Columbus.

After running a scenario involving intentional release of pneumonic plague at a rock concert, emergency preparedness officials discovered there was little in place to address the mental health needs of doctors and nurses in the horrific aftermath. In the exercise, an attack with *Yersinia pestis* resulted in 332 fatalities, 720 hospitalizations, and 4,300 people who were examined and released.

"How do you handle all of the nurses and doctors who have seen many, many deaths, who have tried to decrease panic by remaining calm, and who have survived this huge confusion and turmoil?" asks **Kay Ball**, RN, MSA, CNOR, FAAN, a participant in the exercise and perioperative consultant and educator at K & D Medical in Lewis Center, OH. "What about their mental health? That is something that we found that we are weak in. We really have to develop that better."

The hypothetical event began Friday, March 15, when a popular regional band performed at Shawnee State University in Portsmouth, OH. Approximately 2,000 students and community members went to see the band, which is known for its use of smoke and visual enhancements, according to the scenario. **(See tabletop timeline, p. 3.)**

"[The terrorists] aerosolized the agent in a fogging system and that is how it was spread throughout the building." says **Darren Price**, exercise training officer with the state of Ohio Emergency Management Agency in Columbus.

The players take their seats

The exercise had four groups of about nine people, each working at different tables as the events unfolded. The groups were health / medical, law enforcement, fire / emergency medical services, and government. An audience of about 150 people was on hand to observe and evaluate the exercise.

"The whole purpose was to determine our strengths and weaknesses through the disaster that happened," says Ball, who served as facilitator and discussion leader of the health / medical group. "The planning committee will meet and analyze what we learned from this, and then we will bring back everybody who participated."

The scenario was divided into three phases: incubation, response, and recovery. Each phase received about an hour of discussion at the tables, and all players received updated information at the same time. **(See tabletop tips, p. 2.)** The scenario was necessarily arbitrary but designed to

This supplement was written by Gary Evans, editor of *Hospital Infection Control*. Telephone: (706) 742-2515. E-mail: gary.evans@ahcpub.com.

test the state's resources at many levels, Price notes.

"Anytime, you are dealing with tabletop exercises there are a lot of assumptions and artificialities built in just to make it flow," he says. "We ask [participants] to bring their emergency operations procedures and plans, and to actually react based upon their plan."

While the exercise is still being analyzed, the mental health needs for medical providers became apparent in playing out the scenario. Part of the problem is the historic perception that health care workers must not succumb to the emotional toll of patient care, Ball says.

"Even in surgery today, if we lose a patient on the table, there is nothing really in place to talk about the trauma the practitioners are going through," she says. "We just think that we are these stalwart people and we can't crumble under emotional strains. That was one of the [identified] weaknesses."

In contrast, firefighters and emergency medical service workers had a more thorough stress debriefing process than their hospital-based counterparts.

"Within the hospitals themselves we really don't have the mental and spiritual health that we need," she says.

Moreover, the scenario projected widespread "psychological manifestations" in the affected area, with students withdrawing from school and residents reluctant to return to their homes. Bioterrorism response planners brainstormed about how to fight the problem, including bringing in celebrities and public officials to show it was safe to return to the stricken area.

The scenario included a short delay in determining the etiological agent, with chaos building before plague was confirmed as the infecting pathogen. Even with the new emphasis on bioterror education, that scenario is fairly realistic because so few clinicians have seen infections caused by the potential bioterrorism pathogens.

"The first problem was what kind of a bug was it?" Ball says. "Where do we send the cultures, and how fast can we get them back?

The scenario also had many students leaving on spring break. Given the anticipated exodus of people from the community — particularly into the neighboring states of Kentucky and West Virginia — there was no attempt to set up mass quarantine areas, Price says. Instead the national stockpile of antibiotics was called up and confirmed or suspect cases were treated and isolated.

"We looked at the issue of quarantine and determined it was not really feasible," he says. "You would have these large [quarantine] circles everywhere. We moved more toward isolation [of patients] at that point."

While identifying a weakness in mental health care, the planners found communications were strong between groups, there were no turf battles, and additional resources became available quickly.

"One of the strengths that we found was that we were able to get supplies in and to call in extra people," Ball says. "We were able to pull in lots of people very rapidly. We are learning how to work more with all of the other diverse factions."

Indeed, the exercise was set in a rural area so that resources would be taxed, reaching thresholds that would trigger state response, Price adds.

"We're better prepared today than we were yesterday," he says. ■

Bioterror tips for running a tabletop

Planners of a recent bioterrorism tabletop exercise in Columbus, OH, **(see cover story for more information)** offered the following tips for participants in the exercise:

- The scenario is plausible, and events occur as they are presented.
- There are no hidden agendas or trick questions.
- All players receive information at the same time.
- There is not a "textbook" solution. Varying viewpoints and possible disagreements are anticipated.
- Respond based on your knowledge or current plans and capabilities.
- Current agency or department policies and procedures should not limit discussion and development of key decisions.
- The outcome is neither intended to set precedents or reflect an organization's final position on specific issues.
- Assume cooperation and support from other responders and agencies.
- Speak up! Talk to your colleagues and ask questions. This is your chance to learn how other agencies in your community would respond in an emergency. ■

Dire straits: Plague released at concert

Tabletop scenario from first case to aftermath

Highlights of a recent bioterrorism tabletop exercise run by planners in Ohio **(see cover story for more information)** included the following timeline of events:

Sunday, March 17, 2002, Portsmouth, OH

8:00 a.m.: At the emergency department (ED) of Southern Ohio Medical Center (SOMC), a doctor has just come on duty and sees her first patient, a 22-year-old woman. The patient's sister says the woman has been complaining of chest pain and has a temperature of 102 degrees F. The sister worries that the patient may have caught the "bug" through her position at the Shawnee State University (SSU) dormitory mailroom where she works part time. A rapid flu test shows a negative result.

The physician is suspicious in light of the national anthrax cases five months earlier and orders a sputum and blood culture. Transport assistance is requested for sending the cultures to the Ohio Department of Health (ODH) laboratory for anthrax testing. The woman is admitted. The Portsmouth City Health Department and Scioto County District Board of Health are notified of the situation. In turn, the ODH and Ohio Emergency Management Agency (EMA) duty officer are called.

2:00 p.m.: The 22-year-old woman admitted to SOMC earlier this morning develops severe respiratory complications and dies. A full autopsy is ordered, and the physician awaits the preliminary results of the sputum and blood cultures. As the day progresses, local emergency medical services (EMS) become overwhelmed with patients presenting with flu-like symptoms. People presenting with the most severe symptoms, including high fever and difficulty breathing, are hospitalized; however, with many more sick waiting in the ED, the hospital beds and wards are filling rapidly.

5:00 p.m.: Traffic around SOMC becomes impassible, and several ambulances are severely hindered. Medical facilities request security assistance from local law enforcement agencies.

10:00 p.m.: Six patients admitted during the day with the severe flu-like symptoms also die. New cases continue to arrive at SOMC with an increase in the number of patients reporting each hour.

Monday, March 18

8:00 a.m.: Overnight, a public health emergency was declared in Scioto County. A request was made by Scioto County Health, via the Scioto County EMA and elected officials for state support in the growing crisis.

A Level 2 emergency status is reached in Scioto County. The state assessment room is activated to support the events in Scioto County.

10:00 a.m.: The preliminary tests of clinical specimens taken from the 22-year-old woman who died Sunday are complete. The ODH Lab notifies the local health departments that the specimens have tested negative for *Bacillus anthracis.* The laboratory begins rule-out testing for other pathogens.

3:00 p.m.: Epidemiological evidence points to an event three days earlier as a common activity of the majority of new patients. On Friday, March 15, a popular regional band performed at SSU in Portsmouth. The band is well known for use of visual enhancements. Approximately 2,000 students and community members attended the concert.

4:00 p.m.: Hospital supplies are insufficient to meet demand. Fifteen additional patients have died, and 111 are listed in critical condition. Reports now include similar symptoms among several health care workers and first responders. SOMC hospital beds are full.

5:30 p.m.: ODH Lab staff notifies Scioto County local health officials that the 22-year-old patient's cultures are preliminarily positive for *Yersinia pestis.* Local health officials inform local health care professionals and EMS personnel that, in order to prevent the spread of disease, patients having confirmed pneumonic plague should be isolated until sputum cultures are negative for *Y. pestis* bacilli.

Those suspected of having pneumonic plague should be isolated for 48 hours after antibiotic treatment begins.

Wednesday, March 27

It has been 10 days since the first victims arrived at SOMC and local clinics. There have been no further cases of illness identified in Scioto County in the past seven days.

Waiting for signs of recovery

Resources begin to flow into the area as a result of national public outreach. Visitors, however, avoid the area and the impact of the event on the local economy becomes apparent as local businesses are slow to reopen.

The psychological manifestations associated with this event are widespread. Although school reopens, many students withdraw from classes for the quarter. Local residents, still frightened and shocked, look to local and state officials for guidance as they attempt to return to normalcy. ■

Winds of war: Researchers track airborne anthrax

A strikingly rapid and wide dispersion

Struck by the surprising level of aerosolization after merely opening an envelope, Canadian researchers are now using a spore surrogate to study how airborne anthrax silently spreads within an office building, *Bioterrorism Watch* has learned.

Researchers are using *Bacillus globigii* spores to simulant the movements of *Bacillus anthracis* in a one-story research building at the Defence Research Establishment Suffield (DRES) at the Canadian Forces Base in Suffield, Alberta, says **Kent Harding,** chief scientist at DRES. "We will be looking at movement between actual offices along corridors using the *B. globigii* as a simulant. It is a spore-like material that is a well-accepted simulant used to assess and challenge biological detection apparatus." The DRES is on the cutting edge of bioterrorism research; scientists there were studying the dispersion of anthrax from envelopes prior to Sept. 11 and its aftermath. In response to an anthrax hoax mailing in Canada in February 2001, the DRES conducted a study last year using an 1,800 cubic foot test chamber to represent an office space. "We had a hoax letter in this country that closed down a major federal office building," he says. "We were interested in [determining] had it been a real infectious material in the envelope, what was the extent of the risk? We went to the scientific literature and really didn't find anything."

It was hypothesized that opening an envelope constituted a "passive form of dissemination" that would produce minimum aerosolization of spores unless additional energy was added via panic behavior or strong airflows, the researchers stated.[1]

"Our scenario was in a chamber, which was conducive to studying the movement of materials on air currents." Harding says. "An individual was given a stack of envelopes and told to keep opening them until powder fell out. When that happened, [he or she] stood quietly by the desk and didn't move for 10 minutes. We just looked at the movement of material around the room, just simply as a consequence of opening the envelope and pulling out a piece of standard 8½ by 11 paper folded in three." Almost immediately upon opening the envelope, a significant aerosol concentration was observed in the area of the "desk." It declined slowly over the 10-minute sampling period, but the high-resolution slit sampler plates used to measure the release became densely packed with bacterial colonies. In the study, significant numbers of respirable aerosol particles were released upon opening envelopes containing 0.1 g or 1.0 g of *B. globigii* spores. A potentially deadly dose could be inhaled within seconds of opening an anthrax spore-filled envelope. Also, the aerosol quickly spread throughout the room so that other workers, depending on their exact locations and the directional airflow within the office, would likely inhale doses. There was very heavy contamination on the back and front of clothing worn by the test subject.

"There was a large dose presented to the person opening the envelope, which was not unexpected," Harding says. "But what was surprising was the very rapid and extensive movement around that room simply as consequence of the movement of normal air currents. It distributed around the room very quickly and in fairly high quantity."

The researchers also found that the spores could escape from a sealed envelope, a phenomenon that caught U.S. investigators off-guard during the 2001 attacks. "We did note that in a standard envelope sealed in the usual way — just with licking the glue on the back of — that there are substantial openings on the back of the envelope," he says. "In fact, the 'envelope people' design them that way so you can get a letter opener inside. Spores did escape from those openings, but we never quantified that and never referred to it to anything more than an anecdotal manner."

The Centers for Disease Control and Prevention (CDC) in Atlanta was apparently unaware of the study during the initial stages of the U.S. anthrax attacks. Whether it would have made any difference is impossible to say, though some wonder if it would have resulted in more aggressive treatment of postal workers.[2] Regardless, the CDC decision to administer antibiotics to a broad range of people, not just those in the immediate exposure area, is reinforced by the study, Hawkins says. The Canadian researchers have now fully briefed the CDC about the study and their ongoing research.

References

1. Defence Research Establishment Suffield. Kournikakis B, Armour SJ, Boulet CA, et al. Risk assessment of anthrax threat letters. September 2001. *Technical Report DRES TR-2001-048*.

2. Brown D. Agency with most need didn't get anthrax data. *Washington Post*, Feb. 11, 2002:A/03. ■