Abstracts for the Scientific and Invited Papers

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Building Connecticut's Clinical Laboratory Surge Capacity to Mitigate the Health Consequences of Radiological and Nuclear Disasters

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Introduction: Biodosimetry, based on the analysis of dicentric chromosomes in circulating lymphocytes, is considered the "gold standard" for estimating radiation injury, and is used to make informed decisions regarding the medical management of irradiated persons.

Objective: This presentation describes the development of biodosimetry laboratory surge capacity for the health consequences of radiological and nuclear disasters in Connecticut, including: (1) establishment of the Biodosimetry Laboratory for the timely assessment of radiation dosage in biodosimetry specimens; (2) identification of clinical laboratories qualified and willing to process biodosimetry specimens from a large number of victims; (3) training of clinical laboratorians in initial biodosimetry specimen processing; and (4) conducting a functional drill that evaluated the effectiveness of these elements.

Methods: Descriptive information was obtained from: (1) personal observations; (2) a needs assessment of clinical laboratories in Connecticut; (3) records from a training program of clinical laboratorians in biodosimetry specimen processing that was developed and provided by the Office of Emergency Preparedness, Yale New Haven Health System; and (4) records from a statewide functional drill in biodosimetry specimen processing that was developed and conducted by the State of Connecticut Biodosimetry Laboratory.

Results: A Biodosimetry Laboratory was established at Bridgeport Hospital in a collaborative program between the Office of Emergency Preparedness, the Yale New Haven Health System, and the Connecticut Department of Public Health. A needs assessment of clinical laboratories in Connecticut identified 30 of 32 clinical laboratories qualified and willing to perform initial biodosimetry specimen processing. Currently, 79 clinical laboratorians in 18 of these qualified clinical laboratories have been trained in biodosimetry specimen processing. A functional drill was conducted, involving 37 of these trained clinical laboratorians in 18 qualified laboratories, as well as the Biodosimetry Laboratory. The average turn around time for biodosimetry specimen processing in this drill was 199 minutes. Drill participants provided feedback which will be used to further optimize biodosimetry specimen processing protocols in Connecticut.

Conclusion: Substantial progress has been made in the development of the necessary elements of clinical laboratory surge capacity for radiological and nuclear disasters in Connecticut.

Keywords: biodosimetry; biodosimetry specimen processing; Connecticut; drill; laboratory

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Modifying the Advanced Disaster Life Support Course's DISASTER Paradigm for In-hospital Emergency Response

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Introduction: According to the American Medical Association's (AMA) Advanced Disaster Life Support (ADLS) course, the word "D-I-S-A-S-T-E-R" may be used as a mnemonic for listing the elements of emergency response. The AMA DISASTER paradigm emphasizes out-of-hospital emergency response and includes the following elements: (1) detect; (2) incident command; (3) scene security and safety; (4) assess hazards; (5) support; (6) triage and treatment; (7) evacuation; and (8) recovery.

Objective: This presentation describes the modification of the ADLS DISASTER paradigm for in-hospital emergency response and its application to hospital emergency preparedness.

Methods: Descriptive information was obtained from observations and records associated with this project.

Results: In 2005, a consensus group of clinical experts in disaster medicine at the Yale New Haven Center for Disaster Preparedness and Emergency Response modified the ADLS DISASTER paradigm for in-hospital emergency response. This hospital DISASTER paradigm has the following elements:

1. detect the event if occult and determine the event characteristics that will modify in-hospital emergency response;
2. inform persons who immediately need to know of the event, activate the hospital emergency incident command system (HEICS) according to pre-determined criteria or judgment, and initiate key critical emergency response elements (e.g., deploying a portable decontamination facility, postponing elective surgical cases, and deploying chemical antidotes to the emergency department;
3. implement safety and security measures (including an assessment of hazards);
4. accommodate arriving patients through surge capacity, assign personnel to various HEICS units, and assess ongoing patient needs and capacity requirements;
5. sort arriving patients (triage) with the first triage question being whether they are contaminated or infectious;
6. treat arriving patients;
7. empty the emergency department (and other hospital areas as needed) through admission, discharge, or secondary distribution to other facilities; and
8. record patient and event data and implement recovery efforts (including mental health services).

This paradigm was used to summarize the complex elements in previously written emergency department emergency operations plans for: (1) trauma and burn emergencies; (2) chemical emergencies; (3) radiation emergencies; and (4) emergencies with pediatric patients (with biological emergencies and emergencies with mental health needs in progress).

Conclusion: The ADLS DISASTER paradigm may be modified for hospital emergency preparedness and may serve as a convenient tool for logically organizing the complex elements of in-hospital emergency response.

Keywords: disaster; education; emergency department; hospital emergency incident command system (HEICS); preparedness
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What is the Threshold Value for Mixed Venous Oxygen Saturation (SvO_2) in Patients with Acute Cyanide Poisoning?

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Introduction: Although cyanide increases mixed venous oxygen saturation (SvO_2) through its blockade of mitochondrial respiration, the diagnostic value of SvO_2 is unclear in patients with cyanide poisoning.

Objective: This study sought to determine SvO_2 in patients with suspected cyanide poisoning before antidotal therapy.

Methods: This was a prospective study of SvO_2 in six patients who were admitted to Lariboisière Hospital with suspected cyanide poisoning. SvO_2 was determined in blood specimens that were collected from Swan Ganz catheters in patients 1, 2, 4, and 5, and femoral veins in patients 3 and 6 before antidotal therapy was administered.

Results: The mean age of the six patients was 39 years of age (SD = 15 years of age). Four patients were comatose, one had altered mental status, and one had normal neurological status. Relevant data are shown in Table 1. The lowest SvO_2 measured was 83.7%. Only three patients had SvO_2 >90%, a threshold suggesting inhibition of oxygen utilization, including two patients with femoral vein samples.

Conclusion: Inhibition of oxygen utilization may be only transient and area-dependent in humans who are severely poisoned with cyanide.

Keywords: cyanide; cyanide poisoning; mixed venous oxygen saturation; oxygen utilization
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Case Report: Cyanide as an Unrecognized Cause of Neurological Sequelae in a Fire Victim

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Introduction: Early and late neurological manifestations of smoke-induced cyanide poisoning are controversial.

Objective: This presentation describes a fire victim with severe cyanide poisoning, but without carbon monoxide poisoning, which resulted in early and late neurological sequelae.

Methods: This is a case report using emergency medical services and hospital records.

Results: A 60-year-old woman was found apneic, pulseless, and comatose at the scene of a fire. Endotracheal intubation and mechanical ventilation were performed and hydroxycobalamin (Cyanokit®) 2.5 g IV was given at the scene. Before hydroxycobalamin administration, carboxyhemoglobin and cyanide levels were 11% and 69 μmol/L respectively. After hydroxycobalamin administration, her blood pressure was 120/80. Further antidotal therapy was not given. The patient gradually awoke over the next several days. On Day 8, she spontaneously opened her eyes and reacted to pain appropriately. On Day 30, choreoathetotic movements and dysarthria appeared, resolving over the course of one month. An extrapyramidal hypertonia, predominantly involving the left upper arm and face, persisted for six months. On Day 7, a magnetic resonance imaging (MRI) of her brain revealed hypointensity on T1-W and hyperintensity on T2-W1 in the putamini, globus pallidi, and caudate nuclei. On Day 17, computerized tomography of her