Results. Compared with the roller pump group, the T-PLS group showed similar or improved effects on hemodynamic and hematologic parameters, including plasma paraquat level. However, there were no significant differences between the groups.

Conclusion. We suggest that hemoperfusion using T-PLS may be an alternative method for the removal of toxic substances in blood.

297 Electrocardiographic Abnormality in Carbon Monoxide–Poisoned Patients
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Study objectives. Carbon monoxide (CO) poisoning is not infrequently treated in the emergency department (ED). In that the heart is one target organ affected in CO ingestions, it follows that the ECG is a potentially important investigation in these patients. We review the ECG findings in patients with CO poisoning with correlation to the clinical presentation.

Methods. Consecutive ED patients with CO poisoning identified by toxicology service medical records represent the study group. Criteria for inclusion included pathologically abnormal CO serum level and ECG performed within 6 hours of presentation. Medical records and ECGs were reviewed; the ECG reviewers were blinded to the other medical data. Three emergency physicians reviewed the ECGs for rhythm and morphologic features.

Results. Twenty-six patients met entry criteria and were used for data analysis. The mean age of the patients was 36.4 years. The ECGs demonstrated abnormality in 15 cases (56.7%). Mean serum CO and troponin values were 23.0 mg/dL and 0.60 mg/dL, respectively. ECG findings included rhythm disturbances (sinus bradycardia, 2 (7.7%)) and sinus tachycardia, 4 (15.4%)) and morphologic abnormalities (prolonged PR interval, 0; widened QRS complex, 4 (15.4%); prolonged QT interval 2 (7.7%); ST segment depression, 4 (15.4%); ST segment elevation, 3 (11.5%); and T wave inversion, 10 (38.5%)). Morphologic ECG findings involving the ST segment and T wave more often occurred in the anterior distribution (<P<.0001). Patient age, increasing serum CO level, and increasing serum troponin values were all associated with greater degrees of ECG abnormality (<P<.0001 for all comparisons).

Conclusion. ECG abnormality is frequent in patients poisoned with CO. Such abnormalities most often involved the ST segment and T wave, features associated with acute coronary ischemia. Dysrhythmias were rare and, if encountered, benign in nature. An abnormal ECG was more often found in patients with increased age and higher serum CO and troponin values.

298 Therapeutic Effects of Glucagon on Carbon Monoxide Poisoning
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Study objectives. Carboxyhemoglobin (CO) poisoning is the presumed leading cause of poisoning deaths in the United States. Traditional treatment modalities for CO poisoning involve around hyperbaric oxygen therapy to reduce the half-life of the CO-hemoglobin association in the blood. Normal physiologic processing of the small amount of CO naturally produced in the body is regulated by at least 2 mechanisms that decrease the affinity of CO for the heme molecule. One pathway involves the amino acid histidine, which, in proximity to the heme-CO complex, causes dissociation through steric hindrance. The second pathway involves bisphosphoglycerate (BPG), an intermediate in glycolysis and gluconeogenesis. When BPG binds to heme, the affinity for CO is decreased, shifting the oxygen-dissociation curve to the right. Glucagon contains a distal histidine and increases BPG levels by 2 enzymatic pathways. Treatment of CO poisoning with glucagon is a proposed novel therapeutic approach for rapidly decreasing CO blood levels by increasing steric hindrance of the heme-CO association and by production of BPG, which decreases the affinity of heme for CO. We seek to assess whether therapeutic doses of glucagon will significantly reduce peripheral blood CO levels in a timely manner.

Methods. A prospective controlled study was completed using 8 Sprague-Dawley rats and 15 CD-1 mice. The animals were individually exposed to high CO levels in a sealed chamber until the primary sign of seizures was observed, indicating CO toxicity. Carboxyhemoglobin concentrations were obtained from the saphenous vein before and after exposure. The animals were then treated with intraperitoneal saline solution (control) or intraperitoneal glucagon (0.1, 0.5, 1.0, 20 mg/kg), and CO blood levels were measured at 5, 10, 20, 30, or 60 minutes after exposure.

Results. Glucagon at different dose levels during the specified time interval showed no statistically significant reduction in blood carboxyhemoglobin levels in either the rat or mouse population (P=22 and P=80, respectively).

Conclusion. Whereas hyperbaric oxygen therapy is not always readily available and carries the risk of serious side effects such as seizures, other treatment modalities for CO poisoning need to be examined. Although it initially appears that glucagon therapy is not singularly effective in treating CO poisoning, the biochemical properties of glucagon in conjunction with other treatment modalities and in other subject groups warrants further investigation.

299 Gastric Decontamination in the Emergency Department: What Is the Consensus?
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Study objectives. Poison centers have improved care of the acute or chronically poisoned emergency department (ED) patient by allowing rapid access to toxicology experts. In 1997, the American Academy of Clinical Toxicology published a position statement for gastric decontamination. Syrup of ipecac is not recommended in the ED, and it was noted that the clinical benefit of gastric lavage has “not been confirmed in controlled studies.” Additionally, “activated charcoal should not be routinely administered” but “may be considered if a patient has ingested a potentially toxic amount of a poison up to 1 hour previously.” Although some minor variation in recommendations would not be unusual according to clinical preferences, consistent poison center recommendations are generally expected. We compare recommendations from different poison centers about decontamination of 4 hypothetical patients (A: 3-year-old child ingested 2 Elavil capsules 20 minutes earlier, B: 14-year-old patient with unknown quantity of Tylenol 3 ingested 2 hours earlier who is drowsy and arousable to pain, C: 4-year-old child with 2 Procardia XL ingested 2 hours earlier, and D: 4-year-old child ingested 6 oz albuterol 1 hour ago with pulse rate of 160 beats/min).

Methods. Using toll-free access route, 41 of 50 US poison centers were contacted. After informed consent, each was asked their recommendation for ED management in these hypothetical and scripted cases.

Results. There were no ipecac and 2 gastric lavage (C, D) recommendations. For case A, 95% (39/41) recommended charcoal, 2 recommended no decontamination (<P<.001). For case B, 56% (23/41) recommended charcoal and 44% (18/41) no decontamination (P=NS). For case C, 80% (33/41) recommended charcoal and 20% (8/41) no decontamination (<P<.001). Whole bowel irrigation was also suggested in 20% (8/41) for case C. For case D, 49% (20/41) recommended charcoal and 49% (20/41) no gastric decontamination (P=NS).

Conclusion. Because there seems to be a fair amount of inconsistency in the use of charcoal in acute ingestion, further studies for or against its use may be helpful.
Results: Ciprofloxacin, doxycycline, and amoxicillin use per thousand in October 2001 was 5, 14, and 3.5, respectively. Compared with the year before the anthrax bioterrorism incidents, the number of patients in October 2001 with 1 or more filled prescriptions was 29% higher for ciprofloxacin (95% CI 26% to 33%), 29% higher for doxycycline (95% CI 24% to 33%), and 3% higher for amoxicillin (95% CI 2% to 5%). Compared with the year after the anthrax bioterrorism incidents, the number of patients in October 2001 with filled prescriptions was 19% (95% CI 17% to 22%), 10% (95% CI 7% to 13%), and 13% (95% CI 12% to 15%) higher for ciprofloxacin, doxycycline, and amoxicillin, respectively. Although the increase was more pronounced in the states that were directly affected by the alert, a statistically significant higher rate of use of these drugs in October 2001 was also observed in the nonantrax states.

Conclusion: Despite the limited areas of the anthrax bioterrorism incidents, October 2001 witnessed a nationwide, historic increase in filled prescriptions for antibiotics involved in anthrax postexposure prophylaxis. This information may help understand the public perception and reaction to risk associated with bioterrorism events.

Study objectives: Although it is clear that, over large distances, damage from an earthquake decreases as the distance from the epicenter increases, this may not be true within the immediate disaster zone (near-field). Nonetheless, it is frequently assumed that hospitals near the epicenter will be damaged, whereas those farther away will be spared. In addition, many believe it is safe to transfer patients evacuated from damaged hospitals to facilities located farther away from the epicenter but still within the area of active shaking. This study examines these assumptions by evaluating the impact of epicenter distance and ground motion on hospital evacuation and closure for structures close to the epicenter in the Northridge earthquake and identifies how this affects transfers of evacuated patients.

Methods: This is a retrospective case-controlled observational study of all hospitals reporting off-site evacuations or permanent closure because of damage from the January 17, 1994, Northridge earthquake. Hospitals selected as controls were randomly identified from facilities that did not evacuate. The epicenter-to-hospital distance for nonevacuated facilities could not exceed the maximum value of the mean epicenter-to-hospital distance for evacuated hospitals (study group). The mean epicenter-to-hospital distance for evacuated hospitals reporting off-site evacuations or permanent closure in the near-field: Implications for Patient Evacuation

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Study objectives: To evaluate the impact of epicenter distance and ground motion on hospital evacuation and closure because of damage from the Northridge earthquake and to identify how this affects transfers of evacuated patients.

Methods: This is a retrospective case-controlled observational study of all hospitals reporting off-site evacuations or permanent closure because of damage from the January 17, 1994, Northridge earthquake. Hospitals selected as controls were randomly identified from facilities that did not evacuate. The epicenter-to-hospital distance for nonevacuated facilities could not exceed the maximum value of the distance for evacuated or condemned hospitals. This distance defined the near-field. Peak ground acceleration (PGA) was calculated for each hospital from the Trinet ShakeMap data. Significance was determined using the 2-sided Wilcoxon test.

Results: Ninety-one acute care hospitals existed in Los Angeles County at the time of the Northridge earthquake. Eight hospitals evacuated patients (study group), 4 of which were condemned. These were matched with 8 hospitals that did not evacuate patients (control group). The mean epicenter-to-hospital distance for evacuated facilities is 10.2 miles (95% CI 3.5 to 16.8), whereas that for nonevacuated facilities is 13.6 miles (95% CI 8.6 to 18.7). The difference in the means is –3.5 (95% CI –11.1 to 4.1; P=.32). The PGA had a mean of 0.71 g (95% CI 0.56 to 0.87) for study hospitals and a mean of 0.39 g (95% CI 0.27 to 0.52) for control hospitals. The difference in means is 0.32 (95% CI 0.14 to 0.50; P=.02).

Conclusion: There is no significant difference in distance from the epicenter for either evacuated or condemned facilities and control hospitals. Epicenter distance cannot be used to predict which hospitals will be damaged or whether patients can be evacuated from facilities in the near-field. Three of the 4 condemned hospitals were located at a distance farther than the epicenter from the epicenter in the study group. PGA is a superior indicator of the potential for hospital damage and evacuation. Patients should be transferred to facilities in areas of lower recorded PGA.

Study objectives: There is no symptom-based civilian triage protocol for bioterrorism victims. To that end, we developed a laminated triage algorithm foldout card with 4 goals: (1) maximize recognition of victims; (2) minimize secondary contamination; (3) teach principles of dirty resuscitation; and (4) expedite treatment of agents requiring early antidotes. The target audience includes any health care provider who may first contact a victim. We describe the card development and report the results of our pilot testing using the card to triage theoretical patients. We tested the use of the card in those who have taken our 1-day Advanced Bioterrorism Triage Course (which includes the card) and those who have not taken the course to ascertain whether the card can be used effectively with and without the course.

Methods: The initial card algorithms were developed using high-quality references from military and civilian sources. An exercise was then conducted, during which theoretical individual patients from a CD-ROM simulator (Bioterrorism Simulator 2002, Aneasoft Corporation, Issaquah, WA) were used to test those patients’ flow through the algorithms. The algorithms were adjusted during this process until all the patients would flow through satisfactorily. There is an “attack” card that begins with “overt” versus “covert” attacks. The card proceeds to “stable patient” versus “unstable patient” and then flows to sections on dirty resuscitation, chemical agents, biological agents, bomb/blast, and radiation dispersal devices. Experts from multiple relevant fields (infectious disease, trauma, toxicology, disaster medicine, emergency medical services, and military chemical weapons response) reviewed and commented on the card to add face validity. To test the usability of the card, a series of 26 paragraph-length paper scenarios were created. The termination points on the “attack” card and the final cards were labeled. After reading each scenario, the participants were asked to note the “attack” card termination point and the final card termination point to capture how the individual would have triaged the patient. The scenarios were designed so that there would be 3 scenarios for each attack card termination point. The scenarios were also designed with a proposed difficulty index of easy, medium, and difficult scenarios. The participants were attending physicians and emergency residents. All participants were given a 1-page instruction sheet with 1 example. The answers of those taking the test were compared with the consensus answers developed by the 3 primary investigators. The proportion of correct answers in the training versus no-training groups was compared using the z test for correlations (using Fisher’s transform for correlations). Results: There were 8 attending physicians and 6 residents in the no-training group (N=14) and 3 attending physicians and 13 residents (N=16) in the trained group. The overall percentage of correct answers on the attack card was 79% for the no-training group and 79.8% for the training group (P=.60). The percentage of those correct for the final card termination point had a variable N because one had to test the “attack” card to have an opportunity to answer the final card point correctly. According to that variable N, the no-training group had 77.8% correct and the training group had 78.3% correct (P=.92). The attack card test items that showed the greatest percentage increase with training was the decision to go to dirty resuscitation (19.8% improvement) and botulism symptom recognition (17.3% improvement). The overall test percentages achieved are consistent with a moderately difficult testing instrument. We were unable to show good correlation between items the investigators thought would be difficult and those that were proven difficult by the test.

Conclusion: The Advanced Bioterrorism Triage Card proved to be successful at assisting theoretical triage decisions with and without formal training in its use. The card includes a symptom-based civilian triage protocol for bioterrorism victims. Future studies will include a revised testing instrument and observational studies of field use during mass casualty drills.

Study objectives: We assess the training and preparedness of the volunteer fire departments in western New York to deal with incidents involving weapons of mass destruction (WMDs).

Methods: A survey was developed and mailed to the 238 volunteer fire companies of the 8 counties of western New York (Erie, Niagara, Chautauqua, Cattaraugus, Allegany, Genesee, Orleans, and Wyoming). The surveys were number coded to protect the identity of the responding company and were sent to the attention of the