being use to assess and to follow-up on stable patients with blunt abdominal trauma concern for solid organ (liver, spleen, kidneys) damage, particularly in low-energy injuries [Afag A et al. *Eur J Emerg Med*. 2012].

Spinal Boards for Spinal Immobilization Prove Harmful

Written by Mary Beth Nierengarten

One million spine injuries occur annually, and 2% to 3% are spinal cord injuries [Hauswald M. *Emerg Med J*. 2013]. For patients with suspected spinal injury, the use of spinal boards for spine immobilization confers no benefit [Oteir AO et al. *Prehosp Disaster Med*. 2014] and may cause harm [Goldberg W et al. *Ann Emerg Med*. 2001]. Christopher B. Colwell, MD, Denver Health Medical Center, Denver, Colorado, USA, reviewed the current evidence on the use of spinal boards for spinal immobilization.

Dr Colwell noted that the traditional use of spinal boards for spinal injuries is based on a set of beliefs that additional movement in people with suspected spinal injuries may exacerbate or cause injury and that immobilization can prevent further injury.

However, data used to support this dogma are not based on solid evidence. Dr Colwell highlighted the lack of evidence from randomized clinical controlled trials to support the recommendation to use backboards and cervical-collars (c-collars) for trauma patients with signs and symptoms of spinal injury made in the 1971 guidelines by the American Academy of Orthopedic Surgeons.

For patients with a penetrating trauma, such as a gunshot wound, Dr Colwell emphasized that the evidence clearly shows that spinal immobilization is harmful and doubles the mortality rate [Haut ER et al. *J Trauma*. 2010]. Because of the increased mortality rate due to delayed resuscitation, the American Academy of Neurological Surgeons recommended against spinal immobilization in patients with penetrating trauma [Theodore N et al. *Neurosurgery*. 2013]. Dr Colwell provided further evidence that spinal boards have harmful consequences, such as respiratory compromise and increased pain (Table 1).

Harm is also associated with c-collars [Ben-Galim P et al. *J Trauma*. 2010], and there is evidence to suggest that routine use of c-collars can be safely avoided [Sundstrøm T et al. *J Neurotrauma*. 2014].

For those looking for a way to safely transfer a patient from the pram to the hospital bed, research has shown that scoop stretchers can restrict motion as well as long boards [Del Rossi G et al. *AmJ Emerg Med*. 2010]. Evidence has demonstrated that controlled self-extrication had up to 4 times less spine movement [Dixon M et al. *Emerg Med J*. 2013].

Table 1. Evidence for Harm With Spinal Boards

Harm	Evidence
Respiratory compromise	Walsh M et al. *Ann Emerg Med*. 1990; Bauer D et al. *Ann Emerg Med*. 1988
Pressure sores and tissue hypoxia	Ham HW et al. *J Trauma*. 2014; Hemmes B et al. *Injury*. 2014; Oomens CW et al. *Clin Biomech (Bristol, Avon)*. 2013; Berg G et al. *Prehop Emerg Care*. 2010
Increased pain	Lerner EB et al. *Prehosp Emerg Care*. 1998; Chan D et al. *Ann Emerg Med*. 1994
Increased radiation	March JA et al. *Prehosp Emerg Care*. 2002
Increased pain, increased radiation, increased admission in pediatric patients	Leonard JC et al. *Prehosp Emerg Care*. 2012

Given the evidence, Dr Colwell concluded that change is needed regarding the traditional use of spinal boards for spinal immobilization and emphasized that if a medication had the same risk/benefit ratio as spinal boards, it would no longer be used.

Diagnosis and Treatment of NSTEMI in 2014

Written by Emma Hitt Nichols, PhD

Acute coronary syndromes (ACSs) affect > 780 000 individuals in the United States each year, 70% of which cases will be NSTEMI [Amsterdam EA et al. *Circulation*. 2014]. Tarlan Hedayati, MD, Cook County Health and Hospitals System, Chicago, Illinois, USA, discussed updates in the treatment of NSTE-ACS based on the 2014 American Heart Association / American College of Cardiology guideline for the management of patients with NSTE-ACS [Amsterdam EA et al. *Circulation*. 2014].

NSTE-ACS includes NSTEMI and unstable angina (UA). The difference between the 2 is the myocardial necrosis that occurs in NSTEMI, which can be identified by an increase in biomarkers caused by myocyte death. However, troponin levels are elevated not only in patients with myocardial infarction (MI) but also in those with other conditions, such as tachycardia, trauma, heart failure, pulmonary embolism, burns, drug toxicity, respiratory failure, and neurologic diseases. Therefore, a history and clinical exam are important in the diagnosis of NSTEMI. Elevated troponin levels may be present for up to 2 weeks after the index event, but a

>20% increase over prior troponin levels may indicate reinfarction.

Patients with NSTEMI should receive initial treatment of 162 to 325 mg of aspirin or a loading dose of clopidogrel if they cannot tolerate aspirin. In addition, patients should receive nitrates and may require oxygen if their oxygen saturation is <90%. Patients expected to undergo early invasive therapy should receive a $P2Y_{12}$ receptor inhibitor, such as clopidogrel or ticagrelor, in addition to aspirin [Amsterdam EA et al. *Circulation.* 2014]. For patients with UA or NSTEMI who will receive conservative therapy, $P2Y_{12}$ receptor inhibition should be administered upon admission.

Clopidogrel is a prodrug that requires a 2-step process to produce the active metabolite that elicits antiplatelet activity. Some patients harbor a polymorphism in 1 of the metabolic enzymes required for this transformation, and in these patients, the benefit of clopidogrel therapy is attenuated. In contrast, ticagrelor is the active agent and does not require biotransformation.

The PLATO trial [Wallentin L et al. *N Engl J Med.* 2009] evaluated ticagrelor in >18 000 patients with ACS, with a primary end point of cardiovascular death, MI, and stroke at 12 months. Patients treated with ticagrelor experienced a lower rate of cardiovascular death, MI, and stroke, without an increase in major bleeding. However, patients with a body weight <60 kg and normal biomarker levels did not experience a benefit from ticagrelor when compared with clopidogrel. Patients in North America who received ticagrelor also did not demonstrate an improvement regarding the primary end point when compared with clopidogrel; however, it is believed that the higher aspirin dose that is administered in North America may have negated the advantage of ticagrelor.

In addition to dual antiplatelet therapy (DAPT), patients with UA or NSTEMI who are expected to undergo invasive therapy should receive glycoprotein IIb/IIIa inhibition with intravenous eptifibatide or tirofiban [Amsterdam EA et al. *Circulation.* 2014]. Anticoagulation should also be initiated. In patients who are undergoing an invasive strategy, bivalirudin, unfractionated heparin (UFH), or enoxaparin should be administered, whereas in patients who are undergoing conservative therapy, enoxaparin or fondaparinux is preferred over UFH.

An early invasive strategy is typically performed in patients with UA or NSTEMI if they are high risk according to the TIMI criteria. In the TIMACS study [Mehta SR et al. *N Engl J Med.* 2009], early vs delayed percutaneous coronary intervention (PCI) was evaluated in >3000 patients with NSTEMI with a primary outcome of death, MI, and stroke. There was no significant difference in the primary outcome among the 2 arms of the study ($P=.15$). However, early PCI was associated with a significant decrease in the secondary outcome of death, MI, and refractory ischemia (HR, 0.72; 95% CI, 0.58 to 0.89; $P=.003$). In this study, high-risk patients experienced a benefit from early PCI, but medium- to low-risk patients did not.

In conclusion, once NSTEMI is diagnosed, all patients should be treated with DAPT and anticoagulation. Beyond that, risk stratification should be performed to determine if an early invasive therapy should be initiated.

New Substances That Cause New Overdoses

Written by Phil Vinall

Mark B. Mycyk, MD, Cook County Health and Hospitals System, Chicago, Illinois, USA, advised that clinicians learn to recognize the latest trends in toxicological emergencies, identify easily missed toxicological complications, and develop a rational emergency department (ED) approach to new sources of overdose.

Several common household items have been reported to cause serious effects when taken in excess. For example, massive ingestion of soy sauce has been reported to cause hypernatremia [Carlberg DJ et al. *J Emerg Med.* 2013]. Excessive intake of Diet Coke led to seizures and hyponatremia [Mortelmans LJ et al. *Eur J Emerg Med.* 2008].

Laundry detergent pods are among the newer household items that can cause potentially serious effects [Scharman EJ. *Clin Toxicol (Phila).* 2012]. According to one study, when ingested, they can lead to gastrointestinal, neurologic, and metabolic toxicity [Smith E et al. *J Med Toxicol.* 2014]. Despite the absence of oral erythema, ulcers, or swelling, of the 3 patients who ingested laundry detergent pods, all developed some degree of esophageal injury. Another study showed that the most significant clinical characteristics of children aged ≤5 years exposed to laundry pods were vomiting and drowsiness/lethargy ($P<.001$ for both; Table 1) [Centers for Disease Control and Prevention (CDC). *MMWR Morb Mortal Wkly Rep*. 2012].

Another newer item with potential for harming children is liquid nicotine. Following reports of children overdosing on this form of nicotine used in e-cigarettes [Chatham-Stephens K et al. *MMWR Morb Mortal Wkly Rep.* 2014], pediatricians are calling for childproof packaging.

Indeed, half of all poisonings occur in children aged ≤5 years. Buprenorphine, which is taken for the