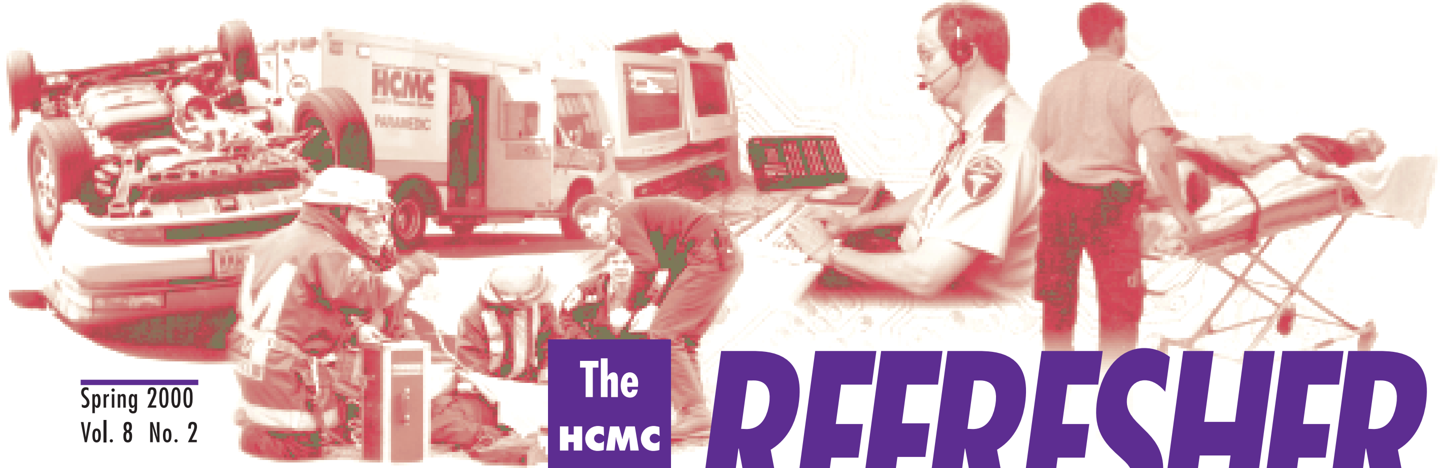

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Hennepin County Medical Center EMS Education
and Public Relations Departments

The HCMC REFRESHER

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Initial Response Vehicles: An Urban Study

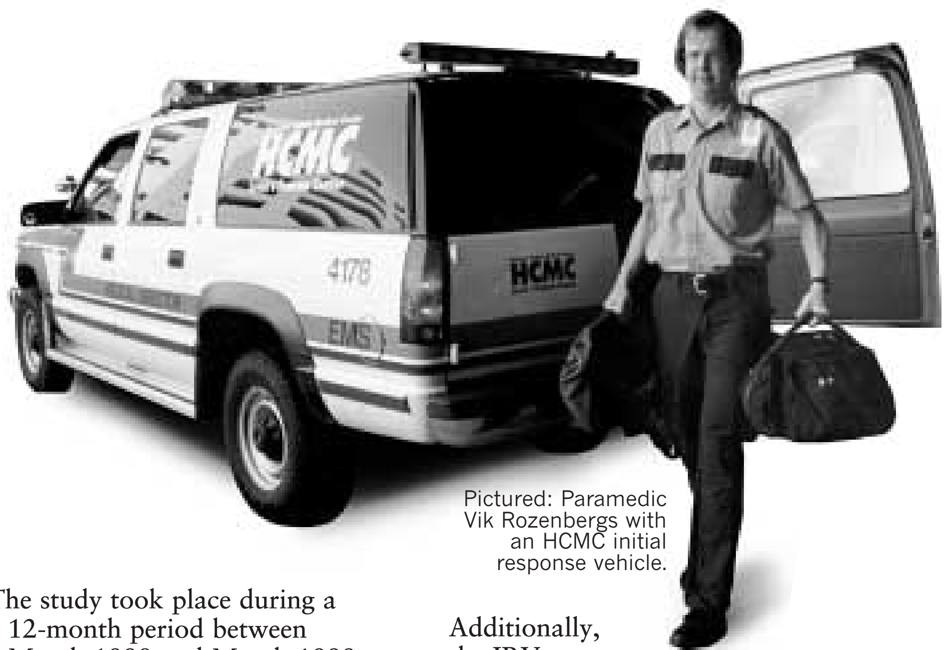
by Mendee Bayless-Tarnowski, NREMT-P, EMS Education Specialist

Due to high patient volume and varied types of calls, Hennepin County Medical Center's ambulance service frequently participates in studies involving both patient care and operational issues. Most recently, HCMC studied the operational effects of an initial response vehicle (IRV) when used within an urban EMS service area. Though IRVs are not a new idea, their use has been limited primarily to rural areas where budgetary, geographic, or personnel limitations make delivery of ALS care a challenge.

Ambulance services have begun to experiment with more cost-effective methods of operation, while continuing to provide quality prehospital care. Though initial response vehicles have been utilized in some rural areas with success, their effectiveness in an urban setting has not yet been established. That was the purpose of the study, which was funded in part by a grant from the Metropolitan 911 Board.

The parameters for the study were as follows:

- The IRV consisted of an ambulance service-owned vehicle equipped with clearly visible markings and state-approved lights and a siren device. It was also equipped with state and county required ALS equipment, but had no transport capability.
- Staffing consisted of either a paramedic or an EMS physician.
- The vehicle was randomly staffed during known peak run volume intervals. For HCMC, these hours are 11 a.m.– 11p.m. Sunday through Thursday, and 11 a.m. – 2 a.m. Friday and Saturday.
- The study took place during a 12-month period between March 1998 and March 1999.
- The IRV's responding area was limited to that portion of HCMC's primary service area with the highest call volume.



Pictured: Paramedic Vik Rozenbergs with an HCMC initial response vehicle.

Only one IRV was in operation at any given time. The vehicle was posted at a central location within the primary service area. The ambulance service dispatch center was then notified of the IRV's location and availability and could simultaneously dispatch the IRV and the nearest ambulance. In the HCMC system, all ambulances are ALS staffed and equipped. In addition, the IRV operator monitored the radio at all times and had the option of notifying dispatch when the operator wished to co-respond to a call with the ambulance.

During the 12-month study, a total of 435 IRV runs were recorded. Average response times for the IRV was 5.6 minutes, and 6.9 minutes for the co-responding ambulance. The IRV was able to cancel the ambulance 60 times, resulting in a cancellation rate of 13.8%.

Additionally, the IRV operator was able to downgrade the responding ambulance from lights and siren (Code III) to a routine response (Code II) 20% of the time. (Further data was collected, but those results were unavailable at the time this article was written.)

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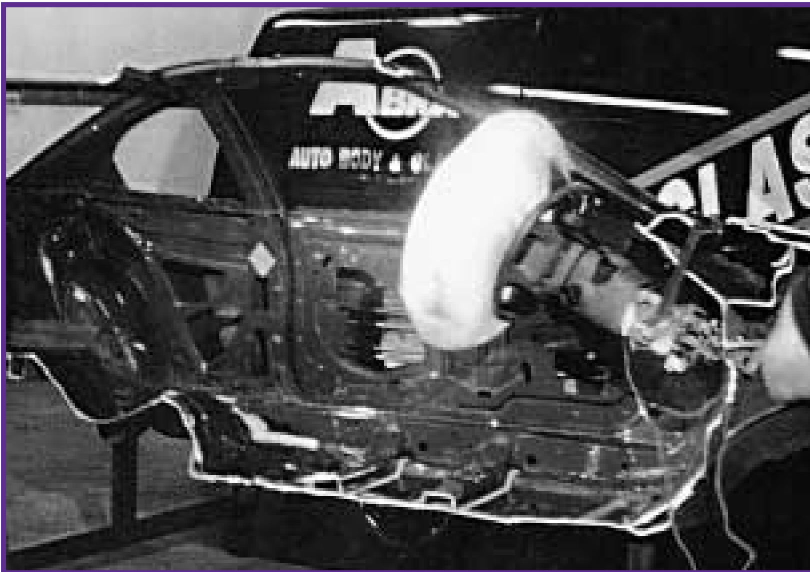
EMS Week was May 14–20

HCMC would like to take this opportunity to salute EMS providers. Thanks for continuing to provide outstanding patient care.

New Look for the REFRESHER

We've designed a new face for the newsletter reflecting the many facets of our readers.

Air Bags: They're not just full of hot air



by Diane Ranzau, EMS Education Specialist

Air Bags! We see them in commercials, on TV news magazine shows, and in the movies. They are depicted either as lifesavers allowing you to walk away without a scratch no matter how horrific the accident, or as causes of injury or death during deployment. There is a lot more to air bags than just a lot of hot air.

Air bags are a supplemental restraint system (SRS) and have been required in all new passenger vehicles since 1998. They are designed to supplement, not replace, safety belts and harnesses. Most current air bags are designed for single impact only and are not designed to deploy in many types of crashes (rollovers, angled frontal impact, rear end and side impact) simply because they wouldn't help prevent injuries in those circumstances.

An air bag will deploy in a frontal collision of 8–17 mph if 2 of the 3 sensors are activated. Inflation of the bag is loud and sudden, taking only 3/10 of a second (moving at a rate of 98 to 300 mph) from the moment the sensors detect a collision to full deployment of the bag. Rescue personnel who arrive immediately after an air bag deploys may see smoke and powder inside the vehicle. The powder is usually cornstarch or talcum powder used to coat the inside of the bag to prevent it from sticking together during storage and to ease inflation. The smoke is produced by the combustion of chemicals within the inflator module. The heat generated from combustion is slightly warmer than air as it exits a hair blow dryer.

The powder and products of combustion have not been shown to have any significant health effects, however the powder may exacerbate respiratory conditions and irritate the eyes. Prolonged exposure may require flushing of the eyes.

Deployed air bags are not dangerous. Use standard rescue procedures and equipment. However, undeployed air bags do pose a threat to vehicle occupants and rescue personnel. Although it is rare, an air bag can deploy during rescue operations. A few simple steps can be taken to minimize risks. Identify the presence of an undeployed bag and turn off the ignition without putting your body in front of it.

If a vehicle has air bags, the initials SIR, SRS, SIPS (most commonly) should be printed on the steering wheel hub, instrument panel, dashboard, windshield, sun visor or VIN tag. Vehicles with side air bags may have these initials on the driver side B pillar or on the side or back of the seat. Move the occupant's seat away from the air bag. Disconnect the power to the air bag system by disconnecting or cutting both battery cables (negative first). Be aware of possible "bounce back," which can reactivate the sensors. (Cables tend to spring back to their original position and can re-establish an electrical connection.)

Unplug all accessories such as cell phones and anti-theft systems, etc., that can bleed back power to the electrical system. The static electricity created by sliding across the seat is enough to create the 1/2 milliamps it takes to power the sensors. If time permits, wait until the air bag system deactivates. This may take from one to 30 minutes (most take less than 10 minutes) depending on the model of the vehicle. It is always wise for rescuers to stay out of the potential deployment path of an air bag, even if you believe it has been deactivated.

The U.S. Department of Transportation National Highway Traffic Safety Administration has published "Emergency Rescue Guidelines for Air Bag Equipped Vehicles." It suggests:

Look Beyond the Obvious – Check the *S.C.E.N.E.*

In crashes, serious internal injuries may be present but not be externally apparent. To address this situation and increase the chances that these crash victims receive timely and appropriate emergency care, look beyond the obvious. The following information should be collected and reported to medical personnel to alert them to check for internal injuries:

*S*teering wheel deformation. Lift the air bag and look for a bent steering wheel rim. This could indicate internal injuries.

*C*lose proximity of the driver to the steering wheel. Occupants of small stature or large girth sitting close to the steering wheel are at greater risk of internal injuries.

*E*nergy of the crash. Twenty or more inches of vehicle crush indicate high crash forces that can cause serious internal injuries.

*N*on-use of seat belts. Non-use of lap or lap/shoulder belts could result in multiple impacts and greater probability of internal injuries.

*E*ye-witness reports. Verbal reports, photos, and video images of the interior and exterior of the crash vehicle graphically convey the severity of the crash, and can indicate the probability and type of internal injuries. Remember these important points by using S.C.E.N.E.

While deployed air bags are safe, undeployed air bags ALWAYS pose a risk to patients and rescuers. Stay out of the deployment path.

continued on page 4

You Be the Judge:
Is it Trauma or is it Medical?

by Rachel Knudson-Ballard, R.N., B.S.N., EMS Education Specialist

The page goes out: Respond to a personal injury accident with unknown injuries.

You arrive at the scene of an off-set, head-on collision involving a small car and a Chevy Suburban and find a patient supine on the pavement with Police First Responders assisting ventilations.

Witnesses report that the patient was slumped over his steering wheel at the time of the low-speed collision (25-30 mph zone). After the collision, witnesses state he was alert and sitting in his car complaining of neck pain. Inspection of the vehicle revealed moderate front-end damage and a bent steering wheel. It is believed, but unconfirmed, that the patient was not wearing his seatbelt. Firefighters found the patient not breathing and pulseless.

What is your general impression? Is this a traumatic arrest or a medical arrest? What are the treatment priorities at this time?

Firefighters had pulled the victim from the small vehicle, initiated CPR while police continued ventilations, and then placed the AED. They report that no shock was indicated by the AED, and the patient regained his pulse just prior to your (ALS) arrival.

Initial assessment of the patient reveals the patient has a pulse but is not breathing on his own. Firefighters continue positive pressure ventilations at a rate of 12 per minute. His Glasgow Coma Score (GCS) is three. You attempt to insert an oral airway and the patient gags on it. You then attempt a nasal airway and the patient denies it as well. You place a c-collar and long backboard and transfer the patient to the ambulance. Vital signs reveal a BP of 110 palpated with a heart rate of 48.

Is this patient's airway secure? Is he perfusing adequately? What are your treatment priorities now?

You note the patient is breathing on his own at a rate of 60 breaths per minute but continue assisting ventilations without difficulty. You are concerned about the slow heart rate and rhythm (atrial fibrillation with slow ventricular response) so you start an IV of normal saline and place pacer pads. You then contact medical direction, and the physician on duty orders 1 mg. atropine IV, which is promptly administered.

Twelve minutes after arriving on the scene, you leave for the hospital. Following the atropine, there is no improvement in the patient's heart rate, and subsequent vital signs are BP of 90 palpated, HR of 40, and RR of 60. You elect to use the external pacemaker at a rate of 80 beats per minute (bpm) and run the IV fluids wide open. Shortly thereafter, his blood pressure improves.

A visual survey of the patient for obvious trauma reveals no gross deformities. Eight minutes after leaving the scene, the patient is responding to voice and answers questions upon your arrival to the local hospital (25 minutes after being dispatched). You turn patient care over to the Emergency Department staff.

Upon arrival in the stabilization room, the patient's GCS was 15, BP was 145 systolic and heart paced at 80 bpm. He later dropped his BP to 69/45, HR to 106, and RR to 40. He was placed in trendelenburg for the severe hypotension. The patient was intubated using rapid sequence intubation with in-line immobilization. Cervical-spine films revealed fracture-dislocation to C- 4, 5, & 6 and the patient was unable to move his arms or legs. Chest x-ray revealed possible pulmonary contusions vs. pulmonary edema. A cardiac ultrasound indicated poor contractility or "squeeze." His 12-Lead EKG showed atrial fibrillation with a possible myocardial infarction in the anterior leads.

The patient continued to have rhythm instability as well as bouts of hypotension, which was treated with dopamine. A repeat ultrasound showed pericardial effusion and right ventricular collapse. A pericardiocentesis was performed with blood and serosanguinous fluid returned. Subsequently, a pericardial window was placed for further aspiration of re-accumulating pericardial fluid.

Traction and manual reduction of the C-spine injury was initiated, and the patient was able to move his shoulders. Unfortunately, the patient remained unstable and died a few hours later. Upon death, further exam revealed a C-8 transverse fracture, cardiac contusion, lung contusion and transverse fracture of the sternum.

It appears that this gentleman suffered a medical event prior to the traumatic event, which greatly contributed to the complexity of the situation. One may surmise that a possible cardiac, CNS, or syncopal event could have caused the collision. Did he arrest prior to the collision? Did the impact of his chest onto the steering wheel act as a "precordial thump" that revived him temporarily?

How would you handle this type of patient?

When dealing with the elderly in traumatic situations, we need to consider the possibility that a medical condition was a contributing factor. Research has shown that 25 percent of geriatric falls are associated with cardiac dysrhythmias.

In this case, paramedics found the patient in a dysrhythmia that is known to produce clots that could cause a stroke. The heart rate was also slow enough that it could have caused syncope due to hypotension.

If someone is in cardiac arrest post-trauma, you need to attend to the ABCs. The cause of the arrest may be traumatic in nature, such as from a tension pneumothorax, cardiac tamponade, flail chest, or sucking chest wound. Look for these injuries and treat them immediately because they can compromise the ABCs and perfusion so severely that a cardiac arrest results. The cause of the arrest could also be medical in nature, so it is appropriate to place your AED. You certainly have nothing to lose and everything to gain.

** **Writer's note:** The following people contributed to this article: Mark Lappe, EMT-P, Acting Manager, HCAS; Paul Redmond, EMT-P, HCAS; Rob Miller, Firefighter-EMT, St. Anthony Fire Department.*

Initial Response Vehicles...

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Based upon these results, the facilitators of the study have concluded that there may be several potential benefits of IRV use in urban EMS systems. These included provision of quality patient care while conserving resources, enhanced response times in areas of high call volume, and significant potential financial savings. Factors that influence this conclusion were: shortened response time of the IRV vs. the ambulance, the ability to triage patients and cancel the responding ambulance when appropriate, and the decreased cost of staffing an ALS vehicle with one paramedic instead of two. The ability of the IRV operator to slow the ambulance from a Code III response to a Code II response can also decrease the risk of driving with lights and siren for both the ambulance crew and the public.

There are limitations to the efficacy of IRV use, particularly in an urban setting. Some of these limitations include the personal safety of a single responder, the financial outlay for initiating an IRV program such as vehicle and equipment costs, and the personnel issues of a reduction in workforce. Regardless of the debate, the rising costs of providing quality prehospital care cannot be ignored. In some settings, the addition of an initial response vehicle to an ambulance service may, in part, help offset other financial burdens.

In summary, combined with other cost containment efforts such as priority dispatch, IRVs may help to alleviate some of the financial challenges that modern EMS systems are facing. Of course, initial response vehicles are not the only solution, but they are certainly worth consideration.

References:
Jeffrey Ho, M.D., HCMC Emergency Medicine
Mark Lappe, EMT-P, HCMC Ambulance Service

Air Bags ...

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For more information on air bag systems, check out the National Highway Traffic Safety Administration's website at http://www.nhtsa.dot.gov

References:

1. U.S. Department of Transportation, National Highway Traffic Safety Administration, ***Emergency Rescue Guidelines for Air Bag Equipped Vehicles***

2. U.S. Department of Transportation, National Highway Traffic Safety Administration,

Rescue Procedures for Air Bag Equipped Vehicles

3. J. Harris, Air Bags, http://www.kaais.or.kr/kaais02/articles/Airbag.htm

The Beat Goes On ...

"The Beat Goes On" program was instituted to recognize EMS professionals who used the Automated External Defibrillator in the field with successful results. Those recognized receive a specially designed pin and certificate acknowledging their achievements. Congratulations to these recent 'Beat Goes On' honorees:

Bricelyn Fire and Ambulance

Dan Ehlert
Robert Mutschler
Jason Obermeyer

Lake Benton First Responders

Kris Christensen
Bev Martinson
Tom Miller
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Steve Schouviller
Shirl Serie

Mendota Heights

Dan Mason
Jim Unger

Minnetonka Police Department

Chris Hamren
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Spring Valley Ambulance Service

Kevin Beck
James Cooper
Nathan Eastvold
Dustin Meyer
Wes Peterson
Kathy Walterman

Stevens County Ambulance

Josh Duda
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Tri-County EMS

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