MIH “How To”
Yearlong series outlines road map for EMS success in the mobile integrated healthcare arena p. 50
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ON THE COVER
Beginning this month, EMS World launches a yearlong series that will provide readers with a road map for developing mobile integrated healthcare programs.
Cr. the future of critical care transport: how do we get there?

January 22, 1:30 p.m. ET

Critical care transport has been around for decades, but continues to be a rapidly evolving area in EMS. In this webinar, we will look briefly at the past and growth of the critical care transport industry and critical care paramedicine. From there, we will focus on the challenges facing the continued growth, including education, hiring standards, regulation and more.

The webinar will be based on current practice and research.

Presented by Rick Erickson

Rick has been involved in EMS for the last 17 years with the last 15 years as a paramedic. A graduate of Creighton’s paramedic program, he has spent his career in transport, 9-1-1 and flight services. He is currently a flight paramedic for a local flight program for the past nine years. His career in education began 11 years ago and he has taught courses from EMT to critical care paramedicine. Rick is currently the Critical Care Paramedic Coordinator at Creighton University and presents frequently at regional and national conferences.

MOULAGE OF THE MONTH

Robby Merica continues his guide to simulating injuries and illnesses through effective use of moulage. This month: Bullet Exit Wound. See EMSWorld.com/12026748

ATF TACTICAL MEDICINE PROGRAM

Join us for a Twitter chat on Wednesday, January 7, from 2-3 p.m. EST for a Q&A with members of the ATF’s Tactical Medicine Program.

What: Join members of the ATF’s Tactical Medicine Program to discuss how ATF tactical medics are trained; the ATF tactical medic scope of practice; the current state of scientific evidence on tactical medicine interventions; and emerging trends for tactical medics.

When: Wednesday, January 7, from 2-3 p.m. EST

How: Follow @EMSWORLDNews, @ATFHQ and #ATFmedic for details on the chat.

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An EMS Vision for the New Year

There is a sense that better times are ahead for the prehospital profession.

THE PHRASE “THIS IS AN EXCITING TIME FOR EMS!” kept popping up in conversations I had at EMS World Expo a couple of months ago. There was a sense that there are finally better times ahead. So on the heels of that best attended EMS event since 2011, the National Association of Emergency Medical Technicians (NAEMT) boldly issued its 2015–17 strategic plan, which we proudly endorse and include below.

2015–2017 Strategic Plan

Our Mission

The mission of the National Association of Emergency Medical Technicians (NAEMT) is to represent and serve emergency and mobile healthcare practitioners, including emergency medical technicians, advanced emergency medical technicians, paramedics, flight paramedics, community paramedics, and mobile integrated healthcare practitioners.

Our Values

• We believe that emergency and mobile healthcare is a distinct and essential service to the public and a fundamental component of our nation’s healthcare system.
• We believe that all patients deserve high-quality and safe medical care delivered by qualified emergency and mobile healthcare practitioners.
• We believe that all emergency and mobile healthcare practitioners deserve a safe, healthy, and respectful work environment.
• We believe that all emergency and mobile healthcare practitioners deserve adequate and equitable compensation.
• We believe that professional education, national education standards and research are essential to the consistent delivery of high-quality, evidence-based emergency and mobile medical care.
• We believe that each community should determine the emergency and mobile healthcare delivery model(ies) that best meets its needs and resources.
• We believe that collaboration within the emergency and mobile healthcare profession and within the larger healthcare community is essential to addressing the key challenges in delivering high-quality emergency and mobile healthcare.
• We shall represent the views and concerns of all emergency and mobile healthcare practitioners regardless of delivery model.
• We shall conduct all NAEMT business with integrity and transparency, and adhere to the ethical standards of our profession.

Our Vision

NAEMT is the recognized leader in advancing the profession of emergency and mobile healthcare.

Our Strategic Goals

1. Membership

• Recruit and retain 13,000 full members.
• Develop and implement new strategies to attract a diverse range of members.
• Develop and promote new networking and engagement opportunities for members.

2. Transformation

• Facilitate the transformation of the emergency and mobile healthcare profession as an essential, data-driven, patient-centered, integrated component of our nation’s healthcare system.

3. Education

• Identify the evolving education needs of emergency and mobile healthcare practitioners and develop and implement education programs that meet those needs.
• Expand access to all NAEMT education programs to new domestic and international locales.

4. Advocacy

• Lead the effort to pass the Field EMS Bill by obtaining at least 145 cosponsors in the House and 30 cosponsors in the Senate.
• Increase the impact of EMS On The Hill Day by doubling the number of annual attendees and ensuring representation from every state and the District of Columbia and Puerto Rico.
• Educate elected officials about the anticipated impact of pending federal legislation on emergency and mobile healthcare.
• Build relationships with all emergency and mobile healthcare stakeholders.

5. Growth

• Strengthen the full range of organizational resources—including human and financial—to support the forward momentum of our association.

I think this is a mission and vision all EMS practitioners can embrace, including the passage of the Field EMS Bill that will be reintroduced in both houses in January. This bill is supported by more than 50 different state and national associations, including the major EMS physician groups of the American College of Emergency Physicians and National Association of EMS Physicians. A complete list can be found at www.naemt.org/advocacy/FieldEMSBill/SupportingOrgs.aspx. Please reach out to your federal representatives and encourage them to support the companion bills. It’s time to take advantage of the momentum in the EMS community to push through legislation that represents the professional interests of all EMS practitioners.

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A Road Map to Achieving Mobile Integrated Healthcare

Yearlong series will provide a tool kit for agencies considering implementing MIH programs

THE RAPID EVOLUTION INTO MOBILE INTEGRATED healthcare has been one of the most discussed issues in the EMS arena. Virtually every national EMS association has an MIH or community paramedicine committee, more than 400 people attended the EMS World Expo MIH Summit in November, and there were more than 200 attendees from seven countries at the International Roundtable on Community Paramedicine in Reno this summer. A resource center has been created by Medtronic Philanthropy, 12 associations collaborated on an MIH vision statement coordinated by the NAEMT MIH-CP committee, and Jones & Bartlett published its first book on the subject, Mobile Integrated Healthcare: An Approach to Implementation. This growth has even helped spawn the launch of Integrated Healthcare Delivery, a whole journal dedicated to effective integration throughout the continuum of healthcare.

The interest in MIH goes far beyond EMS circles. Attendees at the EMS World Expo MIH Summit included TEAMHealth (a publicly traded national physician-contracting corporation) and Kaiser Permanente (the largest integrated delivery system in the county). One Summit sponsor was Amerimed/House Call Physicians, a rapidly growing physician house call company that is forging partnerships with EMS agencies. The foreword for the Jones & Bartlett book was written by Maureen Bisognano, president and CEO of the Institute for Healthcare Improvement, which developed the Triple Aim. Matt Zavadsky, MS-HSA, EMT, who is serving as the executive editor of this project. Matt is the public affairs director at MedStar Mobile Healthcare, the exclusive emergency and non-emergency EMS/MIH provider for Fort Worth and 14 other cities in North Texas. Matt has helped guide the implementation of several innovative programs that have transformed MedStar fully into a mobile integrated healthcare provider, including high-utilizer, CHF readmission reduction, observational admission reduction, hospice revocation avoidance and 9-1-1 nurse triage programs.

We welcome you to send your comments and questions for our experts to address during the year. E-mail editor@emsworld.com.
MORE THAN 5,100 PEOPLE ATTENDED THE 2014 EMS World Expo, held September 9-13 in Nashville, TN. It was the first time the conference, which is co-located with the National Association of EMTs Annual Meeting, had been back in the host city since 2002.

After two days of preconference workshops and the third annual World Trauma Symposium, the core conference program kicked off Tuesday, November 11, with a stirring tribute to longtime EMS educator Mike Smith, who passed away suddenly in October 2013, with a stirring tribute to longtime EMS educator Mike Smith’s family spoke lovingly about his commitment to EMS education and the importance of early detection of heart disease in men before presenting the first Mike Smith Memorial Scholarship.

Eastman, MD, MPH, FACS, interim medical director for the trauma center at Parkland Memorial Hospital in Dallas, TX, and a lieutenant and deputy medical director (SWAT) for the Dallas Police Department, spoke about how there is no one-size-fits-all approach to mitigating an active shooter. But that’s where Tactical Combat Casualty Care (TCCC) comes in, as well as realizing the limitations of EMS and involving others in the community, especially in regard to hemorrhage control.

“This is not as complicated as many people think it is,” Eastman said. “This is a simple problem that needs to have simple solutions. Hemorrhage control is the responsibility of everybody in this room. We need to make sure we teach the public what to do. They’re the real first responders.”

Also during Tuesday’s opening ceremonies, the winners of the 2014 National EMS Awards of Excellence were recognized. See EMSWorld.com/12016199 to read about this year’s award recipients.

Exhibit Hall Offered Innovation, Education
The 2014 EMS World Expo offered the largest EMS exhibit hall in North America, with 328 exhibitors showcasing the latest products, technologies and services improving the delivery of patient care and enhancing the efficiency of EMS operations. Attendees tested their clinical skills in the EMS World Expo Simulation Lab, where they worked through scenarios using the most advanced products and simulators available. Stations were manned by instructors who provided instant feedback on the performance of participants.

The Exhibit Hall Learning Center offered free CE for 30-minute quick-fire sessions taught by several members of the EMS World Expo faculty.

Mobile Integrated Healthcare Summit Focused on Contracts and Payment
A year ago, mobile integrated healthcare was still something EMS providers and their agencies work for largely just talked about. At the second Mobile Integrated Healthcare (MIH) Summit, held with EMS World Expo, it was increasing significantly apparent that the talk is shifting toward action.

MIH practitioners from across the United States gathered to discuss the ground-level challenges of implementing a community paramedic program; case management and patient assessment for mobile healthcare; community paramedics; MIH contracting; and the economic sustainability of EMS and MIH.

Among the questions asked of panelists was how MIH contracts differ from traditional ambulance contracts. For starters, you have to get paid users to paramedics doing different things than just transport. Then you also need to decide how your EMS agency is going to get paid for the MIH services it provides.

Asbel Montes, vice president, government relations & reimbursement for Acadian Ambulance, said Acadian looked at using a capitated, or a per member per month model, based on a Monday–Friday, 8–5 schedule. Acadian is also seeking out models of reimbursement were also discussed. EMS agencies are going to have to work with their partners in the healthcare system to get them to understand the benefits of this new way of offering care. Part of that education process is getting payers to see the value in paying EMS to keep patients out of the hospital, such as is already happening with CHF patients in some programs. One thing panelists emphasized was the need to retain all rights to data when contracting with different payers and health systems. It sounds minor, but that data is what the agency is going to use to sell itself to other customers as its mobile integrated health program grows.

Top left: Matt Zavadsky facilitated classes for the MIH Summit. Left: Free CE was offered in the Exhibit Hall Learning Center. Here, New Orleans EMS Deputy Chief Ken Bouvier presented his top MIH management tricks. Above: Attendees get hands-on with the latest products.

The EMS World Expo Exhibit Hall showcased the latest EMS products, technologies and services.

IH Forum Looked at New Ways of Delivering Patient Care
The day after the MIH Summit saw the debut of the Integrated Healthcare Forum. Experts from the fast-growing field of integrated healthcare joined together to present information on education and training requirements across the spectrum of healthcare providers; pilot projects across the country; developing contracts with payers; and utilizing and implementing patient care data.

Attendees learned how to conduct a community assessment to develop an integrated healthcare program in their area, and found out how integrated healthcare meets the Institute for Healthcare Improvement’s Triple Aim of better health, better healthcare and reduced costs.

EMS agency is going to get paid for the MIH services it provides. TCCCEs attends found out patients are often willing to pay two to three times what it actually costs to provide the services.

Matt Zavadsky, public affairs director at MedStar Mobile Healthcare in Fort Worth, said MedStar started with a similar fee per patient contact per hour model, but has since switched to enrollment fees for the patients it sees as part of its MIH program.

Whatever price you think you want to charge for this, ask for at least twice that amount,” Zavadsky stated bluntly. “We’ve found out patients are often willing to pay two to three times what it actually costs to provide the services.”

EMS World Expo 2015 will be held September 15-19 in Las Vegas, NV. For more information, visit EMSWorldExpo.com.
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**Proposed Interstate EMS Licensure Compact Making the Rounds**

THE NATIONAL ASSOCIATION OF STATE EMERGENCY MEDICAL Services Officials (NASEMSO) has developed draft legislation—the Recognition of EMS Personnel Licensure Interstate Compact (REPLICA)—through which states will share licensure authority related to EMS personnel. Enactment of this draft language as state law would make it possible for an individual licensed in one state to enjoy immediate legal recognition in every other state that enacts the same legislation.

Dia Gainor, MPA, executive director for NASEMSO, discussed this during the EMS World Expo in November. Her session “One License, Multiple States: The Interstate Compact for EMS Personnel Licensure” detailed the provisions and conditions within the compact and assessed its utility for EMS agencies operating on a multistate basis.

Interstate compacts are already common—think driver’s licenses, the nurse licensure compact, EMAC and about 200 others—and a constitutionally granted right of the states. Gainor said the compact would enable EMS personnel to function in another state on both an unanticipated and a regular basis, and would allow states to work together to more easily share resources in times of need.

The compact is designed to achieve the following:

- Increase public access to EMS personnel;
- Enhance the state’s ability to protect the public’s health and safety, especially patient safety;
- Encourage the cooperation of member states in the areas of EMS personnel licensure and regulation;
- Support licensing of military members who are separating from an active-duty tour and their spouses;
- Facilitate the exchange of information between member states regarding EMS personnel licensure, adverse action and significant investigatory information;
- Promote compliance with the laws governing EMS personnel practice in each member state; and
- Invest all member states with the authority to hold EMS personnel accountable through the mutual recognition of member state licenses.

The compact is currently in states’ hands in its final form. All it takes is for state legislatures to propose the idea and pass it as a bill, with the state governor subsequently signing it into law.

—Staff

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Air Traffic Control
With patients’ airways or the skies above, keep control of your scene

WHEN ATTACK ONE IS DISPATCHED TO an intersection off the interstate for a “bicyclist struck,” the urgency in the dispatcher’s voice is obvious. The initial response does not include extrication equipment, but about a minute later the 9-1-1 center adds a rescue and advises Attack One that there’s a report the patient will require rescue. The crew prepares the trauma equipment.

“I hope the person is wearing a helmet,” the paramedic shares with the EMT in the driver’s seat.

The approach to the scene is a little difficult, with a large number of bicycles and cars parked on the interstate exit ramp. There is no traffic moving, and it’s difficult to tell how many vehicles are involved. But it is very clear there is a victim, who is located in the guardrail device at the corner of the intersection. A number of persons surround him, including many in clothing that indicates they’re in some form of sports competition.

The apparent patient is a man who has been thrown into the guardrail mechanism and traffic light controls that sit next to it. It is obvious he was a competitor in a bike race and had been struck in the intersection and bounced across five lanes of the roadway and into his current position.

Another bicyclist reports the man was just ahead of him and was struck crossing the intersection. He had momentarily taken off his helmet and was apparently trying to repair it, which distracted him from seeing the red light and the oncoming traffic. He went up onto the windshield of an SUV and then was thrown across the road. He has been unconscious since it occurred.

The paramedic thanks the man for that critical information, and the man retreats to join about a dozen other individuals filming the event on a range of smartphones, head-mounted devices and cameras mounted on the fronts of their competition bicycles. The crew members are immediately in rescue mode.

The patient is a man around 40, trapped between metal pieces of the road guardrail and fencing and cover of the traffic control device. His torso is mostly upright, but his head and face have open wounds, and he is breathing poorly. He has obvious fractures of his extremities. The EMTs get no verbal response, but his arms withdraw when they are pinched. The crew quickly applies a cervical collar, and the paramedic hands them a bag-valve mask to assist ventilations.

They feel a rapid pulse at the carotid artery but cannot obtain any extremity pulse only, the EMT quickly places the patient on the floor. They are unable to obtain a radial pulse, and there are delayed capillary refill and pale skin. His left lower leg is grossly deformed. The paramedic develops a rapid action plan and outlines it for the crew.

“I’m going to request an air ambulance, and when the rescue vehicle arrives, they will need to do some extrication,” the urgency in the dispatcher’s voice is obvious.

The paramedic develops a rapid action plan and outlines it for the crew.

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relatively quick work trimming back the fencing and guardrail supports so we can free him,” he says. “We will get his airway in place now, start an IV line while they’re working, and prepare to immobilize him on a board and slide him out under the guardrail.”

The man has periods of irregular breathing rate and volume. As the paramedic sets up for the airway, the EMT crew members use the bag-valve mask and high-flow oxygen to assist breathing. The facial injuries make it difficult to get a good seal. The victim’s jaw is clenched, and he has open wounds on his scalp that are bleeding and appear to be covering some depressed skull fractures. There is no blood coming from his nose.

The paramedic recognizes that this patient’s airway is going to be difficult to stabilize. They have limited access to him, though fortunately his torso and head are upright. With the difficulty getting a seal, the paramedic inserts a nasal trumpet through the man’s left nostril, stretches the nasal cannula over the nose and cranks the oxygen delivery up to 15 liters. The patient is breathing irregularly but can inhale high-level oxygen through his nose, and the EMTs can bag to assist that without having a complete seal.

With a couple of minutes to set up, the paramedic wants as many options as possible. He pulls out an endotracheal tube that can be inserted through the nose, with a smaller size to accommodate that smaller port. He gets out a larger endotracheal tube with a stylet inside that can be used for intubation through the mouth. He also prepares a device for a needle cricothyrotomy if no airway can be secured through the nose or mouth. The pulse oximeter was initially not able to get a reading on the arm available for monitoring, so an end-tidal carbon dioxide monitor will assist in determining airway position and allow ventilation at a rate that won’t worsen the head injury.

The extrication crew is just arriving and setting up for the cutting operations, which will take a few minutes to complete. There is enough space for the

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**CASE REVIEW**

**THE PARAMEDIC** **RECOGNIZES THAT THIS PATIENT’S AIRWAY IS GOING TO BE DIFFICULT TO STABILIZE.**
CASE REVIEW

Customer Service Opportunity

A new challenge facing EMS agencies involves the airspace over emergency scenes. The development of surveillance drones may represent a new opportunity for public safety agencies to improve scene operations, recognition, and safety for the public, but drones may also present a safety challenge if members of the lay public operate them above scenes where emergency operations include the airspace.1 2 The digitalization of emergency scenes from an aerial view is just one more addition to the process. There are a large number of devices available to capture the evolution of emergency scenes. EMS providers must be comfortable operating under digital observation that captures many video and audio details of an incident. Providers may not be in a position to control what is being recorded, but they have a responsibility to ask members of the lay public not to impact operations or patient privacy and to keep themselves out of danger.

paramedic and one EMT to work at the head of the patient, and the other EMT sets up all the airway equipment to pass to the paramedic. The rescue operation will take place around the patient’s needs. The paramedic sets up to try an oral airway first. He attempts to insert the blade for the video intubation, but the patient’s jaw will not open wide enough. He leaves the blade in the mouth and moves the cannula so it delivers high oxygen flow through the mouth. He then uses the nasal cannula to lubricate the left nostril (which is much larger than the right) with a generous amount of jelly. He pulls that tube out, lets the EMT assist ventilation for about a minute and then uses the nasal endotracheal tube to attempt intubation that way. The tube easily passes into the space above the larynx but will not pass into the airway. When it finally feels like it does, the carbon dioxide detector gets a value of zero, so the tube is in fact in the trachea. We attempted intubation of the right airway as well but could not pass the tube. The C-MAC® PM’s view of the glottis is an improvement from the traditional Macintosh and Miller blades to eliminate the need to learn a new technique while maintaining the ability to intubate, ideal for both routine and unexpected difficult intubations. The C-MAC® PM is a wireless video laryngoscope ideal for intubations performed by personnel in ground and air emergency medical services, tactical medicine, and combat casualty care, as well as hospital call teams. The C-MAC® PM is in the user’s direct line of sight so it allows simultaneous viewing of both the patient and the monitor. Your back-up plan is already in your hand since the device can be used as a direct laryngoscope should the lens become obscured with blood and secretions. The pocket-sized KARL STORZ C-MAC® Pocket Monitor can be used with any existing stainless-steel C-MAC® blades, and is an exceptional addition to its company’s state-of-the-art airway management solutions.

The C-MAC® Pocket Monitor

The C-MAC® PM is a wireless video laryngoscope ideal for intubations performed by personnel in ground and air emergency medical services, tactical medicine, and combat casualty care, as well as hospital call teams. The C-MAC® PM is in the user’s direct line of sight so it allows simultaneous viewing of both the patient and the monitor. Your back-up plan is already in your hand since the device can be used as a direct laryngoscope should the lens become obscured with blood and secretions.

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esophagus. It is withdrawn back to a position just above the larynx, and the EMT does another minute of bag ventilation.

The patient remains unresponsive, and his breathing rate has decreased further, so the paramedic uses the third device, which is inserted using a needle into the cricothyroid membrane in the neck. The EMT holds the neck stable as the paramedic grasps the area of the larynx, stretches the skin taut over the membrane and inserts a needle into the air space. A larger device then slides in and is attached to the bag-valve, and the EtCO₂ monitor confirms the tube is in the trachea.

It is not easy to stabilize this device with the patient still upright and needing extrication, but there is an opportunity to use the cervical collar for stabilization of the ventilating tube. They attach oxygen and set the ventilation rate to maintain a carbon dioxide value of around 30–35 mmHg.

The extrication crew has cut enough away that the patient’s legs can be disentangled and a long backboard slid under him. They maneuver him carefully onto the board, with one EMT focused only on keeping the tube in the neck stable and in place. The lower extremities are both deformed, and both arms also have fractures. The patient has almost completely stopped breathing, and his blood pressure can’t be obtained. His stomach empties into his mouth as they finish strapping his torso to the backboard.

“Thank goodness we got that airway in before all that emesis came up,” the paramedic states. “Make sure that tube stays in place.”

The helicopter is circling the scene, preparing to land, as they place the patient on the backboard. But then the helicopter pulls abruptly away, and the rescuers notice the sound of a different aircraft.

“Command, this is Helicopter One. There is a drone in our approach path. We cannot land when...
a drone is operating. Please get the operator to get that device out of the air!"

The airway is stable with the patient on the board, and the paramedic must now find a site to get intravenous access. All four extremities are injured, with open fractures of both the left lower leg and the left forearm. The right hip is dislocated, and the right wrist is fractured; thus the only possible intravenous site is the right antecubital fossa. With the helicopter landing delayed, the paramedic has a minute to start a large-bore IV line and pressure-infusion of saline.

Law enforcement at the scene works with command to find the operator of the recreational drone, who, after a brief argument, brings it down. The engine crew having established the landing zone, the helicopter is advised that landing is now safe. The drone operator makes his way in handcuffs to a police cruiser.

The pulse oximeter now begins to pick up a value for pulse rate and oxygen saturation on the right hand. The patient begins to withdraw from painful stimuli. The left leg fracture is grossly realigned on the backboard and stabilized, and the pulse oximeter records a pulse in the left foot. By the time the ground crew and flight team perform a transition of care, he’s received a 2-liter bolus of saline.

After each movement and into the helicopter, the position of the tube in the neck is rechecked, the
Learning Point
Be flexible in trauma patient airway management. EMSs and paramedics must be capable of managing airways using a variety of devices and procedures, sometimes all on the same patient. There are particular challenges in managing patients who are trapped and have serious injuries to the head and face. Equipment for oral, nasal and rescue airways is needed for both adult and pediatric patients. Capnography is an excellent method to ensure airway placement and appropriate ventilation rates for patients with head injuries.

carbon dioxide monitor confirming values in the target area. The patient is stable during the flight to the trauma center. The trauma team finds even more injuries, and the patient goes on to the operating room for the first of many procedures to repair him.

Case Discussion
This patient had severe trauma and unusual circumstances that required airway management prior to extrication. The airway needed to be captured before movement, and the rescuers used a simple bag-valve mask to supplement ventilation and provide oxygen initially. The paramedic needed to move sequentially through attempts at oral and nasal intubation before a device was ultimately fitted through the patient’s neck. There are now a large number of airway devices developed and marketed for EMS use. They include devices for visualizing the airway, for placing a tube in or near the larynx, for placement through the neck, and for securing whatever is placed. All devices require thorough training for use. Behind each of those devices are monitors that measure oxygen saturation and carbon dioxide levels to ensure the patient is getting the benefit of both ventilation and oxygen delivery and that tubes are in the right place initially and as the patient is moved.

It is worth repeating from an earlier column on airway devices: Airway devices have a critical role in EMS and emergency care for a wide range of patients. The selection of rescue airways is an important one, not for the airway that is ultimately selected but for the training in proper use and patient selection that must be made.

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1. Roberts MR. Airway devices: Psychological issues. Fire Chief. www.firechefs.com/2014/05/21/30-airway-devices—-fighting-fear-
4. Dixie is not only a full line EMS product distributor. We now sell a wide range of pharmaceutical products.

Dixie does drugs.

Ferno Leads the Way on Ambulance Crash Safety with the Redesigned Stat Trac® Cot Fastening System

The Ferno Stat Trac has been fully tested and meets the new crash safety standards from SAE of 22.5 g forward and 26 g side impacts.

When industry experts gathered in Nashville for EMS World Expo 2014, among the topics of discussion was building ambulances to meet new crash safety requirements from the Society of Automotive Engineers (SAE). Those requirements, released in July 2014, are aimed at creating safer patient compartments and work environments for EMS personnel.

Among the requirements is the J3007 recommended practice that describes testing procedures for evaluating the integrity of ground ambulance patient litters, litter retention systems and patient restraints in frontal and side-impact collisions. Its purpose, the SAE says, is to provide litter manufacturers, ambulance builders and users with testing procedures and acceptance criteria to ensure patient safety, its retention system and the patient restraint utilize dynamic performance test methodologies similar to those applied to other vehicular seating and occupant restraint systems. It includes descriptions of the test setup, instrumentation, photographic/video coverage, test fixtures and performance metrics.

Ferno was an active participant in developing these new standards as part of their ongoing commitment to patient and provider safety. While traditional “antler and rail” fastening systems will not meet these new requirements, the Ferno® Stat Trac® Cot Fastening System has been fully tested to and meets the new requirements from SAE.

The Ferno Stat Trac is a straight-in-track design that makes it easier to steer the cot into the ambulance, minimizing operator strain on angled surfaces. A single-hand release and wide-angle entrance guide provide quick and easy cot loading. The Ferno Stat Trac can accept the Ferno POWERFlexx®-S® Powered Ambulance Cot and J35XST PROFlexx® Manual X-Frame Cot.

“The Stat Trac was released almost 20 years ago and was already a rock solid design,” says Tim Wells, Ferno’s global emergency product manager. “The main change we made was adding the Stat Trac from a plastic or composite housing to an aluminum extrusion,” he explains. “That gave us added strength, and made the part easier to assemble. We also added a bracket on the head-end of the Stat Trac, which helps us meet the new SAE standards, especially the forward excursion rating,” which is less than 14 inches. Ferno also changed the design of the shoulder harnesses on its cots in response to the new forward excursion rating requirements, and those new restraints are included with all of its Stat Trac-compatible cots.

As a manufacturer, Ferno wanted to ensure it had three components that meet the new SAE standards—the fastener, cots and restraints. And by including a variety of its cots that work with the Stat Trac faster, Ferno has ensured its customers have a good range of options for meeting the standards, rather than locking them into one specific product.

Wells notes Ferno has always been committed to safety and tested the Stat Trac on its own in the 1990s to just over 20 g, well before these new standards were developed. With the new modifications, the Stat Trac exceeds the new SAE standards which require the device to withstand a 22.5 g forward and 26 g lateral, or side, impact.

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What does all the evidence really say about ETI before the hospital?

By Haemonw Philip Moy, MD, & Aldo Andino, MD

Endotracheal Intubation

What does all the evidence really say about ETI before the hospital?

I

Endotracheal Intubation

provoke active conversation within your EMS system
hospital and beyond. It is our hope that this series will
arena impacts our patients' healthcare course in the
in-depth review that has led to engaging conversation
pital medical care. This series began as a learning
and addresses compelling questions about prehos-

it's 2:30 on an unusually quiet Saturday morning.
You are dispatched for a pedestrian injured in
the OR with anesthesiologists, and lastly in the field


t’s 2:30 on an unusually quiet Saturday morning.
You are dispatched for a pedestrian injured in
a motor vehicle accident. On arrival you find
your patient, a 20-year-old male covered in blood
with two obviously deformed legs. Your initial
assessment finds him unresponsive and covered in
alcohol-scented emesis. He is difficult to arouse and
only moans with a vigorous sternal rub.

Just as you start to think his airway is somewhat
clear, the patient begins to vomit. You and your part-
tner roll him on his left side, maintaining c-spine pre-
cautions, and find his pulse oximeter reads 82%. You
grab the airway kit and try to bag the patient, but
he vomits on the both of you. You now realize this
patient needs a more secure airway.

At this point should you intubate? You quickly recall a couple of articles you just read that can help
you make the best decision.

Current Evidence

Prehospital endotracheal intubation (ETI) is an area
that can be controversial but is highly researched. A
recent study using data from 40 states demonstrated
an overall prehospital ETI success rate of 85.3%, an
improvement from the rate of 77% previously report-
ed by Henry Wang, et al.1,2 But for a life-or-death
situation, the safety of prehospital ETI is important
compared to supraglottic airways (SGAs).

For example, did patients requiring ETI have a worse initial prognosis compared to those managed with
just BVM? Did the skill level of the provider who
performed the intubation affect the outcome? Were
there any anatomical or patient characteristics that
discouraged the use of ETI? These factors, in addi-
tion to several other variables, may have affected the
results but were not controlled for in these studies.

Trauma

Prehospital ETI in trauma research has generally
been broad and contradictory. For example, one study
revealed an association of prehospital ETI with worse
hypotension and subsequent risk of death in trauma
patients of similar age and injury severity.3 Worse yet,
another study demonstrated that prehospital ETI, when
used as the only advanced airway, was associated
with worsened 28-day mortality in patients with
hemorrhagic shock.4

In both studies poor outcomes were attributed to
underlying hypotension caused by acute blood loss
compounded by rapid sequence intubation (RSI)
medications and mechanics of ventilation decreas-
ing venous return.5,6 However, contrary to the these
studies, a review of a trauma database found that in
patients with a Glasgow Coma Scale score of less
than 8, prehospital ETI was associated with improved
mortality.7 In addition, another review found res-
cuer procedural experience was not linked to survival
outcome in prehospital ETI.8 The U.S. study on pre-
hospital ETI involving 40 states found intubation in
non-arrest trauma was successful more often than with
non-arrest medical and cardiac arrest patients.9

In general, the current data regarding prehospital
ETI and trauma is diverse, with variables including
the type of trauma, degree of paramedic training and
how outcomes are defined.

RSI

RSI in the prehospital setting has to be weighed in
terms of the benefit of a more relaxed patient for ETI
versus the risk of paralyzing a patient and possibility
of losing the airway. Older data suggested prehospital
RSI was associated with longer on-scene times and
neurological outcomes that were unimproved if not
worse.10,11 Contrary to that belief, though, evidence
from more recent years suggests that with proper
training and supervision, paramedics performing
prehospital ETI have had excellent outcomes.

Notably, a prospective randomized controlled
trial in Australia demonstrated
prehospital ETI by critical care-trained
parameters improved survival rates and functional
outcomes versus delayed intubation in the ED.12

Paramedic Training

The current evidence suggests that increased expe-
rience with ETI attempts leads to more successful
intubations. Notwithstanding, a paramedic needs to
perform five intubations for independent practice in
the United States.13,14

While some results have shown prehospital ETI
success isn't totally dependent on experience, national
data from local EMS services reported to state author-
ities showed a prehospital ETI success rate of 77%.15
A review of paramedic programs found the median
number of intubations by students was seven and
20–25 ETIs are needed for a success rate above 90%.16

Despite this data, there are regions where EMS
providers only perform one ETI a year.17 However,
in EMS systems like the Seattle Fire Department’s,
paramedics require 2,200 hours of didactic, lab
and field experience for certification. Their train-
ing includes ETI performed on manikins, then in
the OR with anesthesiologists, and lastly in the field
with senior paramedic supervision under orders
from medical control. A total of 12 intubations
are required a year. RSI can be used with supervi-
sion, and their success rate has been 88%–97%.18,19

Additionally, a review of a multistate air-transport
EMS team reported a prehospital ETI success rate
of 96.6% and no deaths from loss of an airway.20

EVIDENCE-BASED EMS:

Endotracheal Intubation

Welcome to Evidence-Based EMS, a new bi-monthly
series that reviews current evidence-based articles
and addresses compelling questions about prehos-
ptial medical care. This series begins as a learning
exercise for our emergency medicine residents
during their EMS rotation to comprehend the complicated
nature of prehospital medicine and evolved into an
in-depth review that has led to engaging conversation
between our faculty, residents and prehospital provid-
ers, reinforcing that what is done in the prehospital
arena impacts our patients’ healthcare course in the
hospital and beyond. It is our hope that this series will
provide active conversation within your EMS system
and foster innovative ideas to advance the field of
prehospital medicine.
Of note, the results were similar when isolated to just pediatric patients. These crews consist of paramedics and nurses who have an average of 12 years’ experience, are rigorously trained in RSI protocols, and perform approximately 25 intubations a year with prehospital ETI and simulation combined.

Bottom Line
It is imperative to remember that the best airway is the one that is ventilating and oxygenating the patient, and more advanced techniques can be attempted if and when they are indicated. The paramedic and/or medical director must have a respect for the nuances of airway management, and a conservative approach is warranted. However, despite the risks and complications associated with prehospital intubation, the absence or sudden loss of an airway will lead to imminent death if no other option is available.

At this time literature suggests more training is correlated with greater ETI success in paramedics. Thus, improving skills should be the goal. Remember, anybody can learn to intubate a patient. However, it’s your ability to know when and when not to intubate that makes you a prehospital medical professional. Use the most appropriate airway, respect the procedure and know your limitations.

REFERENCES
ABOUT THE AUTHORS

Hannah Reilly, MD, is an assistant medical director of the St. Louis Fire Department and emergency medicine critical care and core faculty of the EMS Section of the Division of Emergency Medicine at Washington University School of Medicine in St. Louis. He completed his emergency medicine residency at Barnes Jewish Hospital/ Washington University in St. Louis and his EMS fellowship at the University of North Carolina in Chapel Hill.

Aldo Andino, MD, is a second-year emergency medicine resident physician at Washington University in St. Louis, and a graduate of the University of Texas Medical School at Houston. His professional interests include medical public relations, disaster preparedness and tactical EMS.

The Nose Knows

A novel approach to preoxygenating the high-risk patient

By Russ Brown, NREMT-P

It’s dinnertime at the station and you are just about to sit down and enjoy a hot meal when the tones go off. You are dispatched to the local nursing home for a 62-year-old female with a chief complaint of difficulty breathing.

When you arrive, you find the patient sitting upright in bed and responsive to painful stimulus only. You quickly instruct your paramedic partner to obtain a set of vital signs while you begin your initial assessment. Her skin is pale and diaphoretic and her pulse is weak and rapid at a rate of 100 bpm. She is breathing at a rate of 40 per minute and once your partner has placed the pulse oximetry probe you see her oxygen saturation is only 74% on room air.

You tell your partner to place a non-rebreather mask on the patient at a flow rate of 15 lpm and one of the engine crew members begins to obtain IV access for you. You know you need to protect the patient’s airway, but with the non-rebreather mask the patient’s oxygen saturation only improves to 80%. A properly sized nasal trumpet is placed and a BVM is applied using a two-person technique, improving oxygen saturation to 92%. You decide to protect the patient’s airway with an endotracheal tube using a rapid sequence intubation, but you know the patient is at risk for rapid desaturation and possibly hypoxic arrest if you encounter any difficulties. What do you do?

Introduction

This article discusses a concept called apneic diffusion oxygenation, or simply apneic oxygenation. This powerful technique for oxygenating your patient has received quite a bit of notoriety in emergency medicine literature and has started to trickle into the prehospital realm as well.1

This article explores the clinical significance, history and pathophysiology behind apneic oxygenation, and how the reader can use it to improve the quality of care their patients receive, building upon traditional airway management techniques while giving readers another "tool" to use as part of their airway management strategy.

Apneic Oxygenation

Apneic oxygenation is usually achieved by the placement of a simple nasal cannula into the patient’s nares. The oxygen is then applied at a flow rate of 12–15 liters per minute to facilitate preoxygenation in the patient who qualifies for a rapid sequence intubation.2 Most of us were taught the maximal flow rate for a nasal cannula is six liters per minute. Six liters per minute would be all you would want to administer in a consciously breathing, awake patient, but as we will explore further apneic oxygenation is for the purpose of RSI and the anticipated difficult airway.

The gold standard of emergency airway management is oxygenation, and ventilation and rapid sequence intubation is one way to provide this. Studies show it carries a high success rate when in the hands of a properly trained provider.3 While it’s considered best practice to preoxygenate all patients requiring intubation, it is especially important for those who require RSI. The rationale behind preoxygenating your patient is to extend their duration of safe apnea. Relatively speaking, there is no absolute “safe” time for apnea, but what this means is the time it takes for your patient’s oxygen saturation to go from 100% to 93% on the oxygen hemoglobin dissociation curve. After 93%, a person’s oxygen saturation will drop precipitously, putting the patient at risk for hypoxic brain damage, cardiac arrhythmias and possibly cardiac arrest.

Healthy patients undergoing elective intubation who have been adequately preoxygenated have been shown to tolerate apnea for up to 8 minutes.4 Unfortunately, EMS providers do not typically intubate healthy patients. Patients intubated during prehospital or ED care typically present with poor lung pathology from conditions such as pneumonia, COPD, asthma and CHF. These patients’ oxygen saturations may never start out at 100% and can drop faster than those of a healthy patient with good lung function. Obese, pediatric and pregnant patients are also known to desaturate more quickly during RSI.'
Traditionally, the practice of preoxygenation is achieved with the placement of a 100% non-rebreather mask. This is actually a misnomer, as the NRB mask only really delivers 60%–75% FiO2 due to the rebreathing of CO2 and the mask being bent and misshaped, which causes entrainment of room air and dilution of pure oxygen. The use of a BVM is usually reserved for the patient with an oxygen saturation of less than 93% or who has no spontaneous ventilations. If positive pressure ventilations are provided too aggressively this can lead to insufflation of air into the stomach, and increase the risk of vomiting and aspiration, all of which we want to avoid. Poor mask technique also allows air leaks and entrainment of room air and negates the value of BVM ventilation. This typically can be remedied with a two-person BVM technique. Once the patient is rendered apneic it becomes a race against time to place the endotracheal tube.

If positive pressure ventilations are provided too aggressively this can lead to insufflation of air into the stomach, and increase the risk of vomiting and aspiration, all of which we want to avoid. Poor mask technique also allows air leaks and entrainment of room air and negates the value of BVM ventilation. This typically can be remedied with a two-person BVM technique. Once the patient is rendered apneic it becomes a race against time to place the endotracheal tube.

The placement of a high-flow nasal cannula can fix these issues. The nose is a direct conduit for oxygen to passively flow into the oropharynx. A 2012 study demonstrates the validity of this powerful technique. A simple nasal cannula is placed on your patient at 5–6 lpm with a NRB at 15 lpm placed over the nasal cannula. You allow your patient to receive preoxygenation ideally for a period of 3 minutes. The purpose is to maximally oxygenate your patient and bring the oxygen saturation as close to 100% as possible. Ideally your goal should be 95% or better.

1. Non-rebreather at 15 lpm and nasal cannula at 15 lpm will give you close to 100% FiO2.
2. Once patient is ready to be intubated, remove NRB and leave on nasal cannula.

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GASES WILL ALWAYS MOVE FROM AN AREA OF HIGHER PRESSURE TO AN AREA OF LOWER PRESSURE.

Pain to the patient. We must remember, though, that the patient is undergoing intubation and has been given an induction agent and paralytic, so this will be of little consequence. Also, the duration of time we will have them on the nasal cannula is minimal so this will not cause any adverse effects. The NRB is then removed from the patient but the nasal cannula is left in place to continue to oxygenate the patient passively during your intubation attempt. Often, but not always, you will actually see your patient’s oxygen sats go up during your intubation attempt.

A 1959 study looked at the effects of this phenomenon, known as apneic diffusion oxygenation. The study took eight patients undergoing various elective surgical procedures and sedated and paralyzed them using a combination of thiopternal and succinylcholine. They then intubated them and allowed them to passively receive oxygen without ventilations. The duration of apnea lasted anywhere from 30–55 minutes. The patient’s oxygen saturation, pH and arterial CO2 levels were monitored throughout the duration of apnea. All the subjects’ oxygen sats stayed between 98% and 100%. The only complications indicated were that some patients experienced PVCs. The PaCO2 values for the patients ranged from 130–250. Obviously, you would expect high PaCO2 values if your patient is not being ventilated to exhale the buildup of CO2. More recent studies include one by Maciej Babinski and others showing up to 30 minutes of apnea with no significant oxygen desaturations using endobronchial oxygen catheters. While these studies were conducted in an operating room setting, as opposed to the prehospital environment, they do illustrate the potential benefits of nasal cannula oxygenation during preoxygenation.

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power and utility of apneic oxygenation as a means to provide optimal care for patients.

How Gases Diffuse

To better understand apneic oxygenation we have to look at the basic laws of physics and how gases diffuse.

Gases will always move from an area of higher pressure to an area of lower pressure. This is the basis of how humans breathe.

When our intercostal muscles and diaphragm contract our lungs expand, creating a negative pressure inside our chest cavity. This pressure created inside our thoracic cavity is lower than atmospheric pressure, which causes a net flow of gases to move from the atmosphere through our mouth and trachea and into our lungs.

Once these inhaled gases reach our lungs they enter the alveoli where the exchange of oxygen and CO₂ takes place. The pressure of oxygen in the alveoli is higher than the pressure of CO₂. The reverse is true in the arterial pulmonary arteries where the pressure of oxygen is lower and CO₂ is higher. This creates a pressure differential that pulls oxygen from the alveoli and exchanges it for CO₂.

This same process of gases diffusing from a higher pressure to a lower pressure is evident at the tissue level as well. The concentration of CO₂ is higher in the tissues than in the arterial circulation, causing CO₂ to diffuse back into the circulation. The pressure of arterial oxygen is higher than in the tissues causing oxygen to diffuse into the tissues and the process starts all over again.

When a patient undergoes RSI and a paralytic medication is administered, all tissues and the process starts all over again.

When a patient undergoes RSI and a paralytic medication is administered, all tissues and the process starts all over again.

Case Scenario

Returning to the scenario presented at the start of the article, you decide this patient needs to be intubated using a rapid sequence technique. While your partner obtains an IV, you place a nasal cannula in the patient’s nares and place a non-rebreather mask on the patient. You turn the oxygen up to 15 lpm for both devices and sit the patient up to facilitate preoxygenation. Your patient’s oxygen saturation is now at 96%. You draw up 28 mg of etomidate and 84 mg of rocuronium. After 3 minutes of preoxygenation you push the etomidate and rocuronium and take the non-rebreather off of the patient, but leave the nasal cannula in place. The oxygen saturation continues to go up and is now at 98% as you intubate.

You initially have trouble with placing the tube, but after repositioning the patient and the aid of a bougie you are successful. This confirms by waveform capnography and the presence of bilateral breath sounds. You transport the patient code 3 to the hospital where it’s confirmed by chest X-ray that she has a multilobar pneumonia. She spends four days in the ICU, after which she is extubated and makes a full recovery.

Conclusion

Using a high-flow nasal cannula to facilitate apneic oxygenation will greatly aid us in our oxygenation and airway management strategy. While there is ongoing controversy as to the validity of paramedic drug-assisted intubation, it is imperative we continue to stay abreast of new techniques and methodologies to improve the care of our patients. So, the next time you’re faced with an airway emergency, just remember—the nose knows!®

REFERENCES

Surgical Cricothyrotomies in Prehospital Care

Surgical airway placement is indicated when you cannot intubate or ventilate

By Kevin T. Collopy, BA, FP-C, CCEMT-P, NREMT-P, WEMT, Sean M. Kivlehan, MD, MPH, NREMT-P, & Scott R. Snyder, BS, NREMT-P

medic 12, respond to Route 12b, approximately one mile south of the Utica city line, reported car versus train. Your dispatch time is 1630.” Anthony and Kit, both experienced paramedics, begin their response. Upon arriving on scene, they see the fire department and police have already ensured the road is shut down and are extricating their mid-20s male patient from a severely damaged SUV. When Anthony approaches the car, a firefighter/EMT inside the car advises him that, "I’ve been trying to keep his airway open with suction and a jaw thrust. He’s completely unresponsive, but his jaw is shattered and moves in pieces. I don’t think we can ventilate him completely."

Anthony says, “Response time is 1630. Anthony and Kit prepare their surgical cricothyrotomy equipment. Anthony attempts to perform endotracheal intubation, finding their patient’s mouth quickly fills with blood faster than it can be suctioned. Looking at Kit, Anthony calmly tells him, “Go ahead and perform a cricothyrotomy, there’s no way we can intubate.”

Introduction

While infrequent, an emergency cricothyrotomy is a lifesaving intervention paramedics may have in their scope of practice and may be credentialed to perform. The cricothyrotomy is the most invasive airway access via the cricothyroid membrane for the purposes of ventilating and airway access via the cricothyroid membrane is by definition a surgical cricothyrotomy. There are three strategies for a surgical cricothyrotomy: needle cricothyrotomy, Seldinger cricothyrotomy, and open cricothyrotomy. For the purposes of this article the term “cricothyrotomy” describes the procedure generically and includes all three of these techniques.

Cricothyrotomies are not common anywhere in emergency medicine. Hospital-based studies have reported that surgical cricothyrotomies are performed in less than 1% of patients requiring airway management. Outside of the hospital, this procedure is only slightly more common. A recent analysis published in early 2014 reviewed over 4,800 prehospital intubation encounters by 78 air medical transport teams. The researchers found cricothyrotomies were performed on only 35 patients (0.7%). Providers were successful in 33 of the 35 cases, which is a 94% success rate. When compared to a 1996 study in the Journal of Trauma on prehospital cricothyrosis, when 98.8% of patients needing an advanced airway received cricothyrotomy, there is a clear decline in the frequency of cricothyrotomy performance compared to overall prehospital airway management cases. This drop in frequency is likely associated with improved airway management training, the implementation of prehospital rapid sequence intubation (RSI) programs, and the introduction of adjuncts such as the gum-elastic bougie, supraglottic devices and video laryngoscopy, as well as the removal of this skill from some systems.

However, do not think this means a paramedic doesn’t need to master cricothyrotomy; rather, it signals the need for increased practice on a skill that an individual will likely only perform a few times in their career and which will always be performed in a high-stress environment. This is further evidenced by a study that reviewed all of the emergent surgical cricothyrotomies received and performed at two level I trauma centers. Researchers found every prehospital placed surgical airway had serious complications, ranging from major bleeding to airways placed in the cervical fascia (a false lumen).1

Indications

A definitive airway is defined as the placement of a cuffed tube in the trachea beyond the vocal cords. By using a tube with a cuff it becomes possible to prevent aspiration and control air pressure within the respiratory system. Simply stated, a surgical cricothyrotomy is indicated when you can’t intubate, can’t ventilate and can’t maintain an SpO2 greater than 90% for your patient. Contrary to popular belief, a cricothyrotomy does not need to be a last-ditch effort. Instead, think of them as just another strategy for establishing a definitive airway. In fact, there are times, such as respiratory arrest in anaphylaxis or upper airway obstruction with arrest in anaphylaxis or upper airway obstruction, when cricothyrotomy could be the first choice in airway management.

There are a many situations that can lead to a “can’t intubate, can’t ventilate” situation. The most common reasons for prehospital cricothyrotomy include clenched jaw, blood and vomit impairing airway visualization despite suction, massive maxillofacial injury, and limited patient access due to entrapment.2 When most of these situations are related to trauma, non-trauma airway compromise can require surgical cricothyrotomy and some causes are noted in Table 1.

Keep in mind cricothyrotomy does not mean the airway is totally occluded; rather, it means the airway is compromised in a manner that prevents effective ventilation. This is an important distinction that becomes critically important when selecting the tools and method for the procedure.
Indications for Surgical Cricothyrotomy

The mnemonic SHORT can be used to remember reasons to proceed cautiously when selecting surgical cricothyrotomy. SHORT stands for: surgery (evidence of prior head trauma, intracranial hemorrhage, radiation therapy evidence, and trauma to the site). The presence of these conditions suggests an increased risk for complications, including increased bleeding and difficulty placing the airway. Other reasons to consider deferring a surgical cricothyrotomy include the presence of a tumor, abscess or other evidence of infection at the insertion site.

Identifying Landmarks

The cricothyroid membrane is the tissue between the cricoid and the thyroid membranes. Any “stomys” is a hole by medical definition. Thus, a cricothyrotomy is the surgical placement of a hole in the cricothyroid membrane. With a patient lying supine and the head in a neutral midline position, palpate the thyroid cartilage, also known as the Adam’s apple. Immediately inferior to the thyroid cartilage is a small gap, the cricothyroid membrane. Moving inferior from the cricothyroid membrane is the cricoid cartilage; the thyroid gland attaches firmly to the cricoid cartilage. In the lateral aspects of the cricoid cartilage by the thyroid gland; however, as noted in Figure 1, there are several great vessels below the thyroid gland. These blood vessels increase the risk of bleeding during procedures in this anatomical region and thus the region is best avoided. Figure 1 also illustrates the high concentration of vessels surrounding the trachea. This high concentration of vessels is one reason severe bleeding is common during surgical cricothyrotomy.

Pay particular attention to the small size of the cricothyroid membrane; it has an average vertical width of 9 mm and its horizontal length averages 30 mm. This gap is just large enough to accept devices roughly the size of a 6.0 ETT, which has an outer diameter of 8.2 mm. By comparison, the outer diameter of an 8.0 ETT is 11 mm. Some large patients may be able to accept a slightly larger airway through the cricothyroid membrane, although it is better to have a small and secure airway than it is to force in a larger airway and cause more damage.

Approach Considerations

There are three primary approaches to a cricothyrotomy:

- Needle cricothyrotomy
- Seldinger technique surgical cricothyrotomy
- Open cricothyrotomy

Every provider needs to learn their system’s equipment and expectations and practice it regularly. Develop a systematic approach to the cricothyrotomy that is easy to repeat and execute. Additionally, be flexible and realize that each patient is different and each situation may require slight adaptation.

Whichever approach used, all demand a similar patient preparation and initial care. In most instances, all ALS and traditional ALS interventions should be attempted before progressing to cricothyrotomy. While critical thinking may suggest that only a cricothyrotomy will secure the airway, it’s reasonable to have one of the providers on scene attempt to open the airway and attempt BVM ventilations with a mask and/or other airway device while the cricothyrotomy equipment is prepared. Since the inability to maintain a SpO2 above 90% is one of the indicators, it makes sense to apply pulse oximetry throughout the procedure. However, it’s understood the patient is likely already hypoxic and while intubation attempts cease as O2 decreases to 90%, the cricothyrotomy procedure should not. Rather, focus on performing cricothyrotomy as smoothly and rapidly as possible. Accurate airway placement is more important than rapid airway placement.

The patient’s neck for all approaches is placed in a neutral midline position. Standardize your practice by always working from the same side of the patient. For those who are right-handed, work from the patient’s right side, those who are left-handed from the left side. This approach allows you an increased range of motion with your dominant hand while avoiding obstruction by the chin. It is unnecessary to establish the patient in the sniffing, or head elevated, position for the procedure. However, tilting the head slightly backward—head extension—may help stabilize the trachea in place should cervical spine stabilization not be indicated.
is securing the airway. However, as soon as practical establish IV/Needle cricothyrotomy is the fastest and least effective method to palpate the cricothyroid membrane and other landmarks. Fluid prior to beginning a cricothyrotomy may impede your ability from a 3.5 ID endotracheal. Must go up. Thus, the pressure of the oxygen inside of the partial pressures of each gas within that mixture, and Boyle’s law result, the CO₂ levels within the bloodstream rise. The human body can tolerate this state of oxygenation and increased CO₂ sure of CO₂ in the alveoli remains the same, the CO₂ cannot of oxygen within the alveoli, more oxygen can diffuse into states gases move across membranes from areas of higher can be life-threatening. CONTINUING EDUCATION JANUARY 2015 | EMSWORLD.com EDUCATION Fran Milner, www.franimation.com

Needle Cricothyrotomy Needle cricothyrotomy is the fastest and least effective method for establishing a surgical airway. By placing a 10–14 gauge angiocath needle through the cricothyroid membrane, the needle cri- cotrachealSeldinger Technique Seldinger technique for surgical cricothyrotomy is faster than open cricothyrotomy and has less risk for major vessel injury. When using a commercially prepared device, the manu- facturer’s packaging should include all of the equipment necessary to perform the procedure. Avoid using systems that require obtaining additional equipment not provided within their kit because time is lost as the upper airway opening passes 5 mm. Cuffed tracheal tubes such as the Quicktrach II and the cuffed Melker have been shown to effectively ventilate at tidal volumes exceeding 600 mL regardless of upper airway size. Retrospective studies have shown pre- hospital cricothyrotomies using a modified Seldinger technique can have success rates exceeding 90%, and be more consistently opened cricothyrotomy for surgical cricothyrotomy is faster than open cricothyrotomy and has less risk for major vessel injury. Major vessel injury is lost as the upper airway opening passes 5 mm. Cuffed tracheal tubes such as the Quicktrach II and the cuffed Melker have been shown to effectively ventilate at tidal volumes exceeding 600 mL regardless of upper airway size. Open Cricothyrotomy Open cricothyrotomy ultimately allows a commercial tracheal tube or endotracheal tube to be placed into the trachea through an incision. Performing an open cricothyrotomy requires you obtain the following equipment: 6.5 ET T Bag-valve mask 4. Sterile guide wire 3. #10 blade scalpel 2. A tracheal hook or hemostat 1. Gum-elastic bougie Follow a four-step rapid approach to the open surgical cricothyrotomy (Figures 2–4). 1. Stabilize the thyroid cartilage with the non-dominant hand and then identify and make a 2–3 cm vertical incision over the cricothyroid membrane. 2. Stab the cricothyroid membrane with your scalpel and then insert either a tracheal hook or hemostats immediately inferior to the scalpel. With a tracheal hook pull inferior traction with slight elevation of the

Why Needle Cricothyrotomy? In choosing to perform needle cricothyrotomy, we are making a conscious decision to oxygenate rather than ventilate. This means while we can deliver oxygen for a short (40 minutes) period of time to our patient, we must accept that effective cardio-vascular responses elution is not possible. Dalton’s law of partial pressures states the total pressure exerted by a mixture of gases is equal to the sum of the partial pressures of each gas within that mixture, and Boyle’s law states that at a constant temperature, the pressure of a gas is inversely proportional to the volume it takes up. Now, accepting the alveoli have a fixed volume of mixed air comprised of oxygen and CO₂, if we increase the amount of oxygen in the alveoli—more oxygen molecules, same volume—the pressure must go up. Thus, the pressure of the oxygen inside of the lungs rises. At the same time, since we haven’t eliminated CO₂, the partial pressure of the CO₂ stays the same. Graham’s law states gases move across membranes from areas of higher according to the pressure of the other gases. So with an increased partial pressure of oxygen within the alveoli, more oxygen can diffuse into the bloodstream. At the same time, since the partial pres- sure of CO₂ in the alveoli remains the same, the CO₂ cannot adequately flow from the bloodstream into the alveoli. As a result, the CO₂ levels within the bloodstream rise. The human body can tolerate this state of oxygenation and increased CO₂ levels for a short period of time. However, keep in mind that until ventilation can be accomplished, CO₂ levels will continue to rise, which in patients suffering from traumatic brain injuries can be life-threatening. Further, a 2011 study on surgical airways demonstrated needle cricothyrotomy is ineffective at providing effective tidal volume delivery unless the airway above the cricothyroid membrane is essentially completely occluded. In this study, when the diameter of the upper airway remained open 3 mm or more, it was impossible to deliver tidal volumes over 87 mL. Although when total airway occlusion occurred, needle cricothyrotomy permitted a tidal volume of nearly 200 mL, which is considered adequate for oxygenation but not CO₂ elimination. When using a needle cricothyrotomy on a non-occluded airway it may be necessary to close the upper airway to achieve effective ventilation. When performing a needle cricothyrotomy prepare the following equipment: • Bag-valve mask • The 15 mL adapter off of a 3.5 ETT • An over-the-needle catheter appropriate for the patient’s age • A 10 mL syringe filled with 5 mL water • An antiseptic solution Once your equipment is prepared, cleanse the neck with an anti- As long as its defined aseptic process is followed. Without the use of sterile gloves throughout this procedure, cleaning the skin likely has limited true value. Once cleansed, palpate and identify the cri- cothyroid membrane through the skin and: 1. Stabilize the skin and trachea with your non-dominant hand between your thumb and middle finger, leaving the index finger free to palpate the landmarks. 2. With the 10 mL syringe attached to your needle, insert the needle through the skin and cricothyroid membrane caudally at a 45° angle. 3. While inserting the needle, aspirate with the syringe. Bubbles will appear in the syringe once you have penetrated the tracheal lumen. 4. Stop advancing the needle once bubbles are observed. Decrease your needle angle to 20° and advance the catheter over the needle to its hub so it is completely within the trachea and then remove the needle. 5. Connect the 15 mL adapter from the 3.5 ETT to the catheter so a BVM may be attached. 6. Control bleeding as necessary and sta- bilize with tape and manually. With needle cricothyrotomy do not expect to see significant chest rise. This method allows oxygen to be forced into the lungs until a definitive airway can be established. An alternative method for oxy- genation is by using a meconium aspirator and oxygen tubing. Attach the meconium aspirator to the 15 mm ET T adapter, and instead of attaching it to suction, con- nect it to an oxygen source with a flow of at least 15 liters per minute—the higher the better. Simply cover the hole in the meconium aspira- tor to oxygenate the patient and release it between breaths (Figures 2a and 2b). Seldinger Technique Seldinger technique for surgical cricothyrotomy is faster than open cricothyrotomy and has less risk for major vessel injury. When using a commercially prepared device, the manu- facturer’s packaging should include all of the equipment necessary to perform the procedure. Avoid using systems that require obtaining additional equipment not provided within their kit because time will be wasted assembling the additional equipment. The Seldinger equipment used for the Seldinger technique includes: • A #11 or #10 scalpel • A Trousseau dilator • A sterile guide wire • A tracheostomy tube or endotracheal tube • Bag-valve mask The traditional Seldinger technique fol- lows the initial steps for needle cricothyrotomy only with a needle rather than an angiocath. Then follow the following steps: 1. Isolate the trachea by inserting a guide wire through the needle and into the trachea and removing the needle. 2. With a 10-gauge scalpel, cut the skin and cricothyroid membrane vertically along the wire. 3. Insert a dilator through the tracheal tube and over the wire. 4. Slide the tracheal tube and dilator into the trachea along the wire. 5. Remove the wire and the dilator. 6. Secure the device. It is uncommon to find an EMS system utilizing the traditional Seldinger technique. Rather, systems are using a manufactured device that uses the same dilatation-based device. Quicktrach II—only with a guide wire. Dilation widens the hole created in the skin and cricothyroid membrane to create a pas- sage through which a trach tube can more easily be passed. Manufactured devices are available with and without a cuff. Uncuffed tracheal tubes such as the Quicktrach and Melker can produce tidal volumes over 500 mL when ventilating lungs with an occluded upper airway. However, their effectiveness is lost as the upper airway opening passes 5 mm. Cuffed tracheal tubes such as the Quicktrach II and the cuffed Melker have been shown to effectively ventilate at tidal volumes exceeding 600 mL regardless of upper airway size. Retrospective studies have shown pre- hospital cricothyrotomies using a modified Seldinger technique can have success rates exceeding 90%, and be more consistently opened cricothyrotomy for surgical cricothyrotomy is faster than open cricothyrotomy and has less risk for major vessel injury. 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Figure 3: Always make incisions vertically to avoid blood vessels.
trachea. If using a hemostat, insert and open the device along the vertical plane of the cricothyroid membrane.

3. Insert the bougie gently caudally until you meet resistance (upon reaching the carina).

4. Insert the endotracheal tube over the bougie or in the hole beneath the trachea. If using a hemostat, insert and open the hemostats while inserting a bougie and into the trachea then remove the hemostats and bougie.

Ongoing Training

Regardless of the surgical cricothyrotomy method or commercial device used, no provider will maintain proficiency without continuous practice. Simply reading about a procedure is inadequate and sets providers up for failure. Instead, insist on being allowed to perform hands-on practice at a minimum of once per year. In a study on the ongoing proficiency of surgical airway procedures in anesthesia residency, an increased procedure proficiency and protocol compliance was observed when simulation training occurred at 3-, 6- and 12-month intervals, with the greatest compliance occurring at 3-month intervals. Surgical cricothyrotomy is not a procedure that can be practiced infrequently and have proficiency assumed. Many circles argue surgical airways should no longer be a prehospital skill. While this debate is ongoing, it’s important to prepare with regular practice. With increased practice comes increased confidence and competency.

Definitive Care

A cuffed tube placed in the trachea beyond the vocal cords is considered a definitive airway. That said, EMS is not a definitive environment. Tubes used in an emergency surgical cricothyrotomy will need to be replaced with either an endotracheal tube or a permanent tracheostomy in the hospital within 24 hours. Just because a physician exchanges an airway placed in the prehospital setting does not mean it is a bad airway. Nor are paramedics wrong when they place a surgical airway on a patient who is later successfully intubated by a physician. Once at the hospital physicians have access to other intubation procedures, including fiber-optic intubation, that may be use, which may not be available out of the hospital.

Be sure to communicate when a surgical cricothyrotomy is performed with a device without an inflatable cuff, because a definitive airway has not been placed. Without an inflatable cuff an airway does not protect against aspiration, and it can be difficult to deliver an adequate tidal volume. In these instances do not be surprised to see a more definitive airway placed in the emergency department. This will happen immediately whenever a needle cricothyrotomy is used, as the needle cricothyrotomy does not allow for effective ventilation.

Summary

Managing the airway does not mean intubation, it means managing the airway. Allowing a patient to breathe on their own with appropriate positioning, bag-valve ventilation and blind insertion devices are all airway management options. The surgical cricothyrotomy is a rare and lifesaving procedure when managing patients who are in a “can’t intubate, can’t ventilate” situation. These patients will die without aggressive and rapid intervention. While not all surgical cricothyrotomies provide a definitive airway, the needle cricothyrotomy is an ineffective means for ventilation and its use is discouraged. Understand the techniques used in your program and that are within your scope of practice as an EMS provider. Provide your patient the best opportunity for survival by knowing your program’s surgical airway procedure thoroughly, and practice it regularly.

REFERENCES

Strategic Planning for Rapid Implementation

How to work with stakeholders to deploy an MIH program

By Matt Zavadsky, MS-HSA, EMT

The Challenge

Healthcare stakeholders such as hospitals, physicians, payers, home health agencies and hospice agencies are quickly learning the impact EMS-based MIH programs can have on patient outcomes and the cost of care. While that is great news, it is also scary. In some instances they may want an MIH program faster than you can comfortably implement one.

What would you do if one of your local healthcare stakeholders called you today, said they’d heard about EMS-MIH and wanted to meet with you next week to get a program started? What gaps would you fill? What’s the right delivery model? What education will the providers need? What data metrics should you track to demonstrate the value of the program? This article walks you through the steps necessary to strategically plan and rapidly deploy an MIH program for your community.

The Phone Call

It’s Tuesday morning. You’re sifting through the field operations schedule, trying to fill those last openings for Saturday night, when your phone rings. It’s Liz Harris, the CFO of Mercy Medical Center, the largest hospital in your service area. Liz explains she just received the hospital’s 2015 readmission penalty notice, and it’s increased from 0.51% last year to 1.89% this year. She recalls that last year you met with them to discuss readmission prevention programs, but at that time the payments they were getting for the admissions were higher than the penalties being assessed. With the change in the penalty this year, the reverse is now true, and the hospital wants to start a program with you as quickly as possible. Liz invites you to a breakfast meeting tomorrow with her, the chief executive officer, chief medical officer, chief experience officer, chief nursing officer and vice president of care coordination. As your palms start to sweat, you accept the invitation, thank her for her call and hang up. Game on!

Your strategy for the meeting is crucial. As a savvy leader, you start assembling your innovation and integration team and invite them to a working lunch. The team includes your medical director, operations manager, communications manager, human resources manager, IT manager, clinical manager, compliance officer and billing manager. During lunch you work to frame out the questions you’ll need to work through with the Mercy team in the morning.

The Challenge

What is the problem Mercy would like to solve? Can EMS provide the right solution? What is the delivery model? Who all needs to be involved and committed? What training will be necessary for practitioners? Who will do the training? How will information be shared? What is the economic model? How will success be measured?

You agree to recommend to Mercy the use of a rapid implementation strategic plan using the “driver diagram” methodology (see Figure 1) recommended by the Center for Medicare & Medicaid Innovation.1 A driver diagram depicts the relationship between the aim (the goal or objective of the program), the primary drivers that contribute directly to achieving it (the factors or components of a system that influence achievement of the aim) and the secondary drivers necessary to achieve the primary drivers.

Clearly defining an aim and its drivers enables the team to have a shared view of the theory of change in a system because it represents the team members’ current theories of cause and effect—what changes will likely cause the desired effects. It sets the stage for defining the “hows” elements of a project—the specific changes or interventions that will lead to the desired outcome.

Aim

Reduce all-cause readmissions within 30 days at Hospital X by 20% by 1/1/2016

Primary Drivers

- Improve care at transition out of the hospital
- Provide early post-discharge services
- Patient engagement and education for self-management
- Target high-risk patients
- Provide transition for patients with limited English proficiency

Secondary Drivers

- Complete discharge summaries within 24 hours of discharge
- Rigorous medication review before discharge
- Provide 30-day supply of meds at discharge
- Timely, effective communications among all care team members (pre- and post-discharge)
- Schedule PCP follow-up appointments before discharge
- Home telemonitoring
- Provide patient with a transition coach (RN)
- Multidisciplinary home visits
- Follow-up calls
- Confirm that patients and families understand what they need to know and do
- Proactive counseling and care planning for end-of-life patients
- Focus on patients with diseases with high likelihood of readmission (diabetes, heart failure, etc.)
- Focus on patients with multiple chronic diseases
- Special care for homeless patients
- Special care for patients who need English proficiency

Outcomes:

- Improve patient satisfaction ratings
- Avoid Medicare penalties for preventable readmissions

Figure 1: Driver Diagram

The Meeting

The next day your team is enthusiastically welcomed into Mercy’s c-suite. During breakfast the Mercy team offers preliminary answers to the key questions your innovation team developed. They want to reduce 30-day CHF readmissions by a quarter. Together you come up with the strategic plan shown in Table 1.

All agree that in order to meet the goal, several joint Mercy/EMS task forces (Table 2) will need to be formed. The goal is implementation within 90 days.

With this plan you are well on your way toward a rapid implementation strategy. You agree to have weekly program implementation conference calls and face-to-face meetings every three weeks. During these meetings the task force leaders will report progress and everyone will help with accountability. The executive task force will work through thorny issues such as HIPAA compliance, health IT integration and contracting. The cardiology and EMS medical control leaders will meet with their constituents and get various protocols approved and contact processes resolved. The finance task force will assist with financing asset acquisition and setting up the billing process. The CMS Quality Innovation Network (QIN) participants on the clinical task force will offer assistance in developing the quality improvement and patient safety reporting processes and facilitate the reporting of outcomes to the state Medicaid office and CMS Innovation Center.

Because you are a well-connected EMS leader and have kept abreast of the MHH movement, you also decide it’s time to reopen the book to those chapters. A smile comes to your face as you reread the section describing that, in some cases, the need comes to you faster than you thought, sometimes the need comes to you because you reread the section describing that, in some cases, the need comes to you faster than you thought, and you should be ready to move quickly. “Yeah, I get that.”

### TABLE 1: STEPS TOWARD A STRATEGIC PLAN

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>SOLUTION</th>
</tr>
</thead>
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| What’s the problem Mercy would like to solve? | • Reduce 30-day readmissions for CHF discharges by 25%  
• Improve patient health status  
• Improve patient experience of care |
| Can EMS provide the right solution? | • Yes, with mobile resources, 24/7 availability and core competencies, as well as being a trusted partner in other projects and within the community |
| What is the delivery model? | • Care plans developed by PCP  
• Medical control shared between EMS medical director and PCP-cardiologist  
• Specialty trained mobile healthcare practitioners in non-transport marked vehicles providing proactive home visits for education care integration  
• Enrolled patient access to 24/7 access to 10-digit medical call center for episodic needs  
• Patients identified as qualifying for home health referred to home health  
• Patients identified as appropriate for palliative care have a conversation initiated by MHPs and, if agree to, referral to hospice |
| Who needs to be involved? | • Cardiology nurse educators  
• EMS agency innovations team  
• Discharge planning team  
• Cardiology team  
• Home health agencies  
• Hospice agencies  
• Local & state EMS agency regulator  
• State CMS Quality Innovation Network 🌐  
• CMS and medical control leaders will meet with their constituents and get various protocols approved and contact processes resolved. The finance task force will assist with financing asset acquisition and setting up the billing process. The CMS Quality Innovation Network (QIN) participants on the clinical task force will offer assistance in developing the quality improvement and patient safety reporting processes and facilitate the reporting of outcomes to the state Medicaid office and CMS Innovation Center.  
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| What training is necessary for practitioners? | • 44 hours of focused CHF management, care transitions, motivational interviewing and The Conversation Project 🌐  
• 20-hour classroom, 24-hour clinical rotations in CHF clinic and cardiology offices and hospice agency |
| Who will do the training? | • Cardiology nurse educators  
• Cardiologists  
• EMS medical director  
• Patient experience officer  
• Hospice nurses  
• Home health administrator |
| How will information be shared? | • Face sheets faxed to EMS agency with signed consents  
• Written record of each patient encounter sent electronically to hospital for upload to hospital EHR on shared platform with cardiologists  
• Related scoring tools conducted by EMS agency (health status, patient experience ratings) |
| What is the economic model? | • Budget developed by EMS agency and approved by Mercy  
• Mercy pays referral fee to balance EMS agency budget  
• Bonus payment to EMS agency by Mercy if goals are met or exceeded |
| What does success look like and how will it be measured? | • All-cause readmissions tracked by Mercy and the regional hospital council  
• 30-day post-discharge ED and admission data reported  
• Readmission ratio of expected to actual measured  
• Health status questionnaires completed  
• Patient experience surveys conducted |

### TABLE 2: TASK FORCE DEVELOPMENT

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<tr>
<th>TASK FORCE DEVELOPMENT</th>
<th>GOALS</th>
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| Executive/Sponsorship | • Ensure organizational commitment  
• Reach out to other stakeholders and brief on the proposed project  
• Home health  
• Hospice  
• Remove roadblocks to success |
| Clinical | • Select providers  
• Develop/implement training and credentialing  
• Develop/approve protocols  
• Develop equipment list  
• Resolve CLIA issues for point-of-care testing  
• Develop CQI process |
| Operational | • Introduce concept and secure support from the EMS agency workforce  
• Develop schedules  
• Acquire assets  
• Develop process map for referrals and operations |
| Financial | • Develop/approve budget  
• Develop payment model and billing process  
• Draw in 3rd-party payers to the team as consultants |
| Health IT | • Develop/implement patient care reporting process  
• Develop/implement data exchange process |
| Compliance | • Review and resolve state/local regulator issues  
• Develop/exeute contract |

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**ABOUT THE AUTHOR**

Matt Zavadsky, MS-HSA, EMT, is the public affairs director at MedStar Mobile Healthcare, the exclusive emergency and non-emergency EMS/MIH provider for Fort Worth and 14 other cities in North Texas. Matt has helped guide the implementation of several innovative programs that have transformed Mobile Healthcare into a mobile integrated healthcare provider, including high-utilizer, CHF readmission reduction, observational admission reduction, hospicerevocation avoidance and 9-1-1 nurse triage programs.
Connecting Care Providers for Tomorrow’s Healthcare Today

Telemedicine offers many applications for mobile integrated healthcare

Change is upon us. But isn’t it always? Changes in healthcare are certainly in play with charters like the IHI’s Triple Aim emphasis on experience, health and cost. Out-of-hospital care is an integral piece of the puzzle and has given rise to an “integrated healthcare” approach, of which emergency medical services are an important part. We see the beginning of this embedded in the umbrella we’ve come to know as “mobile integrated healthcare” (MIH). MIH and community paramedicine extend the traditional role of EMS 9-1-1 emergency care to include transport alternatives and nonemergency scheduled care. That’s a game-changer for sure, but the concepts are not new. Turning these concepts into reality requires new ways of thinking, new policies and new technology tools. Mobile (EMS) telemedicine is one of these tools necessary to connect care providers in new ways to bridge gaps and facilitate these emerging delivery models. After all, “One look is worth 1,000 words,” right?

Like MIH, mobile/EMS telemedicine is not a new concept. It is an extension of traditional wired telemedicine typically associated with connecting hospitals and clinics. The difference is that mobility adds complexity—nearly any application uses, which are as diverse as EMS itself. Common examples include secure text messaging, sending 12-lead ECGs and pictures of wounds, burns and mechanisms of injury, and enhanced activation of trauma, neuro and cardiac teams before hospital arrival. Live two-way videoconferencing between a medic and distant physician or specialist allows for real-time collaboration and an added dimension to patient care. Equally as useful is the transmission of video clips for purposes like stroke assessment or simply documenting a refusal.

For the lay public, these seemingly simple tasks are intuitively expected given the capabilities of the smart devices we all carry. Of course consumer apps are not permitted for HIPAA-legal care. Forward-looking organizations have avoided the “We’ve always done it this way” trap and view mobile telemedicine for what it is: a technology tool to enhance a medic’s capability and thereby enhance patient care—simply, connecting care providers for tomorrow’s healthcare today.

General Devices believes in challenging the status quo. It accomplishes this by responding to changing needs with innovative solutions that are well-designed and simple to use for the benefit of patients, communities and care providers alike. For more than 25 years, GD continues to be the leader in EMS-hospital communications and mobile telemedicine systems, connecting care providers nationwide and handling thousands of calls daily. GD’s innovative spirit continues to push the envelope with next-gen solutions for wearable devices like Google Glass and an eye to future networks like FirstNet. Visit general-devices.com to learn more.

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e-Net Messenger is a HIPAA secure mobile telemedicine solution providing live video, images and data on your device. Connecting healthcare in the field or home, with physicians in the hospital or on the go, for tomorrow’s healthcare today.

The new CAREpoint Workstation provides all the tools for the Hospital ED to efficiently interact with EMS and MIH providers, by integrating communications, information, documentation, 12-Leads, telemedicine, and more.

For More Information Circle 43 on Reader Service Card
Paramedic educators play a critical role in advancing EMS education, with their responsibilities often extending far beyond the classroom. While a 2005 study led by University of Toledo professor Judith Ruple described some characteristics of EMS educators at all levels, no previous studies have specifically explored the work of paramedic educators at a national level. In an effort to gain a better understanding of this profession, the National Association of EMS Educators (NAEMSE) teamed up with the National Registry of Emergency Medical Technicians (NREMT) to design a research study that would explore the workload of those who lead initial entry-level paramedic programs, as well as the resources available to them.

Who Was Included in This Study?
A random sample of 300 paramedic program directors was selected from the NREMT database to participate in our study. Since we were interested in paramedic educators, we asked all individuals from this sample whether they were responsible for teaching the greatest number of didactic and skills lab hours at their current entry-level paramedic program. If not, we asked the individual to provide contact information for the lead instructor. Only lead instructors were included in our study. We sent an e-mail link to an online survey containing 86 items related to educator workload, resources and demographics to our national sample of paramedic educators. We received 208 usable surveys for a response rate of 69%.

Table 1: Paramedic Educator Demographics and Work-Life Characteristics

<table>
<thead>
<tr>
<th>Category</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29 (76.3)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (23.7)</td>
</tr>
<tr>
<td>Highest Clinical Credential</td>
<td></td>
</tr>
<tr>
<td>EMS Professional</td>
<td>25 (65.8)</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Nurse</td>
<td>4 (10.5)</td>
</tr>
<tr>
<td>Physician</td>
<td>3 (7.8)</td>
</tr>
<tr>
<td>Other</td>
<td>5 (13.2)</td>
</tr>
<tr>
<td>Highest Level of Education Completed</td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>2 (5.3)</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>4 (10.5)</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>15 (38.5)</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>13 (34.2)</td>
</tr>
<tr>
<td>Doctoral Degree</td>
<td>4 (10.5)</td>
</tr>
<tr>
<td>Currently Enrolled in Higher Education</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11 (29.0)</td>
</tr>
<tr>
<td>Community Size</td>
<td></td>
</tr>
<tr>
<td>Rural (&lt;25,000)</td>
<td>5 (13.2)</td>
</tr>
<tr>
<td>Urban (≥25,000)</td>
<td>33 (86.8)</td>
</tr>
<tr>
<td>Age Mean (SD)</td>
<td>54.2 (9.0)</td>
</tr>
<tr>
<td>Experience as EMS Professional</td>
<td></td>
</tr>
<tr>
<td>≤15 years</td>
<td>9 (24.3)</td>
</tr>
<tr>
<td>&gt;15 years</td>
<td>28 (75.7)</td>
</tr>
<tr>
<td>Experience as Paramedic Educutor</td>
<td></td>
</tr>
<tr>
<td>≤15 years</td>
<td>20 (52.6)</td>
</tr>
<tr>
<td>&gt;15 years</td>
<td>18 (47.4)</td>
</tr>
</tbody>
</table>

Are Paramedic Program Educators Overworked and Underresourced?

National assessment of paramedic educator workload

By Remle P. Crowe, BS, NREMT, Melissa A. Bentley, MS, NRP, Elliot Carhart, EdD, RRT, NRP, NCEE, & Kim D. McKenna, MEd, RN, EMT-P

TABLE 1: PARAMEDIC EDUCATOR DEMOGRAPHICS AND WORK-LIFE CHARACTERISTICS

Figure 1: Median Hours Per Week Paramedic Educators Spent on Instructional Tasks

- Direct instruction in the classroom: 8 hours
- Instructional preparation: 8 hours
- Direct instruction in the skills lab: 5 hours
- Exam development: 3 hours
- Teaching non-paramedic students: 2 hours
- Grading: 2 hours
- Tutoring: 2 hours
- Direct supervision in a field setting: 2 hours
- Direct supervision in a clinical setting: 2 hours

Figure 2: Median Hours Per Week Paramedic Educators Spent on Non-Instructional Tasks

- Office hours: 5.5 hours
- Reports and processing paperwork: 5 hours
- Preparing equipment and supplies for skills lab: 3 hours
- Clinical or field scheduling: 2 hours
- Recruiting and interviewing potential students: 2 hours
- Committee involvement: 1.5 hours
- Research: 1.5 hours
- Maintaining equipment: 1.5 hours
- Interaction with the MD, program admin, dean, etc.: 1 hour
- Counseling and discipline: 1 hour
sent two additional reminder e-mails after the initial invitation to participate in our study.

What We Found Out About Paramedic Educators

A total of 68 (22.7%) educators responded to the survey. Table 1 displays the demographic and work-life characteristics of the educators who responded. Most of the educators who participated in our study were male (76.3%) and the average age was 54 years. Nearly half of paramedic educators had a master’s degree or higher (44.7%), and a little less than one-third (29.0%) said they were currently enrolled in higher education. The majority of educators in our study worked at post-secondary institutions (69.1%) followed by governmental education (10.3%). Among educators at post-secondary institutions, most worked for two-year colleges (66.0%). Less than one-third of all paramedic educators in our study were tenured or on tenure track (27.8%). Among educators at post-secondary institutions, most worked for two-year colleges, and the average age was 54 years. Nearly half of paramedic educators had a master’s degree or higher (44.7%), and a little less than one-third (29.0%) said they were currently enrolled in higher education. The majority of educators in our study worked at post-secondary institutions (69.1%) followed by governmental education (10.3%). Among educators at post-secondary institutions, most worked for two-year colleges (66.0%). Less than one-third of all paramedic educators in our study were tenured or on tenure track (27.8%). Among all programs, the median time to achieve a paramedic certificate was 52 weeks, with 56% of those hours spent on instructional tasks. Figures 1 and 2 display the breakdown of educator workload by instructional and non-instructional tasks. Perhaps not surprisingly, many of the educators who participated in this study were dissatisfied with the current paramedic program workload (40.3%).

Resources Available to Paramedic Educators

Nearly a third of paramedic educators depended on volunteer instructors or proctors to run their skills labs (29.0%), and 15.8% had to borrow equipment either sometimes or often. Meanwhile, the vast majority of educators said they received donations from local EMS agencies (97.7%). As for access to other important resources, most paramedic educators did have access to clerical support for tasks such as copying and filing (84.2%), while fewer had access to grant writing (54.1%) and assistance with statistical analyses (46.0%). Only 34.2% of educators had access to a teaching assistant or work study. Overall, 86.8% of educators reported they had adequate non-consumable supplies and all educators had enough consumable supplies. Figure 3 displays the percentage of educators who had access to selected resources.

Taking a closer look at paramedic program facilities, we found nearly all educators had access to wireless Internet in the classroom (94.7%). Although still a majority, fewer had access to learning management systems, such as Blackboard or MyLab (79.0%), or to item analysis software such as Scantron (79.0%). Just over two-thirds of educators had access to peer-reviewed journals (65.8%). Figure 4 displays the percentage of educators who had access to select resources at their paramedic program facility.

Limitations of Our Study

This study has limitations that may impact the generalizability of these results to all entry-level paramedic program educators in the U.S. While the sample of paramedic educators was randomly selected, the survey response rate was low. We believe this may have been impacted by the recruitment strategy of our study. Since we did not have access to a database of all paramedic educators, we utilized an existing national database to contact program directors under the assumption that individuals in this role may also serve as lead instructors. We then depended on program directors who were serving as lead instructors may have simply opted not to participate in our study. As no demographic information was collected for those who did not respond to the survey, it is unknown whether these individuals differed from those who did respond.

Why This Study Matters

As the first national assessment of paramedic educator workload and resources for entry-level paramedic programs, this study provides a baseline description of what paramedic educators do and with what tools. Overall, the findings from this investigation suggest that the majority of paramedic educators worked far more hours than assigned and were dissatisfied with the current program workload. Our findings are similar to what we found among other educators who participate in our study.

Paramedic Educator Workload

Educators were assigned to work a median of 25 hours at their paramedic program in a week. However, the results of our study suggest paramedic educators are actually working far more hours than assigned. Educators reported working an average of 57 hours per week, with 56% of those hours spent on instructional tasks. Figures 1 and 2 display the breakdown of educator workload by instructional and non-instructional tasks. Perhaps not surprisingly, many of the educators who participated in this study were dissatisfied with the current paramedic program workload (40.3%).

Many of the educators who participated in this study were dissatisfied with the current paramedic program workload.

**Table 1**

Educators

<table>
<thead>
<tr>
<th>Resource Available to Paramedic Educators</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Clerical support (copying, filing, etc.)</td>
<td>84.2%</td>
</tr>
<tr>
<td>Learning resource center (for learning disabilities)</td>
<td>83.8%</td>
</tr>
<tr>
<td>Student counseling (mental health, family issues, etc.)</td>
<td>81.6%</td>
</tr>
<tr>
<td>Employee assistance program</td>
<td>79.0%</td>
</tr>
<tr>
<td>Subject matter experts</td>
<td>76.3%</td>
</tr>
<tr>
<td>Information technology (IT) specialist</td>
<td>65.8%</td>
</tr>
<tr>
<td>Grant writing</td>
<td>54.1%</td>
</tr>
<tr>
<td>Statistical assistance (research, QI, item analysis)</td>
<td>46.0%</td>
</tr>
<tr>
<td>Legal advice (attorney)</td>
<td>39.5%</td>
</tr>
<tr>
<td>Teaching assistant/work study</td>
<td>34.2%</td>
</tr>
</tbody>
</table>

**Figure 3:** Paramedic Educator Access to Resources

**Figure 4:** Educator Access to Resources at Paramedic Program Facility

<table>
<thead>
<tr>
<th>Resource Available to Educators</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed projector system in classroom</td>
<td>100.0%</td>
</tr>
<tr>
<td>Wireless Internet in classroom</td>
<td>94.7%</td>
</tr>
<tr>
<td>Wireless Internet in lab</td>
<td>94.7%</td>
</tr>
<tr>
<td>Computer lab</td>
<td>89.5%</td>
</tr>
<tr>
<td>Item analysis software (grading system, Scantron, etc.)</td>
<td>79.0%</td>
</tr>
<tr>
<td>Learning management system (Blackboard, MyLab, etc.)</td>
<td>79.0%</td>
</tr>
<tr>
<td>Online tracking system for lab clinical, and field</td>
<td>79.0%</td>
</tr>
<tr>
<td>Portable projector</td>
<td>76.3%</td>
</tr>
<tr>
<td>Peer-reviewed journals</td>
<td>68.4%</td>
</tr>
<tr>
<td>Audience response systems (clickers)</td>
<td>65.8%</td>
</tr>
<tr>
<td>Electronic device in each lab to enter skill performance</td>
<td>36.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource Available to Educators</th>
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<tbody>
<tr>
<td>Teaching assistant/work study</td>
<td>34.2%</td>
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</table>
10 TIPS to Stay on Top of Your EMS Game
How to improve organizational performance and deliver clinical excellence

AT EMS WORLD EXPO 2014, I WAS CHALLENGED to deliver a session on what high-performing EMS systems should be doing to stay on top of their game. I focused on key elements of business practice, organizational performance and clinical excellence required for any high-performing system, EMS or otherwise. I drew my inspiration from the practices of my own organization and those of the Coalition of Advanced Emergency Medical Systems (CAEMS), but the tips are scalable and useful to all. In summary, my top 10 tips are as follows:

1. Embrace Economic Efficiency
   From an economic sense, the mission of EMS—and any healthcare organization for that matter—is to “convert the amount of available budget money into high-quality healthcare in order to produce excellent clinical outcomes.” The days of well-padded budgets are a thing of the past. Municipal coffers are shrinking for the public sector, collection rates and reimbursements are down for private EMS, and charitable giving and the donation of free time is fast disappearing in the volunteer sector. In other words, no matter the type or style of your organization, it must be run as a business, with an eye on the bottom line and a realization that EVERYTHING costs something.

2. Manage Data
   In this day and age it’s difficult to believe some EMS organizations think they have little or no management information. The actual situation is quite the contrary and individual data mines are bottomless. Information is freely available, from call volume to patient condition to mean times between failures of vehicle components. When collected, collated and analyzed, this information becomes a valuable intelligence product that can be acted upon to improve the next cycle of response, care and administration.

3. Analyze Demand
   System status management (SSM) is the science of being in the right place with the right resource at the right time to meet the patients’ needs. Some say it’s the practice of placing ambulances on street corners, but the crucial thing we must remember is the patient is having the emergency so we must be poised to respond with minimal delay and maximum impact. SSM takes the intelligence products of demand analysis of both time and space, and matches manpower and availability to deploy a responder as close to the patient as possible. This achieves a minimal response time for the patient, and reduces time spent running under emergency conditions for the crew—not to mention distracted pedestrians!

4. Engage Your Medical Director
   So far all the planning and data crunching has been devoted to the first 10 minutes, or approximately one-sixth of the patient response episode. It’s ironic that some organizations set great store by, and are judged on, their response times alone. It’s not “high-performing” if you are good at racing to the scene, only to be incapable of delivering the clinical goods on arrival. A well-trained workforce that has sufficient preception, mentoring and training, and is clinically current, is an absolute requisite for success. To achieve this, the involvement and active engagement of the operational medical director (OMD) must occur—often.

ABOUT THE AUTHOR
Rob Lawrence is chief operating officer of the Richmond Ambulance Authority. Before coming to the USA in 2008 to work with RAA, he held the same position with the English county of Suffolk as part of the East of England Ambulance Service. He is a graduate of the Royal Military Academy Sandhurst and served in the Royal Army Medical Corps. Rob is a member of the EMS World Editorial Advisory Board and host of the Word on the Street podcast. Follow him on Twitter at @wotsukrobl.
Run a Lean System

EMS is not only response, treatment and transport; the back office and support functions are the “power behind the punch” of service delivery. The creation of lean, efficient and measurable systems is the key to success. An example of this is a high-functioning fleet service. If your vehicles fail on the way to calls, then so does the mission. Keeping your organization well serviced and maintained is an artrial function and performance could hemorrhage if you can’t get to where you need to go. The swift conversion of treatment to bill to income is also an essential function. Remembering the economic requirement that we turn the amount of available funds into quality healthcare requires the generation of said funds to keep the EMS circle of life turning. While those in support functions are not delivering life-saving and patient care, they keep the organization alive and healthy.

Develop a Culture of Safety

The Culture of Safety is, surprisingly, still a new concept to some quarters of U.S. EMS. This is nationally apparent by the stream of line-of-duty deaths (LODD) and devastating vehicle accidents that result in well-publicized photos of ambulances splayed like bananas after impacts with both moving and static objects. An environment of cultured safety seeks to establish the root cause of these issues then put techniques, practices, procedures and philosophy in place to create a safe environment for all.

Make Friends with Public Health

When I go out to speak, I often ask the audience if they know who their public health director is. Many do not, which is shameful. EMS enjoys its role in public safety and recognizes its place in the house of medicine, but fails to realize it is an essential member of the public health camp. Prevention is better than cure every time, so understanding the aims and objectives of the public health system is essential. The current Ebola crisis has reinforced the point that we are joined solidly to public health and we must interact often and well.

Advocate for Innovation and Research

To continue to push the boundaries of the EMS world, we require evidence-based practice, outcomes and data to trump industry anecdote and tradition. To progress we can’t simply hide behind the mantra of “We have always done it that way.” Organizations should consider researching, collaborating, capturing and presenting studies and good practices. It doesn’t have to be major projects or massive patient studies, but perhaps a series of “small cycle testing” that relies on a “plan, do, study, act” (PDSA) cycle. Large change can occur from small tests. Writing these up, complete with supporting evidence, can effect change not only in the researchers’ organizations, but in the wider industry.

Get Out in the Community

The evolution of community-based programs here is almost anthropologically in nature. Community paramedicine, or mobile integrated healthcare, is evolving and forming according to local environmental and political conditions. No two programs are the same, which is technologically good, as they are shaped to meet the needs of the population they serve. The bottom line for many of these programs to be successful and attain longevity is to be actually a source and genuine income to be self-sustaining. Sadly many programs to date have operated on a loss-leading footing and, unless sustainable income is forthcoming via legislatice changes, some could fade as quickly as they initially shone. That said, some community-based activity is already part of normal daily EMS practice and could rightly be classed as “paramedic in the community” activity.

Understanding who your frequent service users are, and managing their whole system use and creating case conferences, is a great community activity. Fostering relationships with other local care organizations such as behavioral health, social services, faith-based groups and both the primary and secondary care sectors may lead to the creation of cost-effective and sustainable programs. This level of liaison also assists in the breaking of barriers and removal of care silos.

Ensure Your Voice is Heard

Internally, “If no one is following, then you are not leading.” Externally, if you don’t broadcast your message, then no one will hear it! A key communication strategy should be a major corporate activity. Some say it takes 10 good news stories to trump one bad story. Having an active communication plan that involves providing your local media with positive stories (to get your “10 good ones in the bank”) is a good investment in time. Good news stories inform the public as to the quality of your agency and instil a sense of pride within the service. In the social media age it is now relatively easy to place news. A photograph and a descriptive paragraph can quickly be crafted and posted on your organization’s social media sites or sent to the editor of a national trade magazine for both national and international coverage.

A Bonus Tip: Know the Four Words that Count Most

EMS organizations are usually one degree of separation away from politics. Public-sector organizations are governed by councils or boards of supervisors, private-sector companies have shareholders and executive boards. If those who lead our EMS organizations are not politically aware and astute at navigating the rocky waters of achievement and funding, then the organizations—regardless of how good or efficient they actually are—can be overturned by four political words: “All in favor?” If you have an inability to influence those who govern, then be prepared to be outvoted or worse—voted off the island.

87 Running, training and maintaining your EMS fleet is essential. The current Ebola crisis has reinforced the point that we are joined solidly to public health and we must interact often and well.

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Duty to React
When you’re needed, don’t turn a blind eye

HALF A CENTURY AGO, 28-YEAR-OLD KITTY Genovese was stalked and stabbed in New York City. I remember the case well—not because of its location or outcome, but because of the report that 38 people witnessed the crime and did nothing. Although that estimate has since been reduced to five, the Genovese murder reminds us that not getting involved can have tragic consequences.

Much more recently an EMS forum I follow published a post from an off-duty EMT who wondered if he was right to answer a commuter-train crew’s request for help with an elderly victim of a fall. The newly certified responder, who checked the passenger’s pulse, took a SAMPLE history and evaluated her according to the Cincinnati Pre-hospital Stroke Scale, chided himself for not being able to determine the cause of her fall and questioned whether he’d helped the patient at all.

When I read his account I thought, “Good for him; here’s someone new to our field who gets the point about helping others.” Then critical comments like, “I probably would have just called 9-1-1” and “Don’t get involved” started appearing, and I began to wonder how long it would take the ambivalence of colleagues to erode our diligent EMT’s enthusiasm.

Show Some Concern

Yes, there are risks to administering care away from one’s district, but I’ve never believed a uniform or a duty to act is the most important consideration when someone is sick or hurt. I try not to overthink the downside of good intentions, but I only know I’d want others to show concern for members of my family in distress.

Maybe it’s inconvenient and just plain bad luck to be on a call so horrific, you figured the only way to survive in EMS while achieving some measure of longevity was to titrate your compassion? I get that, but sometimes we underestimate the difference conversation, counsel and even hand-holding can make to someone hurting and needy. No one had to explain that to Sophia Farrar, the only Genovese neighbor who left the safety of locked doors to offer aid. Without medical training, Farrar easily could have rationalized letting someone else be the rescuer. Instead she focused on what she could do. Genovese died in her arms.

The anniversary of Kitty Genovese’s murder is a sobering reminder of a population’s capacity for indifference. It doesn’t matter whether 38 people or five witnessed the attack; citizens who might have intervened favored refuge over rescue, convenience over care. The only contribution to society offered by most of these onlookers was clarification of the term bystander.

We in EMS are better than that, aren’t we? When faced with distress—not even danger—don’t we have a bias to intervene? We used to. You used to. You know who you are—the ones who set examples for me; the ones who took care of my daughter, my wife, my mother, my father. Please tell me you’re still out there.

“Why did it become OK to bet a life with someone else’s chips?”

When you’re there, you’re there. You can try to ignore it and keep driving while telling yourself it’s someone else’s territory, someone else’s scene. You might even justify that attitude by reminding yourself you spent the last 24 hours answering those kinds of calls and now it’s someone else’s turn.

Seriously?

What if there’s a delay? What if the responding crew lacks your training or experience? When did it become OK to bet a life with someone else’s chips?

I don’t think most of us entered EMS with lots of self-imposed conditions about when and how we’d engage in rescue. When I got started, I wasn’t too picky about which patients I’d treat on duty or off. I was on a 24/7 safari for the elusive good call—naive and even silly perhaps, but I wasn’t about to let any opportunities to play medic pass by.

Have you ever felt that way? When did it change for you? Was it when you realized we don’t make a huge difference every day—not that we don’t make any difference, just not as much as we’d hoped? Or were you on a call so horrific, you figured the only way to survive in EMS while achieving some measure of longevity was to titrate your compassion?

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Mike Rubin, BS, NREMT-P
About the Author

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