An Inside Look at How Ebola was Stopped in its Tracks in New York City

When Haz-Tac EMS Paramedic Winsley Julien first got the call on October 23, 2014, that a patient in Hamilton Heights very likely had Ebola, the 15-year EMS veteran said he started to get a little nervous. "I took a deep breath, but then I knew we had the suits, so I would be okay," he said. Paramedic Julien had been on previous runs where it was thought the patient might have Ebola, but actually was afflicted with something else. This initial New York City case of Ebola was a doctor who had been in Guinea treating patients through Doctors Without Borders and called 911, stating that he had a fever of 100.3 degrees and recently had been exposed to the virus in Africa.

"My heart was racing, but then I donned my personal protective equipment--a TyChem-F suit and Powered Air Purifying Respirator (PAPR), relied on my training and knew I was protected," Paramedic Julien remembered. "The patient was very nice to us once we arrived at his apartment and wanted to make sure he didn't further expose his fiancée and neighbors." Paramedic Julien and his partner took the patient down the steps of the apartment building in a stair-chair and into the ambulance, while ensuring that everyone stayed back. Everything in the ambulance already was sealed by this point, so he secured the patient on the stretcher and administered supplemental oxygen. "We just tried to keep him isolated and make sure we kept everything enclosed so nothing was exposed," he explained. NYC's first Ebola patient arrived at Bellevue Hospital Center properly isolated and was handed off to medical personnel there.

Once at the hospital, using a bleach and water solution, Paramedic Julien and his partner deconned with the aid of Haz-Mat Firefighters. Then, they did an assisted doff of the suit. The FDNY uses a unique valet doffing process to ensure member safety. Doffing a PPE suit after being exposed to a hazardous biological element, such as Ebola, is a high-risk process that requires a structured procedure, followed by elimination of the suits and cleaning the area with bleach. "After doffing, my adrenaline was pumping when the Fire Department (Bureau of Health Services) doctor told us we needed to take our temperature twice a day for two weeks," Paramedic Julien stated. Since there wasn't a breach in the PPE suits of Paramedic Julien and his partner and they followed protocol exactly, they went back in service immediately and finished their shift, while the ambulance used for transport was taken to be cleaned.

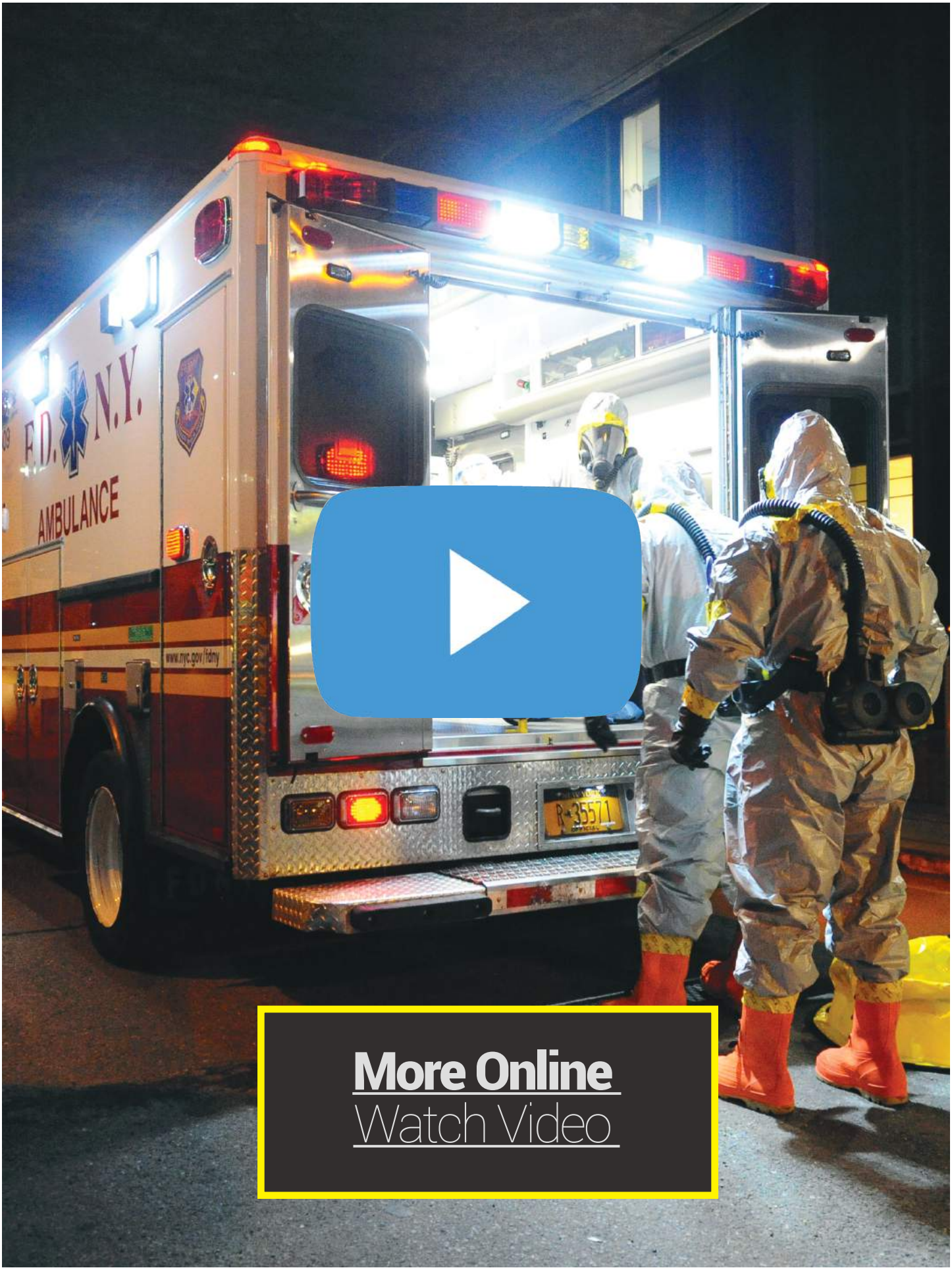
"The process went very smoothly and it worked out just as well as we could have planned," said Dr. Glenn H. Asaeda, Chief Medical Director of the Office of Medical Affairs (OMA). "We previously did transfer drills from Kings County Hospital to Bellevue Hospital Center. We took it further and identified where we would decon. We ran through every step as if it were real. That made it seamless when the actual case came through. All members knew where they were supposed to be and what they were supposed to do."

At the hospital, Dr. Asaeda told Paramedic Julien and his partner, "Of all cases, it appears credible that this patient is going to test positive. There was no breach in your PPE, so you're fine, but I'm sure you're a little bit uneasy, as anyone would be. Not for nothing, but you've taken care of the first New York City case of Ebola!"

"I trusted my training and trusted my suit. When it comes down to it, your training is the most important thing that gives you confidence," said Paramedic Julien. "In the haz-mat area, it takes a lot of guts to handle any of the situations we're faced with, but the Department is really great with our training and I trust it 100 percent."

Preparing for Ebola

Although the FDNY was tracking Ebola in West Africa since spring of 2014, by early summer, officials started initial preparations of what to do if/when it came to New York City. After an incident in Dallas in September 2014, Commissioner Daniel A.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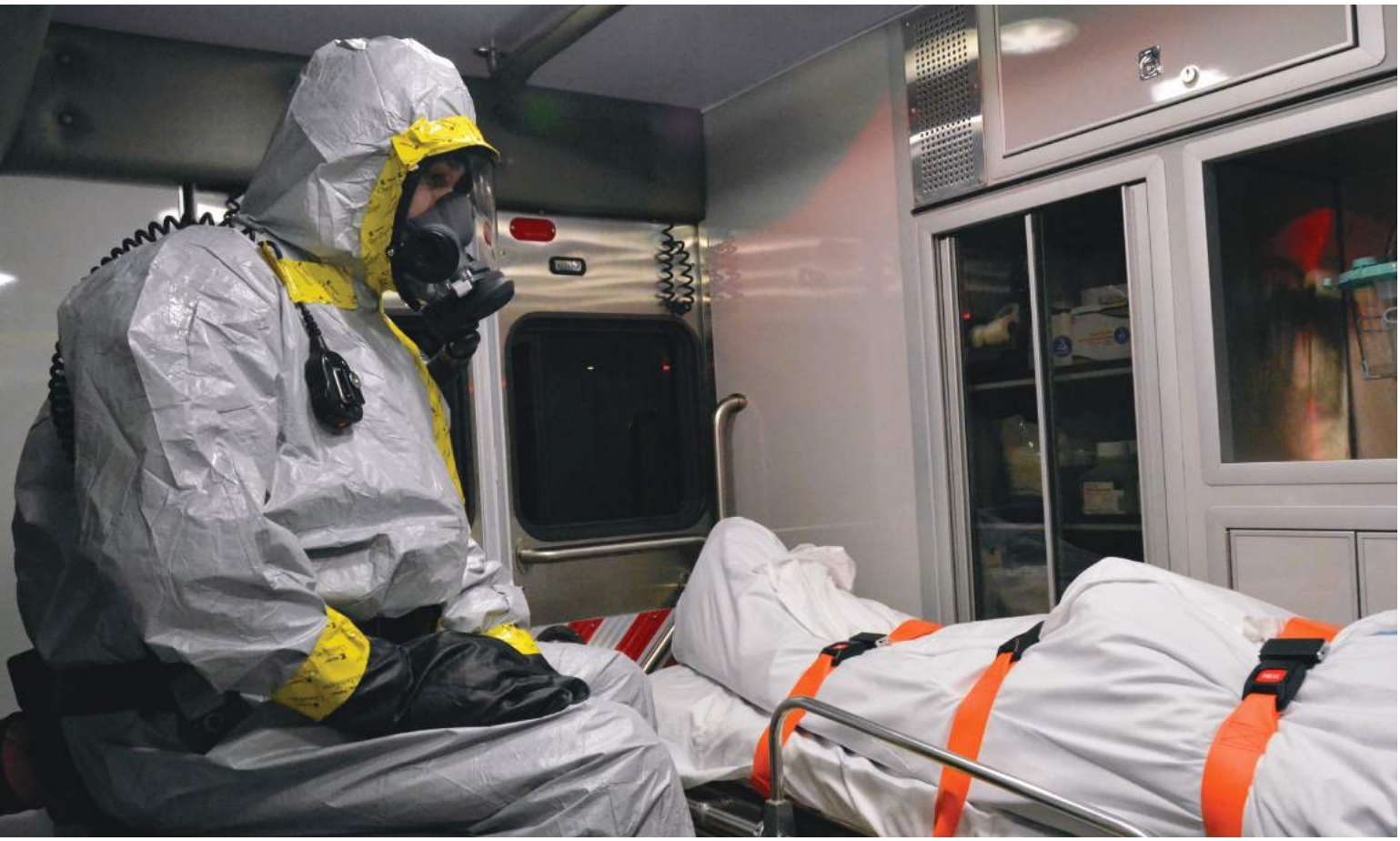


Huge Undertaking. *It took roughly three months to train the entire EMS workforce and each training session took approximately four hours.*

Leonard. They'd have the full travel history within 30 minutes and most of the time, it ruled out that this person was an Ebola candidate. "It was a great partnership with DHS in order to get travel history that quickly. They gave us travel dates and times of patients who were classified as a Fever/Travel case. Once we [had confirmed there was a chance of Ebola], we took the ultimate caution for our people," Chief Leonard emphasized.

Training with Equipment

"After we watched the Dallas Ebola case unfold on the news and saw what they were wearing, we realized we already have this equipment and the EMS Haz-Tac Battalion already was familiar with it," explained Deputy Chief Paul Miano. "It wouldn't be learning to use the equipment; it would be familiarizing ourselves again and understanding that it can be used for this type of situation, not just the situation for which we were training."

The PPE suits normally are used for chemical protection and hazardous materials, so it was a relatively easy transition. But, now, there was a different mask, the addition of a double-glove and use of the booties. "We got approvals from the companies that manufacture the equipment, saying that it can be used for biological protection. It meets all the standards and the ratings and our Haz-Tac members already train twice a year on this equipment for 16 hours each time," noted Chief Miano. Training was a matter of "Come on down. We're going to be using this equipment again, but we're using it for biological incidents this time," Chief Miano remarked. "While we already had enough PPE suits, the FDNY did purchase more because they were unsure just how widespread Ebola could become and the suits must be thrown out after opened. The canister we started using is called a CAP-1 filter, but it was overkill for our needs, so we switched to the smaller, P-100 filter and bought a lot of those," explained Chief Miano.

"We got our equipment as needed, but then there were some rejections during that time when we realized some of the equipment we were purchasing didn't meet our needs. Some of the gloves, booties and hats we purchased were permeable to the Ebola virus and had to go back," said Chief Ahee. The CDC put out parameters of the equipment the Department should have to protect their members from Ebola, but the FDNY ordered even higher quality than what the CDC recommended.

The Haz-Tac teams were trained on how to don and doff the suits, whether they should wear the boots over or under the suit and, depending on one's assignment, the way one doffs would differ. "In this situation, the Haz-Tac team was going to cut and peel the suit and this was going to be an assisted doff. Although we already were trained in that, we had to identify this was the way we were going to do it," said Chief Miano.

"We also needed to educate our workers about the disease so they'd feel comfortable operating around it since they already were comfortable wearing the equipment," he continued. "It was about building confidence that this suit had the right protections to keep our workers safe," Chief Miano remarked.

The Firefighters were part of the decon process for the EMS

Ingenuity on Display. *FDNY members use a bleach solution to decon, which includes a dye in it so units can see where the cleaning solution, which is typically clear, is hitting and where it still needs to be applied.*

Nigro formed the EVD Task Force to prepare for all contingencies and the Department started holding meetings up to five times a week with a very diverse group. The meetings included EMS Operations, Fire Operations, Haz-Tac operations, Fire Special Operations Command, the Chief Medical Officer, Chief Medical Director and technology. "Nearly every entity had a representative in these meetings," explained Michael Fitton, Assistant Chief, EMS Operations. "We all came together in the Fire Department to devise a coordinated, cohesive plan, not only to protect the public, but also our members," he said.

Even though James E. Leonard officially became Chief of Department on November 1, 2014, after NYC's inaugural Ebola patient was being cared for at the hospital, he was briefed on the situation in the weeks leading up to his onboard date. According to Chief Leonard, "The most important thing was that every bureau of the Department was leveraged for this."

After 9/11, the FDNY decided to tier the haz-mat response to chemical/biological and any hazard, so the Department had elements in place to deal with certain incidents, even though they weren't Ebola-specific. "People did a lot of research for us and some things we already had captured," said Deputy Assistant Chief Roger Ahee, then assigned to EMS Bureau of Training. "We had past lessons and people on staff who had knowledge of the virus already, including the doctors and Office of Medical Affairs staff," stated Chief Ahee. "They were well-prepped, so they were able to put together the video and PowerPoint presentations for training relatively quickly.

"We were so successful with our training model that many members of New York State called and asked us to share the training, video and our PowerPoint with them, which we did willingly, because we didn't know where this virus was going," noted Chief Ahee.

A lot of ingenuity was exhibited by different members of the Department. "One simple change was that we were using a bleach solution to decon people. It's clear, so you can't see it, but someone suggested putting a dye in the bleach so you can see that the dye is hitting where it needs to be hitting while deconning our people," remarked Chief Leonard.

Training the Workforce to Identify Ebola

"The training portion of this was a huge undertaking. We never had done anything like this before. It was spur of the moment; we were reacting, based on information we received from the Centers for Disease Control (CDC) and, sometimes, their planning changed hourly," stated Chief Ahee.

It took roughly three months to train the entire EMS workforce and each training session took approximately four hours. The Department trained all EMTs and Paramedics regarding what to do when faced with an Ebola patient, just in case there was a true outbreak. Everyone would have the same four-hour training, so they were prepared if it became an "all hands on deck" situation.

"We had to get the staff up to speed and recruit additional instructors because we couldn't do everything with the in-house faculty we had," said Chief Ahee. "There was additional staff in from the field and we brought them up to Headquarters and trained them," he mentioned. "Then we did 'the road show' and took to the field to train the members near where they worked to make it more convenient. We had double and triple sessions in all five boroughs, including weekends. The training staff was working from 7 a.m. to 11 p.m. In a very short period of time, everyone came through. We got everything done in a very short time frame."

Finding the "Ebola Needle in the NYC Haystack"

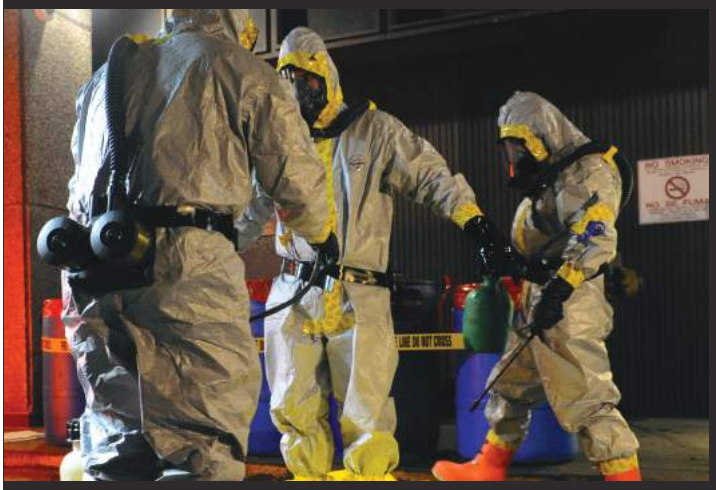
The FDNY wanted to catch the "front end" of Ebola, those patients who potentially could have Ebola, were exposed to Ebola or already sick with Ebola as part of our Emergency Medical Dispatch, said Dr. Asaeda. To determine the "potential Ebola patient," we decided to implement the Fever/Travel (F/T) call since the CDC recommendations said Ebola patients likely would have a fever. "It was relatively easy to implement the F/T call type since we already had fever rash and fever cough call types in place after the World Trade Center attacks. It was a matter of adding the question about whether they visited Sierra Leone, Guinea or Liberia and getting the Department of Health involved," Dr. Asaeda noted.

"When we first were put on notice about Ebola, we had our assignment receiving dispatchers discern people who might be high index," stated Chief Fitton. The Department created a telephone triage algorithm that would whittle its way down to anyone who reported he/she was suffering from a fever and if he/she had traveled to West Africa within the past 30 days. "We monitored compliance in the [dispatch system] very closely," he said. "The first time you introduce something new to the algorithm, there's a break-in period where people are still catching on and a big part of that fell on the Officers who worked at Emergency Medical Dispatch. In the beginning, anyone who had a call with a fever would alert an Officer so the Officer could come, assist and oversee the call. We did that until we got our feet beneath us and the call became more routine," Chief Fitton explained.

"Once we got a patient's name and identified it as a F/T call, Fire Marshals would work with the Department of Homeland Security (DHS) Border Patrol and run their travel history," remarked Chief

Valet Doffing/Decontamination Procedures for Ebola

By Deputy Chief Nicholas Del Re



Valet Doffing. *FDNY Haz-Mat units were instructed to wash down...to cut and peel suits off FDNY Haz-Tac teams in an assisted doff. After numerous exercises and training sessions, the Department identified the best approach for the type of suits that were donned.*

In the summer of 2014, there wasn't much information available in the United States regarding the proper doffing and equipment decontamination procedures for handling patients potentially infected with the Ebola Virus Disease (EVD). Subsequent to the cross contamination and exposure of a registered nurse who treated a confirmed EVD patient in Dallas during September of 2014, the Centers for Disease Control (CDC) put forth recommendations on Ebola decontamination for both emergency personnel and equipment.

FDNY Haz-Mat Operations carefully reviewed these newly issued CDC recommendations. Working closely with the FDNY Office of Medical Affairs, Haz-Mat Operations modified the existing doffing/decontamination procedures that members already were trained on and familiar with to include additional procedures from the newly released CDC recommendations. This created a new EVD doffing/decontamination procedure that ensured that the health and safety of FDNY personnel were the utmost priorities.

After many hours of practicing, modifying and training, the Department released a new operational procedure to its members. This unique FDNY doffing and decontamination procedure has been successfully utilized during many suspected cases of EVD, as well as during the first confirmed case of EVD in New York City.

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providers and wore their own PPE suits, said Assistant Chief Stephen Raynis, then the Chief of Training. The firefighting workforce of the FDNY did awareness training through videos released internally on the Department's intranet website DiamondPlate to recognize the symptoms of an Ebola patient, even if the patient they were dealing with didn't come in as a Fever/Travel call type. "They were trained for that and to recognize when the run came in, we set up our CAD system to classify a patient they're responding to as a Fever/Travel patient. If they traveled to any of those West African countries, the dispatcher would enter it into the CAD system and the Firefighters would know that it was a Fever/Travel call and they'd have to wear PPE and other protective equipment. They were trained to put on a mask and gloves and an N95 'TB' respirator, the gloves and a gown when dealing with a Fever/Travel patient. This equipment is part of an isolation kit that's on their rigs, but is not as sophisticated as the PPE suits the EMS Haz-Tac used," explained Chief Raynis.

Making Sure Units Were Available

There were select Haz-Tac units designated and strategically deployed off-line or on standby, waiting for that F/T call type. "Because it was such a high-profile situation and there was a great deal of concern by the Fire Department and the City as a whole, we made sure these Haz-Tac units were available. They were put on a separate frequency on our City-wide frequency and utilized for Fever/Travel calls," remembered Chief Fitton. "We backfilled

Leading New York City's first successful Ebola operation showed the country that the FDNY is ready and able to handle any situation its members face.

those Haz-Tac ambulances with other ambulances on overtime or straight time so we had the same coverage in the field," he said. "As we moved on and were able to evaluate the number and frequency of these Fever/Travel call types, we put the [ambulances] back in the 911 system and if we had a Fever/Travel call, we'd send an ambulance, a Haz-Tac ambulance and a Haz-Tac Officer as well." The Haz-Tac Officer assigned to the situation would call a physician out of telemetry and further evaluate the circumstances. "Unless a patient was in dire need, the direction was to stand back and wait for the properly outfitted individual who could operate safely in that environment should there be someone who posed a high index of suspicion," Chief Fitton remarked. The FDNY transported 13 patients while fully dressed in PPE, but only one case proved positive for Ebola.

There were two Haz-Tac units on the scene, but only two Paramedics treating the patient. "We determined early on that you couldn't take care of a patient, take the suit off, get in the ambulance and drive it and put the suit back on and get the patient out of the ambulance," stated Chief Miano. There's too much chance of getting contaminated while doffing the equipment. "We'd have two ambulances respond to the call, one being a Haz-Tac unit or two being half Haz-Tac units to make a Haz-Tac unit and we'd have 'clean members' and 'dirty members.' 'Dirty members' treated the patient; 'clean members' never came in contact with the patient; they drove the vehicles," he continued.

Using Telemetry with the Ebola Case

The FDNY calls the On Line Medical Control Center (OLMC) as their source of "telemetry." Based in Queens, it's a 24/7 center where at least one physician is on duty at any time so that EMTs and Paramedics can call when they need additional medical orders, information about additional medication or treatment that's beyond their protocol.

"Telemetry was part of our planning for Ebola and we put OLMC into the mix; mainly as the contact person for the Department of Health physician," noted Dr. Asaeda. Since the field personnel are in encapsulated suits, they're knocked out of the box of making simple phone calls, so there was always a Haz-Tac Officer responding to the scene in every one of the Fever/Travel calls. That supervisor would be the contact for OLMC, who would be in contact with the Department of Health and there would be a discussion between the two physicians regarding the hospital to which the patient should go. Then, the DOH physician would contact the transport facility to let them know a patient is coming and later, the FDNY OLMC physician contacted the hospital to let them know when the crews were ready to leave the scene. This allowed the hospital staff to get ready, but prevented them from having to be dressed in their PPE for too long while waiting for the patient to arrive. "We figured the DOH would get their plan ready, then we told them when we're just about to leave. That gave them about 25 to 30 minutes to get the suits on, meet our crew and facilitate a handoff," explained Dr. Asaeda.

"Member safety was our number one priority," said Chief Leonard. "We couldn't expose our people, nor did we want to expose any civilians unnecessarily. We knew we had to be right in what we were doing. Our mission for success had to be 100 percent."

Lessons Learned/Reinforced

- Leading New York City's first successful Ebola operation showed the country that the FDNY is ready and able to handle any situation its members face.
- "The way we reframed and retooled this Department after 9/11 allowed us to seamlessly adapt to situations such as Ebola," explained Chief Leonard. "The strength of the FDNY is always its people. We have tremendous people. I say that my goal as the Chief of Department is to have the 'Best trained, best equipped, best led,' Department and in this situation, we gave them the best training, the most up-to-date equipment and they were led by the best Chiefs and Officers we had. It was a success not only for the Department, but also the City of New York."
- "The primary reason our Haz-Tac individuals have these TyChem-F suits and Powered Air Purifying Respirators is to work in a hazardous-material environment," noted Chief Fitton. "While this equipment wasn't necessarily designed for a biological or contagious disease situation, we used those resources for other circumstances and applied them to the situation that was presented to us."
- "You need to be reactive to incidents taking place around the country and know that any situation can arise and affect your Department's service," stated Chief Miano. "I think my peers in other parts of the country should look around at what's going on in other parts of the country and say, 'If this came here tomorrow, am I prepared'? If not, figure out how you can be. It doesn't take long for something to get from one part of the world to the next. Be proactive in your Department by being reactive to what's going on across the country. When 'patient zero' came, we already had something in place; we were prepared. In the future, if something else comes to New York City, we are prepared because we have a structure that allows us the latitude to make adjustments, but still have this protocol in place to start from," Chief Miano elaborated.
- "In this time of need, the smartest of the smart people all got together, everyone put aside egos and we got the job done because we recognized the importance of the safety of our members," remarked Chief Ahee. "Everyone came together, everyone participated. The team effort truly worked well for us." ■

Building Blocks for Accomplishing Our Mission

By Chief Medical Officer, Special Advisor to the Fire Commissioner for Health Policy, Dr. David Prezant

In August 2014, months before FDNY successfully transported its first Ebola patient, it was my responsibility as FDNY's Chief Medical Officer and Special Advisor to the Fire Commissioner on Health Policy, to provide the Department with advice on what was needed to safely respond to, stabilize and transport a patient with Ebola Virus Disease (EVD) from a pre-hospital environment to a hospital's emergency department or bio-containment unit. At the time, guidance information was sparse and changing rapidly. As the disease spread, time was short and any day we faced the possibility of having to treat an Ebola patient.

The facts, known and unknown, were presented to Fire Commissioner Daniel A. Nigro and he determined that a task force was necessary to bring all Bureaus of the Department together with a clear objective– "provide exceptional patient care, while keeping our members safe."

I was appointed Chair of the EVD Task Force and charged with leading the effort to assess our current level of preparedness. The task force was designed to assess and accomplish the following action items:

- Tailor rapidly evolving medical and scientific knowledge in a way that works in our pre-hospital setting.
- Redesign protocols and personal protective equipment (PPE), integrate the best EMS and Fire had to offer and retrain accordingly.
- Coordinate with other partners, including the New York City Department of Health (DOH), receiving hospitals and other agencies at the local, state and federal levels.
- Institute a continuous improvement process to reassess, redesign and retrain.

Using an Incident Command structure, the task force consisted of decision-making and technical representatives from Fire and EMS Operations, Haz-Tac EMS, Haz-Mat Fire, Communications, Physicians from the Office of Medical Affairs and the Bureau of Health Services, Logistics, Safety Command, Training Academy and others, as needed. Labor and management were kept informed.

The clock was ticking. The fear was that with New York City being an international travel hub, we would be faced immediately with an epidemic-like surge of patients.

At the table. *Led by Dr. David Prezant (pictured at the head of the table, left), the FDNY EVD Task Force consisted of decision-making and technical representatives from many of the Department's Bureaus and units.*

Based on the task force's collective experience, we knew that the far greater likelihood was that single or several patients would present long before a surge response might be needed.

Through meetings, demonstrations, tabletops and drills, we agreed that while the building blocks for success were in place, we lacked the information and confidence that our PPE and protocols were adequate to keep us safe from this new threat.

Therefore, the task force's immediate solution was to use Haz-Tac/Haz-Mat units already trained to operate in PPE with full skin coverage and respiratory protection to respond to the EVD patient. Understanding that if patient numbers climbed, surge capacity for Haz-Tac/Haz-Mat units would become unmanageable, that was addressed with a mid-term plan (equipping and training approximately 1,300 FDNY EMS members within two months and another 2,000 two months later to work in full PPE with Officer-supervised doffing and a special call to Haz-Mat if body fluid contamination occurred) and a long-term plan (do the same for all Firefighter Certified First Responders, if needed).

The best plans are useless without follow-up. We organized tabletops and drills with FDNY, DOH and receiving hospitals to assess and improve all facets of the response. Members of the task force were present and reported back with assessments, corrective actions and follow-up after implementation.

The greatest measure of success is that through these efforts, the workforce trust was maintained, with record numbers of members requesting to join Haz-Tac and Haz-Mat units. And, today, with the threat of EVD no longer immediate, drills continue to maintain our preparedness for this and all hazards.

The task force was recognized by the Fire Commissioner and the Chief of Department with an award for excellence. The award institutionalizes the task force approach as a model for future use by FDNY and other departments. ■

About the Contributors

(In order of appearance in article)

Haz-Tac Paramedic Winsley Julien joined FDNY in 1999 as a Paramedic. He became Haz-Tac certified in 2005. He has served for 16 years at Station 14 in the Mott Haven section of the South Bronx. He was honored by the Department in 2015 with the Tracy Allen-Lee Medal for his role in transporting New York City's first Ebola patient. He holds an AAS degree in Applied Science from Manhattan Community College.

Dr. Glenn H. Asaeda, MD, FAAEM, DABEMS, is the Chief Medical Director with the FDNY. Board certified in Emergency Medicine and EMS, he has been an EMS field provider since 1983 and with FDNY since 1998. He is the Associate Medical Director for the NYTF-1 USAR team with deployments to Haiti, the Dominican Republic and upstate New York. He also provided on-site medical oversight during the tragic September 11th terrorist attacks.

Assistant Chief Michael Fitton was appointed as an EMT in 1984 and assigned to EMS Communications where he processed and dispatched 911 calls. He was promoted to Captain in 1997, Deputy Chief in 2006 and Division Chief in 2008, serving in all five boroughs. In 2011, he was appointed Chief of Medical Dispatch. In January 2015, Chief Fitton was appointed Assistant Chief of EMS. Chief Fitton holds a Bachelor's degree in Emergency Management and Community Affairs from Empire State College of the State University of New York.

Chief James E. Leonard is the current and 35th Chief of Department. He was appointed in 2014. His career with the Department began as a Firefighter with Engine 310 in Brooklyn in 1979. Most recently, he was the Brooklyn Borough Commander and, before that, the Division 8 Division Commander. He holds both AA and BA degrees from St. Francis College, as well as a Masters degree from John Jay College/CUNY. He is a graduate of the FDNY Officers Management Institute (FOMI) at Columbia University.

Deputy Assistant Chief Roger Ahee began his career in EMS in 1987. He went on to become a Paramedic in 1990, working at several field commands. Throughout his career, Chief Ahee has served in a number of key positions, including the role of Commanding Officer–Station 45, Deputy Chief in Division 2 and the Deputy Chief of EMS Training. Currently assigned to Recruitment and Diversity.

Deputy Chief Paul Miano, is a 16-year veteran of the FDNY Emergency Medical Service. He serves as the Chief of the Haz-Tac Battalion. He began his career as an EMT in Brooklyn, later serving as a Haz-Tac and Rescue Paramedic. Chief Miano has deployed with the FDNY SOC Task Force and was a member of USAR NYTF-1. In 2015, he was awarded the Jack Pintchik Medal and The Leon Lowenstein Award.

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Assistant Chief Stephen Raynis is a 35-year veteran of the FDNY. He is the Chief of Fire Dispatch Operations in the Bureau of Communications. He is a graduate of the Masters Program from the Center for Homeland Defense and Security at the Naval Postgraduate School and FDNY Officers Management Institute (FOMI) from Columbia University Graduate School of Business.

Deputy Chief Nicholas Del Re has served the FDNY since 1985. He is the Chief in Charge of Haz-Mat Operations. He is a graduate of the FDNY Officers Management Institute (FOMI), the Executive Leaders Training Program from the Naval Postgraduate School and the Combating Terrorism Leadership Program at West Point Military Academy. He is a member of numerous committees, including NFPA 1992/1994 Technical Committee related to Chemical Protective Clothing Standards.

Dr. David Prezant is the Chief Medical Officer for the FDNY, Office of Medical Affairs, and the Special Advisor to the Fire Commissioner for Health Policy. He is Co-Director of FDNY's World Trade Center Medical Program. Dr. Prezant was in charge of coordinating FDNY's overall preparedness and response to patients with potential Ebola Virus Disease.