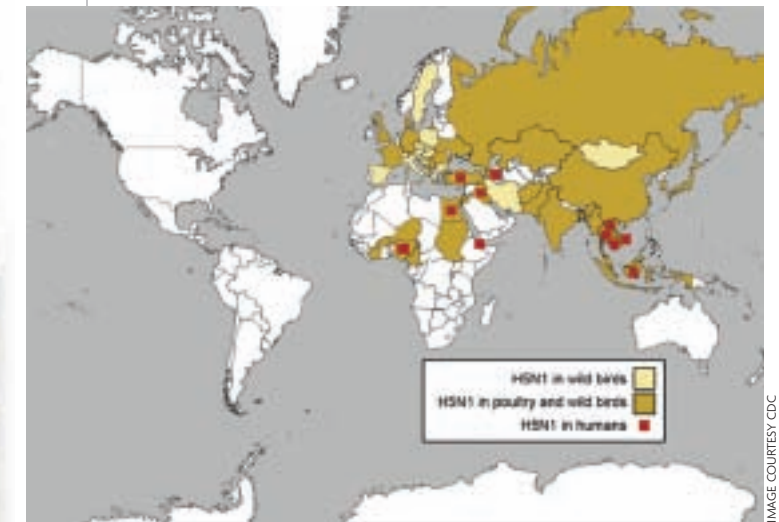


PANDEMIC PLANNING STRATEGIES



Left: German soldiers collect dead birds in February 2006 on the island of Ummanz. The number of cases of avian flu in Germany rose to 103 that month.



Above: This map from the CDC shows the nations with confirmed cases of avian flu (H5N1) as of February 2007.

>> BY ROBERT POWERS, RN, BS, EMT-P, & CAPT. LYNN A. SLEPSKI, RN, MSN, CCNS

HOW YOUR AGENCY SHOULD PREPARE TO DEAL WITH PANDEMIC EVENTS

It's the middle of the night, and you're stepping into your rig to head out on a call. It seems like any other time in your EMS career, but as you rub the sleep from your eyes, you remember it isn't. Your community, and the nation, is entering the fifth week of a pandemic flu. Business is far from usual.

Your department is working with only 60% of its staff. Some are at home taking care of their sick families, but most are ill themselves. Your partner was one of a handful of deaths so far within your department. Your current driver is a community volunteer who attended a hastily compiled emergency vehicle operations class last week.

You reach for your N-95 mask and remember you don't have one anymore. Your department ran out a week ago after initially receiving a limited number of supplies from state stockpiles. Your normal supplier stopped delivering a week into the event. You put on the surgical mask you've been using for the past several days.

After being unable to get a decision from local and state officials on whether it was legal and ethical to suspend EMS operations because of the lack of proper personal protective equipment (PPE), your agency decided to deploy only those willing to volunteer to continue working.

Dispatchers are screening all calls to determine whether or not to send an ambulance. Hospitals are overflowing, and you've ceased transporting non-critical patients. Pandemic flu patients are going to special alternate care facilities (ACFs). With EMS supplies almost gone and hospitals without spare ventilators, field cardiac arrests are now limited to defibrillation and an initial round of medications; local officials are locked in debate over whether to work them at all.

THE NEED FOR PANDEMIC PREPARATION

Experts say the risk of an influenza pandemic is great—it's not if, but when, a pandemic will occur. Proper planning strategies for a flu pandemic are mandatory to achieve the greatest good for the greatest number of patients. EMS leaders will have to plan and make adjustments in their system to maintain service to the community because EMS is a critical infrastructure that must remain in operation. Without sufficient planning and established protocols in place prior to any event, EMS systems may fail their communities in their time of greatest need.

STAFFING

During a flu pandemic, some EMS personnel won't report to work. They'll be sick, just like the general public. They'll have sick families they need to take care of, and some will choose to stay away from work out of fear.

Along with the public, sick EMS workers will be isolated until they are no longer contagious, and providers exposed to an ill patient will be quarantined for twice the incubation period, i.e., eight to 10 days. Additionally, schools and daycare centers will be closed. This will create another dilemma for EMS workers who are trying to get care for

their children in order to go to work.

Estimates put the absentee rate at 30–50% of the EMS workforce, the same as the expected national rate.¹ This lack of staffing will place an additional burden on those EMS personnel who *are* able to work. Services without other options in place will expect these workers to staff longer shifts with little or no downtime.

To prevent significant psychological stress on these EMS workers, systems must be implemented to ensure an adequate rotation of staff. Even with adequate rotation, mental health support must be available. Ideally, each offgoing shift should meet with mental health staff before being released from work. In addition, personnel need specific training directly related to the pandemic event so they know what they're dealing with and what measures are in place to protect them.

Other strategies to increase and maintain your workforce include identifying and training non-medical personnel. This step may involve the reallocation of firefighters to ambulances in a combined service, or an agreement between agencies that allows for the temporary loan of employees during a pandemic event, such as parks department or other city employees who can be diverted from their normal work functions to drive ambulances or provide other support functions.

Retired or former EMS personnel can also be reintegrated into the service. Non-traditional resources could include drivers obtained from private industry or simply volunteers from the general public who complete "just in time" training on emergency vehicle operation.

Based on the magnitude of the pandemic, resources may need to be pulled from other states, as occurred during Hurricane Katrina in 2005. This will involve waiving the usual requirements for EMS personnel to work in the involved state, including application and testing for state certification. In a pandemic event, states will be forced to use legislation, such as the Emergency Powers Act, to provide immediate reciprocity or suspend certification requirements. These emergency measures must be developed, agreed upon and in place before the event occurs, carefully considering both the risks and the benefits to ensure adequate protection of the public.

These changes in state requirements

FLU 101

Along with the general public, many EMS providers are confused about influenza, better known as "the flu." The influenza virus has several strains, and two—avian influenza and pandemic influenza—are making news, while the "normal," or endemic flu, continues to kill an estimated 36,000 people in the U. S. every year.¹ That estimate may even be low, because until recently influenza hasn't been a disease tracked by the CDC and state health departments.

Humans can be infected with types A, B and C of the influenza virus. Depending on scientific estimations of which strains of viruses will be prevalent, seasonal flu vaccines are developed that contain three types of the virus—two of the type A viruses (H3N2 and H1N1) and one type B virus.² (Type C viruses produce such mild disease that they aren't included in vaccines.)

The "H" and "N" in the virus name describe the proteins on the surface of the influenza virus. There are 16 "H" markers (H1–H16) and nine "N" markers (N1–N9).³ To understand how these protein markers are involved in a pandemic, we must first understand the "shifts" and "drifts" of viral strains.

Picture the virus as a bank robber who always wears jeans, a white windbreaker and a white baseball cap. The vaccine is like an all-points bulletin with a picture of the bank robber. Even if the bank robber wears a different brand of jeans or a different team logo on his cap, a security guard (a vaccine-boosted immune system) can still easily recognize him. These subtle changes are analogous to what happens with the flu virus from year to year. This is called "antigen drift."

Additionally, three or four times a century, the Hs and/or Ns of a virus shuffle to create a "new look." This is known as "antigen shift." For example, from 1957–1967, the predominant virus was H2N2. In 1967, the predominant virus shifted from H2N2 to H3N2. Our bank robber kept his blue jeans and white hat, but he changed to a red windbreaker and snuck right past the bank guard, who didn't know about the "new look." Thus, the vaccine disseminated in 1967 didn't prepare people's immune systems to recognize and fight the new H3N2 virus, and a worldwide pandemic ensued.

The avian flu virus, H5N1, is a strain of the influenza type A virus. It has been documented that when a human is infected with this virus from a bird, it's extremely deadly and kills more than 60% of its victims. Of current concern is whether the avian flu virus will mutate to allow easy transmission from human to human.

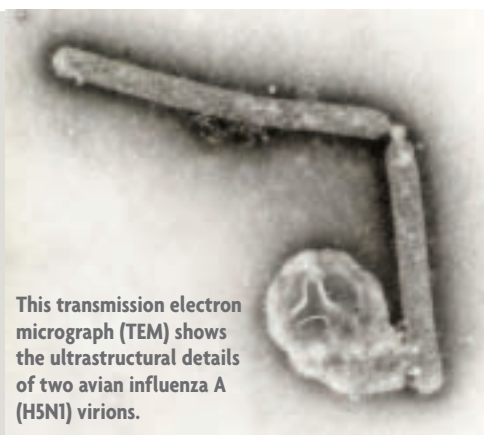
At present, medical researchers are actively seeking a vaccine effective against avian flu in humans. Vaccines developed by Sanofi Pasteur and Chiron have been in trials since 2004. Tests using different age groups and dosages are under study to determine vaccine safety and efficacy.⁴

Efforts are also underway to devise a new vaccine that does not rely on the Hs and Ns but instead uses a protein marker (which doesn't change frequently) to identify the offending virus. Advances in this area may, in the future, produce longer lasting vaccines and eliminate the need for annual re-vaccination.

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- National Institute of Allergy and Infectious Disease: "Questions and answers: Avian influenza trials." www3.niaid.nih.gov/news/QA/H5N1QandA.htm.



This transmission electron micrograph (TEM) shows the ultrastructural details of two avian influenza A (H5N1) virions.

IMAGE COURTESY CDC/CYNTHIA GOLDSMITH, JACKIE KATZ

should also include plans at the state and local levels that would expand the standard scope of practice for EMTs and paramedics. With an expanded scope, your workforce could continue to function by allowing providers to perform more advanced skills.

During a pandemic, a paramedic might be able to administer medications not normally on a prehospital drug list but deemed essential to the health and welfare of the citizenry. Selected EMTs, with specific training, could increase their scope of practice and work a cardiac arrest under a defined protocol.

ANTIVIRALS & VACCINES

As drug manufacturing capacities of antivirals increase, the potential use of antivirals as prophylaxis has gained attention. Some communities may choose to provide antivirals to members of critical infrastructure who have high exposure risks, and even to their families in some cases, in order to prevent infection and ultimately maintain a continuity of operations.

Likewise, the priority for a pandemic vaccine is also under discussion. Once a well-matched pandemic vaccine is available (approximately five to six months after the beginning of sustained, efficient human-to-

Estimates put the absentee rate of the EMS workforce at 30–50%. This will place an additional burden on those who *are* able to work.

human transmission), the limited supplies will be allocated based on the characteristics of the disease and the populations most affected. Critical infrastructure employees, such as EMS personnel, are carefully being considered in vaccine prioritization discussions at the national level.

SUPPLY ISSUES

The Federal Strategic National Stockpile (SNS), along with state stockpiles, is currently working to establish supplies of PPE, such as N-95 masks, gowns and gloves. However, during a pandemic event, available supplies and resources will be spread thin. If supplies do arrive from outside sources, the quantities may be so few that they may not make a substantial difference

to the local community.

EMS agencies may not be able to rely on their normal deliveries from suppliers, unless these companies have also developed robust pandemic plans in advance. Like EMS, these suppliers will have difficulty maintaining operations due to decreases in their workforce. Trouble getting gas or vehicle repairs will further decrease their ability to make deliveries.

Rationing of available supplies will affect every aspect of operations. So advanced planning must be coordinated and in place with local businesses that agree to provide services to EMS during pandemic conditions. A rig that runs out of gas with no fuel deliveries coming to the neighborhood or one that breaks down with no repair shop open is one fewer ambulance available to the community.

Local and county government officials may be able to negotiate with gas stations to close their businesses to the general public if fuel deliveries stop, and to keep their complete supply available for emergency vehicle use only.

Masks and other PPE will be needed on every call to protect staff and patients. This will result in shortages. Even if services are able to mimic the recommendation for hos-

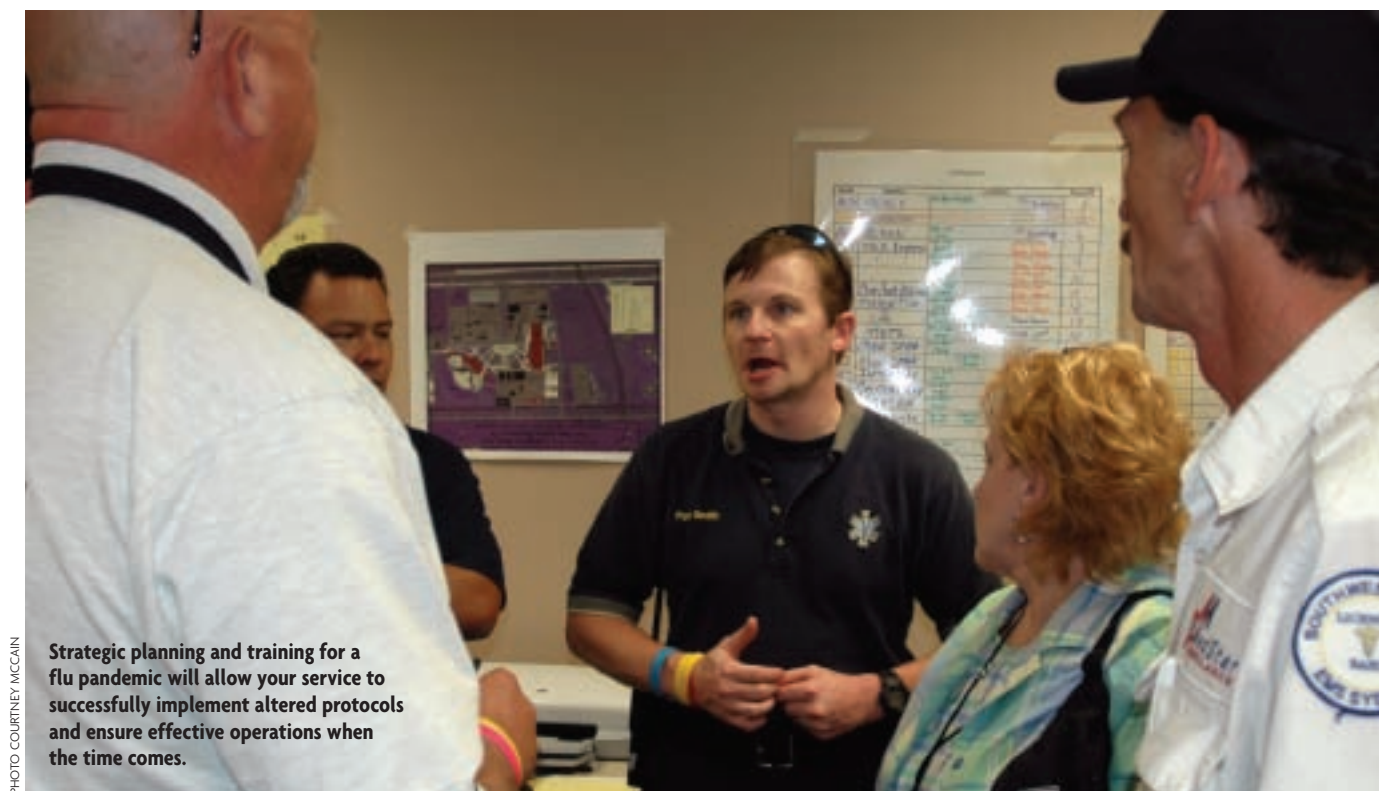


PHOTO COURTESY MCCAIN

Strategic planning and training for a flu pandemic will allow your service to successfully implement altered protocols and ensure effective operations when the time comes.

pitals to maintain eight weeks of PPE stockpiles, difficulties in calculating exact quantities needed, and rapid utilization during an event, will likely result in quick depletion of needed supplies.²

The Department of Health and Human Services (DHHS) doubts that even increasing the manufacturing of masks would allow stockpiles to meet the potential demand.³ If proper PPE is not available to your crews, decisions will need to be made regarding the suspension of EMS services. Pre-event policies need to be worked out with local health departments to determine a community medical plan, ranging from not responding at all to continuing to run all calls, some of which may put EMS crews and patients at great risk.

Options to cope with the lack of N-95 masks are in development. The Institute of Medicine is studying whether N-95 masks can be modified for reuse.³ The DHHS is also considering stockpiling standard surgical masks, even though they have limited value in control-



PHOTO MARK C. DE

Work with your regional disaster planning groups to develop altered protocols for transport, including the location of any ACFs that will be used.

ling spread of an infection.³ Researchers are also experimenting with other readily available resources to create improvised respiratory barriers. One effort under study is using layers of washable T-shirt material as a respiratory barrier.⁴ None of these is a first choice, but when supplies disappear, backup plans must be in place.

ALTERED STANDARDS OF RESPONSE

Rationing supplies also involves rationing response, transport and care. In the face of an overwhelming number of patients and scarce resources, agencies could easily fail to maintain their ability to respond. Altered standards seek to maintain operations at a lower level than by adhering to the disaster goal of doing “the greatest good for the greatest number of people.” However, these types of discussions must take place before the event to ensure everyone is in agreement with the decisions made and that adherence to legalities is being properly maintained.

Triage is the well-established process of allocating limited resources to those with the most immediate need. Ambulances themselves would be a limited resource in a pandemic event due to increased call volume and lack of supplies, fuel, staff and operational

support. Therefore, ambulance triage would need to be established to determine which 9-1-1 callers receive an ambulance.

Ambulance triage would allow those limited EMS resources to be prioritized to the varying needs of the community. This process would be dependent on advanced planning to establish the parameters for ambulance response and firmly anchor those protocols into legal and ethical standards.

An EMS specialist or public health staff member at the 9-1-1 center would also not only determine whether an ambulance was to be dispatched, but also the availability of beds for patients at hospitals or ACFs. Many infected patients would be kept in their homes and not sent to the hospitals or ACFs until their condition became critical.

If all available beds and ventilators are tied up, many patients may not even be transported. EMS may potentially be dispatched to intubate these patients and teach family members or volunteers to hand-bag such patients until a ventilator becomes available.

ALTERED STANDARDS OF TRANSPORT

During a pandemic event, EMS crews will also need to use pre-established criteria to determine whether transport is necessary. With hospitals overflowing, EMS cannot transport minor complaints.

During a pandemic, transport will be provided for patients with certain categories of complaints. However, EMS might not transport these patients to hospitals but rather to alternate screening sites or private doctors’ offices. The care offered at an alternate site will not be the same as would be offered at a pre-pandemic flu emergency department (ED), and it may consist of only baseline physician assessments. EMTs may be asked to contact these doctors directly from the scene, relay patient assessment information and carry out requested orders in the home. Criteria for this type of potential response should be built into an EMS agency’s pandemic plan ahead of time.

If transport is necessary during a pandemic, EMS may be asked to take patients to sites other than EDs. With hospitals and health departments establishing ACFs for the large volume of infected patients that overflowing hospitals can’t handle, EMS will be tasked with transporting directly to an ACF.

For this process, EMS may use pre-established flu trucks that specifically deal with the transport of patients known or suspected to be infected. These specially designated vehicles would limit the potential exposure of staff, contamination of the vehicle fleet and use of scarce PPE. Other alterations in normal transport include transporting several flu patients at the same time and utilizing mass transportation, such as buses and vans.

During the development of altered transport standards, EMS must be involved in their community and regional local disaster planning process in order to be aware of and provide input to any changes in locations where patients will be housed. Involvement will enable EMS to strategically plan for alterations and ensure effective operations during a pandemic.

ALTERED STANDARDS OF CARE

Hospitals are working to develop altered standards of care for a ventilator triage process. The U.S. hospital system has 105,000 ventilators. However, the potential need for ventilators during a severe pandemic event is estimated at more than 742,500.⁵ The SNS is estimated to

PANDEMIC PLANNING

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have 4,000–5,000 ventilators—not enough to help if the shortages are widespread. A standardized ventilator triage process would guide physicians in determining which patients get the scarce machines and provide a legal framework that would help protect physicians during any post-event legal inquiries.

To develop altered standards of EMS care, agencies will first need to evaluate its level of resuscitative treatment for pre-hospital cardiac arrests. With limited supplies to run codes and limited hospital beds or ventilators available if a patient is resuscitated, local medical directors will have to enforce altered standards of care that may involve limiting code efforts to CPR, defibrillation and perhaps a first round of medications or, potentially, not working any cardiac arrests at all. Unresponsive patients would be left at their homes for transport to temporary morgue facilities.

During a pandemic, hospitals may place patients who would normally be in a hospital ward bed, back in their homes. These patients could place an additional strain on EMS, with crews being asked to conduct house calls and perform IV maintenance, IV and medication infusions, and dressing changes.

In addition, health departments may implement home isolation or quarantine for patients who aren't critical enough for the limited hospital beds; the increased needs of these homebound patients could create yet another strain on the EMS system.



PHOTO COURTESY MEMPHIS FIRE DEPARTMENT

Shortages of masks and other PPE will be evident early in a pandemic as resources are spread thin. Establish a stockpile to lessen this effect.

To properly address concerns of negligence or liability, these issues must be planned for well in advance of a pandemic event. State and local governments must identify who is authorized to execute altered standards of care. This person, potentially local EMS medical directors, would have the authority to determine the changes necessary in established protocols to provide some level of care to the general public.

REGIONAL RESPONSE

Disaster planning has typically focused on regional response allocation, which coordinates support from neighboring resources. If one community is hit harder than the other, support comes from neighboring communities.

KEY RESOURCES

- >> **National Strategy for Pandemic Influenza**
www.whitehouse.gov/homeland/pandemic-influenza.html
- >> **Centers for Disease Control and Prevention**
www.cdc.gov/flu
- >> **World Health Organization**
www.who.int/topics/avian_influenza/en/
- >> **American Red Cross** www.redcross.org/news/ds/panflu/
- >> **Public Broadcasting Service Boston**
www.pbs.org/wgbh/amex/influenza/sfeature/trackers.html

Regional medical support consists of hospital staff and supplies, such as ventilators. EMS agencies need pre-existing regional response agreements that will allow them to send staff, ambulances and supplies to more populated or more heavily impacted areas.

As stated earlier, credentialing issues must be dealt with on a state level pre-event so that available personnel from other states won't have to spend time working out problems with reciprocity instead of taking care of patients. During a disaster, Colorado legislation allows EMTs to work under the license of any physician rather than their normal requirement of allowing them to work under licenses of physicians with prior agreements only, in addition to granting EMTs immunity for their good faith actions.⁶

Regionally, ambulances will also be needed to redistribute patients away from heavily impacted areas. With EMS already taxed to their limit because of local community needs, this redistribution will call for additional ambulances, which may exceed the number they can provide.

The relocation of patients to lesser impacted areas must be a top priority for EMS. By moving these patients beyond the boundaries of the heavily impacted area, needed hospital space and ventilators will be opened up for the next round of patients.

Even though a severe pandemic event may impact all areas of a region, there will still be areas of greatest impact. Pre-event regional planning will help allocate ambulances to these areas during an event and ensure that all the necessary issues, e.g., written agreements, credentialing, salaries and worker's compensation, are addressed well in advance.

TRAINING & COMMUNICATION

Pandemic-specific training of EMS personnel must occur before an event. Staff must also be kept informed of every phase of a developing pandemic event, including education of their altered role and the necessary PPE requirements. Proper education will allow staff to feel more comfortable about their protection, and they will be more likely to show up for work.

In addition to communicating with staff, plans must be in place for communicating with the public in a timely and appropriate manner. The public should be informed and involved early in your pandemic planning process so they can offer input into decisions regarding altered standards of care. A joint effort by local EMS agencies, emergency management and public health should involve and inform the public of potential changes through town meetings or public information spots. The public should know in advance how they will receive

updated information and from which local authority. The public should also be provided with clear information through the media regarding changes in response or care.

CONCLUSION

Pre-planning strategies to operate during a pandemic flu outbreak is imperative for EMS agencies. Prehospital leaders will have to plan and make adjustments in their normal operations to maintain service and provide care to the community in its time of greatest need. Failing the community because of poor planning is inexcusable. EMS is a critical infrastructure that must maintain its ability to function, even at a reduced level and with significant alterations, during a pandemic event. [JEMS](#)

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The views expressed here are those of the authors and do not represent the official policy or position of the Department of Homeland Security, the Uniformed Services University of the Health Sciences or the United States Government.

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