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## In the midst of a large measles outbreak, EDs take steps to bolster screening procedures, prevent potential transmissions

*Measles outbreak renews debate about the public health role of emergency providers*

**M**easles, a disease that public health officials declared gone from the United States more than a decade ago, is now clearly back. And it is yet another infectious disease that frontline health care personnel

need to spot quickly to prevent potential transmissions to unvaccinated and immunocompromised patients.

As of February 20, the Centers for Disease Control (CDC) in Atlanta, GA, reported that at least 154 people

### EXECUTIVE SUMMARY

A large, multi-state outbreak of measles is prompting EDs around the country to bolster their screening procedures and provide education to staff, most of whom have never seen a measles case. Dozens of people in more than 17 states have been confirmed to have the disease, with most of these cases associated with an outbreak that began at an amusement park in southern California.

- Measles is extremely contagious, infecting nine out of 10 people exposed to the virus if they are susceptible to the disease.
- In cases in which a contagious disease is suspected, experts advise emergency providers to protect themselves before proceeding to the traditional vital signs. It's a concept referred to as "vital sign zero."
- Once a measles case is confirmed, experts say emergency staff should isolate the patient with protection such as an N-95 mask, and inform both the hospital's infection control department and public health authorities.

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in 17 states were confirmed to have measles, and that at least 118 of these cases were associated with a large, multi-state outbreak that started in December 2014 at an amusement park in southern California. Two other unrelated outbreaks of measles were reported: one in Nevada and the other in Illinois. In total, more than 600 confirmed cases of measles were reported in 2014.

With EDs already on alert for potential cases of Ebola, many experts say that cases of measles shouldn't be that difficult to pick up, but the disease does present some significant challenges, according to **Kristi L. Koenig**, MD, FACEP, FIFEM, director of the Center for Disaster Medical Sciences and a professor of emergency medicine at the University of California at Irvine, CA.

First, since the live vaccine for measles was licensed in 1963, a high percentage of health care providers have never encountered a measles case, so recognition can be an issue. "Measles can mimic other childhood rashes or rashes of any sort ... so it is not necessarily something we would think of unless there is awareness," says Koenig. "Measles starts on the head and the face and moves downward, as opposed to some other rashes that might start on the torso or the lower extremities and move upward."

Further complicating recognition is the fact that patients with measles can be symptomatic before the rash appears. "If you are not thinking about measles and asking whether there has been an exposure or about the patient's immunization status, you might just think someone has a bread-and-butter viral syndrome ... like an upper respiratory syndrome," says Koenig.

She adds that the measles virus is airborne and, thus, spreads from person to person very easily. "It is probably the most contagious disease we know," says Koenig. "Nine out of 10 people [exposed to the virus] would get it if they are susceptible, and [the virus] can live on surfaces [or in the air] for up to two hours after a [measles] patient has left the room."

While it is impossible for emergency providers to always be on the outlook for everything, they still need to have some sense of when measles should be considered, according to **Carl Schultz**, MD, FACEP, a professor of clinical emergency medicine and the director of Disaster Medical Services in the Department of Emergency Medicine at the University of California at Irvine Medical Center. A history of foreign travel can be a strong clue, he says.

"The spark that usually starts these [measles outbreaks] rolling is somebody from outside the country because measles is much less controlled outside [the United States], so if a U.S. citizen goes abroad and then returns to the United States with an infection, a fever, and a rash, or someone from another country comes to the United States with a fever and rash, that would be the time to consider measles," says Schultz. (Also see: "The role of emergency medicine in curbing, preventing measles outbreaks," p. 41.)

## Protect providers, emergency staff

The ED at UC Irvine Medical Center in Orange, CA, has seen at least one confirmed case of measles from this year's outbreak, and it

also saw several cases from a smaller measles outbreak that occurred last year, says Koenig. “We are at the epicenter of the measles epidemic,” she says. “We are the only level one trauma center in the county ... and we also have a lot of foreign visitors who may not be up to date on their immunizations, particularly from Mexico, but we also see people from all over the world visiting the Disneyland [theme park].”

Given the contagiousness of the measles virus, the ED has put up signage directing patients who have a rash and certain other symptoms to use an alternate entryway rather than coming in through the main triage area where everybody else enters.

“We have tried to get people to self-isolate if they are ill with concerning symptoms until somebody is able to evaluate them,” says Koenig. “Then the person on the front lines doing the evaluation needs to have that awareness as well.”

To improve this awareness, Koenig has proposed a concept she refers to as vital sign zero, a measure she suggests should come before the traditional vital signs of blood pressure, heart rate, respiratory rate, and temperature.<sup>1</sup> “What I am saying is before you even go near a patient to measure those standard vital signs, you have to consider what I term ‘vital sign zero’ to make sure [the patient] is not a hazard or a threat, and that they don’t have something that could be contagious, and that you could catch as a health care provider and spread to other patients in your waiting area,” she says.

In cases in which patients may be contagious, such as is the case with measles or Ebola, Koenig has developed a construct: identify, isolate, and inform.<sup>2</sup> Specifically, once the clinician has identified that the patient may be contagious, the

next step is to isolate the patient with respiratory protection such as an N-95 respirator. When the provider has confirmed or has high suspicion, he or she needs to inform both public health authorities and the hospital’s infection control department.

The approach should not just apply to measles and Ebola, but other infectious disease threats as well, stresses Koenig. “There are many more of these emerging infectious diseases coming along,” she says. “Measles is something that is known and recurring, but there are new things all the time like SARS [severe acute respiratory syndrome] and MERS [Middle East respiratory syndrome] and whatever the next big thing is going to be.”

## Bolster screening, education

One of the first steps clinical leaders at the University of Chicago Medicine Comer Children’s Hospital in Chicago, IL, took upon being notified of a measles outbreak in the region was to check to make sure all frontline personnel and ED staff were protected from the virus.

“Our occupational medicine folks went back and double checked all of the records of everyone who works in our adult and pediatric EDs and all of the rest of our pediatric providers, to verify that we did have documentation [showing that all staff were immune to the virus],” explains **Allison Bartlett**, MD, MS, an assistant professor of pediatrics and the associate medical director for the Infection Control Program at Comer Children’s Hospital. “That is a reassuring thing from a staff standpoint.”

In addition to these steps,

infection control specialists have bolstered telephone screening procedures for patients calling into the health system’s outpatient clinic. “Our appointment schedulers, who routinely ask Ebola travel-related questions, have added a couple of questions about fever, cough, runny nose, rash, and red eyes,” says Bartlett. “If they get some positive answers to those questions, we are referring the call to a clinic nurse to do an additional round of screening.”

If the clinic nurse suspects that any of these patients have measles, she will guide them toward the ED rather than a clinic appointment. “The [outpatient clinic] is less equipped to handle [measles cases] ... so unless we become overwhelmed, our plan is to have these patients seen in the ED where we have a negative pressure room, and we can have better control over the situation for evaluating them,” explains Bartlett.

Infection control specialists have also taken steps to insure that the ED is prepared to recognize and treat any measles cases. “We already have a robust screening in place for our ongoing Ebola patients, so we have added some additional screening questions that are educational in and of themselves,” says Bartlett. “We have provided education to the frontline nursing staff that will be screening the patients, and we have discussed this [information] with our physicians as well.”

Infection control staff have distributed a screening tool and pictures of patients with measles to better familiarize emergency personnel with how measles can present, says Bartlett. “As we get additional information, we are sharing that with clinicians,” she says.

At press time, the ED at Comer

Children's Hospital had not yet seen any cases of measles associated with the current outbreak, although one patient was evaluated as a possible case of measles.

However, Bartlett notes there is particular concern about certain groups of patients who are most at risk for the disease.

"We have seen many cases in infants who are between 6 and 12 months of age," she says. "Infants who are younger than 6 months old generally have protective immunity left from their mother, which is why the youngest infants are not at risk, so it is that 6- to 12-month time frame of infants that are too young to be vaccinated, according to our standard schedule, who are at risk."

The other populations at risk include school-aged children who never received the measles vaccine, immunocompromised patients, such as young people with cancer, adults who only received one dose of the measles vaccine, and some older adults with less robust immune systems, explains Bartlett.

## Consider potential complications

In addition to being able to quickly identify measles cases, emergency providers also need to determine which patients need to be admitted and which patients can be safely discharged, explains Koenig. Factors to consider include whether the patient is well nourished, not living in poverty, and whether the patient is vitamin A deficient. "Vitamin A seems to be very important in the body's [ability] to fight measles, and it is commonly administered in refugee camps where people are very deficient," explains Koenig.

It is also important to rule out any serious complications. For example, measles can cause respiratory complications such as measles-pneumonia or neurologic problems; the disease can also cause otitis media, which can lead to deafness in some cases, explains Koenig. However, if there are no serious complications or concerning deficiencies, a discharge with appropriate supportive care instructions and follow-up may be the best course of action, she says.

"The vast majority of people [with measles] are going to do OK, and you don't necessarily need to admit them," says Koenig. Given the highly contagious nature of measles, you don't want otherwise healthy patients with the disease to be in a position in which they can potentially expose immunocompromised patients or others who may be at risk for the disease, she explains.

While most healthy patients will recover and do well following a case of measles, Koenig is nonetheless worried about the potential of the current outbreaks to expand. "My sense is that we need to pay really close attention to this," she says. "I have been, and continue to be, very concerned. It is hard to predict [how many cases the current outbreak will produce], but, of course, the better we are at contact tracking, the better able we will be to control it, but resources are very thin."

In particular, Koenig is worried about the ability of public health departments to respond quickly. "We are supposed to have 24/7 contact-ability ... but they are stretched so thin that it can be very difficult to reach someone in a timely manner when you are in the middle of managing multiple emergency patients," she observes. "If this heats up more, [resources] are going to get

stretched even thinner because our public health system is just not that robust in the country right now. It is underfunded." ■

*Editor's note: For more information about the emergency response to the measles outbreak, visit the CDC's information page for health care providers at <http://www.cdc.gov/measles/hcp/index.html>. Also see the American College of Emergency Physicians' information on measles at <http://www.acep.org/measles/>.*

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# The role of emergency medicine in curbing, preventing measles outbreaks

It's hard to discuss the current measles outbreaks without pointing out what experts see as the primary reason for the recurrence of a disease that had been largely vanquished, at least in this country. "The major issue is this overall public health threat that I think the suspicion against vaccines has created," stresses **Carl Schultz**, MD, FACEP, a professor of clinical emergency medicine and the director of Disaster Medical Services in the Department of Emergency Medicine at the University of California at Irvine Medical Center. "People are more afraid of the threat from the vaccine than they are from the disease, which is human nature; it just isn't rational."

Part of the problem is that most people have never seen measles, so they don't remember how many people died from the disease before a protective vaccine was developed and licensed back in the early 1960s, explains Schultz. "To them, the fear of the disease is this abstract threat that they have never seen ... but they get all of this publicity about the vaccine, and that is right in their face, so they all see [the vaccine] as really the threat," he says. "It is unfortunate because it is really untrue. And [it poses a] threat from the disease for a lot of people who really can't get the vaccine because of allergies or medical conditions. For adults, [measles] can be fatal, and for small children, this can be fatal and it is totally unnecessary."

Schultz says his biggest fear is that the perpetuation of this unrealistic fear of the vaccine will result in real deaths because people fail to get vaccinated. "This is tough because if people got the vaccine in a rational manner, we wouldn't see native disease in this country. It would basically disappear," he says.

Consequently, beyond identifying and appropriately treating patients who present with signs of measles, should emergency providers be playing a bigger role in making sure that patients receive the measles vaccine? While many emergency providers would quickly answer in the affirmative, others worry that taking on added public health responsibilities could hamper their ability to respond to acute care crises.

"This is part of a much broader [discussion] on what is the role of emergency medicine in our society going forward," says Schultz. "Traditionally, it has been basically to deal with flare-ups of acute disease so that people don't die between the time they come to the ED and they get follow-up, so we handle true emergencies and sort of put the fires out, allowing people to get stabilized and to get further treatment down the line."

However, increasingly, emergency providers have been taking on a larger public health role. Many EDs, for example, now routinely provide HIV screening, and most provide tetanus vaccinations if someone

comes in with a wound and does not have a complete vaccination history, observes Schultz. "There are things we have done, and it is not unprecedented to ask us to do something like measles vaccinations," he says.

The downside is that the more non-emergency tasks are added to the list of what emergency providers are expected to do, the longer it takes to move patients through the ED and the more such operations cost, says Schultz.

While there is not yet a clear answer on how much of a public health role emergency providers should provide, Schultz says he would not be opposed to providing measles vaccinations on a temporary basis, given the current acuity of the situation. "The [outbreaks] are occurring right now, so if we were to initiate measles vaccines in the ED, I think that might be useful. It might be a way of messaging to the public the importance of that," he says.

There aren't that many unvaccinated people who would be seen in any specific ED, so providing the MMR vaccine would not pose a huge burden, suggests Schultz. "It is not a commitment. We are not going to do this forever, but I think given that the need is right now, and [thinking about] what we could do to make a difference, this is rational," he says. "As a temporary measure, I would be supportive of doing MMR vaccinations in the ED." ■

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# New type of center focuses on caring for the most critically ill patients, decompressing ED that serves patients at the upper end of the acuity spectrum

*Center highlights, takes advantage of new specialty within emergency care*

Much of the discussion surrounding emergency medicine seems to focus on how to keep lower-acuity patients out of the ED, or at least how to move them through to discharge faster. While it is true that many EDs see a high percentage of low-acuity or fast-track patients, there are also EDs that are overwhelmed with patients at the other end of the acuity spectrum. The University of Michigan Health System's (UMHS) adult ED in Ann Arbor is a case in point.

"We don't have a fast track anymore because I don't have enough patients to keep people busy. We use the Emergency Severity Index (ESI) here, and our ESI 4s and 5s [make up]

less than 10% of our patients," explains **Jennifer Gegenheimer-Holmes**, RN, BSN, MHSA, CEN, the director of operations for the Department of Emergency Medicine at UMHS. "We take a lot of transfers from other hospitals, and the acuity and complexity of our patients is fairly high."

These critical care patients require more time and resources than lower-acuity patients, often creating backlogs and long waits. This creates different flow issues faced by EDs that see a high number of lower-acuity patients. Recognizing the challenge of high-acuity patients, UMHS has just unveiled a new unit designed specifically for the most critically ill emergency patients. Dubbed

the Massey Emergency Critical Care Center, or EC3, this new branch of the ED is the first such center in the country, and it could well provide a model for other referral centers that manage and care for a high number of patients on the upper end of the acuity spectrum. (Also see "New center offers a unique venue for research, training," p. 45.)

## Cohort critically ill patients

There were multiple factors involved with the drive to develop EC3, but chief among them was the fact that the number of patients coming to the ED was continuing to increase, and the acuity of these patients was on the rise, with about one-third requiring admission to the hospital.

"As our patients are getting better therapies for cancer, heart failure, and other disease states, they are living longer. These patients are coming in and they are actually sicker," explains **Kyle Gunnerson**, MD, an emergency physician, critical care specialist, and leader of the EC3. "Dovetail that with the crisis for the critical folks upstairs who have also seen shortages in resources. We don't have enough ICU [intensive care unit] beds and we don't have enough intensivists — especially in large, tertiary referral centers like

## EXECUTIVE SUMMARY

The University of Michigan Health System (UMHS) in Ann Arbor has opened a new unit within its ED to focus on caring for the most critically ill patients who present to the ED. Dubbed the Massey Emergency Critical Care Center, or EC3, the model is the first of its kind in the country, with its own ICU and a lower nurse-patient ratio than the main ED to facilitate closer monitoring. Developers hope the new unit will decompress the ED, shorten wait times, and potentially reduce the demand for ICU care on the upper floors.

- The adult ED at UMHS receives patients on the higher end of the acuity spectrum, with high-acuity patients making up 90% of the patient volume.
- Staffing of the EC3 includes emergency nurses and physicians who have had extra training in critical care.
- The EC3 will serve as a new research center for emergency critical care patients, and a training ground for physicians and nurses looking to enhance their skills in critical care.

UMHS and other big centers in the area. The ICUs are running almost at capacity.”

With all of these forces converging, it is like a “perfect storm brewing,” says Gunnerson. “What happens is you have a 3-5% increase in the amount of patients each year filling up the ED, the acuity is going up, and we can’t get [patients] upstairs into the ICU quick enough, so they end up sitting down in the ED waiting for an average of six to nine hours for an ICU bed. Sometimes, we even have these patients for 24 hours.”

Also contributing to the problem is the fact that emergency physicians are not really trained to provide more than the early stages of critical care, says Gunnerson. “Emergency medicine [providers are] really good for doing the resuscitations, the CPR [cardiopulmonary resuscitation], the acute treatment, but once that happens, we are really not trained to do the next phase: the titrating, the fine tuning, the critical care, and really getting down into the details of what critical care needs are required,” he explains. “And at the same time we are having to deal with all the people coming in the door. We are responsible for 18 to 20 other patients; we’ve got 40 people in the waiting room and we’ve got another 40 people waiting to be admitted.”

To address all of these factors, the EC3 is being equipped with five resuscitation/trauma bays, nine patient rooms, and emergency providers who have undergone additional training in critical care. Further, there will be one nurse for every two patients to facilitate the closer monitoring required for these sicker patients.

“This is really a treatment

area within our ED where we are cohorting our critical patients, where we have additional, extensive monitoring, and closer patient-to-nurse ratios so we can really focus our attention on the first 6-12 hours,” observes Gegenheimer-Holmes. “We can make sure that when these patients move to the next care unit they are in a place where the handoff can be done safely.”

Further, administrators anticipate that the EC3 will take some pressure off the hospital’s ICUs. “We will have another set of doctors and teams to manage these sick patients before they go to the ICU, and that way we can start their treatments early, we can start titrating their therapies, we can start even potentially de-escalating care, and, in some cases, reserve that precious commodity of an ICU for another patient. If we can get a patient better, he may be able to go straight to a [hospital] floor,” says Gunnerson. “There are a lot of potential benefits to having this model down here in the ED, and that is what prompted us to try this kind of new health care delivery model for acute critical care.”

## Provide training in critical care

To staff the EC3, the hospital is looking to emergency physicians who have undergone extra training in critical care. “The [American Board of Medical Specialties] has just passed an approved pathway now where ED residents can do a two-year fellowship in critical care, either through anesthesiology, internal medicine, or surgery. They can sit for the boards, and then have full hospital privileges to

round in an ICU,” says Gunnerson. “They are trained through the fellowship to take care of patients with that detail and expertise, and so now these [physicians] are coming out with a different mentality. They understand the problems in the ED and they understand the problems up in the ICUs.”

Extra training is required for the nurses who will be staffing the EC3 as well. It’s a paradigm shift for emergency nurses because while they have been treating critical care patients for years, the mindset has always been to stabilize them quickly and move them out, observes Gegenheimer-Holmes.

“We had [already] implemented some critical care procedures that typically would be done in the ICU, but because we were trying to move those patients through to be ready and available for the next critical patient that may arrive, we were really handing off patients at a time that really may not be ideal,” explains Gegenheimer-Holmes.

Consequently, to equip about 40 emergency nurses with the additional skills they would need to provide critical care for a longer period of time in the new unit, the ED has been partnering with the hospital’s critical care units upstairs. “There has been a great team effort over about a six-month period,” explains Gegenheimer-Holmes. “We rotated the nurses up to the different ICUs, and we sent them through the same critical care nursing orientation that the nurses who are hired into critical care go through.”

While personnel from the critical care units on the upper floors have been thoroughly supportive of the new unit in the ED, keeping the training fresh

among the emergency staff has been difficult. “It is very challenging to try to learn how to do these new things and then come back into a place where you are not doing them yet,” says Gegenheimer-Holmes.

However, now that the EC3 is open, the nurses who received the extra critical care training can begin using these new skills and also precepting some of the other emergency nurses. “In order to keep everyone’s skills up, we will limit the numbers just so the nurses are rotating through [the EC3] on a regular basis and aren’t spending too much time away from the unit,” says Gegenheimer-Holmes. She adds that eventually about one-third of the emergency nurses will be equipped with the critical care training needed to work in the EC3.

## Identify patients for protocolized care

As the training proceeds, administrators are gradually ramping up capacity. The EC3 officially opened in late February with just four beds available for critical patients. When construction is complete and the unit is fully operational later this spring, there will be nine beds available, staffed by five nurses on duty at any given time, explains Gegenheimer-Holmes. One nurse will care for a single patient while functioning as the team leader.

When personnel are assigned to the EC3 that will be their only assignment, but there will be flexibility built into the system to accommodate patient volume, explains Gunnerson. “When we are very slow [in the EC3], and they need a lot of extra hands out

in the main ED, personnel can be pulled from the EC3 out to the main ED, and vice versa. If we need some extra help up in the EC3, the appropriate nurses that have the appropriate training will be pulled up to the EC3 for additional staffing,” he says. “The nice thing is that they are our own nurses.”

The types of patients who will be sent to the EC3 will be those on the “far extreme of either complexity or critical care needs,” explains Gunnerson, noting that it is not a designation that can be simply summed up in terms of an ESI assignment. For instance, he explains that a patient who is categorized as ESI 3 may have several issues, none of which is all that severe when viewed in isolation, but the care that is ultimately required may be very labor intensive or intense.

“The EC3 will really be for those patients for whom early intervention and protocolized care can be initiated,” says Gegenheimer-Holmes. “Most of the patients who will come to the EC3 have medical problems [such as] sepsis, a GI [gastrointestinal] bleed, a subarachnoid hemorrhage, or post-cardiac arrest.”

In some cases, the handoff to an EC3 team will take place in the resuscitation bay. Patients from other hospitals may also be sent directly to the EC3 if physicians determine their needs are appropriate for the unit. And in other cases, patients might come through triage to the main ED, but then later get sent to the EC3 once clinicians become more familiar with their conditions or there is some deterioration status. In fact, that is precisely what happened in the case of the very first patient to be cared for in the new unit on February 16th.

“The patient had been in the ED receiving care for an hour or so and began to decompensate. It was a patient who needed dialysis. We were going to admit him to the dialysis unit, but we do have the capability to initiate dialysis in the critical care center [EC3],” notes Gegenheimer-Holmes. “This was a patient who was becoming unstable, so we moved him over to the EC3, and we did the same thing with another patient later in the afternoon.”

The EC3 is not designed for trauma patients who will most likely be sent to a trauma-specific ICU where they will be cared for by a trauma team once they are stabilized in the ED, explains Gegenheimer-Holmes. She notes that the critical care unit is also not the likely destination for patients with acute myocardial infarctions (MI) because there is already an effective pathway in place for patients with ST segment elevation (STEMI) MIs to be quickly transitioned to the cath lab.

## Decompress the ED

The UMHS has six specialized adult ICUs upstairs, and now it has the EC3 as well. But even with all of these specialized care options, the main ED at UMHS is still largely taking care of patients with a relatively high level of acuity.

However, Gunnerson anticipates that the EC3 will ease pressure on the ED, shortening wait times and facilitating patient flow. “Before, when we didn’t have this [critical care unit], we were having to take care of five, six, or seven of these [critical care] patients smattered throughout the ED, and it really drained the resources,” he observes.

“You can imagine someone waiting for an ICU bed for eight, nine, or 10 hours, and using all the nursing resources on that assignment in that one room.”

What happens is the room can't be turned over, and then you multiply the problem by seven or eight, and you have decreased the ED's capacity by 10%, explains Gunnerson. “We are hoping that by

decompressing that complexity and that higher level of care from the main ED ... it will open up rooms so that we will ... see a decrease in wait times to get patients back, and a decrease of patients leaving without being seen.” ■

## SOURCES

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## New center offers a unique venue for research, training

**W**hile the Massey Emergency Critical Care Center (EC3) at the University of Michigan Health System (UMHS) in Ann Arbor has only just opened its doors, planning for the unit has been a multi-year, multidisciplinary effort, explains **Jennifer Gegenheimer-Holmes**, RN, BSN, MHSA, CEN, the director of operations for the Department of Emergency Medicine at UMHS. “We created an emergency critical care advisory group [which includes] the medical directors of the adult ICUs here, respiratory therapy, and our physician leads within the ED,” she says.

The emergency care leaders in the group made it clear that they wanted to partner with the critical care specialists to develop a unit that would offer benefits and solutions to both sides. “We are all trying to manage our scarce resources in different ways, and this really has been a team effort all the way around,” observes Gegenheimer-Holmes.

This advisory group has been focused on reviewing all of the hospital's critical care admissions to identify the types of patients

who would benefit from early interventions and a consistent protocol that may start as early as when patients are en route to the hospital in an ambulance, but certainly when they arrive in the ED, observes Gegenheimer-Holmes.

Further, now that the EC3 is open, Gegenheimer-Holmes is working with the other group members to bring more consistency to the way critical care is delivered hospital-wide, so that the same equipment and processes are used in all the ICUs as well as the EC3.

While the new unit is designed to improve care and outcomes for emergency critical care patients, it has also been designed with research in mind. Developers are hoping that the first-of-its-kind center will attract research dollars and facilitate the testing of new treatments, diagnostic tools, and devices. In fact, research is already underway on sepsis.

“We built a database for sepsis a year ago so that we could track the before and after, and how the EC3 is impacting care,” offers Gegenheimer-Holmes. “We are really trying to look at this as an ecosystem — and how this change in the ecosystem is

affecting critical care throughout the hospital.”

Additionally, developers note that the EC3 will serve as a fertile training ground both for nurses looking to specialize in emergency critical care and emergency physicians who are seeking to enhance their skills with board certification in critical care.

“We are the only place in the country that has an ICU like this in the ED, so emergency physician fellows are coming now, and they are learning as we learn now too how to manage these patients,” explains Gunnerson.

What is different about many of these patients who present to the EC3 with critical care needs is that they are what Gunnerson calls undifferentiated: no other physician has touched them before. “A lot of times when patients come to the ICU, they are coming from the floor or from the ED and several [clinicians] who have seen them have already weighed in on what's going on,” he says. “Here [physicians] get to start from scratch, so this is going to be part of their training: how we work these patients up, and how we take it from there to that next level.” ■

# Study: Bacterium associated with rare “forgotten” disease also responsible for more sore throats than Group A strep in young adults

Sore throat expert urges providers to consider red flags of a bacterial infection when evaluating patients with sore throat

A new study suggests that *Fusobacterium necrophorum*, the bacterium associated with a “forgotten disease,” is, in fact, the cause of more sore throats than the more commonly considered Group A strep bacterium among the college-aged population. Researchers, led by **Robert Centor**, MD, a professor in the Division of General Internal Medicine at the University of Alabama at Birmingham (UAB) and a noted authority on sore throats, strongly urge frontline providers, such as those who serve in EDs across the country, to consider *F. necrophorum* when evaluating young adults with pharyngitis, and to treat accordingly.<sup>1</sup>

Why is this important? Because *F. necrophorum* pharyngitis is the leading cause of Lemierre’s syndrome, a very serious disease that largely affects adolescents and young adults. Lemierre’s disease frequently requires long, complicated hospitalizations, and proves fatal in 5% of cases, explains Centor. While rare, Centor observes that Lemierre’s disease occurs more frequently than acute rheumatic fever, which is a complication of strep bacterium.

Centor explains that Lemierre’s disease was much more prominent in the early part of the 20th century. “It was greatly diminished in the 50s, 60s, and 70s, and then started coming back in the 80s, about the

time we started being a little bit more prudent about using antibiotics for sore throat,” he explains. While Lemierre’s disease is more common than it has been in the past, it is frequently termed in the literature as “the forgotten disease.”

Centor adds that the *F. necrophorum* bacterium doesn’t just cause Lemierre’s syndrome. “It is also the most common cause of peritonsillar abscess in [the young adult] age group, and this age group is the most likely population to get peritonsillar abscess,” he explains.

A peritonsillar abscess is a deep infection of the head or neck that can lead to more serious complications, including Lemierre’s disease and sepsis.

## EXECUTIVE SUMMARY

New findings show that *Fusobacterium necrophorum*, the bacterium responsible for most cases of Lemierre’s disease, a relatively rare condition that is sometimes called “the forgotten disease,” is also the culprit for more sore throats than Group A strep bacterium among college-aged patients. However, as there is no point-of-care test for *F. necrophorum*, providers need to rely on physical examination when determining whether a sore throat is due to the bacterial infection.

- In an analysis of 312 college students, investigators detected *F. necrophorum* in more than 20% of patients with symptoms of sore throat. Group A strep was only detected in 10% of the cases, and Group C or G strep was detected in 9% of the cases.
- Researchers note that the *F. necrophorum* bacterium is associated with both Lemierre’s disease and most cases involving a peritonsillar abscess, a deep infection of the head or neck that occurs most commonly in young adults.
- Infections caused by *F. necrophorum* can be effectively treated with penicillin or a cephalosporin, but do not typically respond to azithromycin.

## Watch for red flags

Centor, who is known for developing the Centor Criteria, a set of criteria developed to quickly ascertain the presence of Group A strep infection in adults presenting to the ED with sore throat,<sup>2</sup> says that what prompted his latest study was the observation that only about 50% of patients showing all the signs of a bacterial infection were testing positive for strep. “I kept wondering what else is going on,” notes Centor. “I really didn’t think viruses were the cause.”

The study involved an analysis of 312 college students at UAB’s Student Health Clinic. Investigators detected

*F. necrophorum* in more than 20% of patients with symptoms of sore throat. Group A strep was only detected in 10% of the cases, and Group C or G strep was detected in 9% of the cases.

Centor says that this is the first study in the United States to show that *F. necrophorum* causes a significant number of pharyngitis cases in the young adult population, and that the signs of such an infection closely resemble strep throat.

Unfortunately, while investigators developed their own research assay, a polymerase chain reaction (PCR) test for *F. necrophorum*, to carry out their study, there is no rapid test available to clinicians to verify the presence of the bacterium, as there is with strep. Consequently, clinicians need to rely on physical examination to determine if a bacterial infection is likely.

“If a sore throat is not getting better after two or three days, it is not simply a sore throat. That is red flag number one, and certainly if the sore throat is getting worse, that is cause for concern,” explains Centor. “Also, routine sore throats do not cause drenching night sweats and they don’t cause rigors.”

Another red flag is swelling on one side of neck. “This could be either a peritonsillar abscess or a suppurative jugular vein clot that is infected,” notes Centor. “If you get someone on antibiotics right away, they should get better.”

## Select effective treatment

However, it is important to prescribe the right antibiotics, stresses Centor. “The big mistake that happens with too many PCPs [primary care physicians], which includes pediatricians, general internists, family

physicians, and too many ED docs, is that they give a Z-Pac [azithromycin] in this age group,” he says. “If you are going to give empiric therapy, you ought to prescribe penicillin or a cephalosporin.”

Centor notes that *F. necrophorum* in this young adult population is almost never sensitive to azithromycin. Further, he makes the case that everything that is resistant to penicillin or amoxicillin or a first- or second-generation cephalosporin is already likely resistant to those drugs, so you are not likely to create any staph resistance because staph is already resistant to penicillin. “Strep is still sensitive to penicillin after all these years, so I don’t think we are contributing to the antibiotic resistance problem by treating these people,” he says.

Centor acknowledges that while his findings are nonetheless likely to raise concerns about the overuse of antibiotics, he points out that 6% of the population, aged 15 to 30, seek medical attention each year for a sore throat. “It is a pretty important problem,” he says. “It is usually just a sore throat, but our job is to make

sure that we don’t miss the really serious ones.”

Centor would like to collect more data on *F. necrophorum*-related infections, and he would also like to see a rapid point-of-care test developed for the *F. necrophorum* bacterium. “It would be helpful to ED docs, people who work in college health, pediatricians who take care of adolescents, and family docs who take care of young adults,” he says. ■

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## SOURCE

- **Robert Centor**, MD, Professor, Division of General Internal Medicine, University of Alabama, Birmingham. E-mail: rcentor@uab.edu.

## CNE/CME OBJECTIVES

After completing this activity, participants will be able to:

1. Apply new information about various approaches to ED management;
2. Discuss how developments in the regulatory arena apply to the ED setting; and
3. Implement managerial procedures suggested by your peers in the publication.

## COMING IN FUTURE MONTHS

- More sensitive triage criteria for older patients
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## CNE/CME QUESTIONS

1. The measles rash starts on the \_\_\_\_\_ and moves \_\_\_\_\_, according to Kristi L. Koenig, MD, FACEP, FIFEM.

- A. torso, downward
- B. lower extremities, upward
- C. head and face, downward
- D. back, around to the front

2. Koenig has proposed a concept she refers to as \_\_\_\_\_, a measure she suggests should come before the traditional four vital sign checks of blood pressure, heart rate, respiratory rate, and temperature.

- A. identify, isolate, and inform
- B. vital sign zero
- C. self-protection 101
- D. none of the above

3. Carl Schultz, MD, FACEP, a professor of clinical emergency medicine and director of Disaster Medical Services in the Department of Emergency Medicine at the University of California at Irvine Medical Center, says that the spark

that usually starts measles outbreaks rolling is:

- A. someone from outside the United States
- B. an anti-vaccination group
- C. a patient between 6 months and 12 months of age
- D. an immune-compromised patient

4. The new Emergency Critical Care Center (EC3) at the University of Michigan Health System (UMHS) in Ann Arbor represents a paradigm shift for emergency nurses because while they have been treating critical care patients for years, the mindset has always been to \_\_\_\_\_, according to Jennifer Gegenheimer-Holmes, RN, BSN, MHSA, CEN.

- A. stabilize them quickly and move them out
- B. move patients through to discharge
- C. respond to acute care emergencies
- D. work as part of an acute care team