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Novel Paramedic Programs Respond to Behavioral Health-related Calls

While a dearth of psychiatric beds remains an obstacle, EMS-driven interventions are making a dent in hospital utilization, ED crowding

As a full-time emergency medicine physician at Kaiser Permanente South Sacramento Medical Center in Sacramento, CA,

Kevin Mackey, MD, knows all too well how patients presenting with behavioral health (BH) concerns can fill an ED, resulting in long waits and boarding while staff scramble to find open psychiatric beds in the community.

“The problem strains resources ... and costs a lot of money,” he explains.

“In our system, [these BH patients] cost \$7,600 per patient, on average.”

To address the problem, Mackey leads an initiative that empowers six specially trained paramedics not only

to respond to BH-related calls, but also to resolve many of these calls by either arranging transportation directly to a psychiatric facility or crisis stabilization

unit, or by stabilizing patients on the spot and establishing appropriate follow-up care.

The approach, which has been in effect since Nov. 25, 2015, has reduced the amount of time it takes to connect these BH patients to appropriate care drastically, and preliminary figures suggest it has saved more than \$1

million, according to Mackey. Although there are still kinks to work out, such as a way to achieve sustained funding for the approach and find an answer to the shortage of psychiatric facilities in the

PATIENTS PRESENTING WITH BEHAVIORAL HEALTH CONCERNS CAN PACK INTO THE ED, RESULTING IN LONG WAITS AND BOARDING.

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region, Mackey sees the approach as one potential solution to a problem that plagues too many hospitals.

"Many, many EDs struggle with this," he stresses.

Equip Paramedics with Training

Mackey, who also serves as medical director of Modesto, CA-based Mountain Valley EMS, needed a waiver from the state EMS authority to launch the program because current regulations do not allow paramedics to transport patients anywhere other than the ED.

"There are currently 12 approved projects in California looking at various aspects of mobile integrated health practice, or MIHP," he explains. "Our project is looking at the strain on the ED from BH patients."

The six paramedics involved in the program have undergone 140 hours of additional training.

"They trained alongside law enforcement in something called crisis intervention training [CIT], they spent time with BH specialists and with public health, and then they went through a program run by UCLA," Mackey notes.

Part of this training goes toward empowering the paramedics to conduct a mental health screen. When they respond to BH patient calls, paramedics perform both a mental health screen and a patient safety screen, Mackey says.

Currently, there are three ways these specially trained paramedics can be engaged. First, when someone calls 911 and an ambulance is sent to the scene, if the EMS team determines the patient has no medical issues and that the problem is purely psychiatric, the team then can trigger a response of the community para-

medicine team.

"That ambulance engages the community paramedic through the 911 system, and then the community paramedic comes to the patient's side and does an assessment," Mackey says. "The community paramedics work as a single resource. They travel in SUVs that are equipped as paramedic units, but they do not transport [patients] at all."

The second way the community paramedics can be engaged is through law enforcement.

"The police department has been trained about our program and when patients are appropriate," Mackey says, noting patients must be fairly cooperative. "They can be acutely psychotic, but they can't be psychotic and extremely aggressive, requiring restraint."

The third way community paramedics can be called to the scene is when a patient walks into a psychiatric hospital.

"Most psychiatric hospitals in the country require patients to have medical clearance, and currently, our psychiatric hospital doesn't have the ability to do that, so the county has to pay for an ambulance to transport that patient to an ED to, again, take up a bed and resources, and then the county pays to have the patient transported back to the psychiatric center," Mackey notes. "Instead of doing all that, the community paramedic will go to the patient's side in the lobby of the BH hospital and do the medical clearance right there."

Link BH Patients to Care

Now that the BH-focused community paramedics have responded to nearly 700 patient calls, program administrators have a good sense of what the mental health needs are in

the region.

“We have noticed that the vast majority of our patients are in their 30s, and the vast majority are male and Caucasian,” Mackey explains. “We did not expect that because we have a large Hispanic population here.”

The primary complaint typically is depression, suicidal ideation, or psychosis, Mackey notes. Specifically, many of these patients have a history of schizophrenia and they are off their medications, and an even larger percentage have taken methamphetamines and are acutely psychotic, he says.

When community paramedics determine that a patient needs placement in a psychiatric facility, they will call ahead and make sure there is a bed available prior to transport. When there is availability, the patient typically is transferred within 90 minutes. Unfortunately, roughly one-third of the time, there is no bed available. Mackey notes that although the number of psychiatric beds has decreased by about 25% over the past decade, the population and the need for these beds has continued to grow.

“There is a gap now of 44.9% between availability and need,” he says. “That is the number one reason why we can’t, on occasion, take patients directly to psychiatric facilities.”

When no psychiatric bed is available, patients are transported to the ED, but Mackey suggests that a solution to this problem is not necessarily the construction of more psychiatric hospitals.

“Most of these patients don’t require a 24-hour hospitalization; most can be stabilized in 23 hours,” he says. “They just need to be put back on their medicines, they need to be given resources, and they need to be shown the way. That is for the vast majority. There are a few patients

that do require hospitalization.”

Demonstrate Savings, Benefits

As far as next steps, Mackey intends to publish the results of the program from a safety aspect.

“When I started on this project, I was told by a lot of psychiatrists that there is no way that a paramedic can safely do this, so throughout this entire project my personal goal was safety; I wanted to prove that it could be done safely,” he says. “I have followed all of my patients all the way through the process, and we have had zero patients fall out or bounce back because the paramedics failed to recognize a medical issue.”

Mackey also intends to thoroughly analyze and publish the results of the program from an economic stand-

point to illustrate how much money it can save the healthcare system.

“When you can show how money is saved, I think you can get folks to open up their pocketbooks a little bit instead of coming in with your hat in your hand and saying, ‘please donate,’” he says.

The program already has elicited such strong support from law enforcement that Mackey believes there could be some financial support for the program from that sector.

“In the past, officers would go to one of these calls, then they would put the patient in the back of one of their cars, and they would transport the patient to the ED,” he says. “Then they would stand in the hall of the ED waiting for a bed and a security officer, fill out the 5150 [for an involuntary psychiatric hold], and eventually return to service.”

The amount of law enforcement

EXECUTIVE SUMMARY

A number of communities are turning to community paramedicine programs to help manage the crushing demand on EDs and EMS providers by patients with behavioral health (BH) concerns. In Modesto, CA, a pilot program provides extra training to paramedics to respond to BH-related calls, and a program in Atlanta pairs paramedics with mental health social workers to meet the needs of BH patients, many of whom repeatedly call 911 for help. Both programs curb the need for hospital and ED visits while linking patients with appropriate care more expeditiously. However, a shortage of psychiatric treatment facilities remains a barrier.

- Paramedics in the Modesto, CA, program undergo 140 hours of specialized training in how to handle BH-related 911 calls safely and appropriately.
- Program developers note that most of these patients can be stabilized within 23 hours, nixing the need for a bed in an inpatient psychiatric facility.
- Developers say that the pilot program has saved more than \$1 million and significantly reduced the time to treatment for BH patients.
- The Upstream Crisis Intervention program in Atlanta teams a paramedic with a mental health social worker to respond to BH-related calls through a mental health unit that is dispatched through the 911 system.
- The mental health unit teams also check on BH patients when they are not in crisis to make sure they have their medicine and are on track with their plan of care; the teams will intervene if patients need assistance.

service time that the program has saved is astronomical, Mackey notes, and he intends to tally these results, too.

“We expect those numbers to be really remarkable,” he says, noting that these benefits are on top of what the program delivers in terms of efficiency and care quality. “My whole interest in this is because of what a huge win it is for the healthcare system and also for patients.”

Add Mental Health Expertise

The Grady Health System (GHS) in Atlanta has been leveraging community paramedics to help manage BH-related 911 calls for five years through a program called Upstream Crisis Intervention. However, in this approach, paramedics work alongside mental health social workers when responding to calls. The method has worked so well that what originally began as a three-week pilot program never ceased, notes **Michael Colman**, MPA, NR-P, the vice president of EMS Advanced Practice at GHS. The program originally was conceived because of the high number of patients with BH needs who repeatedly call 911.

“Every month, there are probably 75 to 100 patients who call 911 more than five times a month,” Colman says, explaining this was an issue because paramedics generally do not have the expertise to manage BH patients.

“We spend a lot of time learning about cardiac arrest management, gunshot wounds, trauma, and things like that,” Colman notes. However, he observes that responding to a call involving someone who is experiencing a mental health crisis requires a different skill set. “When we would

get [to the scene], it was really hard for us to figure out how to best interact with the patient without escalating the situation.”

In many of these cases, law enforcement was engaged, and the patient might be subdued or restrained. Such situations might become dangerous and unpredictable, often leaving prehospital providers fearing for their safety and unclear on how to proceed.

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“We were just looking for a better way to manage our mental health calls because we knew they weren’t going to stop coming,” Colman adds.

In the initial stages of the Upstream Crisis Intervention program, Grady EMS dispatched the paramedic/social worker teams, along with a psychiatrist.

“We really wanted to make sure this idea was safe, that it was going to work, and that it made sense,” Colman says. “From a medical standpoint, everyone felt it was great, and we are also now really comfortable with the process.” (See also: “Prevent Mental Health Problems from Escalating into Crises,” p. 18)

Integrate Resources

Roughly 7% of the 911 calls into Grady’s EMS system involve a mental health-related complaint, but these do not necessarily represent an immediate threat to a person’s life. Many of these patients are depressed or anxious, or they may just want to talk to someone. “They don’t necessarily want to go through the whole ED process,” Colman says.

Consequently, one of the first steps that the Upstream Crisis Intervention program took to address these calls was to reach out to the Georgia Crisis and Access Line (GCAL), a program that can fulfill the immediate needs for many of these patients by providing them with a mental health provider to talk to and connect them with appropriate follow-up appointments.

The 911 dispatchers will triage calls over to GCAL in cases in which the approach is deemed most appropriate, negating the need for an ambulance or transport to the ED.

“The person’s call is transferred, [GCAL staff will] talk to them, they set up a safety plan, and get an appointment with one of the mental health facilities in their area,” Colman says. “Sometimes, the issue can be solved over the phone.”

If GCAL staff members express any concerns, they can dispatch their own internal mobile crisis program, or they can call Grady EMS back, Colman explains.

The Grady EMS system features a sophisticated, computerized emergency dispatch system that will assign a code automatically based on the answers to questions the dispatcher asks. There are roughly 1,500 codes that can be assigned according to the system’s underlying algorithms, and these guide the dispatchers’ actions, Colman explains.

For more serious mental health-related calls, these codes typically will prompt 911 dispatchers to deploy one of the mental health units manned by a paramedic and a social worker. These calls involve issues such as suicide, depression, bipolar disorder, or schizophrenia, according to Colman.

In these cases, the paramedic will evaluate the patient first to take vital signs and identify any medical issues of concern. “Once we get the patient checked out and he is [medically] OK, then we have the mental health social worker start talking to him,” Colman says. “The social worker may do a safety plan, work through whatever their condition is ... and make the patient a next-day appointment to see a mental health provider, or we can transport the patient, if needed, to the ED or to an inpatient mental health facility.”

However, there are times when the mental health unit team determines that a patient requires more intervention.

“If the patient is violent or needs some medication to be transported, the paramedic will administer the medicine and then wait for an ambulance because we do not transfer people that we have to medicate because it is not safe to do so,” Colman notes.

It should be noted that in cases in which ambulances or vehicles are owned and operated by the hospital, the Emergency Medical Treatment and Labor Act (EMTALA) may apply to interactions with the target individuals. For more information on this point, please see “An Ambulance Owned by a Hospital Must Also Be Operated by a Hospital to Trigger EMTALA Obligations,” published in the May 2013 issue of *ED Legal Letter* (<http://bit.ly/2iuAYtE>).

Begin Processing in the Field

In 2015, mental health units responded to nearly 1,600 calls, and in the vast majority of these cases, the paramedic/social worker team was able to manage the situation without transporting the patient to the ED. In most of these cases, the patients received follow-up appointments with mental health providers, enabling the health system to preserve resources while also quickly connecting patients with needed care, Colman explains.

THE MENTAL HEALTH UNIT TEAMS HAVE BECOME FAMILIAR WITH MANY OF THE CALLERS, AND THESE TEAMS OFTEN CAN ANTICIPATE THEIR NEEDS.

The mental health unit teams determine a patient must be transported to the hospital about 400 times a year, but even in these cases, the prehospital provider team works to minimize delays. One of the mental health unit team members will ride with the patient and make sure he or she is monitored and comfortable, Colman says.

“Once we get to the hospital, it speeds the process because the paramedic speaks with the nurse, reports on the patient’s vital signs, explains

what has already been done for the patient, and passes on the patient’s history,” he says. “Then, the mental health social worker from the unit will report his or her findings to the psychiatrist or a mental health professional who is on staff in the ED.”

By this point, the mental health social worker from the team has been with the patient for at least 45 minutes and may have even seen this patient before, Colman offers.

“This can potentially shave a couple of hours off the patient’s stay in the ED,” he says. “The patient can already be on a path to either getting admitted or really just being discharged [if his needs can be managed in the ED].”

About 70 times a year, the mental health unit determines that a patient must be transported to an inpatient mental health facility. It is a process that has become increasingly difficult, as such facilities often are full, and the state has moved to a single point of entry for patients who need a bed in one of these facilities, according to Colman. However, the mental health unit teams can initiate the admissions process.

“We start the process in the field so that when the patient gets to the ED, usually at Grady Memorial Hospital, we can say that ... the patient is already in line for a bed,” Colman says. “This shortens the amount of time that the patient is going to spend at Grady waiting for a bed to become available.”

Now that the program has been in operation for five years, the mental health unit teams have become familiar with many of the callers, and these teams often can anticipate their needs, Colman notes.

“It is much less expensive for this unit to respond rather than sending an ambulance since the paramedic/social worker team is so familiar with

the patients,” he says. Often, it is just a matter of making sure a patient is taking his or her medicine as directed and that he or she is appropriately housed and nourished, Colman adds.

“That task becomes more difficult for an ambulance because on any given day, we could have 25 or 30 ambulances in the field, and the people in those ambulances don’t encounter these patients frequently, so they may be unsure of whether the patient is in extremis or is [acting in accordance with] his or her normal mental health condition,” Colman explains. “A lot of times [in the past], these patients would be unnecessarily transferred to the hospital.”

Although Grady has not specifically tallied financial results, it’s clear the program delivers dividends.

“We know that about 65% of the time, when [the mental health unit teams] get on the scene, the patient doesn’t go to the ED, which is nice, and about 92% of the time the patients don’t get an ambulance,” Colman reports. “Before [the program was implemented], these patients got an ambulance 100% of the time, and 80% of the time they went to the hospital.”

In many of these BH-related calls, all the patients really need is an appointment with a mental health provider, Colman notes. Rather than

taking them to the ED, the mental health unit teams can handle that task in the field.

“We have found a better way to get this same result,” he says. ■

SOURCES

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Prevent Mental Health Problems from Escalating into Crises

To be sure, there is a lot of buzz about using community paramedicine programs to help manage the behavioral health (BH)-related demand on busy EDs, but hospital administrators and EMS service providers considering such an approach must be fully aware of all issues involved with taking such an approach.

“You have to have policies and protocols, and you have to worry about liability when you send paramedics by themselves to try and work with mental health patients,” explains **Michael Colman**, MPA, NR-P, the vice president of EMS Advanced Practice at GHS. That’s one of the reasons why Grady Memorial Hospital’s EMS service came up with the idea for handling many of these calls through mobile mental health units that include both a paramedic and a mental health social worker, an approach that has been in operation since Grady developed its Upstream Crisis Intervention program five years ago.

Intervene Earlier

The name of the program reflects an evolution in the care of mental health patients at Grady.

“Years ago, a lot of mental health patients would just come into the ED, get a mental health evaluation, and then go upstairs to where they were managed,” Colman notes. “Then, Grady moved those [mental healthcare] resources down to the ED so that now when a patient comes to the ED, there is a special place for mental health patients where there is a psychiatrist and social workers.”

Given the high demand for BH care, Grady then decided to provide such services “further upstream” by moving them out into the field through the mobile mental health units, which are deployed by EMS, Colman explains. Now, EMS endeavors to work within this program to prevent behavioral health issues

encountered in the field from escalating into crises requiring a hospital visit.

“This program is 100% reactive. Something has to happen in order for patients to call 911, and then we respond,” Colman notes. “The problem with these types of situations is that the patient has [often] decompensated or has moved out of their normal state into some sort of crisis, and then once the paramedic/social worker team gets there, it is very difficult to reverse that.”

Consequently, when responding to 911 calls, mental health unit teams educate patients, family members, and caregivers about recognizing the typical cycle of a mental health condition.

“You can kind of tell that it goes from step A to B and to C, and then at some point there is a 911 call, and all these resources show up, and the patient goes to the hospital,” Colman explains.

With this knowledge, patients or caregivers are urged to call for assistance earlier, when less aggressive intervention will be needed.

“The next time when [a mental health condition] progresses from A to B to C, they can call [the Georgia Crisis and Access Line (GCAL)] and get us out there quicker so we can head the problem off at the pass,” Colman notes.

With this approach, patients are directed to the mental health unit teams through a different route.

“They are not coming from 911; they are coming from GCAL, which is a little bit easier to manage,” Colman adds.

Make Follow-up Calls

In addition to activating this alternate route earlier in an emerging behavioral health crisis, the mental health unit teams also make follow-

up calls to patients to make sure they are OK and have the resources they need to manage their condition.

If they haven’t filled their prescriptions, the paramedics will retrieve them for the patients, and make sure they understand how to take them properly, Colman explains. The teams also distribute medication organizers and planners to keep patients on track, and they even offer a solution for patients who are illiterate.

“Sometimes, we have to go see a patient four or five times before they will tell us that they can’t read,” Colman notes. “Then, we take all of their prescriptions and go back to Grady, and we get the pharmacist to reprint the labels so that they have a rooster for the morning, a sun for the afternoon, and a moon for the night on the prescription bottle.”

Colman notes that a lot of what the mental health unit teams do is mitigate the challenges these patients

face, and stay in contact to make sure patients are compliant with their medical instructions.

“A lot of these patients have cell phones, so we will send them a text, asking if everything is good, and checking to make sure they have all of their medicines,” he says.

Colman notes that filling a prescription is not so easy for a patient who is on the brink of homelessness and doesn’t have any financial resources.

“We will kind of bridge that gap for them,” he says. “We will call the doctor, and we will get the prescription called in, and we will go pick it up for them.” This is where the mobile health unit teams are really effective, Colman stresses. “We have tons of patients who will be calling 10, 15, or 20 times a month, and then they don’t ever call again. We just keep going to see them twice a month.” ■

Administrators Leverage Predictive Analytics to Manage Capacity, Streamline Decision-making

A first-of-its-kind command center at Johns Hopkins Hospital takes data-driven healthcare to a whole new level

Hospitals have been relying on data to manage staffing and resources for decades, but EDs still become overwhelmed at times, and unanticipated surges often lead to long waits, boarding, and other negative effects. However, some pioneering medical centers are taking data-driven operations to a whole new level, leveraging predictive analytics to boost performance on a range of measures while also maximizing resources. Further, some are even experimenting with these newer modeling techniques to see if anticipated patient surges can be

averted through the use of diversion strategies.

Leverage High-tech Tools

Jim Scheulen, PA, MBA, the chief administrative officer for the Johns Hopkins Department of Emergency Medicine in Baltimore, manages the operations of five busy EDs, which altogether handle roughly 250,000 patients a year. He also oversees the hospital system’s transfer center and a new command center at

Johns Hopkins Hospital that monitors 14 IT systems on a 24/7 basis so that all the relevant inputs can factor into decision-making about beds, transfers, consults, admissions, discharges, and other aspects of care.

The command center, which was developed in concert with GE Healthcare Partners and began operations in February 2016, is seeking to make use of the same kinds of sophisticated, mathematical tools that many other industries have long since integrated into their practices.

“We recognized that running a huge hospital like Hopkins is as

complex as running any other complex industry,” Scheulen explains.

For example, he notes that aerospace companies and automobile manufacturers use systems engineering tools to maximize efficiency and boost productivity.

“What that means is that besides the usual process improvement work, they also use all sorts of simulation models, deep data analytics, statistical modeling, and predictive modeling ... as a routine part of what they do,” he says. “The other thing they do: To operate in these complex environments, they bring together everybody who needs to be together to make the place run on a daily basis, they give them all the information they need to run it, and they

give it to them in real time.”

Centralize Decision-making

For Scheulen, the concept of a centralized command center that houses all the relevant information as well as all the key decision-makers in one place makes perfect sense.

“It used to be that when we got a referral in from another hospital or we wanted to admit another patient through the ED, all of these calls would have to go through admitting, our transport group, and our bed managers,” he explains.

Given that none of these players were in the same place, they would

have to communicate through phone calls, faxes, emails, or texts, an approach that would delay the whole process, Scheulen observes.

“We thought if we were just able to bring all these people together, we would take all of that away,” he says.

Further, with improved efficiency, the thinking was that the hospital also could make headway on issues such as ED boarding and OR holds, and hospital administrators could expedite the process of accepting patients referred to Hopkins from other hospitals for the tertiary and quaternary care that Hopkins can provide.

In fact, in just 10 months of operation, the data-driven command center has achieved dramatic improvements, including a 30% reduction in the number of emergency patients who must wait for an inpatient bed.

“We have reduced the time from when an order [for admission is completed] and the bed is assigned by at least 45 minutes,” Scheulen explains. “We have also seen a very significant reduction in the amount of time it takes for us to go get a patient who might be having an emergency at an outside hospital and needs to come in. We have reduced the time it takes for us to get out the door to get that patient by one hour.”

Even more dramatic has been the effect on OR holds.

“We used to routinely have several OR holds a day, which would lead to case cancellations, but over the last several months we have had essentially zero cancellations due to OR holds,” Scheulen notes, adding that many other improvement efforts are in process. “We are still developing a lot of tools, and learning them as we go.”

EXECUTIVE SUMMARY

A growing number of hospitals are turning to predictive analytics to anticipate and manage volume better. The approach, which involves using sophisticated simulation and modeling techniques, enables administrators to get ahead of patient surges and to focus on pressure points. For example, Johns Hopkins Hospital in Baltimore has made significant progress on a range of measures, using a centralized command center to monitor the hospital's data streams. The approach enables the hospital to accelerate decision-making and optimize hospital resources. Investigators at Columbia University believe similar modeling techniques can be used to avert ED congestion when used in conjunction with proactive diversion strategies.

- The 5,000-square-foot command center at Johns Hopkins Hospital monitors 14 IT systems on a 24/7 basis so that all relevant inputs can factor into decision-making about beds, transfers, consults, admissions, discharges, and other aspects of care. Administrators say they have been able to achieve 96% accuracy in their predictions.
- In just 10 months of operation, the data-driven command center has achieved dramatic improvements, including a 30% reduction in the number of emergency patients who must wait for an inpatient bed and a one-hour reduction in the time it takes to get out the door to retrieve a patient identified for transfer to the Hopkins facility. In addition, the hospital has all but eliminated procedure cancellations due to OR holds.
- Investigators at Columbia University contend that by using predictive analytics to guide proactive diversion strategies, ED delays can be reduced by as much as 15%.

Apply Predictive Analytics

The command center is housed in a 5,000-square-foot facility that is positioned in the center of the hospital campus. “It is a very cool, awesome-looking, NASA-like place,” Scheulen says.

There are 22 information screens or “tiles” that retrieve and display a constant flow of information that feeds into the center from the hospital’s IT systems. At any time of the day or night, command center staff can see real-time information about incoming ambulances, pending admissions or discharges, backups in the OR, and many other aspects of care documented in the hospital’s electronic medical record system.

Four groups of personnel monitor all this information throughout the day: the people who take calls from physicians who want to transfer patients to the hospital, bed management nurses, the paramedics who arrange transportation for patients arriving at the hospital from other facilities, and admitting staff who handle all the financial clearances and registrations for patients being admitted, Scheulen explains. Guiding all the decisions taking place in the command center are complex calculations that enable the hospital to anticipate and manage patient volume.

“The first thing we did was build a simulation model that replicated the operations of Johns Hopkins Hospital,” Scheulen explains. “It was unbelievably complex and very difficult to do, but once we had it done, then we were able to see where we should target our process improvement efforts.”

On a daily basis, administrators use the mathematically based tools to

look two or three days ahead to see what the occupancy of beds will be and put appropriate plans in place. For example, perhaps the surgical schedule needs an adjustment to manage the anticipated capacity better, or perhaps certain patients can be discharged earlier to clear beds on days when demand is expected to spike. The information enables decision-makers to act proactively to avert bottlenecks.

WITH THIS TYPE OF DATA, STAFF CAN BEGIN THE DISCHARGE PROCESS SOONER SO PATIENTS EXIT THE HOSPITAL EARLIER IN THE DAY, CREATING NEEDED CAPACITY.

“We use that information when we have our bed huddles,” Scheulen explains. “We are also developing a tool ... that will enable us to predict on an individual patient basis who will be able to go home three days from now, two days from now, and tomorrow.”

With this type of data, staff can begin the discharge process sooner so patients exit the hospital earlier in the day, creating needed capacity, Scheulen notes.

“People will say that they already do this, but they actually don’t because even if they are in a huddle

or a multidisciplinary setting, they might say that a patient is going to go home in two days, but they aren’t sure ... and then all of a sudden the patient is ready to go home, but they haven’t written any of the [necessary] orders,” he explains. “So if we can use this [predictive] information, and then change the conversation during these rounds [or huddles] to say that this predictive model says a patient is almost certainly going to go home tomorrow, then we can have the residents tonight prepare their prescriptions and whatever else the patient needs to be [ready for discharge] tomorrow.”

Fine-tune Predictions

Scheulen acknowledges that when it comes to emergency medicine, there are events that you cannot predict, but the effect of these events on patient utilization predictions is surprisingly small.

“Hopkins in particular has a lot of data,” he says. “We are within 96% accuracy in our predictions.”

Further, the comprehensive view provided by the predictive, analytical modeling used in concert with the command center has helped hospital administrators focus on the very specific, targeted things they need to do to make better progress, Scheulen observes.

For example, administrators have been able to determine that it is not always a lack of beds that slows throughput, but rather provider availability. “So our department of medicine is planning to restructure the way its residency program operates ... so that providers will be available all the time and there won’t be any gaps,” Scheulen explains. “That is going to make a major difference.”

Another alteration in the works

has to do with the way emergency providers arrange for consults from specialty providers, a process that has been plagued with bureaucracy and delays, leading to boarding in the ED.

“We are changing the way the consult process works, putting it through the command center and having time expectations for when [a specialty provider] is going to respond,” Scheulen says.

As processes change and improve, administrators continue using the simulation model to determine what the next process improvement efforts should be, Scheulen notes.

“The people at Hopkins recognize that we have an incredible demand for our service, and they do everything in their power to take care of it,” he says. “We are literally down now to looking at how many minutes a bed is open between patients. That is how tightly we are beginning to be able to run the ship.”

Scheulen is not at liberty to report what the cost was to build and implement the command center, although he acknowledges that it was substantial. However, he notes that hospitals and EDs do not necessarily need a project of this size and scope to take advantage of the kind of predictive analytics that Hopkins leverages.

“We recognize that not everybody needs all of this; nor are people likely to be able to afford it,” he adds. Some hospitals, for example, may want to focus on one problem area or “tile,” Scheulen observes.

“It is possible that someone may just want the predictive discharge tile, or the set of things that [factor into] predictive discharge ... or someone may just want to know the status of every bed in the hospital all the time,” he says. “That is exactly what we are thinking about now — how to do this at places that aren’t as

complex as Hopkins.”

The command center has been a three-year journey thus far, but Scheulen notes that the hospital system is just getting started.

“We are not done by any stretch of the imagination, and that is the point,” he says. “We are trying to make people understand that this is a new way of doing business.”

Act to Avert Congestion

While much of the work around predictive analytics is used to create capacity and boost efficiency in busy hospitals, investigators are looking

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at leveraging this type of data to ease the demand for service in busy EDs that are destined to become overwhelmed with patients.

“What we want to do is take these predictions of when you expect demand is going to be high, and instead

of waiting for the congestion to build up, leaving many patients waiting for hours and hours to get care ... we want to proactively start making decisions to try to reduce the overall congestion,” explains **Carri Chan**, PhD, an associate professor of business in the division of decision, risk, and operations at Columbia University in New York City.

Specifically, Chan proposes proactive decision-making and diversion strategies so that certain patients who would otherwise access care in a particular hospital’s ED actually go elsewhere to receive care. Chan notes that she uses the term “diversion” in the broadest sense to encompass everything from ambulance diversions to simply educating certain patients who arrive in the ED about an alternative site where they can receive care much faster.

While such diversion tactics are not novel, Chan proposes implementing them much earlier, essentially heading off periods of predicted congestion.

“Typically, what hospitals do nowadays is they wait until that buildup of patients occurs ... before they start diverting patients,” she explains. “What we are actually proposing is that you actually know ahead of time that this may be occurring, so you make diversion decisions earlier in a proactive manner.”

For example, when a low-acuity patient arrives in the ED, even though the ED is not yet packed, this patient can be given the option of receiving care at an adjacent urgent care facility to ease delays for the 50 patients administrators know will be arriving in the next hour, Chan observes.

Chan specifies that such conversations would be carried out during triage, so clinicians already would have determined that the patient is dealing

with a low-acuity issue. She also stresses that the patients would be given the choice of whether to wait for care in the ED or to access care at the alternative site. Using simulation techniques that are based on published data regarding average arrival rates and service times, investigators have determined that such proactive diversion tactics can reduce delays by up to 15%.

“We looked at how arrivals are varying by time of day and day of the week, and we used that for these predictions for the future,” Chan explains. “Even if we say we will always take patients by ambulance and that we will only divert the lowest acuity patients, we still find that we get substantial gains.”

Of course, it should be noted that to be in compliance with EMTALA, patients also must be advised about receiving care at an alternative site only *after* they have received a medical screening exam. Also, the alternative care site must be on the hospital campus, as defined by EMTALA regulations, and the process of moving patients must occur in accordance with CMS regulations.

Pair Predictions with Diversion

Chan notes that she is in communication with several EDs that are interested in the approach. She also notes that each facility must create a predictive model built with data that is specific to its own operations.

“Each facility has different types of patients who are coming in, so part of the process is to first collect enough historical data so that we feel confident that these predictions are somewhat accurate,” she explains.

“The more detailed information that is available, the better the predic-

tive power of the algorithm, and the better our approach will do,” Chan offers. For example, she notes that information about weather patterns has big predictive power regarding ED demand. “If it is a particularly icy day, you will see more car accidents. Similarly, flu season can create surges in demand.”

The approach involves taking these data inputs and putting them together with how the ED will act on the predictions.

“Let’s say we are only able to predict 80% of the actual arrivals to the ED,” Chan says. “We will still have improvements in reducing delays, but it certainly won’t be as great as if we had 90% of arrivals predicted, so that is a tradeoff that one needs to consider.”

One of the reasons why investigators focus on using diversion interventions to address anticipated surges in demand is because these mathematical models become much less accurate the farther out you try to predict.

“If I want to predict how many patients are going to come into the ED in three weeks, there is going to be much less accuracy than if I want to predict how many are likely to come in the next two hours,” Chan

explains. “Diversion decisions are being made on a minute or hourly time scale, whereas staffing decisions are often made weeks in advance, so we wanted to account for that reality.”

Going forward, predictive models are only going to become more commonplace in healthcare planning, and people will become more adept at using such data, Chan predicts.

“If we know the variability, we can modify things appropriately,” she says. ■

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SOURCES

- **Carri Chan**, PhD, Associate Professor of Business, Division of Decision, Risk and Operations, Columbia University, New York. Email: cwchan@columbia.edu.
- **Jim Scheulen**, PA, MBA, Chief Administrative Officer, Department of Emergency Medicine, Johns Hopkins Medicine, Baltimore. Email: jscheule@jhmi.edu.

CME/CE 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

- Taking team-based care to a new level
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CME/CE QUESTIONS

- 1. In Modesto, CA, there are three ways a specially trained community paramedicine unit is engaged to respond to a behavioral health-related call: by a traditional ambulance that responds first to the scene, by a member of law enforcement, or:**
 - a. by a family member.
 - b. by an emergency medicine physician.
 - c. by a psychiatrist or mental health social worker.
 - d. by a patient walking into a psychiatric facility.
- 2. Kevin Mackey, MD, notes that he has found that the vast majority of patients served by specially trained community paramedics who respond to behavioral health-related calls are:**
 - a. homeless people who are Hispanic.
 - b. patients with substance use problems.
 - c. patients who are male, Caucasian, and in their 30s.
 - d. middle-aged patients suffering from chronic diseases.
- 3. According to Michael Colman, MPA, NR-P, the vice president of EMS Advanced Practice in the Grady Health System, the Upstream Crisis Intervention program was originally conceived because:**
 - a. of the high number of patients with behavioral health needs who repeatedly call 911.
 - b. of an out-of-control drug abuse problem in the inner city.
 - c. emergency providers needed added assistance in caring for patients with behavioral health needs.
 - d. behavioral health patients were falling through the cracks.
- 4. Jim Scheulen, PA, MBA, chief administrative officer for the Department of Emergency Medicine at Johns Hopkins Medicine, explains that the first thing administrators did after building a high-tech command center was:**
 - a. staff the command center with aerospace industry veterans.
 - b. establish a new process for communicating with transfer hospitals.
 - c. build a simulation model that replicated the operations of the hospital.
 - d. All of the above