

By Ann Williams, PhD, MSN, Anne Whittington, MBA, MSN, RN, CDE, & Mike Taigman

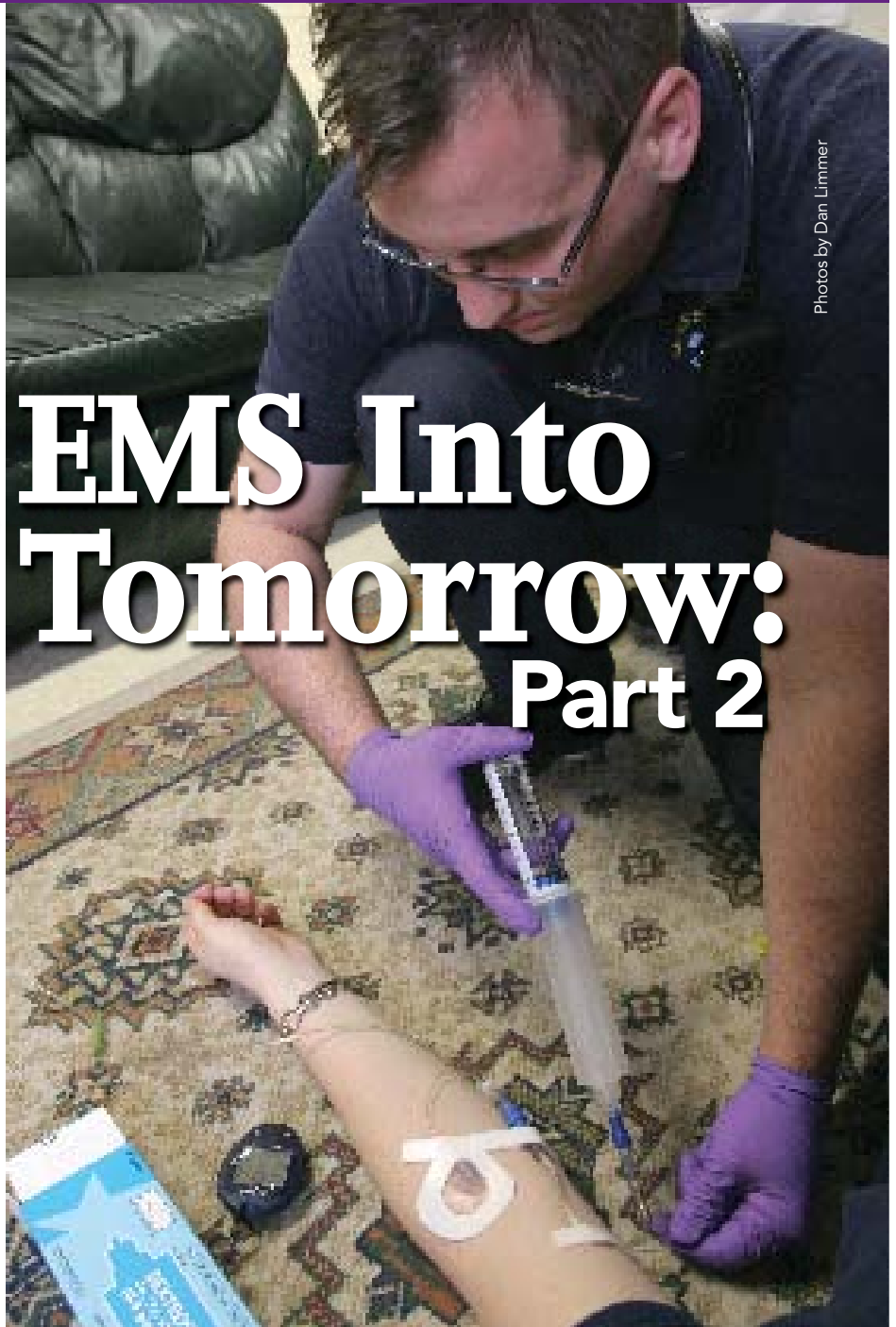
Taking EMS Into Tomorrow: Part 2

How you can help your community live with diabetes

Some people call it “paramagic.” He is unconscious, unresponsive, pale, cool, drenched in sweat, snoring respirations, with his spouse hovering over him, wringing her hands and warning us he’s diabetic. While murmuring words of comfort to the family, we gracefully slip a catheter into an elusive vein. We gently squeeze the syringe full of syrupy sugar water, watching carefully for infiltration. As the plunger on the amp of D50 reaches the halfway point, his breathing starts to normalize, and his pasty cheeks fill with color. Gradually he wakes—a little confused at first. Soon he says something like, “Guess I forgot to eat lunch today.”

This process is one of the coolest things we get to do in EMS, and we get to do it a lot. Waking up someone who looks near death from hypoglycemia is paramagic at its finest. But it’s rare that an EMS provider looks much beyond the emergency to see the big picture of diabetes for their patient.

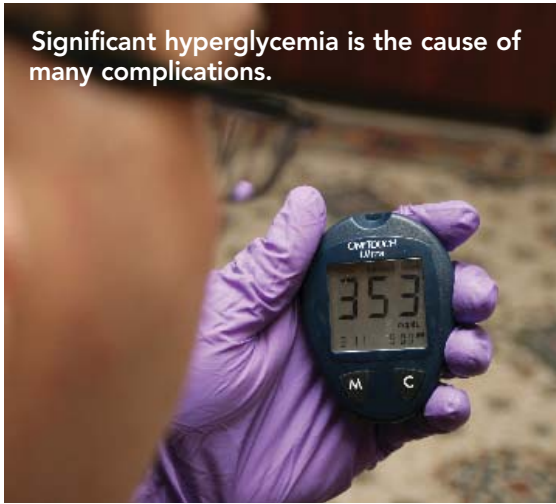
According to the Centers for Disease Control and Prevention, there are 14.6 million people in America who have been diagnosed with diabetes. It’s estimated that 6.2 million have diabetes that has yet to be diagnosed, and more than 41 million have pre-diabetes. That means nearly one in five Americans is suffering from, or is at risk for suffering from, the complications of diabetes.



Photos by Dan Limmer

The list of complications from this disease is long and daunting. The short-term complications, hypo- and hyperglycemia, are the ones with which EMS providers are most familiar. It’s also important that we become aware of the devastating long-term complications. Diabetes is the leading cause of kidney failure, accounting for 44% of new cases in 2002. Diabetic retinopathy is the leading cause of new blindness in adults 20–74. People with diabetes account for more than 60% of lower-limb amputations (over 82,000 in 2002), and 73% of people with diabetes have high blood pressure, which leads to myocardial infarction and stroke. In one state surveyed, 26% of people with diabetes reported having had a myocardial infarction or stroke, compared with 6% of the

Significant hyperglycemia is the cause of many complications.



nondiabetic population.

Diabetes is not an equal-opportunity disease. According to the CDC, Native Americans and African Americans are more than twice as likely to have diabetes as whites. The rate among Latinos and Asian Americans/Pacific Islanders is also

higher than among whites. Diabetes is more common in people without high school educations, with household incomes less than \$15,000 a year, and without telephone service. More than 20% of people over 65 have it.

Mortality rates associated with diabetes are also rising. Rates from 1999–2001 were 61% higher than from 1989–91. "Diabetes has reached epidemic proportions in the U.S.," says Dr. Michael Alderman, professor of epidemiology and population health at Yeshiva University's Albert Einstein College of Medicine. And according to Paul Zimmet, director of the International Diabetes Institute, it's estimated that more than 330 million people worldwide will be affected with diabetes within the next 20 years. The epidemic is happening faster in Asia than in any other region. One researcher predicts that if current trends continue, by 2020 all

the insulin presently manufactured in the world will not be enough for China alone.

Insurance companies are not helping reverse these trends. Diabetic self-management education programs receive meager reimbursement from insurance companies, while treatment for severe complications is paid for. A January 2006 *New York Times* article described how over the last seven years, three of the four hospital-based diabetes programs in New York City closed their doors due to lack of funding, while the number of people with type II diabetes doubled. The article said, "Insurers, for example, will often refuse to pay \$150 for a diabetic to see a podiatrist, who can help prevent foot ailments associated with the disease. Nearly all of them, though, cover amputations, which typically cost more than \$30,000."

The good news is that many of the

Insulin Pumps

One of the most exciting innovations in diabetes care is the insulin pump. Many people with diabetes now prefer these pumps to syringe injections. Insulin pumps are computerized devices, about the size of a pager or cell phone, that people wear on their belts or carry in their pockets or special holders. They deliver a steady, measured dose of insulin (the *basal* dose) through a flexible plastic catheter. The pump releases very small doses continuously, which mimics the body's normal release. When people using a pump eat, they press a button to deliver a bolus of insulin to help them metabolize the carbohydrates in their meal. These devices allow people with diabetes to adapt their insulin to their lifestyle, and give them much greater control over their blood sugar.

More and more of the patients cared for by EMS will have insulin pumps. There are so many brands on the market that it's not reasonable for EMS providers to know how to trouble-shoot all of them. Here are some rules of thumb for treating patients with insulin pumps.

- If your patient is hypoglycemic and you're able to start an IV and give D50, leave the pump in place.
- If your patient is hypoglycemic and you're not able to start an IV, disconnect the pump so that the patient isn't continuing to get insulin when their blood sugar is low and you can't give D50. Just pull the catheter out of the skin—it's easy to reinsert later. Note: These pumps are very expensive (\$5,000–\$6,000 or more), so tape the disconnected pump to the patient's arm. Using a little gauze wrap before your tape will prevent allergic reactions to the adhesive. Patients can go without their pump for 2–3 hours before they begin to develop diabetic ketoacidosis.
- If your patient is in diabetic ketoacidosis, ask them to check their pump to make sure it's working and has insulin.

most severe complications of diabetes can be prevented or dramatically decreased. Diabetics who obtain and maintain control over their blood sugar and blood pressure can live

long and healthy lives. People with diabetes can learn to manage their disease, and EMS providers can support them in their efforts.

TYPES AND HOW TO CONTROL THEM

There are two primary types of diabetes, type I and type II. Type I, formerly called *juvenile-onset* diabe-

tes because it tends to strike persons before the age of 20, affects about 5%–10% of people with diabetes. With this type of diabetes, the pancreas makes no or almost no insulin.

Type II diabetes was previously called *adult-onset* diabetes because in the past it was usually discovered after age 40. However, with Americans' sedentary lifestyles and increasing levels of obesity, this disease is now being found more in adolescents—and sometimes even in children under 10. Type II diabetes constitutes about 90%–95% of all cases. With this type of diabetes, either the pancreas produces a reduced amount of insulin, cells do not respond to the insulin, or both.

For people with diabetes, an important key to preventing complications and staying out of ambulances and EDs is controlling blood glucose. To do this, people need to learn to balance medication, diet

and physical activity every day. The mechanism that lets someone know how much control they have over their disease is blood sugar measurement. People should check their own blood sugar as often as they need the information. For people who have fluctuating blood sugar, this is often four or more times a day. For those with stable blood sugar, once a day may be sufficient. It's important for EMS providers to remember that illnesses (like the flu) or trauma frequently cause blood sugar problems for people with diabetes.

At least twice each year, people with diabetes should have an A1C blood test performed. This test assesses the average amount of sugar in the blood over a 2–3-month period. It's a good overall indicator of how controlled a person's blood sugar is over time. The closer a person with diabetes can keep their A1C to 6% or lower, the better their

diabetes is in control. A 1% change in A1C results reflects a change of about 30 mg/dL in average blood glucose. For instance, an A1C of 6% corresponds to an average glucose of 135 mg/dL, while an A1C of 9% corresponds to an average glucose of 240 mg/dL. Every percentage point drop closer to 6% in A1C blood test results reduces the risk of microvascular complications to the eyes, kidneys and nerves by 40%. The feedback from daily blood sugar tests and regular A1C blood tests allows a person with diabetes to work with his or her healthcare professionals to adjust medications, diet and exercise to fine-tune their self-management program.

We need to understand that helping someone with diabetes obtain and maintain control over his or her blood sugar and blood pressure is as lifesaving as shocking someone's fibrillating heart. For people with type

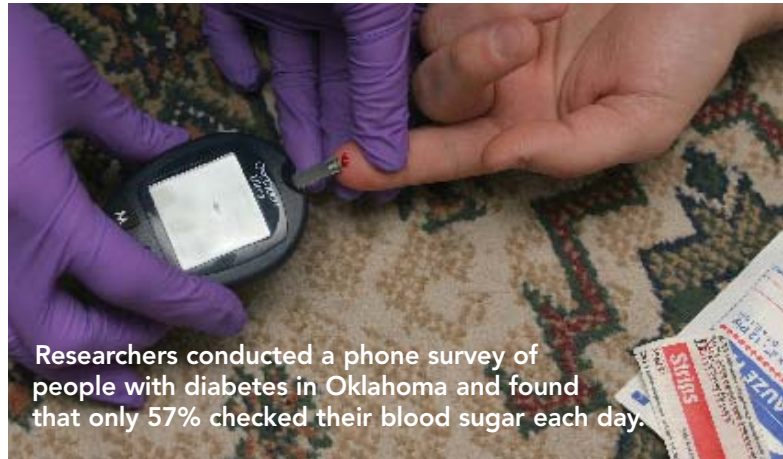
I diabetes, keeping blood glucose levels as close to normal as possible reduces damage to the kidneys by 35%–56% and the eyes by 76%. Blood pressure control reduces risk of cardiovascular and microvascular disease by 33% and decline in kidney function by 30%–70%. As a general rule, for every 10 mm Hg reduction in systolic blood pressure, the risk for any complication related to diabetes is reduced by 12%. Add a comprehensive foot care program, and you can reduce amputation rates by 45%–85%.

For most people with diabetes, the distinct activities involved in gaining and maintaining control over their blood sugar are not difficult. The hard part seems to be keeping the balance and consistent good practices alive every day. Researchers conducted a phone survey of people with diabetes in Oklahoma and found that only 57% checked their blood sugar each day, only 52% had regular A1C blood tests, only 65% had a professional foot exam during the last year and only 66% had a dilated eye exam. Just 56% had ever taken a class on how to manage their disease.

A recent report published in *JAMA* found that only 37% of adults with diabetes achieved an A1C of less than 7%, only 36% had a blood pressure less than 130/80, and just 48% had cholesterol less than 200 mg/dL. Only 7.3% achieved all three treatment goals. While we don't know for sure, chances are good that the people who don't practice good self-management are more likely to receive care from their local EMS systems than those who do.

WHAT DOES IT MEAN?

So what does all this mean for EMS providers and their systems? We already see lots of people with diabetes, and we're going to see more if rates continue to rise as predicted. If someone with diabetes needs EMS services, they need more than an amp of D50 and a lecture about eating when they take their medication. They also need



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help and support managing their disease. It's well within the capabilities of EMTs, paramedics and EMS systems to make dramatic improvements in the lives of people with diabetes.

There are many things EMS providers and systems can do to help people with diabetes live longer,

healthier lives. Some can be done right away, some require system and protocol changes, and some should be explored through proper research studies. It's important, as we venture into new territory, to remember the basics: Each patient and their presenting problem should be treated

with current protocols first. Here are some possibilities to consider:

1) Learn more about modern diabetes management. Take a class in diabetes education. Diabetes treatment changes rapidly. If you learned

- *Team Management of Diabetes, offered by the International Diabetes Center, www.parknicollet.com/CME/diabetes/tmd.cfm.*

- *Diabetes Education Update at Wichita State University, http://webs.wichita.edu/?u=conted&p=/diabetes_education_update/.*

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about diabetes treatment more than three years ago, your knowledge is out of date.

Examples:

- *Core Concepts, offered by the American Association of Diabetes Educators, www.diabeteseducator.org/ContinuingEducationCE/concept.shtml.*

wichita.edu/?u=conted&p=/diabetes_education_update/.

Many other programs teach diabetes education and treatment to professionals.

2) Take and document a thorough history on each patient. Diabetes educators encourage EMS

providers to learn about modern diabetes self-management techniques before adding a history this detailed to their practice. Otherwise it will be difficult for EMS providers to accurately answer the questions that will come from patients as this information is gathered.

- *Assess their diabetes self-management knowledge and practices.*

- *Is there a blood glucose meter in their house? If so, has it been used and calibrated?*

- *How often do they check their blood sugar, and do they keep a record of their results? If they don't check their sugar daily, why not?*

- *What type of exercise do they get, and how often?*

- *Do they follow a meal plan or diet?*

- *Assess their support system: Do they live alone? Do they have someone who provides them with education about managing their disease?*



NAEMT 

CALL FOR
Award Nominations

NAEMT is seeking nominations for the 2006 national awards to be presented at the Annual Meeting in Las Vegas, Nevada in September 2006. Nominations may be submitted in the following categories:

EMT of the Year
EMT-Paramedic of the Year
EMS Instructor/Coordinator of the Year
EMS Administrator of the Year
EMS Medical Director of the Year
EMS Service of the Year
EMS-Paramedic Service of the Year
Scholarships also available

Nomination applications may be downloaded from the NAEMT Web site at www.naemt.org or may be obtained by calling 1-800-34-NAEMT to request an awards packet. Nominations are due to NAEMT headquarters no later than June 1, 2006.

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Do their family members know how to use their blood glucose meter? Record names and contact information of the people in their support system.

- How many times in the last month have they had a low blood sugar reaction, weakness, sweating, anxiety, trembling or a headache?
- How many times in the last year have they had such severe low blood sugar that they passed out from it or needed help from someone?
- How many days in the last month have they had high blood sugar with symptoms like thirst, dry mouth, sugar in the urine, low appetite, nausea or fatigue?
- Do they have a kit for the emergency administration of glucagon? Have their friends and family been trained in its use?

3) Perform a thorough diabetic foot exam. Inspect the foot between the toes and from toe to heel. Examine the skin for injury, calluses, blisters, fissures, ulcers or any unusual condition.

- Look for thin, fragile, shiny and hairless skin—all signs of decreased vascular supply.
- Feel the feet for excessive warmth and dryness.
- Remove any nail polish. Inspect nails for thickening, ingrown corners, length and fungal infection.
- Inspect socks or hose for blood or other discharge.
- Examine footwear for torn linings, foreign objects, breathable materials, abnormal wear patterns and proper fit.
- Check the dorsal pedal and posterior tibial pulses.
- Ask if they have pain in their feet while at rest.
- Ask if they have numbness in their feet or legs.

If you find anything that suggests a patient may have or be heading toward problems with their feet, encourage them to allow you to transport them to the hospital. Include your findings and concerns in your report to the emergency department staff. If the patient refuses transport, advise them and their family members that they should see their healthcare provider, physician or a podiatrist ASAP for a complete foot exam.

4) Set up a system to “adopt” people with diabetes who give you permission to facilitate their self-management. Communicate with their primary care physician and diabetes educator about your willingness to help. Call each day and ask what their blood sugar is, what they’re planning to eat and what physical activity they’re planning to engage in. Record their results on a spreadsheet or in a database. Monitor their progress and notify them and their physician of any problems.

5) Find out what diabetes-related treatment, support and education organizations exist in your service area. You can log onto the American Association of Diabetes Educators website (www.aadenet.org), click on the Diabetes Education tab and find certified educators in your area, or log onto the American Diabetes Association

Figure 1: EMS Referral to Diabetes Education

Patient Name: _____

Phone (home) _____ (work) _____ (cell) _____

(If we can't reach them at above numbers)

Other Contact/relationship _____

Other Contact Phone (____) _____

(not someone they live with)

Address: _____

Insurance Provider: _____ Acct Number _____

Physician: _____

Contact Person: _____ Phone: _____

This patient was seen on _____ (date)

for _____

_____ Severe hypoglycemia

_____ Severe hyperglycemia

_____ Other (please specify) _____

The blood glucose value measured by an EMS was _____ mg/dl.

_____ The patient uses insulin

_____ The patient does not use insulin

The patient was: _____ treated and refused to go to a hospital

_____ treated and transported to: _____

Complications and co-morbidities including

_____ Hypertension _____ Dyslipidemia _____ Stroke _____ Neuropathy _____ Nephropathy

_____ Peripheral Vascular Disease _____ Renal Disease _____ Retinopathy _____ Pregnancy

_____ Coronary Heart Disease _____ Non-healing wound _____ Obesity

_____ Mental/affective disorder _____ Other _____

Other information about patient: _____

Patient referred by _____

Name of EMS Provider

Agency: _____

Permission to provide medical information to physician and diabetes educator:

I _____ give permission for the EMS providers to provide/discuss and/or receive medical information including medical records concerning my diabetes and other health issues with my physician hospital staff and diabetes educators. This release is required to obtain medical information according to the privacy rule detailed in HIPAA (The Health Insurance Portability and Accountability Act of 1996).

Patient Signature _____ Date _____

Education Recognition Program website (www.diabetes.org/education/edustate2.asp) and search your state for ADA-recognized diabetes education programs. Invite representatives from these organizations to lunch and discuss ways your EMS system can facilitate the work already going on in your community. See if it's possible to have your EMS system refer patients directly to educators for diabetes self-management education.

6) Create diabetes assessment and referral forms that your crews can fill out and fax, e-mail, hand-deliver or leave with the patient to deliver to the patient's physicians and diabetes educators (with a signed HIPAA release, of course). See *Figure 1*.

7) Ask your local diabetes education program to provide your crews with diabetes self-management materials they can give to patients and their friends and family. Determine whether people are able to read the material you provide. Recent research indicates that illiteracy is more common in this country than most people believe, among both people whose first language is English and others. People who never learned to read don't usually announce that to the people taking care of them. Also, many people with diabetes have trouble seeing, so their educational information may need to be in an audio format.

continued on page 99

What's Next?

cont. from page 68

WHOSE JOB IS IT?

We are aware that some of you reading this article have little voices in the backs of your minds saying things like, "This isn't the responsibility of EMS," "Don't you know we deal with emergencies? This is chronic disease management," "Checking feet doesn't sound nearly as cool as venting chests—this isn't what I signed up for," and "Who's going to pay for this?" These voices are stuck in the past. They have a very small view of what we can and should do for our communities.

A few of you are thinking, *With just a little bit of extra work, a few additions to our training and protocols and a little shift in our self-image, we could make an important difference in the lives of the people we treat. With a bit of effort, we could dramatically change our relationships with our communities.* You are right. It's time to have your EMS system make the shift from a response model to a public-health model. A public-health model is one that accepts stewardship of facilitat-

ing disease management for people with diabetes who have contact with the EMS system. We can become the best partners our departments of public health could ever wish for. And most important, we could decrease suffering and save more lives than we ever imagined. ■

Ann Williams, PhD, MSN, is dedicated to empowering people to live long and healthy lives. She is also an RN and a certified diabetes educator (CDE), and has had diabetes herself since 1991. She has used insulin since 1992, and has never needed to call EMS to provide care.

Anne Whittington, MBA, MSN, RN, CDE, is the Diabetes Program Manager of the Health Promotion Department for the Naval Medical Center in San Diego. In addition to overseeing diabetes training for the Pacific Fleet of over 250 ships, she and her seeing eye dog, Karl, created Paws for Healing, which is the first program to combine pet therapy, therapeutic outing and reintegration into society for war-injured U.S. Marines. She's been an EMS customer just once.

Mike Taigman is a lifelong student who works with EMS systems worldwide, helping them improve the services they provide. Blood tests indicate he has pre-diabetes. He's been an EMS customer, but it had nothing to do with diabetes. Contact him via www.miketaigman.com.

WHAT'S-UP DOCS

cont. from page 43

The department aims to collect three years' worth of data before formally determining if more people are being saved by this method, but similar projects elsewhere have them optimistic.

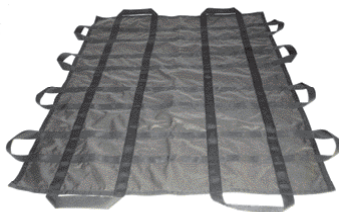
"One of the reasons we decided to do it was it looked like there was very little downside," Valenzuela says. "It seemed unlikely we could harm anybody by doing it. It seems to go a little more smoothly than it did before. Whether we're actually saving more people, we'll know pretty soon."

As exciting as the coming years look for EMS, Valenzuela's biggest concerns for his service run toward the mundane—things like modernizing training and keeping rising call volumes from overwhelming his system.

"One thing we're looking at," he says, "is whether we can create an intermediate tier of response, geared toward minor problems, that doesn't necessarily result in only two choices (refusal or transport). We're looking at ways we can treat and release more people, and for ways that people who call 9-1-1 and don't really have a medical problem—because it's the only way they know to get help—can be hooked into community resources and get their problems addressed.

"Fortunately, in Arizona they've set up the regulatory framework to allow a lot more treat-and-release. The hard part is figuring out how to do it safely." ■

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stretcher for everyday transport of large and obese patients, as a disposable emergency stretcher for MCIs, as a disposable patient transfer system to move the patient from the backboard to the hospital gurney and as a disposable gurney sheet. Call 314/664-0164.

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