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FEATURE

Treating Patients — Stat

Technology comes to the rescue, improving emergency management services.

Karen D. Schwartz

You've seen it on dozens of TV medical shows over the years. An ambulance pulls up to the emergency room and the action unfolds: Paramedics shout the patient's status and vital signs to the ER doctors, who in turn bark directions to their staff about how to best treat the patient.

That kind of patient care is going the way of the rotary phone. Today's ambulances are high-tech, with capabilities ranging from onsite EKGs and short-range vital-sign testing to live feeds of injury photos and quick analysis of where the closest units are to the incident.

Such real-time communications and sophisticated, miniaturized technology are improving emergency services, notes Jay Fitch, founder of Fitch & Associates, an emergency services consulting firm. "Technology is the reason for the trend of moving patient care to the earliest possible stage — in the ambulance or at the scene."

IT Aid

The state of Indiana is using advances in information sharing to improve patient care. With the help of the nonprofit Regenstrief Institute, a medical research organization based in Indianapolis, an initiative to share patient data among ambulances, emergency departments and other primary care facilities is taking off.

With a goal of expanding the ambitious effort across the state, the project so far focuses on about 30 facilities in central Indiana, including Wishard Memorial Hospital, a public hospital in Marion County. Facilities send updated patient information to the system as patients are treated, which in turn creates an updated electronic health record at Regenstrief.

NEMSIS: The National Emergency Medical Services Information System project aims to use a national EMS database to store data from all U.S. states and territories.

"It's a unique program where we can treat thousands of patients a month, and we've got plans to expand it statewide," says Dr. J.T. Finnell, project coordinator and an associate professor of emergency medicine at Indiana University School of Medicine.

Regenstrief developed the Indiana Network for Patient Care (INPC), a database of more than 1.5

million pieces of secure health data for Indiana residents that serves as the backbone of the system. Data include admission and discharge notes, lab test results and other critical information.

Ambulances in Marion and Hamilton counties are outfitted with Panasonic CF-18 or CF-19 Toughbooks or equivalent ruggedized notebooks. When an ambulance picks up a patient, a paramedic immediately enters vital information such as name, address and date of birth. The request is sent wirelessly to a cluster of IBM servers managed at Wishard Emergency Medical Services, a hospital-based EMS that houses a Microsoft SQL-based database. The system servers then forward the request to Regenstrief, which sends back a pre-assembled PDF packet of the latest clinical health data about the patient to the paramedic's Toughbook, including allergies, medications and last set of vital signs. That information is critical to treating the patient in the most effective way, Finnell says.

A consortium of states is taking another approach to patient care by collaborating on electronic collection and transmission of health records. The EMS Performance Improvement Center (EMSPIC) developed, implements and maintains the EMS data system for North Carolina, South Carolina and West Virginia.

Dr. Greg Mears, the EMS medical director for the North Carolina Office of EMS, put together a team that developed the Pre-hospital Medical Information System (PreMIS), based on Oracle 10G. The system houses information collected and sent from paramedics in the field and provides tools to analyze the information to help EMS agencies in the three states improve and optimize patient care, including EMS response times.

"The idea is to map a patient from the time of the incident through the hospital stay to get a complete snapshot of the patient," explains Cindy Raisor, South Carolina's EMS data project coordinator.

If an EMS provider responds to a motor vehicle crash, for example, paramedics will use ruggedized portable or notebook computers to enter specific information about the patient, the situation and the care provided. The information is then transmitted to the PreMIS system, where it can be analyzed through a web-based reporting engine, Raisor explains. Information can be transmitted one of two ways: either via a free Java-based web application developed by Mears' group, or via XML-based data transmissions using web services.

Once the information reaches PreMIS, it is linked as appropriate to other patient databases located throughout the states, including trauma registries, stroke registries and crash records. Together, they create a complete snapshot of the patient and become part of the patient's permanent electronic health record.

Faster Dispatch

In Lexington County, S.C., the local ambulance service participates in PreMIS on the back end, along with a sophisticated locator and communication system on the front end. The latter not only helps get ambulances to the scene faster, but can also determine, through historical data analysis, where ambulances should be at specific times and on specific days to meet predicted demand.

When a 911 call is made to the county's administration building, it is quickly routed to a dispatcher.

The dispatcher enters pertinent information into a computer-aided dispatch (CAD) system, which geocodes each incident's latitude and longitude. The data is then sent via local area network to a server housing Motorola's Mobile Area Routing and Vehicle Location Information System (MARVLIS), which then determines the three closest ambulances from which the dispatcher can choose.

The MARVLIS system always knows the location of each ambulance, which is outfitted with a Motorola MW 900 rugged notebook that communicates with MARVLIS on an 800 megahertz frequency.

The dispatcher then chooses from among the three options MARVLIS has provided, and sends pertinent data about the emergency to the ambulance's onboard computer. Because it's a real-time bidirectional system, the dispatcher can quickly send additional details as they become available.

"It's been a great way to get to emergencies more quickly," says Chief Brian Hood, director of the Lexington County EMS. "Our call volume has increased by more than 5 percent per year, but our response times have held steady. Between the PreMIS system and the MARVLIS system, we're really working hard to use technology to help improve service."

Lessons Learned

Incorporating technology into emergency medical care is a slow and arduous process, thanks to data-sharing issues, funding constraints and regional system disparities. Heed these tips:

- **Integrate high technology standards for emergency management services and software.** This is absolutely critical, advises Cindy Raisor, South Carolina's EMS data project coordinator.
- **Focus funding on regional technology innovation projects.** Instead of funding individual agency technology initiatives, choose projects that further the goal of integrating pre-hospital care with the larger healthcare delivery system, recommends Jay Fitch of Fitch & Associates.
- **Seek a solution provider experienced with the applications you want to implement.** "It's far more than implementation and must include expert training, support and an overall can-do attitude that will allow you, as a team, to be successful," says Chief Brian Hood, director of Lexington County (S.C.) EMS.

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