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Stories from the Field

HEALTH INFORMATION EXCHANGE POISED TO TRANSFORM PRE-HOSPITAL CARE IN CALIFORNIA

Grant to Emergency Medical Services Authority Advances Effective Use of HIE Technology

The handoff of patients from ambulances to emergency departments (ED) is one of the most critical and information-dependent moments in the healthcare system. Advances in health information exchange (HIE) technology are bringing new opportunities to vastly improve communication and transfer of patient data from the field to ED prior to arrival. This allows activation of hospital teams to initiate time-sensitive interventions for stroke, heart attacks, and trauma.

To promote effective use of HIE among California's emergency medical services agencies, the California Health and Human Services (CHHS) Agency awarded a grant to the state Emergency Medical Services Authority (EMSA). Funded by the State HIE Cooperative Agreement, part of the federal HITECH Act, EMSA undertook a three-part project that included a two-day statewide summit; an assessment of the current state of HIE in emergency medical services; and three demonstration projects.

"In pre-hospital emergency care, as in all phases of medical treatment, patient safety, quality of care, and cost-efficacy of care are enhanced by access to patient health information," said EMSA Director Howard Backer, MD, MPH.

Emergency response had always been part the State's strategic plan for HIE, according to Christine Schmoeckel, chief information officer for the California Office of Health Information Integrity (CalOHII), which administers the Cooperative Agreement grant. "We are delighted with the success of EMSA's activities and the model they have set for EMS nationally."

STATEWIDE SUMMIT FEATURED LESSONS LEARNED AND BEST PRACTICES

More than 200 EMS stakeholders and representatives from local, state, and federal government attended a summit hosted by EMSA November 19-20, 2013 in Los Angeles called, "Planting the HIE Seed Today...To Grow an EMS Solution for the Future."

"The EMS Authority believes that the real-time exchange of patient health information between providers in the field and healthcare facilities and their practitioners is an essential component of the patient care continuum," said Tom McGinnis, EMS Systems Division chief. "The Summit helped us communicate current information and explore possibilities for future HIE development in California."

Among attendees was Lee Stevens, director, State Health Information Exchange Policy for the federal Office of the National Coordinator for HIT (ONC). "In a state where emergency medical services must be prepared at all times for the unexpected, HIE is a critical thread running through the support system," he said. "The EMS Summit in Los Angeles instilled an additional sense of purpose for the work we've done over the past four years [at the federal level] to enable HIE across the country, and especially in partnership with the State of California. The enthusiasm and mission-oriented focus of the California EMS and fire officials, HIE experts, and healthcare partners should be a great comfort to all Californians."

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Chris Muir, the ONC program manager who oversaw the California Cooperative Agreement grant, said, "The EMS Summit in Los Angeles illustrates the progressive approach of California EMS and fire officials and the dedication to improving emergency services as new technologies become available. Interoperable HIE enabled by the State and its partners, when made available to emergency services providers, can dramatically improve a patient transition during a small or large-scale event. This is a significant step forward in saving lives."

November's Summit featured speakers from agencies around California that have been leaders in adopting health information technology in the pre-hospital setting. The following highlights three successful efforts.

Los Angeles Fire Department ePCR deployment

The Los Angeles Fire Department (LAFD) is one of the largest fire-based ambulance providers in the nation, transporting about 600 patients each day. But in 2010 they were still documenting their patient care using paper forms. LAFD Assistant Chief Gregory Reynar noted that paper records have many disadvantages – they get wet in the rain, handwriting can be illegible, and paperwork can get lost in the rush of an emergent situation or while traveling through administrative processes.

In 2010 the department gained approval to initiate its electronic Patient Care Record (ePCR) program and distribute portable electronic devices to all its field personnel. The impetus,

Reynar said, was to better document data captured in the field for quality improvement analysis and also to support an ambulance billing upgrade project.

Before getting approval from city leaders, the department spent months looking at the options for hardware and software used to create electronic patient care records, considering a number of vendors before choosing Sansio, which also serves the New York Fire Department. The actual field rollout took about six months. In the three years since, the department has reduced the speed of reimbursement from about 30-45 days to 5-7 business days. "Reimbursement revenue from ambulance transports arrives here in the city much faster since program implementation," Reynar says.

Maintaining information about patient care electronically benefits the department's efforts to better analyze the quality of care it provides. Reynar described his staff previously spending hours organizing stacks of paper to carry out QI projects; now they have a cloud-based database for much easier access to the standardized data fields in their ePCR. "Today my QI folks are more analysts," he said. "They are a mouse click away from the data and being able to begin their work."

The department found that program training was crucial for a successful implementation. The LAFD held orientation meetings for hospital partners and provided a four-hour training class to firefighters and paramedics tasked with using the new system.

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The equipment distributed during the original 2011 rollout is being upgraded in 2014 to a tablet style device that uses Windows 8 and is capable of 4G cellular access rather than the 3g of the original devices. The program upgrade will also be compliant with the latest NEMSIS version 3 requirements. NEMSIS stands for the National Emergency Medical Services Information System. NEMSIS is the national repository that will be used to potentially store EMS data from every state in the nation.

During initial rollout, sharing the information with other providers required additional work, as the County of Los Angeles is not yet connected to a regional health information exchange. Most important was how ambulance crews would transmit patient information to the emergency department destination. Because LAFD transports to dozens of hospitals, its leaders coordinated with the Hospital Association of Southern California and the Los Angeles County EMS Agency to work out a way of transmitting the information that would satisfy concerns about privacy and security of the patient information.

With the new system, participating hospitals can access information in the LAFD electronic record in close-to-real time as the paramedics are typing it in during on-scene care and transit.

The LAFD is looking forward to continued regional cooperation and a future that may allow for the exchange of health information among all patient care providers. "The LAFD continually strives to improve our patient care and ePCR programs such as the one implemented in the City of Los Angeles could be the seed for a future HIE," Reynar said.

Orange County EMS Agency

Over a number of years, Orange County's EMS agency has endeavored to work with a wide variety of stakeholders to create a web-based hub known as the OC-MEDS that functions as either a central database or an electronic medical record system. Laurent Repass, a paramedic and the agency's EMS coordinator, described a long, ongoing effort by a wide range of health care organizations in Orange County to develop a comprehensive information exchange system in their large, densely populated geographic area.

"In many respects it functions like an HIE, but not to the true extent of an HIE," Repass said. The system went live toward the end of 2013, transitioning the participating emergency response agencies from a paper-based to an electronic system. One of our greatest challenges, he said, was finding a solution that meets the needs of the EMS system as well as the business needs and record-keeping requirements of each agency. Some bill for services and others don't, he noted.

The effort began in 2006 with the formation of a task force, which developed a five-step action plan. Over the years, the group pulled together various grant-funding sources and in 2010 chose a software vendor, ImageTrend.

A major advantage was the adoption on a national level of NEMSIS 3 as being HL-7 compliant, meaning its technical standard is compatible with the way electronic documents are shared by hospitals and physician offices.

One of the major goals of the project has been to eliminate passing a paper record when a patient is transferred from an EMS provider to the hospital. "One of the greatest challenges has been how we do that transfer in the electronic world," Repass said. Each hospital is given access

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to the system through a secure web portal where they have access to the EMS patient care record.

Eventually, he said, multiple agencies could share the records by working with a health information exchange organization. "It's possible that during any 911 call that one patient may be touched by three or four different EMS providers before being delivered to the hospital. How do you transfer the record effectively?"

Sharing information among the many players in Orange County is part of the long-term plan for the agency's project, Repass said. "This is the first step in a really long journey to get there," he said.

Hall Ambulance, Bakersfield

Hall Ambulance, the dominant emergency provider in the Bakersfield area, has had electronic patient care recordkeeping for about 15 years. In fact, the private ambulance company jumped into the electronic world before its county was prepared to accept electronic data from emergency responses.

While the system has allowed Hall Ambulance to track its own work internally, its leaders are looking forward to improvements in exchanging patient information that will allow emergency responders in Bakersfield to look up information on patients' previous care and have their own care notes transmitted into a community or hospital record system to provide a longitudinal look at patients' health.

"We want to get our data from the bedside to the hospital and then get feedback to our paramedics," said John Surface, manager of Hall's ambulance division. "We're probably a year or two in development to get there."

An early lesson for Hall, said Surface, was that saving money is the wrong reason to invest in

electronic patient records. "It's about managing the customer experience and your quality improvement program."

The Bakersfield system, maintained by Zoll, is able to send patient information into a county emergency agency database once every four hours. At the hospital, patient information collected during the response and transport is printed out and left at the patient's hospital ED bedside and another copy is faxed to the hospital's medical records department.

Soon, Surface said, that information will be sent directly into the hospital's information system. Also, paramedics will be able to look up information about past responses and transports for a given patient; that access has been delayed until Hall can ensure that it would not violate any patient confidentiality laws.

Because many patients with chronic illnesses are transported by ambulance repeatedly, paramedics could benefit from having information about past treatment, allergies, and medications, and potentially transport to the same hospital the patient has been to before. "If I can look and see we've taken [patient Doe] 11 times, and I can check his allergies and meds, it will improve the field treatment plan and the ER treatment plan," Surface said.

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> EIGHTY PERCENT OF EMS PROVIDERS SAW AN INCREASE IN DATA ACCURACY AFTER CONVERTING TO AN ELECTRONIC SYSTEM.

SURVEY FINDS HIE READINESS WIDESPREAD

All 33 of the state's local EMS agencies reported that their EMS providers are making the transition from paper to electronic patient care records, according to a survey commissioned by EMSA. However, most providers are still in the early stages of being able to electronically transmit data to the hospital that is receiving the patient.

The Health Information Exchange Readiness Assessment/Survey rated each agency and its emergency response providers on a wide range of health IT capabilities. Using a seven-stage model of health IT readiness, the survey found that most agencies and their providers are in early stages, with 78.8 percent reporting the use of an electronic patient care record (ePCR).
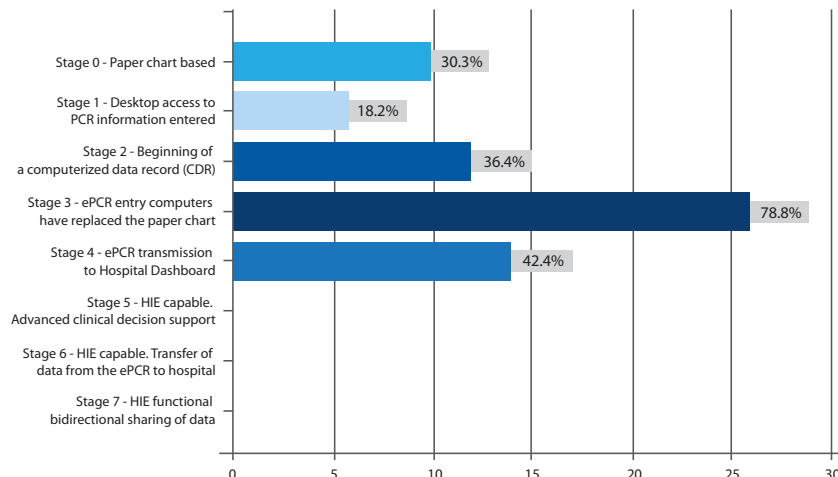
Twenty-three different ePCR software vendors are used by providers. Most common are MEDS (14), Zoll (13), and ImageTrend (8). Most indicated that the vendor maintains the information collected, with a small number (10 percent) keeping it in a data cloud.

About two-thirds of the agencies (62.5 percent) said that patient care data is transmitted electronically to the hospital. The rest said it is not sent electronically, and the most common alternative method is sending by fax or by hand. Of the agencies that are not currently transmitting to the hospital electronically, the vast majority said they intend to, but cited barriers such as cost or concern about privacy.

Most agencies (87 percent) reported that they have not currently integrated the pre-hospital patient information into the hospital's EHR system, though several said they are working to do so.

The survey also asked about providers' implementation issues and found that about two-thirds had a positive experience. Some 80 percent saw an increase in data accuracy after converting to an electronic system. Most were not able to document whether patient outcomes had improved because they do not receive information back from hospitals about the health status of the patients they transport.

Describe what level your agency is at based on the 7 levels of EMS ePCR and HIE Adoption Model (more than one option may apply)

Stage	Percent
Stage 0 - Paper chart based	30.3%
Stage 1 - Desktop access to PCR information entered	18.2%
Stage 2 - Beginning of a computerized data record (CDR)	36.4%
Stage 3 - ePCR entry computers have replaced the paper chart	78.8%
Stage 4 - ePCR transmission to Hospital Dashboard	42.4%
Stage 5 - HIE capable. Advanced clinical decision support	
Stage 6 - HIE capable. Transfer of data from the ePCR to hospital	
Stage 7 - HIE functional bidirectional sharing of data	

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STATE HIE COOPERATIVE GRANT-SUPPORTED EMS DEMONSTRATION PROJECTS

Contra Costa County Emergency Medical Services

Contra Costa County's EMS, part of Contra Costa Health Services, is using the state EMS/HIE demonstration grant to do three things:

- Examine workflows to save steps and make them more efficient
- Determine how to connect the pre-hospital system with the Epic electronic health record in the county's hospitals
- Pilot test a dashboard for the county's hospitals that provides color-coded, real-time information about patients being treated and transported by emergency responders

"These are all collaborations and processes," said Pat Frost, director of the agency. "We're hoping to be an incubator for HIE activity."

The workflow analysis, carried out by a consultant, involved a detailed examination of all the EMS agency's programs. It found more than 13 individual information systems in use. By examining its own internal workflow, the agency is better prepared for the more complex task of sharing information with other parties and working, Frost said.

"We found that this was mission critical to do before you get your feet wet in the HIE environment," Frost said. "HIE with multiple parties is extremely complex and the devil is in the details. We learned we had a lot of unnecessary steps and we were not using data systems to their greatest efficiency." For example, the analysis found that the trauma program could be reduced from 20 to nine steps; the STEMI (heart attack) program from 13 steps to four.

Another grant-supported project, the First Watch Solutions Hospital Offload Dashboard, tracks the time from when an ambulance arrives to the scene to when it leaves, and tracks the number of units parked at each hospital. There are color-coded warnings to let emergency department staff know where the emergency response resources are and what patients might be on their way. "We presented this to our emergency departments and they were very enthusiastic about using it, but later we found people were not actually using it," said Frost. "You can create all sorts of tools but if the tools aren't part of people's workflow they won't be successful."

As part of the demonstration project, the agency reassessed the tool and decided to redeploy it with additional training and education. They found that the ED staff did not have time to go to a monitor and pull up the dashboard. In the new deployment, a monitor will be placed in an easily viewable location, visible at all times, without requiring the extra step of opening it on the computer.

Meanwhile, the agency's Epic project is designed to prepare the pre-hospital system to send information to area hospitals, which should all be using the same Epic software platform by 2016. Frost said her agency is interested in obtaining outcome information for patients transported to local hospitals so it can do quality analysis on patient care protocols, particularly those for trauma, cardiac arrest, stroke, STEMI, and patient safety.

Frost said the agency is also working with the county's hospital system to explore the use of a continuity-of-care document (CCD) to enable data for transported patients to be pulled and pushed, which could serve as a method for future real-time data exchange. It could be similar to the secure CCD that is sent to primary care physicians for patients seen by Contra Costa Regional Medical Center's emergency department.

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The EMS agency is also pursuing discussions about how Contra Costa hospitals and other health care providers will interact outside of the shared Epic platform, potentially through HealthShare Bay Area, the region's health information organization. The pre-hospital care system needs to be involved with regional conversations about coordinated, population-based healthcare, Frost notes.

"People need to know the value-added EMS can bring to continuity of care and chronic conditions. We can really make a contribution," Frost said. "EMS services tend not to be considered part of the healthcare system. People think we are just transportation, but we really are healthcare providers."

Monterey County Emergency Medical Services Agency

Monterey's EMS agency received funding to explore linking pre-hospital care with hospital systems. According to Agency Director Kirk Schmitt, emergency departments reported that they need pre-hospital information within an hour of arrival or it is of no value to treatment. "Doing this electronically we are hoping to overcome that one-hour limit," he said.

Monterey County has four hospitals and a major ambulance provider, AMR, which handles more than 90 percent of transports. The company's electronic patient care record is used by emergency crews who enter the information, hit the print button, and hand off the printed sheet to the hospital emergency department. The hospitals typically scan that printed report into their systems in a PDF format that is difficult to search for specific pieces of data.

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The Monterey agency has been working for two years on a project to map out and align the potential information exchange between the AMR system, the four hospitals, and the area's other transporters. "If we made all these in alignment we would have a flow of information going into the hospital, but also back to the pre-hospital providers about patient outcomes," Schmitt said.

The CalOHII grant, he said, was "icing on the cake" of that project, allowing the agency to make a bridge between the AMR system and the hospitals. The funding allowed the Monterey agency to hire a database developer to carry out mapping between the AMR ePCR system and hospital records so the information from one record can end up in the correct data fields of the other. The grant, received in August, allowed the work to take place during the fall and pilot tests were carried out later in the year to ensure there were no broken links in the connections.

The emergency agency learned through this project that it needed to have health IT expertise on its staff and hired an IT specialist to oversee the work.

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It is time-consuming but doable to build interfaces between the systems, one hospital at a time, Schmitt said. "It's not that it's hard, but it is more complicated than somebody who doesn't have IT expertise might envision," he said. "There are a lot of moving pieces in there. We just assumed there were standards and definitions and being HL7 compliant would allow for easy mapping, but apparently it doesn't."

The EMS agency took on responsibility for pulling together the project because of its regional system coordination role. Schmitt said the biggest issue so far has been that even while field providers and hospital emergency department staff were very supportive of being able to look at one another's electronic records, it was important to engage the ultimate decision-makers in their organizations to get the work done. "You have to elevate it beyond the field level to the management level (including CIOs) and get them engaged early before you make any decisions," he said.

The project's goal is to have all four hospitals connect to the ambulance company's ePCR system by second quarter 2014.

Inland Counties Emergency Medical Agency

California's Inland Empire, which includes San Bernardino, Inyo, and Yolo counties, is home to both a dynamic HIO that is helping hospitals and physician offices share patient information, as well as an EMS agency that was an early adopter of electronic recordkeeping for emergency responders. The combination of those efforts could give the region one of the first opportunities in the state to understand the complete continuum of care, from the time an ambulance rolls up to a medical response scene all the way through to the patient's discharge back home.

"If we can take the patient from first contact in the field to discharge from the hospital and beyond, we can measure what we're doing," said Ron Holk, RN, EMS nurse specialist for the Inland Counties Emergency Medical Agency (ICEMA). "A big missing part for our quality-improvement efforts is knowing what happens to patients at the hospital."

The Inland Counties agency switched to an electronic process for field paramedics about a decade ago. While the agency has a well-developed pre-hospital electronic patient record and some sharing capabilities, it was able to use the grant funding to enhance the system and expand its use. Specifically, the agency wanted to provide the base hospital that is advising paramedics with the capability to expand on standing orders in a way that remains in the patient record rather than being strictly verbal. Having the complete picture of pre-hospital orders and care provides quality improvement staff at the agency with crucial information when they analyze patient care practices, Holk explained.

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> ## A BIG MISSING PART FOR QUALITY-IMPROVEMENT EFFORTS IS KNOWING WHAT HAPPENS TO PATIENTS AT THE HOSPITAL.

With the grant support the agency is also working to expand access to its ePCR system to four other EMS agencies in northern California: Northern California EMA, Sierra-Sacramento Valley, North Coast EMS, and Tuolumne County EMS.

ICEMA is also working on integrating its database with that of the Inland Empire Health Information Exchange, a local health information organization. "Once we connect they can pull up any patient record at any time and get a complete medical history," Holk said. "The hospital can get information on what happened in the field all the times that patient has been transported, even if it was to another hospital."

Linking emergency response to the rest of the care continuum has the potential to improve the quality of care, Holk said. "You end up reducing the possibility of errors because you can follow the progression of the disease process," he said.

The California Emergency Medical Services Authority

The mission of EMSA is to ensure quality patient care by administering an effective, statewide system of coordinated emergency medical care, injury preventions, and disaster medical response. For more information see www.emsa.ca.gov

The California Office of Health Information Integrity (CalOHII) focuses on advancing electronic health information exchange so that patient information is available when and where it is needed for care, while ensuring that the data is protected and exchanged under strict medical privacy and confidentiality standards and procedures.

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