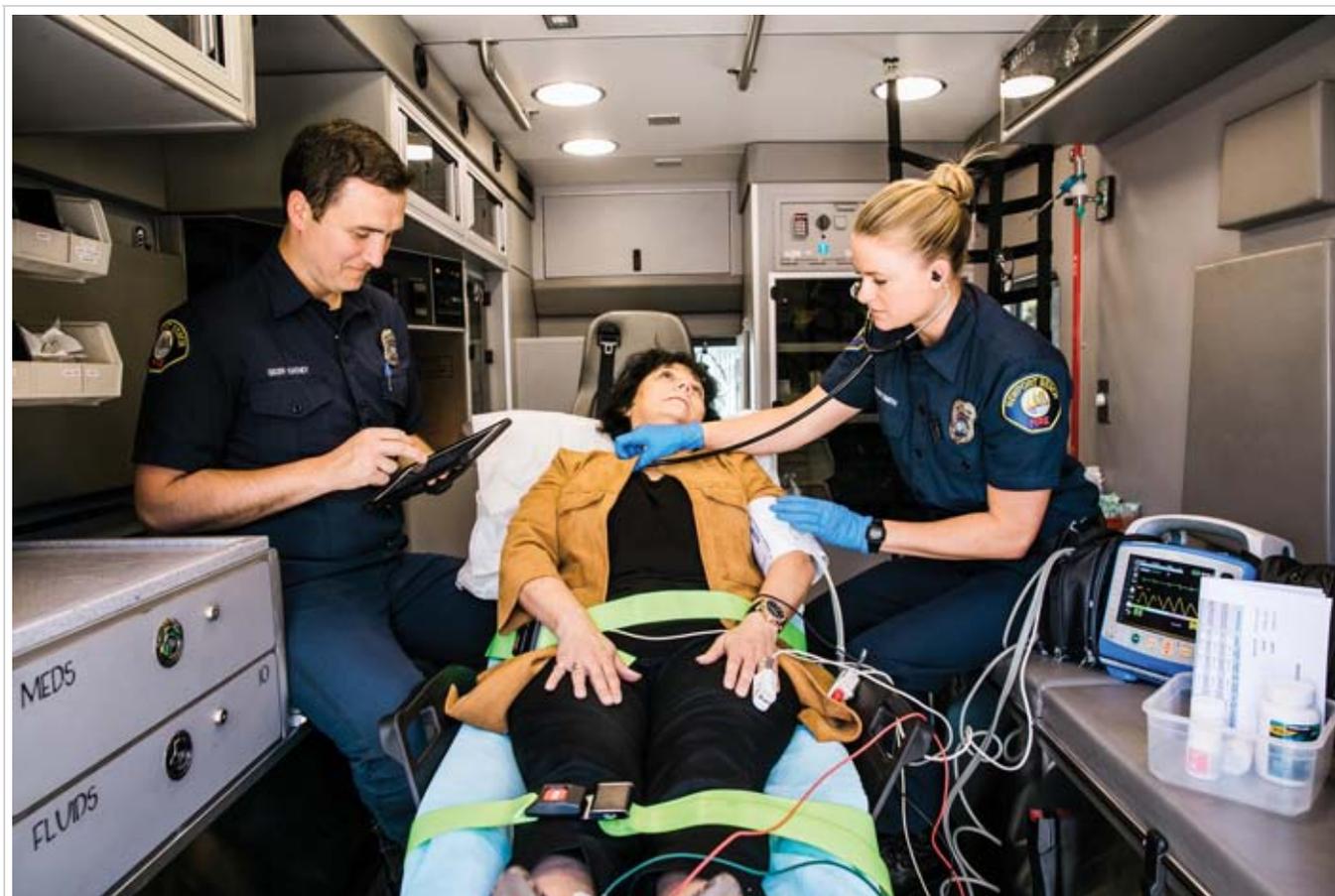


[HOME](#) >> [ORANGE COUNTY, CALIF., BEGINS FIELD IMPLEMENTATION OF EMS ACCESS TO PATIENT HISTORY VIA HIE](#)

Orange County, Calif., Begins Field Implementation of EMS Access to Patient History via HIE

Mon, May 1, 2017 | By [Daniel R. Smiley](#), [Samuel J. Stratton, MD, MPH, FACEP, FAAEM](#)



Health information exchange programs facilitate the secure sharing of a patient's health information throughout the continuum of patient care. Photo courtesy Newport Beach Fire Department

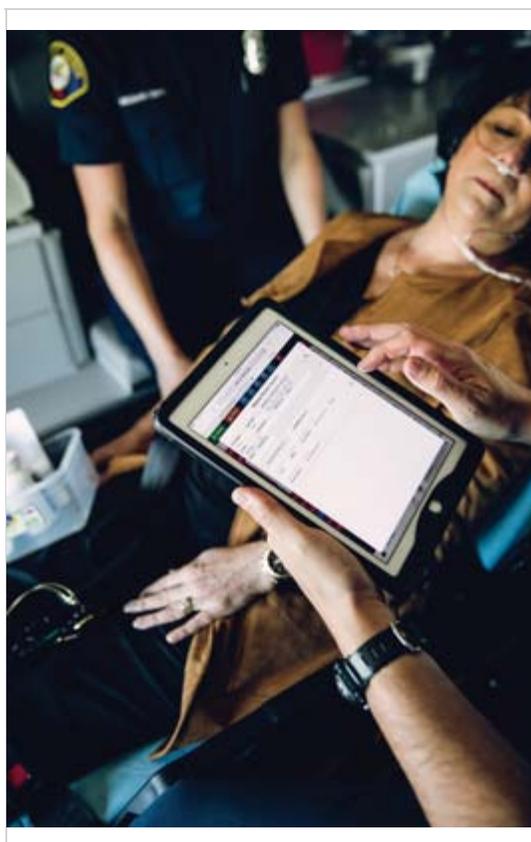
You and your partner respond to a 9-1-1 call for a woman with altered mental status. After ensuring there are no immediate life threats and completing your initial assessment, you attempt to get information about the patient's medical history, current medications and allergies. She isn't able to offer clear information on her current medications, and when you turn to the family, the patient's family member hands you a bag with at least 15 different medications.



This is an all-too-familiar scenario for many EMS responders. EMTs and paramedics typically rely only on those on scene to volunteer critical medical information prior to treatment: the patient, family members, friends or others. A patient's past medical history is otherwise unknown, leaving EMS providers to start from scratch as they input the patient's data into their electronic patient care report (ePCR) system and, eventually, transmit relevant data to the receiving hospital via radio or cell phone. This traditional model is prone to errors and inaccurate data and is simply inefficient.

In Orange County, Calif., however, it's a completely different picture following the field implementation of +EMS and the Search, Alert, File and Reconcile (SAFR) model for health information exchange (HIE), which provides a patient's medical information at providers' fingertips within seconds. To accomplish this, an established HIE is augmented by the alerting and bidirectional data flow capabilities in

ImageTrend's Health Information Hub (HIH) and Hospital Hub to facilitate the technical interactions among EMS, the HIE and hospitals.



Medics can locate patient care data on the HIE directly from ePCR software. Once the correct patient is identified, the ePCR is populated with the available

information. Photo courtesy Newport Beach Fire Department

Here's how it works: As the medic is evaluating and treating a patient in the field, they use their ePCR software, ImageTrend Elite, to search for the patient by first and last name, gender and date of birth. The field EMS data tablet connects to a cloud-based HIE through HIH, where the patient's cumulative hospital, medical provider and EMS electronic medical record is identified, allowing the medic to immediately populate the ePCR with the patient's medications, allergies, recent hospitalizations and past medical history.

An alert within Hospital Hub notifies the receiving hospital of the incoming patient and receives pre-arrival field and medical record information transmitted from EMS to the ED, including: primary impression, age, gender, arrival times, vitals and procedures-including 12-lead ECGs-performed by the EMS crew. A predetermined set of rules triggers the completed ePCR information to be sent automatically in a National EMS Information System (NEMSIS) CCD (Continuity of Care Document) file to the HIE, which is then available in near real-time to the appropriate patient healthcare provider.

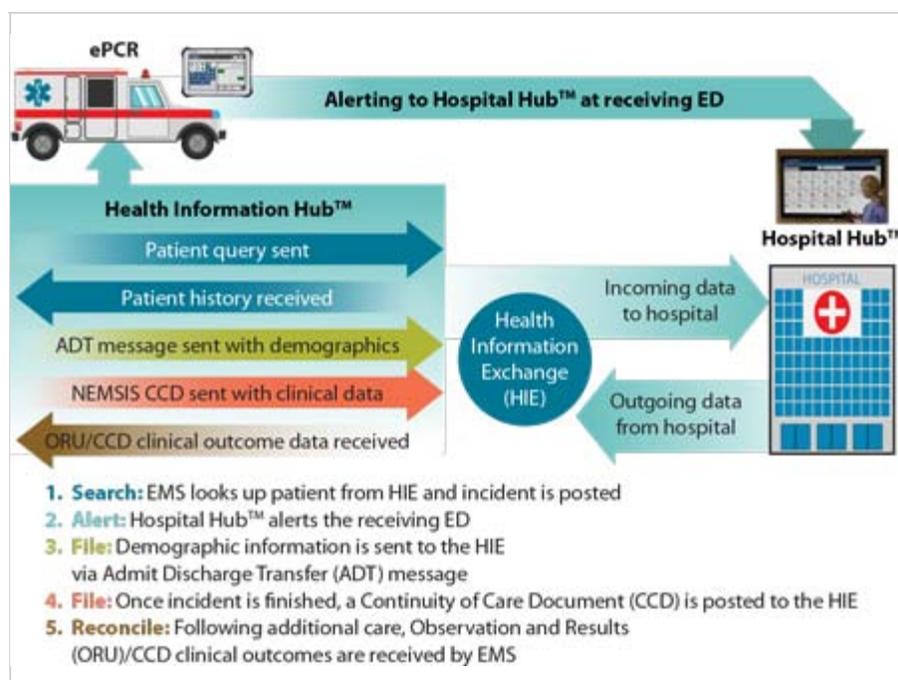


Figure 1: Illustrated SAFR model for health information exchange

The HIH retrieves hospital discharge, insurance and clinical information from the HIE, which then populates ImageTrend Elite for agencies to view and use for continuous quality improvement and to achieve better patient outcomes.

Having immediate access to a patient's healthcare information in the field provides EMTs and paramedics with reliable information, such as recent hospitalizations, past medical history, medications, allergies, preferred healthcare facilities and end-of-life decisions, that can affect initial care decisions and long-term outcomes. Giving EMS providers secure access to this additional patient data helps to paint a more complete picture of the patient in order to facilitate more appropriate prehospital care in addition to optimizing the transition of care in the hospital ED.

Going Electronic

California EMS providers are mandated by state regulations and local policy to complete a PCR when they make contact with a patient to document incident demographics, assessments and treatments. Historically, the PCR was completed on a paper form and a carbon copy was hand delivered to the receiving hospital ED. Despite including a significant amount of information relevant to emergency care, it was often illegible and nearly impossible to extract data for prospective or retrospective analysis of the quality of patient care.

This wasn't a problem unique to California, and in an effort to begin to solve these problems, the National Highway Traffic Safety Administration (NHTSA) sponsored the creation of the NEMSIS standard in 2001. In a few years, NEMSIS defined the technical infrastructure and dataset necessary to create ePCR solutions.

The statewide California EMS Information System (CEMSIS) uses the NEMSIS 3.4 standard and includes additional data necessary to meet the needs of the state. California's Emergency Medical Services Authority (EMSA) requests each of the 33 local EMS agencies (LEMSA) to submit EMS data from their respective jurisdictions to the CEMSIS data repository. At least 20 agencies currently participate and EMSA anticipates that the repository will potentially receive up to four million records annually.

Orange County EMS (OCEMS) created a system called Orange County Medical Emergency Data System (OC-MEDS) to assist with EMS provider agencies, ambulance companies, and fire departments to transition from their outdated paper based documentation methods to OC-MEDS and report their ePCRs in real-time. OC-MEDS was the first comprehensive system of its kind in California that included the collection of emergency patient information at the time of service and made it available for instantaneous reporting to receiving hospitals, base hospitals and the local EMS agency.

The screenshot displays a web-based interface for patient history and medical information. It is divided into three main panels:

- Medical/Surgical History:** Includes a search bar and filters for 'Medical History Obtained From' (System/Other, Family, Health Care Personnel, Patient) and 'Pregnancy' status (No, Possible, Unconfirmed, Yes, Confirmed 12 to 20 weeks, Yes, Confirmed greater than 20 weeks, Yes, Confirmed and less than 12 weeks, Yes, Weeks Unknown). Below are 'Other Past Medical History' entries for 'Fracture of femur (disorder)' and 'Headache (Finding)', each with detailed metadata like effective dates and codes.
- Medication Allergies:** A list of allergies including Sulfamethoxazole Sodium, ciprofloxacin, Ciprofloxacin, and Peanut, with associated descriptions and data sources.
- Current Medications:** A list of active medications including oxycodone-acetaminophen, Furosemide (20 mg and 40 mg oral tablets), naproxen, and allopurinol, with detailed medication information.

Orange County's ePCR solution, ImageTrend Elite, takes advantage of a bidirectional

health information exchange to allow medics to populate the ePCR with the patient's medications, allergies, recent hospitalizations and past medical history. Screenshots courtesy ImageTrend

Standardization & Integration

In 2013, EMSA began exploring how to improve technology for EMS providers, envisioning a future where EMS is integrated into the broader healthcare system. More specifically, that EMS patient records would be shared with hospital electronic health records (EHRs), with the goal of eliminating the paper PCR that paramedics drop off at the hospital during the transfer of care.

In 2014, the +EMS Project was developed in collaboration with the U.S. Health and Human Services Office of the National Coordinator (ONC) for Health Information Technology staff to support nationwide HIE and care coordination efforts. Fundamental to the project, EMSA developed the SAFR model to describe the minimum functional aspects of EMS HIE data exchange. The SAFR model created a framework and defined concrete data elements and functions that explained HIE concepts in terms applicable to the EMS community. EMSA also developed a work group called Consumable Data and Transport to create the list of specifications for the SAFR functionality and the specific elements.

In 2015, health information technology (HIT) standards were changing rapidly and EMS systems would soon be mandated to adopt these new standards. On Jan. 1, 2016, new state law (CA Health and Safety Code 1797.227) mandated that EMS providers transition to modern data systems and submit NEMSIS 3.4-compliant data in realtime to their local EMS agencies.

California had the foresight to create a statewide data collection system that modernizes all EMS data systems and would comply with federal HIT standards. This allows EMS providers to exchange patient care information with other health care providers (such as receiving hospitals) who use the same standards. The exchange of patient care information is a cornerstone of the Institute for Healthcare Improvement Triple Aim Initiative and is supported and sponsored by the federal ONC.

Table 1: Summary of SAFR model for health information exchange

| | |
|------------------|--|
| Search | Improve prehospital clinical decision-making and patient care. |
| Alert | Improve receiving hospital preparedness, transitions of care and overall patient care. |
| File | Build a better longitudinal patient record. |
| Reconcile | Improve overall care and population health. |

In late 2015, EMSA was awarded a \$2.75 million federal grant funded by the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009, to support the creation of bidirectional HIE between EMS providers and hospitals. Although many other healthcare providers have already implemented their exchanges, EMS systems have largely been excluded from any funding to support their implementation. EMSA used grant funds to support local/regional health systems to realize the goal of HIE+EMS interoperability in California.

EMSA Director Howard Backer, MD, MPH, FACEP, emphasizes, "Providing patients' current medical information to all medical providers is essential to provide accurate and high quality care. EMS must often make rapid treatment decisions on the streets or in homes and need access to critical medical history to provide the best care."

On July 26, 2016, EMSA awarded San Diego Health Connect \$592,000, in partnership with One California Partnership Regional Health Information Exchange (OCPRHIO), to carry out the SAFR functionality for San Diego, Orange, and Imperial Counties. The funding for this local assistance grant funding opportunity supports a collaborative solution to integrate EMS as a critical component of the health care system into the HIE landscape. Currently, the grant is being piloted in three counties: San Diego, Orange and Imperial.

Pursuant to project objectives, each respective regional health information organization must establish partnerships with their county LEMSA and must identify one EMS provider and one hospital with which information will be exchanged.

Health information organizations can work together with first responders to improve the data shared during day-to-day patient care, emergencies and disaster.

Data Sharing

There are many components for seamless HIE with EMS. EMSA established the SAFR model with the intention of optimizing bidirectional data exchange (from the HIE to the on-scene EMS provider, and from the EMS provider back to the receiving facility and the HIE) as well as to support quality improvement and research. The SAFR model serves as an HIE framework for EMS by defining the minimum functionality necessary to achieve HIE in easy-to-understand terms.

The SAFR model successfully meets all EMS data sharing goals through four functions. (See Table 1 and Figure 1.)

1. Search: Search individuals' health information for past medical history, medications, allergies, and end-of-life decisions (i.e., physician orders for life sustaining treatment or do-not-resuscitate orders) to enhance clinical decision making in the field.

2. Alert: Alert the receiving hospital about an individual's status directly onto an electronic computer dashboard in the ED to provide decision support and prepare for an individual's arrival especially for conditions requiring time-sensitive treatment or therapy such as trauma, heart attack or stroke.

3. *File*: File the EMS patient care report structured data directly into the receiving facility's EHR system for ease of access and better continuity of care.

4. *Reconcile*: Reconcile the EHR information including diagnoses, disposition, billing, and payment back into the EMS patient care report for use in quality improvement of the EMS system, performance measures, and population health, making EMS a full participant in the exchange of electronic health information. For EMS care teams, the verification of billing and payment information will serve as a critical return on investment.

On Feb. 23, 2017, OCEMS, Newport Beach Fire Department and Hoag Memorial Hospital Presbyterian were first in California to begin the implementation of +EMS and the SAFR model for HIE.

Paramedic Geoffrey Cathey, from Newport Beach Fire Department, reported, "I had more accurate information about the patient and saved time because I was able to rapidly search her ePCR on my device to access the patient's history, medications and allergies."

While still on scene, Cathey electronically transmitted the patient's medical information through OCPRHIO to the Hoag Hospital Newport Beach ED's dashboard demonstrating the first day-to-day emergency HIE in the state of California and nationally.

Carla E. Schneider, MSN, CEN, MICN, the ED director of Hoag Memorial Hospital Presbyterian states, "Overcrowded EDs are often faced with challenges that are associated with surges in patient arrivals. Specifically, related to allocating resources, based on patient acuity, in a timely manner. The information available through HIE, including patient history and current state, allows the healthcare team to collaborate and prioritize care. Overall, the availability of real-time health information supports our shared objective of providing safe, timely and high quality care to the communities we serve."

HIE programs help the sharing of secure access of a patient's health information, from dispatch of EMS to on-scene care, transporting of patients to the ED, admitting them to the hospital, discharging the patient, and reporting of patient's outcome back to the EMS provider for data review for improving the quality of emergency services provided.

It's been recognized that the future of EMS patient care (and of all healthcare providers) is now dependent on successful and secure HIE. To facilitate these exchanges, non-profit regional health information organizations and private HIE networks have been developed throughout the state and nation to connect healthcare providers with one another.

Once connected, relevant patient care information is shared amongst providers, which greatly aids in the continuum of patient care, lowers healthcare costs and further supports the sustainment of healthy communities. These connections further support "meaningful use" initiatives, which incentivize the use of modern health technology.

Executive Director Paul Budilo of the non-profit One California Partnership Regional Health Information Exchange states, "This effort is a tremendous win for EMS and it demonstrates a profound change in

the paradigm of patient care. Our organization has established beneficial partnerships and increased functionality between multiple healthcare providers and hospitals in Orange County including the Hoag Memorial Hospital Presbyterian, Memorial Care Health System, St. Joseph Health System, KPC Healthcare and others."

As first responders, EMS providers often have to make quick, lifesaving decisions without any patient health information during emergencies. HIE in EMS gives an edge previously not afforded to emergency medical technicians and paramedics. Every entity within the healthcare continuum, from ambulance providers to hospitals, and local EMS agencies, should benefit from immediate, secured, electronic access to a patient's health information.

Access to information leads to better care through efficient transitions of care, improved outcomes and experiences. EMS ePCR systems of the near future should support full functionality for HIE. Connecting EMS to the broader health care system through HIE is necessary, and it's inevitable.

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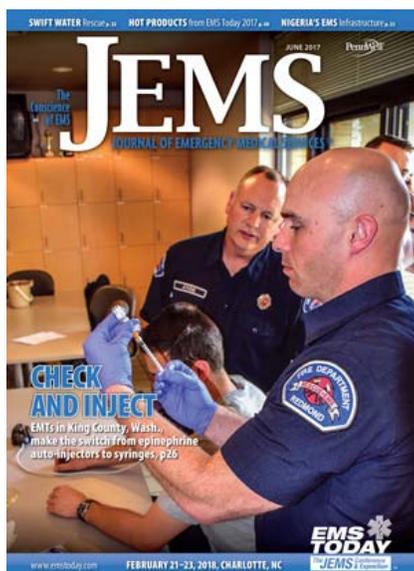
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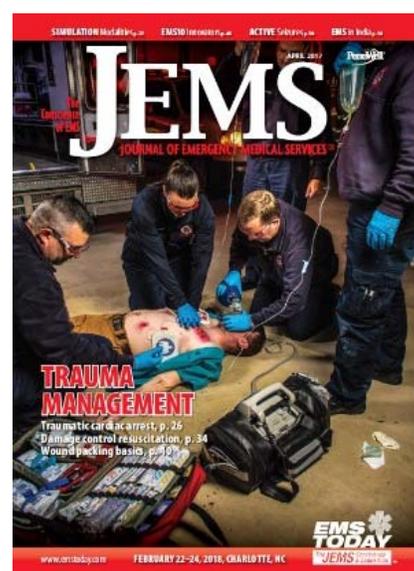
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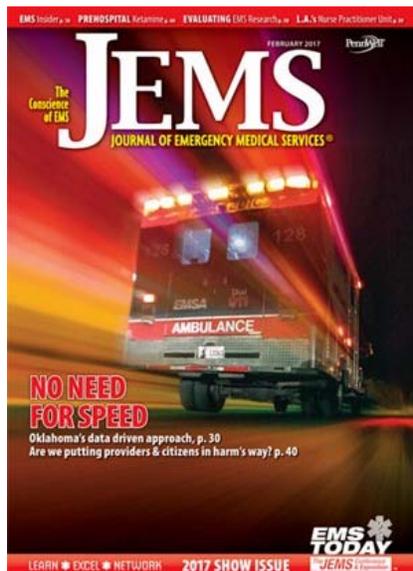
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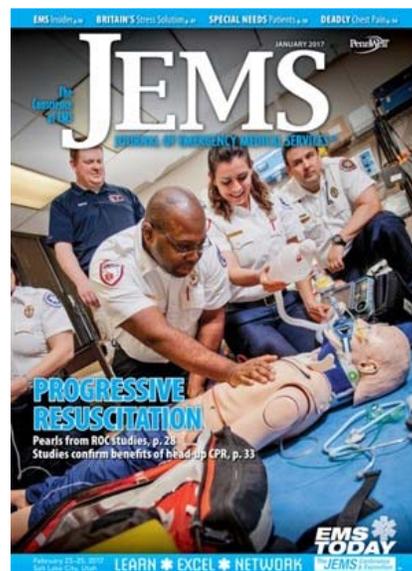
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