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Photo by Frank Romero/RAA

What Is Data Good For?

Better operations and patient care are scarcely possible without it

The call came in as an unresponsive man, 75, who suffered a fall. At the patient's home first responders find the man is actually in sudden cardiac arrest. He fell, his wife tells them, maybe 15 minutes ago or longer, but he seemed to be breathing at first, and she wasn't sure if she should call 9-1-1. She didn't do CPR.

The crew pretty well knows what the outcome will be but pulls out all the stops anyway, just as they've been trained. An hour later the patient is pronounced dead in the ED. The paramedic who impatiently fills out the report has never had a successful save.

A Virtual Explosion

If you've been in EMS long enough, you've probably been in a system that rarely sees a sudden cardiac arrest survivor, or doesn't even know what its survival rate is. In the past several years, however, more and more communities are reporting

improved survival rates as system leaders realize SCA is a treatable condition, not a death sentence. The foundation for this improvement has been a commitment to the collection and analysis of basic data.

Over the past decade there has been a virtual data explosion across society. With the digital revolution came the ability to collect huge amounts of data and search it for answers. Data has always been with us; we just never had the ability to readily access and analyze it until computing power came of age.

Data has also taken on particular importance in healthcare. With the passage of the Affordable Care Act, data will be used now more than ever to define quality of care and what is reimbursable. With the broad adoption of electronic patient care reports, EMS is poised to collect and use this data in innovative ways.

All EMS practitioners are typically trained to a specific standard and follow protocols for the care of given patient conditions. The care they deliver is docu-

mented on a standard platform based on nationally accepted data elements and definitions (the National EMS Information System, or NEMSIS). In most instances, information about 9-1-1 calls is first entered in a CAD or some other sophisticated software system, creating another valuable source of data. Because of these reasons EMS could be a case study on how to look at data for healthcare operations, quality of care and risk reduction.

What Is Data?

Merriam-Webster defines data as "the factual information (as measurements or statistics) used as a basis for reasoning, discussion or calculation."

Data can be virtually anything that gives us factual information, such as 9-1-1 chief complaints, response times, vital signs, patients' addresses, ages, genders, medication histories, hospital drop times, even paramedics' impressions of patients' conditions. You soon come to realize we have been doing "data collection" for

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quite some time. However, in order to use the immense power data holds, just collecting it isn't good enough; you have to collect "good" data. Many researchers and operations chiefs have spent too much time focused on the outcomes of data analysis without investing in the input on the front end.

What's It Good For?

Collecting and analyzing data gives us enormous potential to look for trends, discover new therapies and find ways to improve care and operations.

In thinking back to our cardiac arrest patient, what data would be useful in predicting whether he (or any given patient) has a decent chance at survival? While there are many points of data in a sudden cardiac arrest event, the Utstein criteria are the most accepted. Was the arrest witnessed? Was CPR started by a bystander? Did the 9-1-1 caller receive CPR instructions over the phone? What was the patient's down time? What was the EMS response time? What was the patient's initial rhythm? All of these data points paint a picture that helps to predict whether this patient is likely to survive a cardiac arrest, and all are captured, or should be, somewhere in the system. Being able to say confidently which patients we should look at to determine how well the system is doing and how can we make it better absolutely depends on data provided from the field.

Research and Innovation

Since its beginning EMS has battled to become a respected profession within both public safety and the medical world, with many successes. However, if EMS is ever to become the presumed experts in care of the ill and injured outside the traditional healthcare setting, it will need to prove its worth. To do this takes research, which requires data.

Go back to our cardiac arrest patient and think about the impact of bystander CPR. Research has consistently shown that bystander CPR is one of the most effective ways to improve survival. The data on this, collected by EMS, has been instrumental in how bystander CPR is promoted and taught.

Data also allows you to think innova-

What Data Can Do

REDUCE RISK

Because we perform high-risk procedures, it is essential to document with data that we've done them correctly or, if we didn't, that we recognized it and corrected the problem. One well-used example of risk reduction is airway support. While anesthesiologists learned more valid and reliable ways to ensure endotracheal tubes are in the right hole, EMS was slow to catch on. It was not until well-documented literature showed an alarming rate of undetected esophageal intubations that EMS began to get serious about getting it right. Intubation is a difficult psychomotor skill and can lead to catastrophic events if not performed correctly. Besides good training, your system must also be able to document that lifesaving (or -taking) skills are done correctly and safely. This takes data.

There are many other operational issues where data is key. Have you ever thought a certain medic seemed to use more controlled substances than others? It's possible for an agency to get providers' data in real time and, applying statistical procedures automatically, see who is at the leading edge of the administration curve. If you are not tracking issues like these, you are left to interpretations of events, one of which could be from a plaintiff's lawyer.

IMPROVE DELIVERY OF CARE

Doing robust demand analysis using call data to strategically place assets makes systems more efficient while contributing to survival by ensuring patients' needs are satisfied in a timely fashion. Not having or using this data leads to understaffing and over-resourcing, the worst of both worlds for both patients and taxpayers.

REAL-TIME RESPONSE

Knowing in real time that you're having problems meeting response-time criteria in a certain part of your city allows you to fix deployment of resources so that, at the end of the month, you're not left explaining why the system failed. It is even more of a concern to not know what your response times are, then have an industrious local reporter figure them out after your EMS crew takes 20 minutes to get to a cardiac arrest victim.

tively because you are more confident of your situation and the results. This allows you to see what others may not and try things others may not understand. For instance, it was noted by one EMS agency that having dispatchers go through a long list of instructions for callers in order to start CPR defeated the purpose of dispatcher-assisted CPR. There were often times when callers were still on the phone with dispatchers when medics arrived to find patients pulseless and not breathing—with no CPR having been performed.

In this case the question identified was: How long does it take a dispatcher to start prearrival instructions? The research around this topic led to a simplification of the process and allowed callers to begin chest compressions much more quickly. The result was improved survival from sudden cardiac arrest—and without having or looking at data, this innovation would not have been possible.

Quality of Care

Quality has taken a front seat in the new healthcare argument. The govern-

ment is moving away from paying for *stuff* and is now focusing on paying for *results*. As a healthcare delivery mechanism subsidized in various amounts by taxpayers, EMS is vulnerable. It is critical that EMS show its worth. The best way to do that is through evidence-based performance, based on data.

Measuring quality of care delivered is making headway into EMS. For example, California has recently implemented "core quality measures" with the expressed intent to "highlight opportunities to improve the quality of patient care delivered with an EMS system." Furthermore, "emergency medical services systems across the state will be measured and compared on their performance." It is clear from these statements that unless EMS systems have robust data, they will not be able to be evaluated. Likewise, private EMS providers will find it more and more difficult to bid and win service contracts if they are unable to demonstrate a commitment to quality through attention to data.

So how does EMS show value to the community using data? We go back to our

Case Studies: How the Power of Data Can Transform EMS

| By Nick Nudell, MS, NRP

One thing missing for many EMS practitioners is clear examples of how their efforts to collect high-quality data can be used to improve patient care or better manage operations. For many EMS managers what's missing is the utility of getting this data in real time to make system changes as situations present themselves.

Following are three examples of EMS systems that collect and evaluate their data in real time and use it to improve the quality of patient care and ensure their systems operate as efficiently as possible.

One thing these systems have in common is they use FirstWatch, which allows them to monitor data in real time from a variety of sources: CAD systems, ePCRs, records management systems, public health, even emergency departments and hospitals. When monitoring the data, triggers are designed to look for certain events and save the data for those calls. Some systems receive notifications of such events by e-mail or text message.

A continuous real-time quality improvement system called FirstPass automates the chart review process so that only records meeting specific criteria require further human review. This process feeds a "paramedic report card" that for the first time allows each provider to monitor and manage his or her own quality.

PAIN MANAGEMENT

A new clinical measure for Missouri's St. Charles County Ambulance District is related to pain control for chest pain patients. Among other things, they evaluate all ePCRs for chest pain patients by asking, "Was the patient's pain decreased upon arrival at the ED?" The results are based on the patient care data paramedics enter into their ePCR system.

How many of your chest pain patients arrive at the ED with less pain than they started with? Systemwide, St. Charles reports 71 of their last 100 patients had less pain. They also know that about 23% of all their patients have some pain, and that less than 2% receive pain medication. This finding is now guiding their clinical and quality improvement initiatives regarding pain management.

A study published in 2002 had similar findings across all patients (not just

those with chest pain).¹ Armed with data about their treatment of chest pain patients, paramedics can provide more informed and potentially better care without management intervention.

NARCOTIC USE

Detailed tracking and accountability of controlled substances is a federal requirement and good for patient care. The Richmond Ambulance Authority has taken an innovative approach to maintain compliance with federal laws: It has a FirstWatch trigger that lets a supervisor know whenever a medic uses a controlled substance such as morphine, fentanyl, Versed or even Zofran.

By tracking every drug administration, RAA can monitor and evaluate how often different medications are given. When looking at staff, any unusual patterns or paramedics who document they give more than normal will stand out from the rest.

Pain is a common patient complaint in EMS. Proper pain management is an important contributor to overall patient satisfaction. When you generate reports from the data, you can see if medics have different usage rates. This can provide the manager with critical information so that further analysis can be performed to determine if opportunities for pain management are not being realized by some medics or if pain medication is being used too frequently by others.

MISSING EPCR

In a department as large and busy as the San Antonio Fire Department, it can be easy for crews to get busy and not have time to complete all the charts during a shift. To improve compliance, SAFD management tracks in real time the calls that have been dispatched to EMS units and the ePCRs that have been completed. Four hours after each call has been closed out by dispatch, if its ePCR has not been submitted, a field supervisor will be paged to take action to make it possible for the crew to get it completed.

LESSONS LEARNED

What do these examples have in common?

- All use real-time data to make interventions right away rather

than waiting until the end of the month or quarter to run a report.

- All use ePCR data entered by EMS practitioners.
- All result in feedback to patient care providers.
- All are relatively simple calculations and easy to validate.



The Richmond Ambulance Authority tracks every drug administration and can use that data to see if medics have different usage rates.

These are stories of how regular EMS agencies use their data to measure and manage the quality of the care they provide. Doing this in real time ensures crews still have calls fresh in mind, with details intact, rather than waiting weeks or months for someone to run a static report.

The data being analyzed is primarily entered by the crews—straight from the source. It would not be possible to reliably perform these same functions without the ePCR data. Having a standard, relatively simple approach to documentation via ePCR is critically important. This avoids confusion or concern about how valid measures are and lets providers focus on self-improvement. Feedback directly to crew members lets them self-regulate the quality of their care—a hallmark feature, some would argue, of a true profession.

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Before joining FirstWatch in 2011 as its systems integration manager, Nick Nudell, MS, NRP, served as the regional operations manager for the Idaho State EMS Bureau, as well as an EMS specialist with the San Francisco EMS Agency. A nationally recognized expert on data and business information, Nick serves on the National EMS Advisory Council, providing advice on EMS issues to the federal government.



Analyzing data allows us to look for trends.

example of out-of-hospital cardiac arrest. It is widely accepted that what happens in the first few minutes of the arrest is critical to the outcome.

In 2005 *USA Today* ran a special report documenting the cardiac arrest survival rates of 50 of the largest U.S. cities (<http://usatoday30.usatoday.com/graphics/life/gra/ems/flash.htm>). Only 12 cities were rated as "Tier 1," meaning they used scientifically valid methods to show how many of their citizens survived

cardiac arrest. This standing would not have been possible without a commitment to collecting data. The development of the CARES registry and initiatives like the HeartRescue Project help facilitate and promote the collection of sudden cardiac arrest data.

Conclusion

Finally, let's return once more to that cardiac arrest patient in the opening. The data the paramedic collected on

this patient helped the medical director trend cardiac arrest survival rates, which was then used to go to the city council to argue effectively for more resources, including a public awareness campaign. It allowed a public health researcher to look for clues to improving survival and target segments of the community's population for CPR training. It documented that the medic did an excellent job in caring for this patient, including that the endotracheal tube was in the right place. Finally, it contributed to a research project showing how dispatch-assisted CPR could be more quickly implemented by bystanders. In turn, this research helped support the evidence for new standards for every lay person—which, where implemented, led to more people surviving sudden cardiac arrest. Behold the power of data. 🚑

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