



Optimizing Hospital Operations with Real-Time Data

How EMS data improves care delivery,
efficiency and planning

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Introduction

Emergency department crowding, boarding, ambulance offload delays and patients who leave before being seen are usually managed as problems inside the hospital. Much of what drives them happens outside it, including health system-wide issues such as commercial insurer delays and denials, as well as more local trends such as where 911 calls originate, which agencies respond, how sick those patients are when they are picked up and to which facility they are transported. Hospitals keep detailed records of what happens after their doors open but know comparatively little about what happens before.

Some hospitals are closing that gap with emergency medical services (EMS) data drawn from across their whole service area, and not only from the transports that arrive at their own doors. They are using it to decide where to locate EMS stations and how many trucks to staff, to choose topics for patient education and community outreach, to give lawmakers documentation behind funding requests and to revise patient care protocols. Pairing that data with capacity management systems, analytics, dashboards and AI-assisted scheduling has produced promising early results in reducing crowding and its effects on patients and staff. ●



“EMS market intelligence allows us to leverage our data to better understand patient clusters and manage hospital resources to predict and best meet the evolving needs of the community.”

— **CAROLYN CARPENTER** —
 Senior Vice President of Enterprise Strategy,
 Growth and Market Development,
 Johns Hopkins Medicine, and
 President of the National Capital Region



Using EMS data to unlock system-level insights

This Trailblazer report explores how EMS-derived data can improve operations and support high-quality care delivery, better patient experiences and strategic planning, with examples from AHA-member hospitals.

For many hospitals and health systems, EMS data represents an underutilized resource for reducing ED crowding, mitigating resource constraints, streamlining patient flow, expanding care delivery, understanding referral patterns, growing service lines and improving patient retention.

By understanding where patients originate, where they are transported, which EMS agencies influence volume, where referral patterns are shifting and where patient retention and service line growth opportunities exist, hospital leaders can make faster, smarter decisions about clinical performance, operational planning and strategic growth. ●



Understanding the blind spots in traditional data

Despite these scope and latency limitations, traditional data can still significantly improve hospital operations. Analytics and AI now power dashboards, capacity management systems, command centers and scheduling software that turn those data sources into better staffing decisions and process changes. Some of those gains have been measured. Others are still recommendations from analysts watching the field.

● WHAT HOSPITALS HAVE DOCUMENTED:

Seventy-two percent of hospitals with a capacity management system oriented toward reducing ED boarding documented a positive return on investment, according to a benchmarking survey of hospital capacity command centers published in the Joint Commission Journal on Quality and Patient Safety. The survey's authors concluded that real-time monitoring of throughput and bed capacity metrics lets hos-

pitals "assess capacity across hospitals more efficiently" and saves "valuable time and resources compared to contacting house supervisors at multiple facilities."

● WHAT ANALYSTS RECOMMEND:

An HFMA article on reducing ED overcrowding, sponsored by Kaufman Hall, urged hospitals to "employ AI-powered scheduling and clinical decision tools to adjust staffing in real time based on patient volume predictions and implement automated workload distribution to optimize lab and imaging processing."

These results illustrate the value of using historical data to improve planning and operations and suggest that hospitals can potentially achieve additional benefits with more timely, comprehensive and standardized information. ●



"When I worked for a large health system, our C-suite loved the EMS data and dashboards we were getting because they provided objective benchmarks and helped prioritize areas for growth and improvement."

— JEFF COMEAU —
Strategic Advisor, ImageTrend

How EMS data closes critical information gaps

Our goal is to ensure acutely ill patients have timely access to care,” says Jonathan Berkowitz, M.D., Vice President of Transfer and Acute Coordinated Care at Northwell Health in New Hyde Park, New York. “Market intelligence will grow our understanding of how these patients are being cared for and allow us to optimize our emergency system, improving throughput and patient experience.”

Incident reports from EMS providers are emerging as a data source that hospitals can use to complement their historical data. The National Emergency Medical Services Information System (NEMSIS) is a national database that aggregates data from electronic patient care reports (ePCR) submitted by EMS agencies. It provides a strong foundation for EMS analytics by giving hospitals access to a standardized data set beyond observations of EMS transports arriving at their own facilities: In 2025 the database contained nearly 64 million EMS activations submitted by 14,801 EMS agencies.

Timely access to NEMSIS data can mitigate scope, latency and standardization limitations associated with traditional data sources and analysis methods.

- **SCOPE:** The database covers EMS activity across a hospital’s whole service area, not only the transports that it receives. The data can be filtered by geography, EMS provider, presenting condition and other variables.
- **LATENCY:** NEMSIS data can reach hospitals well ahead of traditional reporting cycles. How current any given view is depends on each EMS agency’s reporting workflow and

transmission processes, so “real time” means different things in different regions.

- **STANDARDIZATION:** Because NEMSIS follows a national data standard, hospitals need fewer custom scripts and interfaces to make the data usable alongside their own. Time saved on data cleansing and integration frees resources for analysis.

Hospitals weighing these sources should also weigh their limits. Public access to data is limited to the national level; access to state-level or EMS agency-level data requires a separate data license or the submission of a request for data for research purposes. In addition, agency participation in NEMSIS is voluntary and uneven, so coverage varies by region. Submission timing also differs by agency, which affects how current any given view is. De-identification requirements constrain some patient-level analyses. Third-party services can provide the data, but that creates cost, contracting and data-use-agreement obligations that vary by vendor.

There is more than one way in. Hospitals and researchers can request NEMSIS research data directly from the national program, and many state EMS offices provide regional extracts to the hospitals they work with. Software and data services package the same underlying data with analytics, dashboards and faster refresh cycles, which is the route the hospitals interviewed for this report have taken. Either way, the information hospitals can obtain is similar (see chart below).

ImageTrend, which sponsored this report, is one of the companies

Using NEMSIS data to your advantage

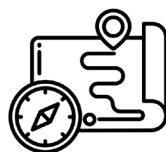
Hospitals can request NEMSIS research data directly from the national program, state EMS offices or software and data services that package the same underlying data with analytics and dashboards.



Patient flow and volume trends month over month, year over year, and by geography, agency, facility and condition.



Clinical and quality insights through EMS measures and performance trends, helping hospitals align improvement priorities with the agencies bringing in patients.



EMS destination patterns across all facilities in the region, revealing service area share, bypass behavior, service line leakage and opportunities for growth.



Transfer and referral activity — including who is sending, who is receiving, and when — to support stronger referral pathways and regional care coordination.



Community demand trends that help healthcare leaders plan resources, partnerships, outreach and future growth strategies.

working in the EMS data services space. It has developed analytics products that package data for hospitals and state EMS offices based on inputs from reporting software used by EMS agencies and fire departments. For leaders who have worked without that view, the change is concrete. “When I worked for a large health system, our C-suite loved the EMS data and dashboards we were getting because they provided objective benchmarks and helped prioritize areas for growth and improvement,” says Jeff Comeau, a former health system executive who is now a strategic advisor at ImageTrend. “Before, we had to make educated guesses about volumes and other developments, or ask different EMS agencies directly for data, which was awkward. The broader data and reports we received gave us insights into EMS operations across the whole service area. We used it to build strategy around patient volume.” For example, Comeau says his health system used volume data showing community demand to support its decision to add a stroke care center.

“EMS market intelligence allows us to leverage our data to better understand patient clusters and manage hospital resources to predict and best meet the evolving needs of the community,” Carolyn Carpenter, president of the National Capital Region and senior vice president of enterprise strategy, growth and market development at Baltimore-based Johns Hopkins Medicine, told attendees at a 2026 Leadership Scan panel discussion presented by the American Hospital Association (AHA) and ImageTrend: “The data around market intelligence from EMS can also help us look forward to be able to predict and understand what’s coming



“The big advantage is, it’s connected to an ePCR record or EHR record, and we can get the outcome data back to the EMS agencies. Now they can see the full picture of what happened to the patient, which is great on the individual agency level, but is also a really big step for the EMS system as a whole.”

— JOE FARRELL —

Director of National Initiatives, ImageTrend

in from the community and do our best job treating those patients.”

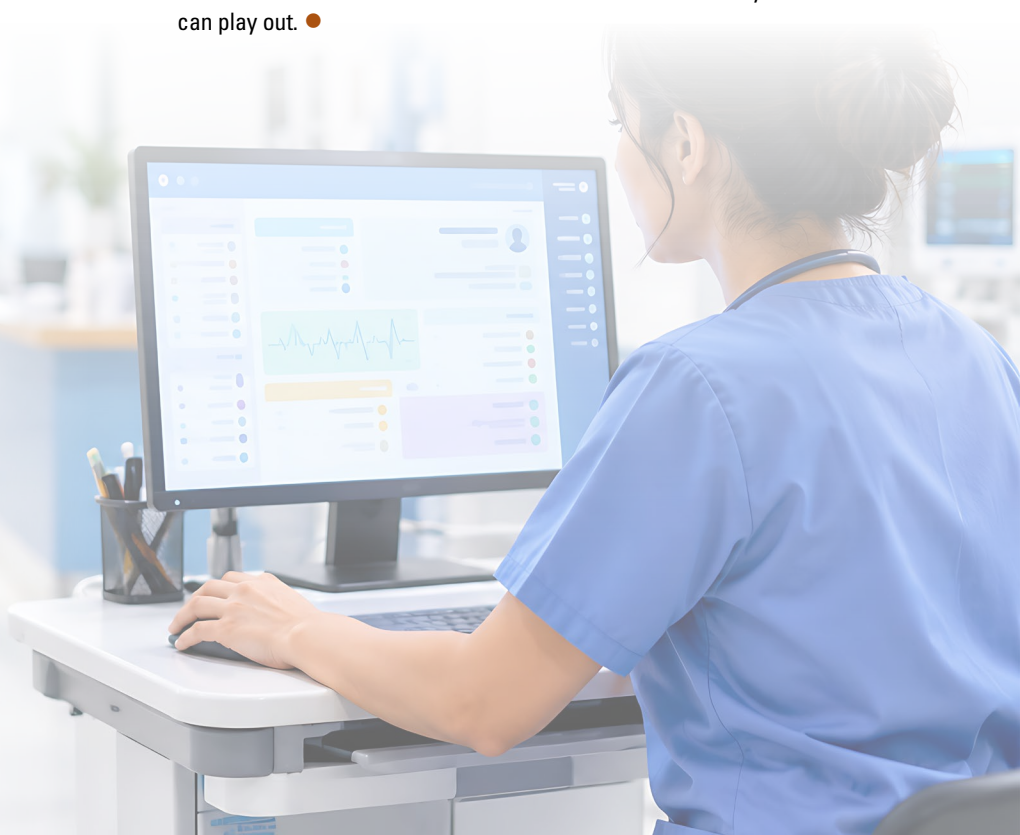
The same connection can run in the other direction. When hospitals send outcome data back to the EMS agencies that brought patients in, the agencies can finally see what happened after the handoff — something they have historically had no way to learn.

“The big advantage is, it’s connected to an ePCR record or EHR record, and we can get the outcome data back to the EMS agencies,” says Joe Farrell, a former paramedic who is now director of national initiatives at ImageTrend. “Now they can see the full picture of what happened to the patient, which is great on the individual agency level, but is also a really big step for the EMS system as a whole.”

Farrell says the gap is widest for small agencies and hospitals that have no data scientists or epidemiologists on staff, and that a shared analytics program lets them track their own performance measures without that expertise.

Susan Doherty, MA, LNHA, AHA’s vice president for field engagement and a member of its Rural Health and Regional Executive Team, says EMS data can be considered a public health resource because it provides insights into geographic patient populations. It can be especially valuable for rural providers, as she notes: “EMS is healthcare for people in rural communities.”

Hospital leaders interviewed for this report say the practical payoff shows up locally: fewer transfers and more patients treated closer to home. The two examples that follow — a rural Georgia hospital that runs its own EMS agency and an Anchorage hospital that shares a statewide caseload with two others — show how differently that can play out. ●





Turn Data Into Actionable Insights

ImageTrend's Healthcare Intelligence System is a fully integrated, scalable suite of hospital tools designed to unify your entire continuum of care. It includes trauma, burn, stroke and cardiac registries; data-driven reporting and analytics; seamless and secure hospital-EMS bidirectional data exchange; and real-time EMS transport pattern intelligence—inside your walls and across your market.

Together, these tools help hospitals improve care quality, eliminate manual workflows, better inform strategic planning, and strengthen compliance.

Too often, vendor “solutions” equate to disconnected systems — leaving hospital teams buried in manual work, dealing with delays and making decisions from incomplete data. Instead of solving the problem, these piecemeal approaches create new silos and make it harder to see the full picture of patient care and hospital performance. Instead, ImageTrend's Healthcare Intelligence System scales seamlessly with the complexities of today's hospital systems, delivering a connected ecosystem of solutions that work together — no bolt-ons, workarounds or compromises.

What often slows progress is fragmentation — compliance reporting in one system, patient outcomes in another and market data trapped somewhere else. But hospitals can no longer afford to juggle disconnected tools when what they really need is a single source of truth.

By uniting compliance, reporting, interoperability and market insights, ImageTrend's Healthcare Intelligence System helps hospitals:

- **Improve patient outcomes** through data-driven performance improvement, with clear visibility into trends, complications and opportunities for intervention.
- **Build seamless coordination** with EMS and community partners, eliminating information silos that delay care and weaken collaboration.
- **Meet evolving regulatory standards** with confidence, reducing the time and risk associated with manual compliance and accreditation prep.
- **Plan for the future** with a clear understanding of market position and community needs, so leaders can make proactive choices about services, staffing and investment.

Hospitals don't need another siloed product — they need a single, connected platform that transforms fragmented data into one unified strategy for compliance, care and growth.

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CASE STUDY Coffee Regional Medical Center



Rebalancing resources keeps patients closer to home

Coffee Regional Medical Center has been using EMS data and analytics longer than most organizations and has a long list of data-informed results to show for it across patient care, staff development, partnerships, facilities planning and funding. The common thread is that EMS data gives the 98-bed hospital a fact-based footing for difficult decisions about where to put limited resources.

Vicki Lewis, FACHE, President and CEO of Coffee Regional and a 2027 trustee-elect to the AHA Board of Trustees, says EMS data is “invaluable” for helping rural health systems balance staff, equipment and facilities across the wide areas they serve.

“Because our resources are so limited, we really can’t afford to make mistakes,” she says.

The hospital operates its own EMS agency and extends its capacity through telehealth and an eICU partner program with Emory Healthcare, headquartered roughly 220 miles away in Atlanta. It also partners with Children’s Healthcare of Atlanta for pediatric care.

“EMS data was invaluable for helping us determine where to put EMS stations, and how many trucks to staff daily,” Lewis says. “Demand is fluid, and we can make data-based decisions on where to allocate trucks and staff.”

Analyzing regionwide data also prompted a decision to relocate an ambulance station to improve response times for more patients. For day-to-day operations, real-time analytics inform how rigs are staffed and where EKG equipment and other shared resources should be staged based on expected demand.

“The longitudinal nature of the EMS data available to us has been a game changer. I believe it helps us plan from a staffing standpoint, from a budgetary standpoint, determining the kind of equipment we need and more,” Lewis says. “It’s very, very valuable information.”

The data has changed clinical protocols as well. Coffee Regional revised the tourniquet protocol for its paramedics and built a community paramedicine program around it after reviewing an analysis of statewide data comparing patient outcomes by the type of treatment received in

CASE STUDY Coffee Regional Medical Center



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President and CEO, Coffee Regional Medical Center

the field, distance from an ED and other factors.

The hospital also collaborates with the Georgia Emergency Management Association and has shared its EMS data to help improve field protocols statewide.

“Georgia has begun to provide blood or blood products to EMS in some units because we’ve been able to share EMS data that shows the number of times having blood in the field would have saved a life or improved an outcome in the field,” Lewis says. “We can’t really move that kind of conversation forward without a data-driven decision behind it.”

Some transfers are inevitable, but Coffee Regional has used EMS analytics to reduce how often they happen and how far they go. Lewis says the resulting protocol changes and transfer agreements have also helped with staff retention.

“Our staff didn’t go into this field to drive people long distances,” she says. “They want to take care of patients, and this gives them more time to do that instead of going on four-hour transfer runs then having to wait for the patient to

be admitted. Sharing run time data with hospitals we have partner agreements with has been powerful.”

EMS data has also shaped how the hospital’s care gets funded. Coffee Regional used EMS data and reports to document a successful grant request for specialized pediatric equipment, and separately to win state funding for its eICU partnership. It is now assembling data on patient types (e.g. head trauma, agricultural injury, injury severity and other factors), to support its bid for Level III trauma designation.

“Our legislators ask that we present information to them that helps them make their case either at the state or the federal level,” Lewis says. “One of our federal legislators recently visited and was asking about data. We present as much information as we can, including number of runs, kinds of runs, how often we have to take someone out of state or out of our community, how often we use air transport or fixed wing and those kinds of things. The distance to the services that are offered right now has become a central factor in the decision-making process.” ●



CASE STUDY Alaska Regional Hospital



Wider visibility helps hospitals be better partners

Alaska is larger than more than 200 countries, but most of its critical care cases are handled by just three hospitals. Alaska Regional Hospital is one of them. Having critical care and patient flow visibility across the vast state has helped Alaska Regional make changes that are saving lives statewide.

“There are only three hospitals that are taking care of the majority of the volume in our state,” Sarah Ransom, director of EMS outreach at Alaska Regional, told attendees during an AHA roundtable webinar about applications for EMS data. “So, if we can look at what types of patients are coming into us versus our partners, we can be better partners by taking more cases or helping collaborate or supporting different types of service lines.”

One such collaboration produced a statewide extracorporeal membrane oxygenation program to support hypothermia care. Cardiac arrests resulting from hypothermia are increasing, and data now helps inform what patients are true candidates for this treatment modality.

Alaska Regional also uses real-time EMS data to coordinate neurology care across the state. It uses remote consultation to assist in vision, aphasia and neglect (VAN) assessments conducted in the field.

“Stroke patients have an extremely tight window for what we can do with our interventions. Our real-time consultation enables EMS teams to ensure VAN positive patients go directly to a facility with CT and neurointerventional

capabilities,” says Ransom. “EMS is able to administer the clot-busting medications in the field to give the patient more adequate perfusion before arriving to definitive care.”

Alaska Regional also uses real-time data, from perfusion CT transfers, patients who received antibiotics from EMTs, medevac transfers and other scenarios to improve the handoff process.

“We are meeting patients at the door, and they are getting their interventions timely because of the information that was shared from a prehospital stance,” says Ransom.

Alaska Regional also improved patient care by analyzing its emergency department patient flow data. It used a heat map visualization that showed patient volumes across the hospital throughout the day. That led to shift adjustments that improved admission times, throughput and staffing levels during high-volume times. It also produced business analysis that led to approval to hire more than 20 new nurses for the ED and supporting admit floors.

“It’s because of market data that we’ve been able to pinpoint where some of our areas of improvement are, not just for throughput and staffing changes but also for our service lines and where we can be better partner for the community,” Ransom says. “This stemmed from finding the correlation between volume and timing so that we could make throughput much more efficient for our hospital.” ●

THE BOTTOM LINE

Real-time EMS data supports better outcomes

The hospitals in this report did not use EMS data for the same thing. Coffee Regional used it to decide where to place trucks, crews and equipment across a wide rural service area, and to document what it needed for legislators and grant makers. Alaska Regional used it to see how three hospitals were dividing a statewide caseload, and where it could be a better partner to the other two.

What they have in common is where the picture came from. Each was working with data on its whole service area rather than only on the patients who arrived at its doors. That view can help healthcare leaders mitigate ED crowding and gain visibility into prehospital patterns to support strategic decision-making, more efficient care delivery and better outcomes for both providers and patients.

Starting does not require a large program. A hospital can begin with a question it already has — why transports bypass it for a particular condition, or where volume is building — then request NEMSIS research data, ask its state EMS office what it can share, or engage a service that packages the data with analytics. The practical first step is finding out which agencies in the area report consistently enough to answer the question. Coverage gaps and reporting lags are real, and they matter most when the data is read as a precise count rather than as a pattern.

For now, the clearest gains are operational. Several of the leaders interviewed for this report expect the more significant change to come in clinical care.

“When we think about the state of technology today...moving from the monitoring into the treatment through the EMS data, I think that’s our future. That’s incredibly exciting,” says Carpenter of Johns Hopkins. “And to the extent that the ED becomes better and better at being able to understand what is arriving along the spectrum and what that care pathway is, how amazing that will be for us in terms of the outcomes, and then the feedback loop to our EMS partners.” ●



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