Connected for Care
How interoperability strengthens trauma response and recovery

Hospital leaders are working with technology companies to break down data silos by implementing interoperable systems that work with their EMS teams.

Sponsored by: **ImageTrend**

Scope of the issue

Hospitals rely on information from emergency medical services (EMS) to guide early trauma care decisions, particularly for patients arriving by ambulance. Yet many clinicians do not receive this information until after they have begun treatment, which can delay and complicate care decisions. When EMS reports arrive late or as PDFs that require manual review, teams may miss early insights about physiology, mechanisms or interventions that shape a patient's initial care pathway.

Part of this problem has to do with the fact that paramedics and emergency medical technicians (EMTs) document care in one system, electronic patient care reports (ePCRs), while clinicians chart in electronic health records (EHRs). Because these systems don't communicate, hospital staff frequently must reconcile the two after the patient arrives, and before they can complete their own documentation or begin any review of patient information.

The scope of this disconnect is significant. A statewide analysis from the California Emergency Medical Services Authority examined trauma cases across the state to understand how well EMS and hospital data systems aligned. The analysis found that fewer than half of 22,745 EMS records submitted by ambulance agencies matched with corresponding hospital trauma records, a failure rate that researchers attributed to systems lacking shared patient identifiers and consistent data formats.

Having incompatible systems affects health care more broadly. Many clinical data systems rely on outdated technologies that don't work well with other systems and use data that are not organized in standard ways, according to the Centers for Disease Control and Prevention (CDC). These disconnects hinder the ability of health care professionals to share essential information quickly.

Hospital leaders are working with technology companies to break down data silos by implementing interoperable systems. According to the CDC, these systems include applications, devices and information platforms that can securely access, exchange, integrate and use data across organizational boundaries, ensuring that patient information moves easily and safely.

Many hospitals already use interoperable interfaces that connect their EHRs with laboratory systems, imaging tools, registries and other care providers. By extending those connections to include ePCRs from EMS agencies, clinicians can access field assessments and on-scene observations before or at the point of patient arrival, which helps them make earlier, more informed care decisions and reduces the administrative burden of manual data reconciliation and also gives trauma teams clearer early insights. Hospitals commonly report fewer missing or inconsistent fields once EMS data arrive electronically instead of being retyped by hand, along with more reliable time stamps that strengthen event sequencing during reviews, says Michael Patock, executive vice president of product at ImageTrend. ●

FACTBOX

Key factors affecting interoperability and data exchange

● **Defining interoperabillity**
The CDC defines interoperability as systems that can "speak the same or similar language," allowing data to move across organizations without manual work.

● **Barriers**
Many health and public health data systems still do not work well together. The CDC cites outdated technology and non-standard data as ongoing barriers to data exchange.

● **Technical issues remain**
Interoperable exchange between EMS and hospitals remains limited. A statewide analysis by the California Emergency Medical Services Authority found that fewer than half of 22,745 EMS records matched with corresponding hospital trauma records. The study attributed failed matches to technical issues, including inconsistent patient identifiers and incompatible data formats.

● **Need for standardization**
Federal certification policy now requires standardized data exchange. Health IT vendors must support formats such as Fast Healthcare Interoperability Resources (FHIR) and the U.S. Core Data for Interoperability (USCDI).

● **The CDC's input**
The CDC and federal partners are working to harmonize data standards so information can be reused as conditions and reporting needs change.
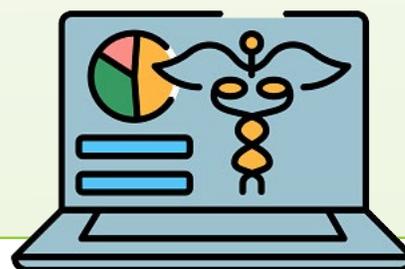
Technology as a pillar

As organizations work to bring pre-hospital documentation into clinical workflows, they are also contributing to a broader national effort to improve EMS-hospital data exchange. This initiative is guided by federal policy and data standards, including the Office of the National Coordinator's Trusted Exchange Framework and Common Agreement that seeks to create a consistent nationwide model for sharing health information, and the CDC, which is updating trauma registry specifications to help states and hospitals incorporate pre-hospital information more reliably.

For hospitals, this work aligns with long-standing goals: improving care coordination, reducing documentation burden, supporting operational readiness and advancing digital transformation priorities. When organizations work to advance these goals, they can improve patient outcomes while easing administrative burdens. This supports the goals of the Quadruple Aim, which focuses on giving patients better experiences, improving health outcomes, lowering costs and making work less stressful for clinicians. Federal policy now requires health information technology vendors to support standardized data formats, such as Fast Healthcare Interoperability Resources (FHIR), a framework for exchanging electronic health information, and the United States Core Data for Interoperability (USCDI), which defines a common set of health data elements. As vendors update their systems to

meet these requirements, hospitals increasingly expect EMS software to send data in the same standardized formats that they use for lab, imaging and other clinical information.

Some EMS systems already support this type of structured exchange. Vendors like ImageTrend are developing platforms that follow national standards and allow clinicians and registrars to view key pre-hospital details directly in their EHRs and registry workflows with fewer manual steps. ImageTrend's Health Information Network, for example, supports standards-based transmission of ePCR information, automated registry submission and connected analytics.

A published case study about Carilion Clinic in Roanoke, Virginia, shows how the organization is using EMS data integration as a foundation for future capabilities. Carilion's team described a long-term goal: Paramedics could look up a patient's chart from the field and see medications, allergies and chronic conditions before arriving on the scene. "Ultimately, we will establish bidirectional exchange with EMS and patient look-up so the paramedic can query Carilion's Epic system on dispatch, pull the patient's chart into the system and know what medications they may have been on, allergies or care history," says Walt Fisher, application analyst. "For example, just knowing the patient has diabetes would be helpful when arriving on scene." ●

Quality and compliance, simplified

Hospitals' trauma registrars can complete case reviews more accurately when they receive the information that they need at the start, including pre-hospital assessments and procedures. Seeing those details sooner helps them confirm activation levels and verify key event times — two elements that directly affect National Trauma Data Standard and Trauma Quality Improvement Program reporting.

Patock notes that the most helpful elements for early performance-improvement work are the basic time points: dispatch,

on scene, depart scene and ED arrival. These anchor the full case timeline. Early vitals and Glasgow Coma Scale scores help teams understand initial severity, and structured fields for airway support, fluids or blood products, cardiac arrest care and tourniquet use flow cleanly into registry and review workflows. Scene details, such as seatbelt use or airbag deployment, also strengthen case reviews and support preparation for American College of Surgeons (ACS) verification.

Hospitals also may experience less back-and-forth with EMS

> "Visibility into inbound acuity supports ED staffing, room/OR prep, offload coordination and transfer planning. It also helps surface quality signals — like pain control or airway management — so teams can trigger a targeted consult, education or protocol tweak faster."
>
> — **MICHAEL PATOCK** —
> Executive vice president of product, ImageTrend

organizations when preparing documentation for American Burn Association (ABA) registry submissions and the CDC's Paul Coverdell National Acute Stroke Program reporting. When key elements are available up front, staff face fewer corrections during audits and less rework during verification cycles.

Clinical and administrative teams responsible for performance improvement work can complete their reviews more efficiently when they receive the full record earlier. Having pre-hospital details at the outset allows them to begin case analysis sooner, resolve questions while events are still fresh and close the loop on identified issues within timeframes established by the ACS, the ABA and state trauma system standards. As trauma data processes become more efficient, clinicians and trauma registrars spend less time on administrative tasks and more time on case review, validation and performance improvement work. ●

Seeing the whole picture

When hospital leaders can view pre-hospital EMS data alongside hospital records, they have a complete picture of a patient's path into acute care. This visibility also highlights off-load patterns, such as how long ambulance crews wait to transfer care and which hospitals experience the most strain during busy periods. With integrated EMS and hospital data, leaders can analyze referral patterns, regional transport variation and throughput issues that influence readiness, resource allocation and capacity planning.

State agencies gain similar benefits. With consistent data across EMS and hospital partners, public health leaders can assess injury trends, monitor facility utilization and track geographic variation in trauma activity. These insights support planning for staffing, equipment and resource distribution across regions and help systems prepare for mass casualty events, seasonal fluctuations and rural transport challenges.

With hospitals using certified, standards-based EHR systems, more organizations are extending the same interoperability expectations to pre-hospital information, laying the groundwork for broader adoption in the years ahead.

The following case studies show how two organizations — a health system and a state health department — strengthened trauma response and performance review by adopting new technologies and improving workflows. ●

FACTBOX

What earlier EMS data can improve

- **Faster trauma activation confirmation**

- **More accurate event timestamps**

- **Stronger NTDS and TQIP reporting**

- **Fewer audit corrections and rework cycles**

- **Earlier performance-improvement reviews**

Turn Data Into Actionable Insights

"Success in interoperability starts long before the call. Agencies that invest in data quality, structured documentation and system alignment are the ones ready to deliver connected care when seconds count."

— Joe Graw, ImageTrend Chief Growth Officer

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 market intelligence.

Together, these tools help hospitals strengthen compliance, improve care quality, streamline operations and plan strategically for the future.

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, 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:

- **Meet evolving regulatory standards** with confidence, reducing the time and risk associated with manual compliance and accreditation prep.

- **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.

- **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.

Discover why Level I and Level II trauma centers nationwide, 23 statewide hospital systems and more than 750 hospitals trust ImageTrend.

ImageTrend

www.imagetrend.com

Automating EMS ePCR data into the EHR

Carilion Clinic, a seven-hospital system in Southwest Virginia, wanted clinicians to have EMS information earlier in the patient encounter. Under the system's previous workflow, paramedics printed a patient care report and left it at the emergency department (ED). Staff later boxed those reports and sent them to a third-party scanning service for upload into Epic, a process that created delays. Reports could be misplaced or attached to the wrong chart, and clinicians could not easily access field assessments, medications or vitals when treating patients.

The challenge

Carilion's clinical and health information teams set out to resolve this issue. They evaluated how EMS agencies documented care and found that many high-volume departments in the region already were completing electronic patient care reports in ImageTrend Elite.

Carilion purchased ImageTrend's Health Information Hub, which allowed Elite to send completed ePCRs directly into Epic through the Care Everywhere interoperability framework. Once paramedics finished their documentation, the system automatically transmitted the ePCR to Epic. Carilion teams could see the report in the patient's chart almost immediately, without printing, scanning or manual matching.

Results

The change had a direct impact on ED readiness. In the first year, the system received more than 20,000 EMS reports electronically. Clinicians no longer needed to search the media tab for scanned documents, and they had field findings, timelines and pre-hospital treatments available while the patient was still in the ED.

EMS crews also benefited. They eliminated the need to print and deliver paper reports, and they avoided the technical issues that previously caused delays. Crews could return to service sooner after a patient handoff.

What comes next

Carilion leaders viewed this work as the first step toward supporting bidirectional exchange with EMS. Their vision includes giving paramedics the ability to look up critical patient data, such as medications, allergies and care history while en route.

Takeaways

Carilion's experience shows how a standards-based connection between EMS ePCR systems and the hospital EHR can strengthen early decision-making, reduce documentation burden and support more reliable trauma and emergency care workflows. It also illustrates how hospitals can use existing interoperability infrastructure to bring pre-hospital information into the clinical workflow with fewer manual steps. ●

Streamlining statewide trauma reporting

EMS and the Bureau of Acute Care Systems at the Mississippi State Department of Health (MSDH) oversee trauma care coordination across 94 hospitals. As MSDH prepared to modernize its trauma registry, leaders said the existing vendor's system was no longer meeting operational needs. Staff reported slow or inconsistent customer support, limited flexibility to configure forms and constraints around data access and control.

"Customer service was a big challenge and the registry as a whole wasn't functioning at the capacity we needed," says Courtney Day, nurse team lead.

Day says the system's structure made it difficult to support hospitals across the state or quickly run reports to guide decision-making. "It was really about getting data back in a timely manner," she adds.

What MSDH needed

When MSDH began exploring ImageTrend solutions, leaders emphasized the need for a trauma registry that would allow them to fully own their data, improve real-time reporting and configure workflows to match Mississippi-specific requirements. They also sought a long-term partner that could support innovation, quality improvement and integration with EMS data systems.

The solution

MSDH selected ImageTrend's Patient Registry software as its new trauma data platform and began implementation across 92 participating facilities in September 2024. Leaders credited strong collaboration, configurable tools and real-time visibility for early success.

Using Patient Registry, MSDH staff now can:

- Access patient records immediately to help hospitals troubleshoot data entry issues, improving turnaround.
- Configure state-specific trauma forms and workflows to reflect Mississippi's protocols.
- Integrate EMS and hospital data automatically through compatibility with ImageTrend Elite EMS.
- Track trends and share statewide performance reports through a centralized dashboard.
- Support mortality tracking through a built-in review form; Mississippi was the first state to request this feature.
- Prepare hospitals for trauma designation visits using a single report, reducing prep time from about three hours to less than 45 minutes.

Takeaways

MSDH's experience demonstrates how state health departments can improve trauma system oversight by selecting registry platforms that offer configurable workflows, real-time data access and vendor support aligned with state-specific needs. The ability to integrate EMS and hospital data in a single system helps state coordinators track performance across facilities and respond more quickly when hospitals need technical assistance or preparation support. ●

CONCLUSION

# Interoperability as a force multiplier for trauma care

Across trauma care, access to timely, reliable information can shape clinical decisions, operational readiness and system performance. As this Trailblazer report shows, strengthening interoperability between EMS and hospital systems helps close critical information gaps at the moment they matter most — when patients first arrive and teams are making rapid care decisions.

Organizations that integrate pre-hospital ePCR data directly into clinical and registry workflows can reduce manual work, improve data quality and gain earlier visibility into patient condition, timelines and interventions. These improvements support faster decision-making, more efficient performance review and stronger readiness for reporting requirements.

More broadly, interoperable data exchange lays the groundwork for future capabilities, from bidirectional information sharing to regional capacity planning and system-level performance improvement. By treating EMS-hospital connectivity as foundational infrastructure rather than an add-on, health systems and state agencies can strengthen trauma response today while building a more resilient, data-driven emergency care ecosystem for the future. •

> "Real-time exchange turns prehospital data into something clinicians can use the moment a patient arrives— fewer clicks, fewer gaps, and decisions made with the full story in view. When EMS data lands in the EHR as discrete fields, teams spend less time retyping and more time treating, while PI and registry work start on a stronger foundation."
>
> — **MICHAEL PATOCK** —
> Executive vice president of product, ImageTrend
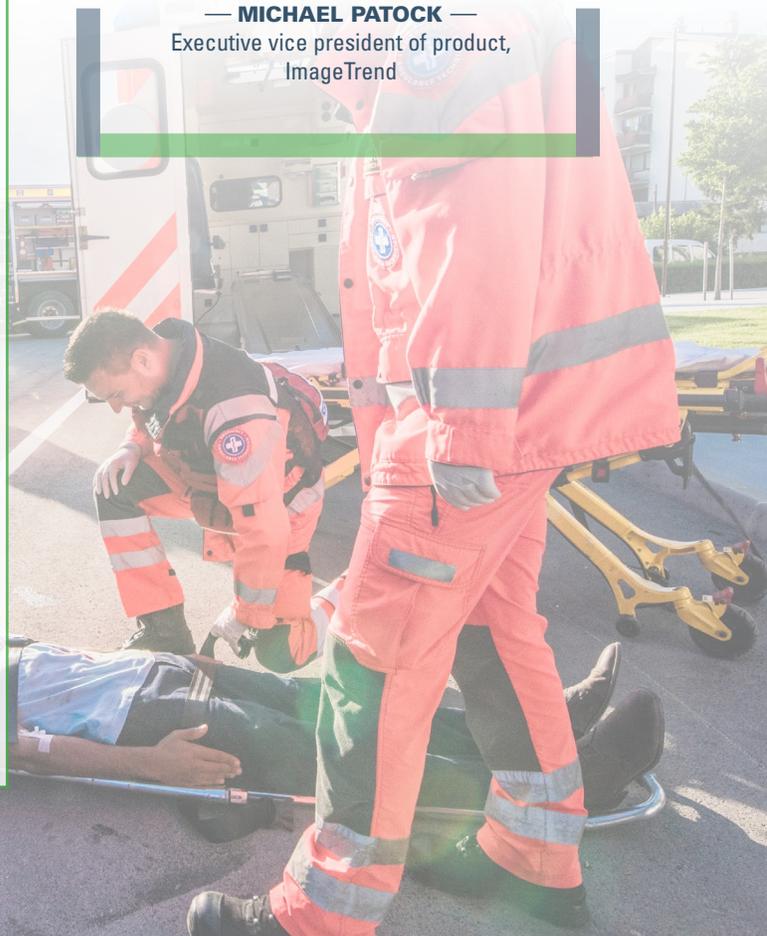
Contributors

The AHA's Market Scan thanks the following for their insight, support and contributions to this Trailblazers report:

Joe Graw
Chief growth officer,
ImageTrend

Micheal Patock
Executive vice president
of product,
ImageTrend

Sources

• Centers for Disease Control and Prevention, "Public Health Data Interoperability."

• Office of the National Coordinator for Health Information Technology, "Health Data, Technology and Interoperability: Certification Program."

• California Emergency Medical Services Authority. Integrating Prehospital and Trauma Registry Data: A California EMS Data Linkage Initiative. EMSA Publication #SYS 100-21

ImageTrend

On the frontlines of tomorrow, intelligence rules. Our all-in-one platform transforms On the frontlines of tomorrow, intelligence rules. Our all-in-one platform transforms raw data into real-time intelligence, helping hospital teams make faster, more informed clinical, operational and strategic decisions to improve performance and stay ahead of what's next. Our advanced software solutions deliver.

• Secure, real-time EMS-hospital data exchange for seamless collaboration across the care continuum
• Automated EMS record/hospital encounter matching for a more complete episode of care
• Configurable dashboards and automated, compliance-ready reports to improve performance
• Near real-time visibility into EMS transport patterns to optimize operations and expand market share

Working by your side, we'll enable your hospital teams to transform scattered data into actionable plans that improve overall patient care, deliver better public safety outcomes and protect critical revenue. For more information, visit **www.imagetrend.com**

American Hospital Association
Advancing Health in America

MARKET SCAN

ABOUT US: The AHA's Market Scan newsletter provides insights and analysis on the field's latest developments in health care disruption, transformation and innovation. For more information and to sign up for our free e-newsletter, visit **www.aha.org/center/form/innovation**