



Case Study

# Modernizing EMS Medication Management:

## How Virginia's Central Shenandoah Valley Region Turned Regulatory Compliance into Operational Excellence

# A 31-agency EMS foundation transforms medication tracking and security while meeting DSCSA requirements

When federal regulations threatened to dismantle a decades-old medication supply system, the Central Shenandoah EMS Foundation faced a choice: scramble to maintain the status quo or reimagine medication management for the modern era. Led by Medication Logistics and Compliance Manager James Larrick, the foundation chose transformation—deploying automated dispensing technology that turned a compliance challenge into a catalyst for unprecedented operational efficiency.

## The Challenge: When the Old System Couldn't Meet New Standards

For more than 50 years, Emergency Medical Services across Virginia relied on a straightforward model: hospitals filled medication boxes, and EMS crews exchanged depleted boxes for fresh ones during patient drop-offs. The system was cost-effective and familiar. It was also unsustainable.

When the Drug Supply Chain Security Act (DSCSA) tightened enforcement in 2023-24, hospitals found themselves legally classified as distributors—responsible for exhaustive recordkeeping on every dose transferred to EMS agencies. Faced with mounting compliance risks and administrative burden, hospitals began withdrawing from the medication supply role they'd filled for decades.

"The old drug box system ended in November 2024," explains Larrick. "EMS agencies now had to have their own DEA licensing and processes to purchase and maintain a drug supply on their own—including managing inventory and DEA paperwork for controlled substances."

For the Central Shenandoah EMS Foundation, the stakes were substantial. The foundation coordinates

medication management for 31 EMS agencies operating 158 vehicles across five counties and five municipalities, serving over 1000 EMS providers ranging from volunteers to career paramedics. In 2023 alone, the region handled 74,652 calls, with medications administered in nearly 12% of cases.

The complexity extended beyond volume:

“ If we wanted to do the drug box exchange system without the assistance of local hospitals, I would need 12 people to handle that without automation, ”

Larrick notes. "Just to keep exchange sites operational 24/7, you'd need three to four people running around-the-clock shifts at each location."

Beyond workforce challenges, DSCSA compliance demanded documentation precision that manual systems couldn't reliably deliver. Every dose required complete chain-of-custody records. Any discrepancy risked FDA sanctions or pharmacy license suspension. The foundation needed a solution that could scale across a geographically dispersed network while meeting federal requirements for traceability, security, and accountability.

## The Solution: Strategic Deployment of Purpose-Built Automation

Rather than attempting to manually replicate hospital-based processes, the Central Shenandoah EMS Foundation partnered with Capsa Healthcare to implement a hub-and-spoke medication distribution model centered on three strategically placed NexsysADC automated dispensing cabinets.

The deployment locations were carefully selected for accessibility and security. Each NexsysADC unit was positioned near a hospital: one at a firehouse adjacent to a medical center, one at a 9-1-1 center five minutes from a hospital, and one at a hospital property across from the emergency room ambulance entrance. This placement enabled crews to restock immediately after patient transfers, minimizing downtime and eliminating the need for staffed exchange sites.

“ The NexsysADC devices in these buildings are not manned—they are fully automated, ”

Larrick explains. “Multiple cameras are watching, an internet connection is running, and alarms are set for wrongful access, but otherwise the cabinets operate independently. EMS crews can come out of the ER and restock their inventory in minutes.”

The system's design addressed the specific workflows of EMS operations. For controlled substances like fentanyl—the second most frequently administered medication in the region—NexsysADC enforces seal-and-serial-number protocols that satisfy DEA requirements while maintaining rapid access during emergencies. The cabinet guides users to exact medication locations, logs every transaction with timestamps and user identification, and requires witnessed procedures for high-risk substances.

Implementation focused on accessibility for a diverse user base. The foundation created a six-minute training video covering core system functions for all the foundation's member EMS providers, then conducted hands-on training for agency administrators. “That six-minute video covered 98% of what any EMS provider—tech savvy or not—would need to do a medication exchange,” Larrick says. “The system was well respected and highly spoken of from day one.”

The technology integrated seamlessly with existing workflows while dramatically reducing administrative complexity. “All EMS providers have to worry about is filling out their Patient Care Report and treating their patient,” Larrick emphasizes. “They don't have to worry about filing any paperwork, building reports, or getting lost in complicated software. The regulatory side is handled by the automated cabinet's system.”

# The Results: Measurable Impact Across Operations, Compliance, and Patient Care

## Workforce Transformation and Efficiency Gains

The NexsysADC deployment delivered immediate operational benefits that exceeded initial projections. The foundation eliminated the need for 12 full-time staff positions that would have been required to manually operate medication exchange sites around the clock—a workforce savings that transformed cost structures and resource allocation.

Medication exchanges that previously required coordination and scheduling now happen in under five minutes at any hour. “Most exchanges happen in less than five minutes,” Larrick reports. “It’s a straightforward system. Questions and user error drop rapidly right after training.”

“ Most exchanges happen in less than five minutes ”

Administrative overhead collapsed alongside labor requirements. Monthly audits of each cabinet, which previously involved complex cross-checking of paper records, now require just one hour per unit. “I can do a full audit of one NexsysADC cabinet in an hour—checking every expiration date, every medication count, with a witness,” Larrick says. “Before, when we manually received medication boxes, we saw as high as 30% of meds inside needing to be expired or nearing expiration within 30 days.”

## Documentation Precision and Compliance Assurance

Between November 25, 2024, and March 25, 2025, the three NexsysADC sites dispensed **4,534 medications**, including **585 DEA-controlled substances**. Every transaction generated complete, audit-ready records without manual data entry.

“I can very quickly log into the system, hit print, and get a report of every time we moved a substance, down to the second, anywhere in the Foundation,” Larrick explains. **“I can tell you the EMS agency, who pulled it, where it was, the call it was used on, the reason why the med was pulled—just by pulling up the report and pressing print.”**

This level of documentation transformed compliance from a burden into a baseline capability. When discrepancies occur—typically from counting errors under pressure rather than security breaches—the system provides immediate forensic clarity. Multi-angle camera footage supplements transaction logs to resolve any questions.

“Nearly every discrepancy I have checked has been either user error or simple counting errors under time pressure,” Larrick notes. “It’s rarely NexsysADC. It’s almost always the user, and the error can be traced.”

A single discrepancy due to a system error was quickly identified and addressed with help from Capsa’s support team.

## Data-Driven Inventory Optimization

Real-time usage tracking enabled evidence-based inventory decisions that reduced waste and improved cost control. Detailed dispensing data revealed patterns invisible in manual systems.

“The system helped me see which meds we use versus which meds never or rarely get used before they expire,” Larrick says. “We used to stock three different medications to raise blood pressure. With the NexsysADC report, I could see the third medication, dopamine, hardly got dispensed—it got used twice in two years. We were able to discontinue carrying it as a routine med.”

Similar analysis of calcium gluconate usage revealed that the medication, while essential for specific scenarios, was rarely needed in actual field operations. This visibility allowed the foundation to optimize which vehicles carry specialized medications, matching equipment loads to crew qualifications and likely patient encounters.

Forecasting accuracy improved dramatically. “I was relying on old patient care reports to project our usage of epinephrine,” Larrick explains. “Now I know exactly what to order based on recent usage through the NexsysADC system. Really helpful in maintaining our inventory and better understanding our costs.”

## Enhanced Quality Assurance and Provider Support

NexsysADC created a secondary data source that cross-validates patient care reports—a critical quality improvement tool in an environment where documentation training varies widely among providers.

“The system lets us have clean data,” Larrick says. “Before we were going off patient care reports, and most EMS providers got very little training on how to properly prepare those reports. There was frequently missing or wrong data. NexsysADC lets me cross-check the call report associated with a ride and have a second source of clean data.”

This verification capability supports continuous improvement without punitive oversight. When discrepancies emerge, they typically indicate training needs rather than misconduct. The system’s layered safeguards and mandatory witness protocols provide both security and support for frontline providers.

“NexsysADC allows the provider to focus on patient care, not worry about the regulatory side of how to manage medications,” Larrick emphasizes. “The system itself is designed to manage the regulatory side, which is my peace of mind as the system manager.”

# Strategic Considerations for EMS Agencies Navigating DSCSA Compliance

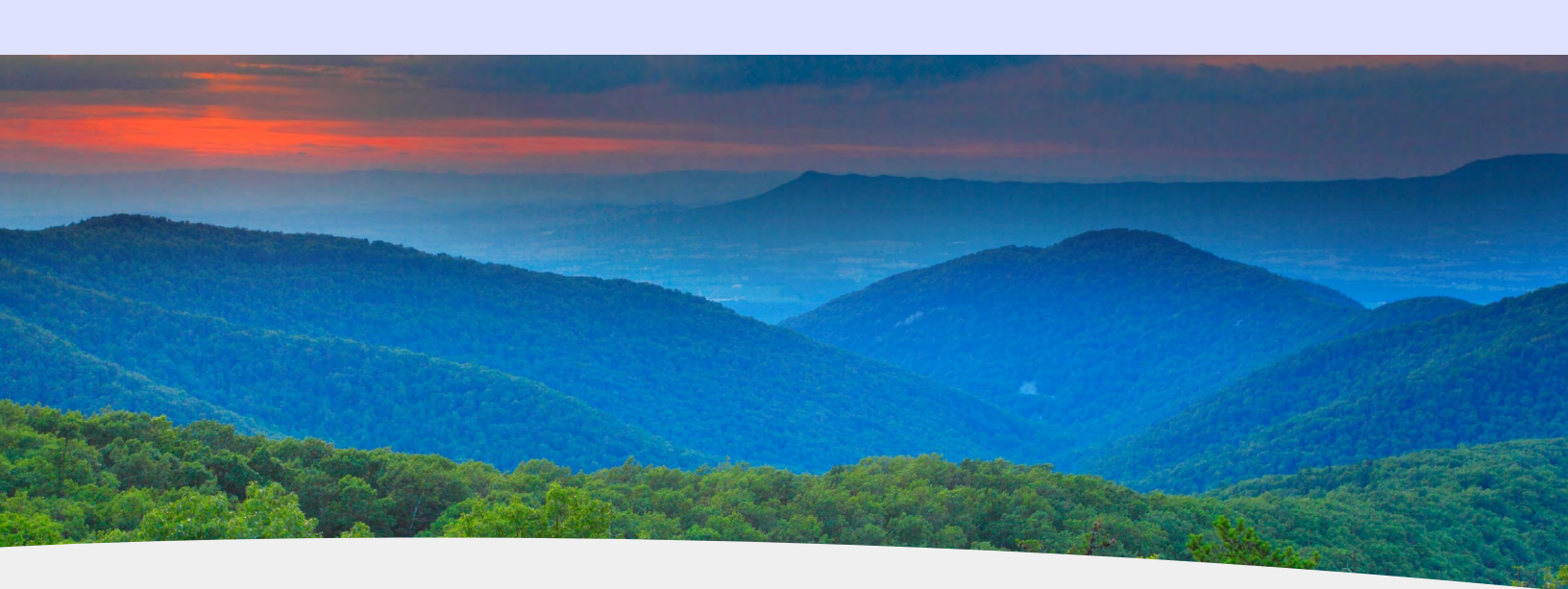
Based on the Central Shenandoah Valley experience, Larrick offers clear guidance for EMS agencies evaluating medication management modernization.

“My advice: NexsysADC is the only automation system that has an EMS-specific workflow,” he says. “I looked at other systems, and NexsysADC easily won out for three reasons: It is medication-focused, is a great value-to-cost ratio, and has the EMS workflow built in.”

He recommends automated dispensing for any agency handling high call volumes, noting that NexsysADC’s large cabinet capacity and adaptable

configuration support diverse operational models. Budget considerations, always paramount in underfunded EMS systems, favor solutions that eliminate rather than create staffing requirements.

“Our system may be more complex than other EMS foundations because of our scope and physical territory,” Larrick acknowledges. “Capsa makes it easy to work with and ensures a smooth entry into the system. I had a ton of people to train and manage, and Capsa was a great partner.”



# From Compliance Burden to Operational Advantage

The Central Shenandoah EMS Foundation's experience demonstrates that regulatory requirements can drive operational innovation rather than merely imposing costs. By replacing manual processes with purpose-built automation, the foundation transformed medication management from a vulnerability into a source of organizational strength.

The system now serves as critical infrastructure for over 1000 EMS providers across five counties, ensuring that regulatory compliance and operational efficiency advance in tandem. As DSCSA enforcement continues to tighten across the nation,

the foundation's model offers a proven pathway for EMS agencies seeking to meet federal standards while improving the reliability and effectiveness of emergency medical services.

For James Larrick and the Central Shenandoah EMS Foundation, the transformation is ongoing. "When you're dealing with controlled substances, it isn't a matter of if you will face a diversion issue—it's a matter of when," he says. "Having the ability to cross-check and know exactly who accessed medications and when is huge. That's not just compliance. That's the foundation of trust."

Learn more about NexsysADC for EMS applications—schedule a call today.



**CAPSAHEALTHCARE**



800.437.6633



[Info@CapsaHealthcare.com](mailto:Info@CapsaHealthcare.com)



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