Strategies for Building & Improving State Stroke Systems of Care

American Heart Association – Sioux Falls, SD

Hosted by Sanford Health

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A Tale of Two Patients

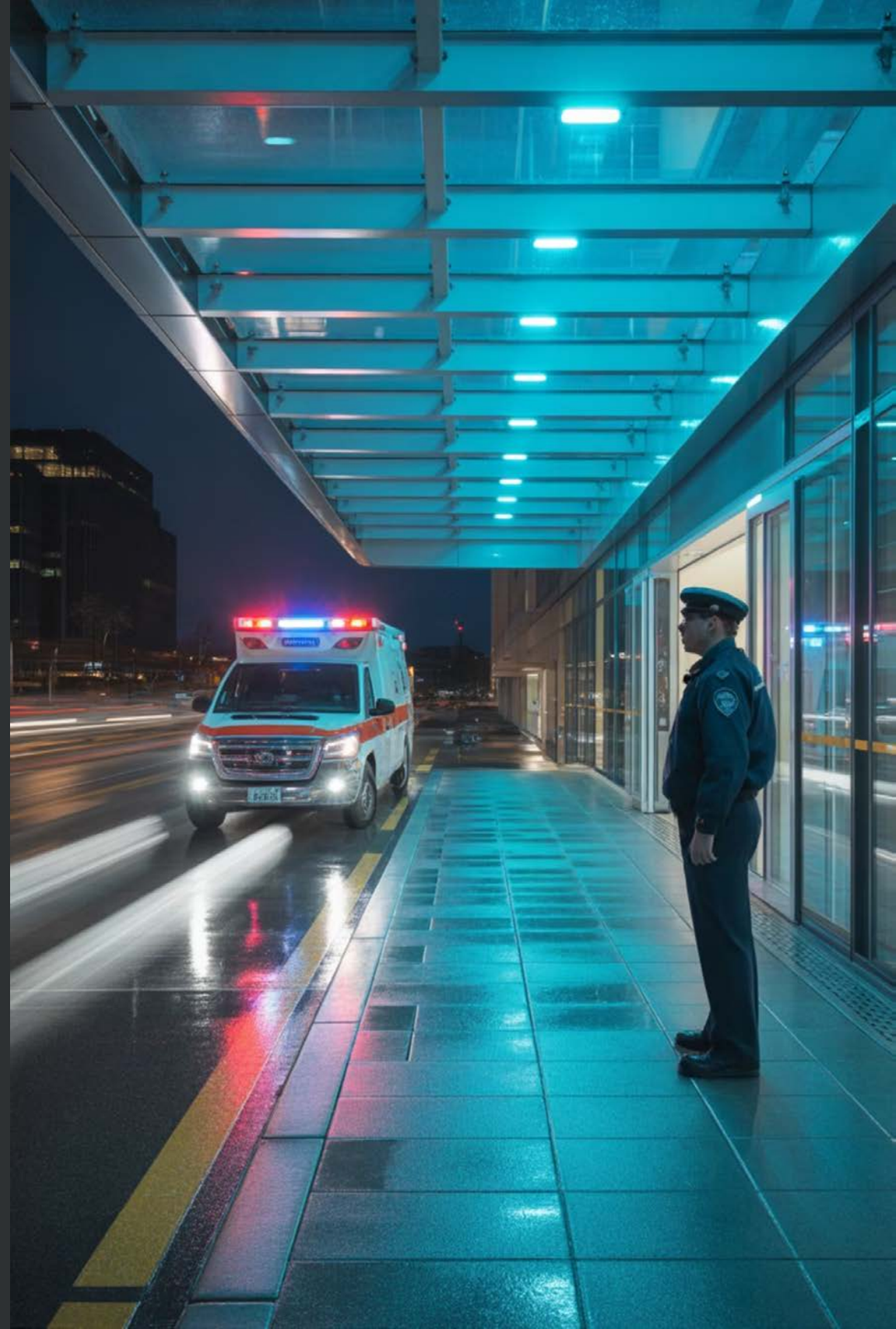
Patient A

Same city, same year. Both suffered ischemic strokes. Patient A was routed directly to the right facility, treated rapidly within the therapeutic window, and walked across the stage at their grandchild's graduation six months later.

Patient B

Patient B went to the wrong door first, experienced critical delays in diagnosis and transfer, and missed the treatment window entirely. Today, they require full-time care and will never regain their independence.

The variable wasn't the severity of disease or patient factors—it was the **system** that determined these vastly different outcomes.



Why This Talk Matters

Systems Thinking

Stroke systems function as the statewide operating system that coordinates every touchpoint from symptom onset through recovery. When designed well, they eliminate variation and ensure consistent, high-quality care regardless of where a patient first seeks help.

Strategic Focus

Our approach centers on four critical pillars: governance structures that align stakeholders, routing protocols that get patients to the right place, data systems that drive improvement, and incentives that reward speed and quality.

North Star

Every decision we make must advance two fundamental goals: improving clinical outcomes through evidence-based care delivery and ensuring health equity so that geography, race, and socioeconomic status don't determine survival and recovery.

Learning Objectives

01

Define stroke systems of care

Understand what constitutes a comprehensive stroke system and why integrated, tiered care delivery dramatically improves patient outcomes compared to fragmented approaches.

02

Examine stroke burden

Analyze stroke impact at global, national, and local levels, including mortality, disability, and economic costs that demonstrate the urgent need for systematic improvement.

03

Explore South Dakota context

Identify unique geographic, demographic, and healthcare infrastructure challenges while recognizing specific opportunities for building effective stroke systems in our state.

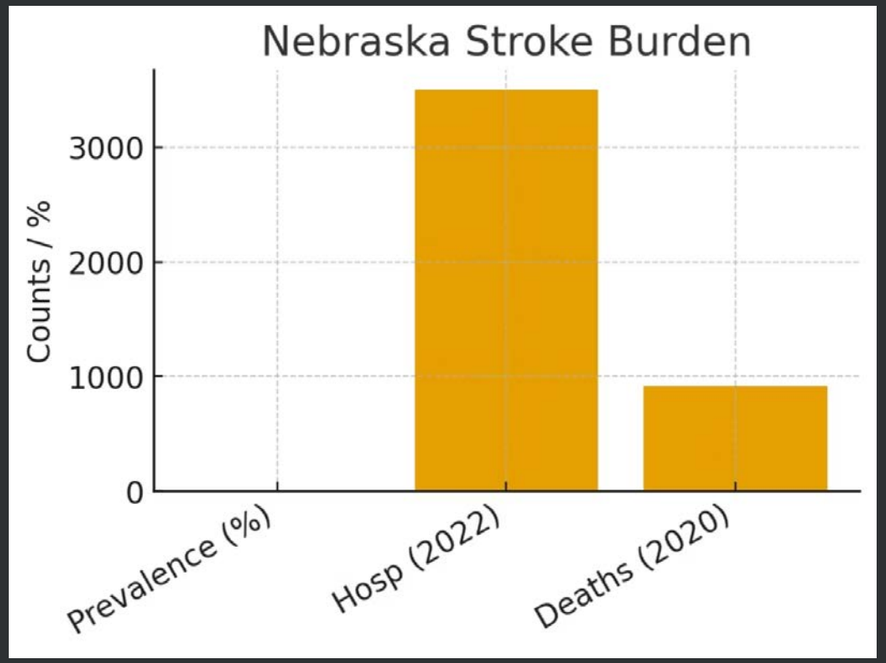
The Cost of Inaction

United States Impact

- 795,000 Americans suffer strokes annually
- One stroke occurs every 40 seconds
- One stroke death every 3 minutes
- $56 billion in annual healthcare costs

Global Burden

- 7.3 million deaths worldwide
- 160 million disability-adjusted life years lost
- Rising incidence in younger populations



Every day we delay building comprehensive stroke systems, we accept preventable death and disability. The human and economic toll demands immediate, coordinated action.

Systems Equal Equity

> "ZIP code should not determine destiny when it comes to stroke survival and recovery."

The persistent rural - urban treatment gap represents one of our healthcare system's greatest failures. Patients in remote areas face longer EMS response times, greater distances to specialized care, and limited access to advanced treatments like mechanical thrombectomy.

True stroke systems of care shrink geography as a determinant of outcome by creating standardized protocols, ensuring appropriate routing, and leveraging telemedicine to bring expertise everywhere stroke can occur. When designed with equity as a core principle, these systems can eliminate disparities and ensure every patient receives optimal care regardless of their location.

What is a Stroke System of Care?

A stroke system of care is a statewide, tiered, and data-linked framework that seamlessly connects every step of the patient journey from first symptom recognition through long-term rehabilitation and secondary prevention.

1

Recognition

Public education and EMS screening

2

Transport

Protocol-driven routing to appropriate facilities

3

Treatment

Rapid diagnosis and evidence-based interventions

4

Recovery

Rehabilitation and ongoing care coordination

This comprehensive approach aligns EMS protocols, certified hospitals, treatment standards, and continuous quality improvement loops to eliminate variation and optimize outcomes at every decision point.

Six Essential Components

Prevention & Recognition

Community education campaigns that teach stroke symptom recognition and emphasize the critical importance of calling 911 immediately rather than seeking alternative transportation.

EMS Protocols

Standardized screening tools and destination protocols that ensure patients reach the most appropriate facility based on stroke severity and available treatments.

Tiered Centers

Designated stroke centers with defined capabilities, from basic acute care to comprehensive services including mechanical thrombectomy and neurocritical care.

Treatment Access

Guaranteed access to time-sensitive interventions including IV tissue plasminogen activator (tPA) and endovascular thrombectomy when clinically indicated.

Rehabilitation

Coordinated post-acute care including inpatient rehabilitation, skilled nursing, home health, and outpatient therapy services tailored to individual recovery needs.

Quality Measurement

Continuous monitoring of performance metrics with regular feedback loops that drive system-wide improvement and ensure accountability.

Hospital Certification Tiers

Comprehensive Stroke Center (CSC)

Advanced capabilities including 24/7 endovascular therapy, neurocritical care, and complex case management. Serves as regional hub for the most severe strokes.

Thrombectomy - Capable Center (TSC)

Provides mechanical thrombectomy services with trained interventionalists, appropriate imaging, and post procedure care capabilities.

Primary Stroke Center (PSC)

Core stroke services including IV thrombolysis, basic imaging, and stroke unit care with established protocols for complex case transfers.

Acute Stroke Ready Hospital (ASRH)

Basic stroke evaluation and treatment capabilities with rapid decision making and transfer protocols to higher levels of care when needed.

EMS: The Critical Front Door

Emergency Medical Services represents the most crucial decision point in stroke care, determining whether patients reach appr opr iate treatment within therapeutic windows.

Unified Severity Assessment

Implementation of a single, validated stroke severity scale statewide ensures consistent patient triage and eliminates confusion between different EMS agencies and receiving hospitals.

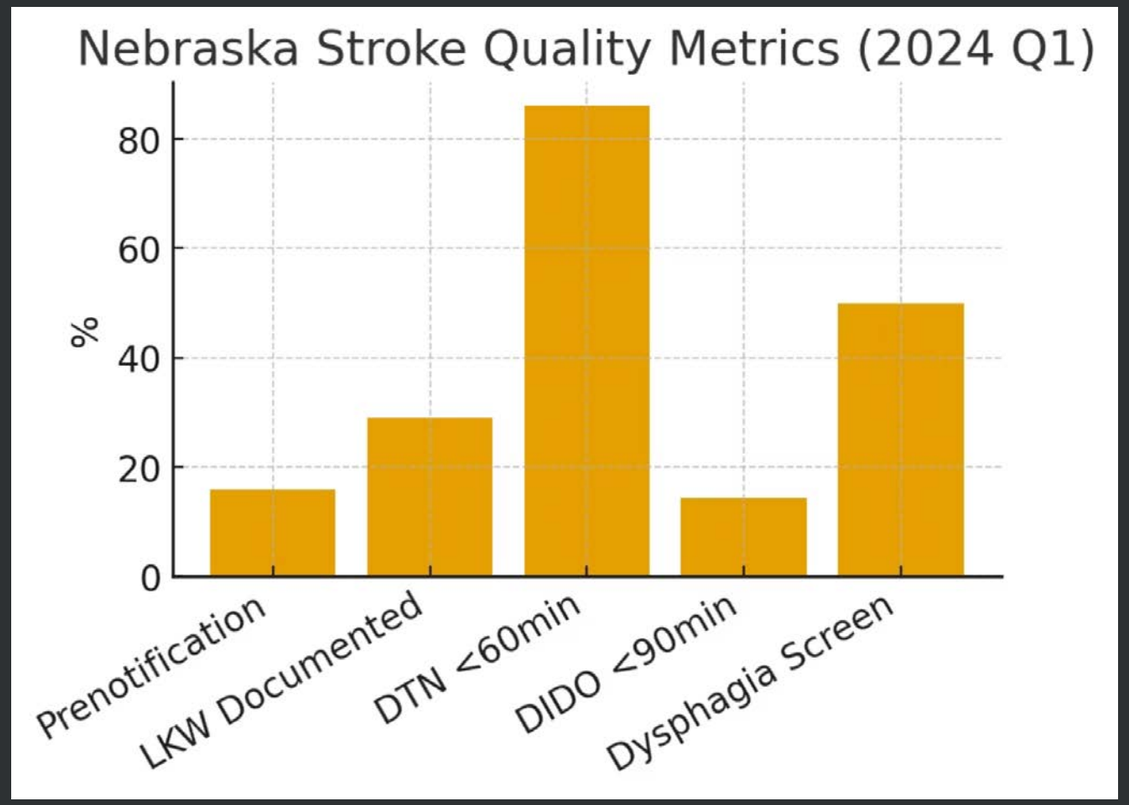
Time- Based Routing

Evidence - based bypass protocols that route suspected large vessel occlusion patients directly to thrombectomy - capable centers, even when it means bypassing closer facilities.

Seamless Communication

Standardized pre - notification procedures and automatic acceptance policies that eliminate transfer delays and ensure receiving teams are prepared upon patient arrival.

Data as the Backbone of Improvement



Registry Integration

Coverdell and Get With The Guidelines - Stroke registries provide the foundation for measuring performance and identifying improvement opportunities across the entire care continuum.

Continuous Monitoring

Real-time integration of EMS and hospital data creates feedback loops that enable rapid identification of system failures and immediate corrective actions.

Transparency Drives Equity

Public reporting of performance metrics creates accountability and helps identify disparities that might otherwise remain hidden in aggregate statistics.

Governance and Accountability

Effective stroke systems require strong governance structures that bring together all key stakeholders and provide clear accountability mechanisms for system performance.

State Stroke Task Force

Multi-disciplinary group including EMS leaders, hospital administrators, public health officials, payers, and tribal health representatives working collaboratively to establish standards and monitor progress.

Policy Mechanisms

Strategic use of regulatory levers including facility certification requirements, EMS protocol standardization, and public transparency reporting to drive system-wide adoption of best practices.

Performance Accountability

Clear metrics and regular reporting cycles that hold all system participants accountable for their roles in achieving optimal patient outcomes and eliminating care disparities.

Proof Point: Los Angeles County Success

40%

Before Implementation

EVT access rate prior to system redesign

93%

After Implementation

EVT access rate with 2-tier routing

2x

Treatment Volume

Thrombectomy procedures more than doubled

LA County's implementation of evidence-based EMS routing protocols demonstrates the transformative power of systems thinking. By creating clear destination algorithms and eliminating the variability of individual decision-making, they dramatically improved access to life-saving treatments while simultaneously reducing unnecessary transfers and system inefficiencies.

Global Stroke Burden

Annual Strokes

New stroke cases worldwide each year, representing a massive public health challenge

Deaths

Lives lost to stroke annually, making it a leading cause of mortality globally

DALYs Lost

Disability-adjusted life years representing the total disease burden

The global burden of stroke continues to rise, with particularly concerning increases in younger populations. This trend underscores the urgent need for comprehensive prevention strategies and systematic approaches to care delivery that can address both treatment and long-term disability management on a population level.

United States Burden and Economic Impact

Clinical Impact

- **795,000** Americans experience stroke annually
- **185,000** are recurrent strokes
- **87%** are ischemic strokes
- Stroke kills more women than men

Economic Burden

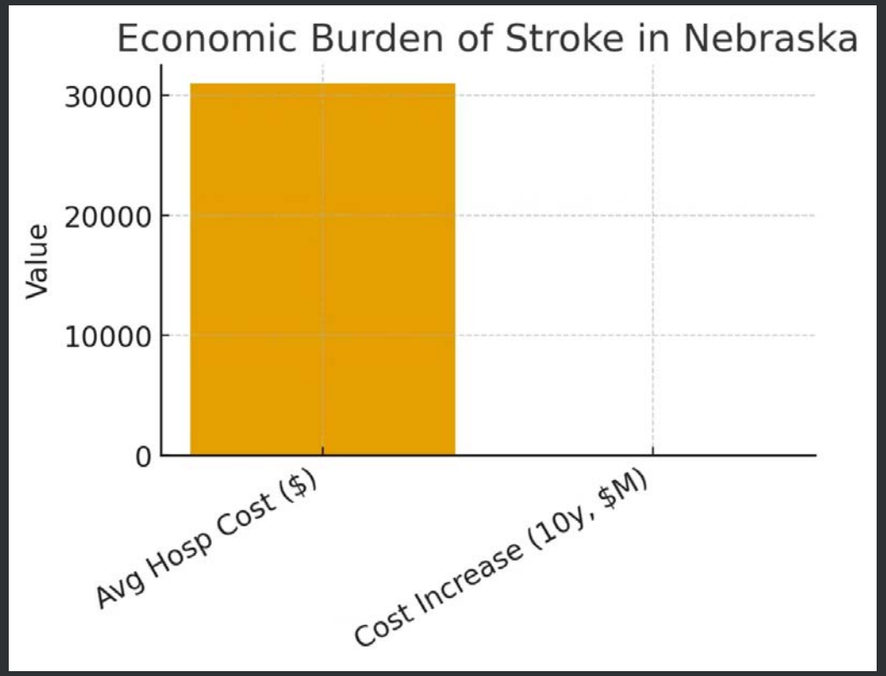
- **$56 billion** total annual cost
- **$39 billion** in direct medical costs
- **$17 billion** in lost productivity
- Lifetime costs exceed $140,000 per patient

Beyond these staggering numbers lies persistent disability burden affecting millions of stroke survivors and their families. The economic impact extends far beyond medical costs to include lost wages, caregiver burden, and reduced quality of life that ripples through communities nationwide.

Stroke as the Leading Cause of Disability

Disability Impact

Stroke stands as the leading cause of adult disability in America, fundamentally altering the lives of survivors and their families. The loss of independence affects not just mobility and speech, but cognitive function, emotional well-being, and social relationships.



Broader Consequences

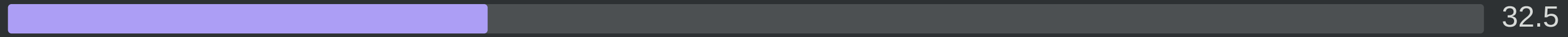
- Loss of employment and financial security
- Increased caregiver burden on families
- Social isolation and depression
- Reduced life expectancy and quality
- Long-term healthcare resource utilization

Understanding stroke's role as a primary disabling condition reinforces why time-sensitive, high-quality acute care is so critical—every minute saved in treatment can mean the difference between independence and lifelong disability.

South Dakota's Stroke Burden

383

Stroke deaths in South Dakota during 2023, equivalent to more than one stroke death every single day in our state.



Mortality Rate

Deaths per 100,000 population, slightly above the national average

While our state's total numbers may seem small compared to larger states, the per-capita impact is significant. More importantly, behind each statistic is a family forever changed, a community member lost, and often a preventable tragedy that highlights the urgent need for systematic improvement in our stroke care delivery.

South Dakota's Unique Disparities

Geographic Challenges

Vast distances between communities and specialized care centers create inherent delays. Some patients face transport times exceeding two hours, well beyond optimal treatment windows for many interventions.

EMS Infrastructure

Heavy reliance on volunteer Emergency Medical Services with varying training levels and availability. Weather conditions can ground air transport, further limiting access to timely care.

Hospital Limitations

Many critical access hospitals lack advanced imaging capabilities or 24/7 coverage by physicians trained in acute stroke care, creating diagnostic and treatment delays.

Urban- Rural Gap

Stark differences in outcomes between patients in Sioux Falls, Rapid City metropolitan areas versus rural communities, where access to specialized care remains limited.

Omaha's Starting Point: Fragmentation

Before system development, the Omaha region exemplified the challenges facing many communities: excellent individual providers and facilities operating in isolation rather than as an integrated network.

Protocol Inconsistencies

Different EMS agencies used varying stroke screening tools and destination criteria, creating confusion and suboptimal routing decisions that delayed definitive care.

Information Silos

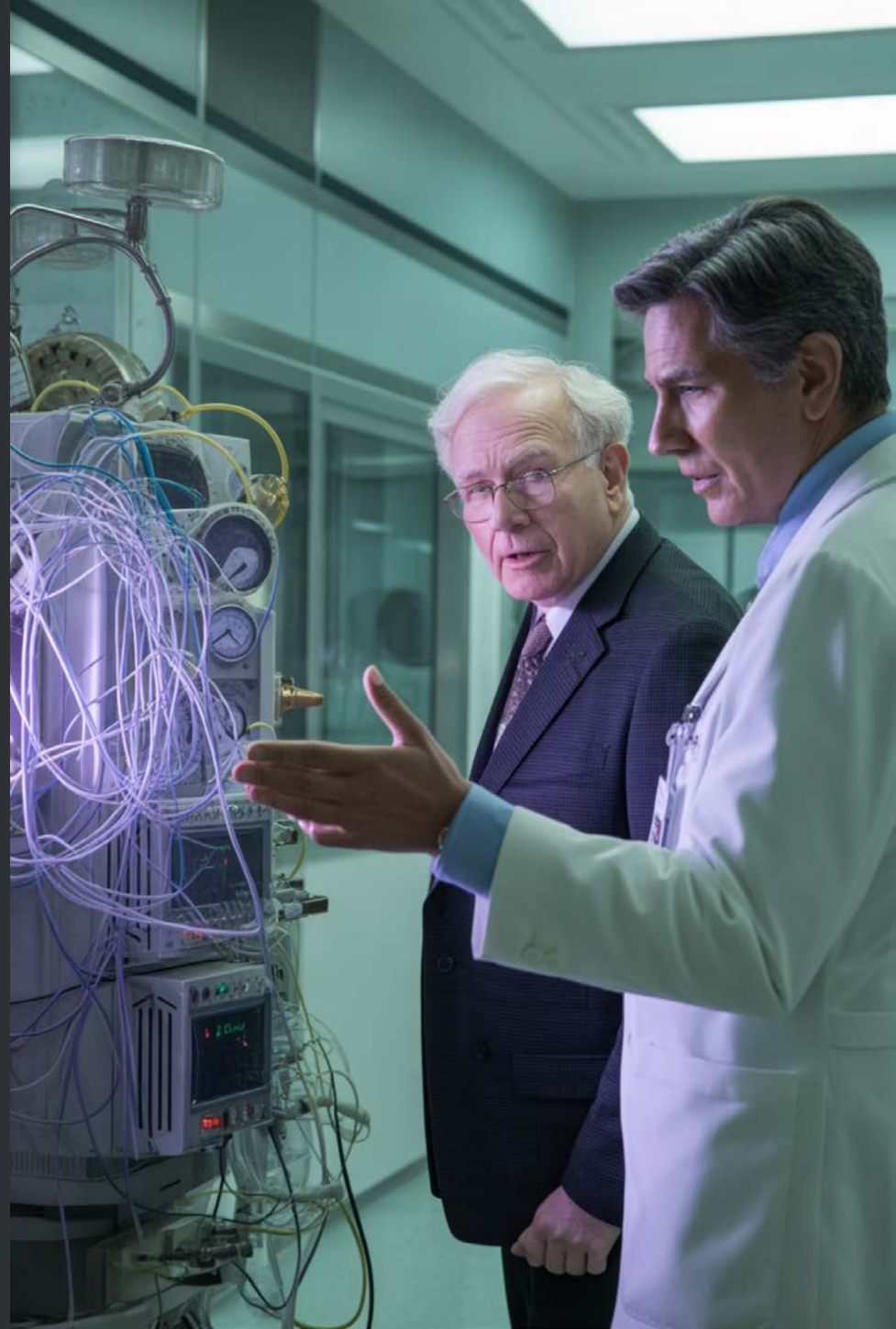
Hospitals operated separate data systems with limited sharing of performance metrics or outcomes, making system-wide quality improvement nearly impossible.

Variable Access

Telestroke coverage was inconsistent, leaving some facilities without reliable access to specialized expertise during critical decision-making moments.

Outcome Lottery

Patient outcomes depended largely on which facility they happened to reach first rather than systematic routing to the most appropriate level of care.



Omaha's Building Blocks for Success

01

Universal Telestroke

Implemented comprehensive telestroke coverage ensuring that specialized neurological expertise was available at every facility where stroke patients might present, regardless of time or location.

02

Standardized EMS Protocols

Adopted a single, validated stroke severity scale across all EMS agencies with clear routing algorithms that eliminated guesswork in destination decisions.

03

Integrated Quality Improvement

Established mandatory participation in stroke registries with regular multidisciplinary QI huddles that brought together all stakeholders to review cases and identify improvement opportunities.

These foundational elements created the infrastructure necessary for systematic improvement while establishing trust and collaboration among previously independent organizations.

Overcoming Implementation Obstacles

1

Staffing Shortages

Addressed through standardized protocols that reduced decision complexity and escalation pathways that ensured appropriate expertise was always accessible, even with limited on-site staffing.

2

Cultural Resistance

Overcome through transparency in performance metrics and building trust by demonstrating that collaboration improved outcomes for everyone's patients rather than creating winners and losers.

3

Financial Barriers

Resolved by aligning reimbursement structures with quality outcomes and demonstrating that system efficiencies reduced overall costs while improving care quality.

Each obstacle required persistent leadership, clear communication about shared goals, and willingness to adapt solutions based on stakeholder feedback and real-world implementation experiences.

Omaha's Measurable Results

25%

Door-to-Needle

Reduction in treatment times

70%

IV Thrombolysis

Increase in utilization rates

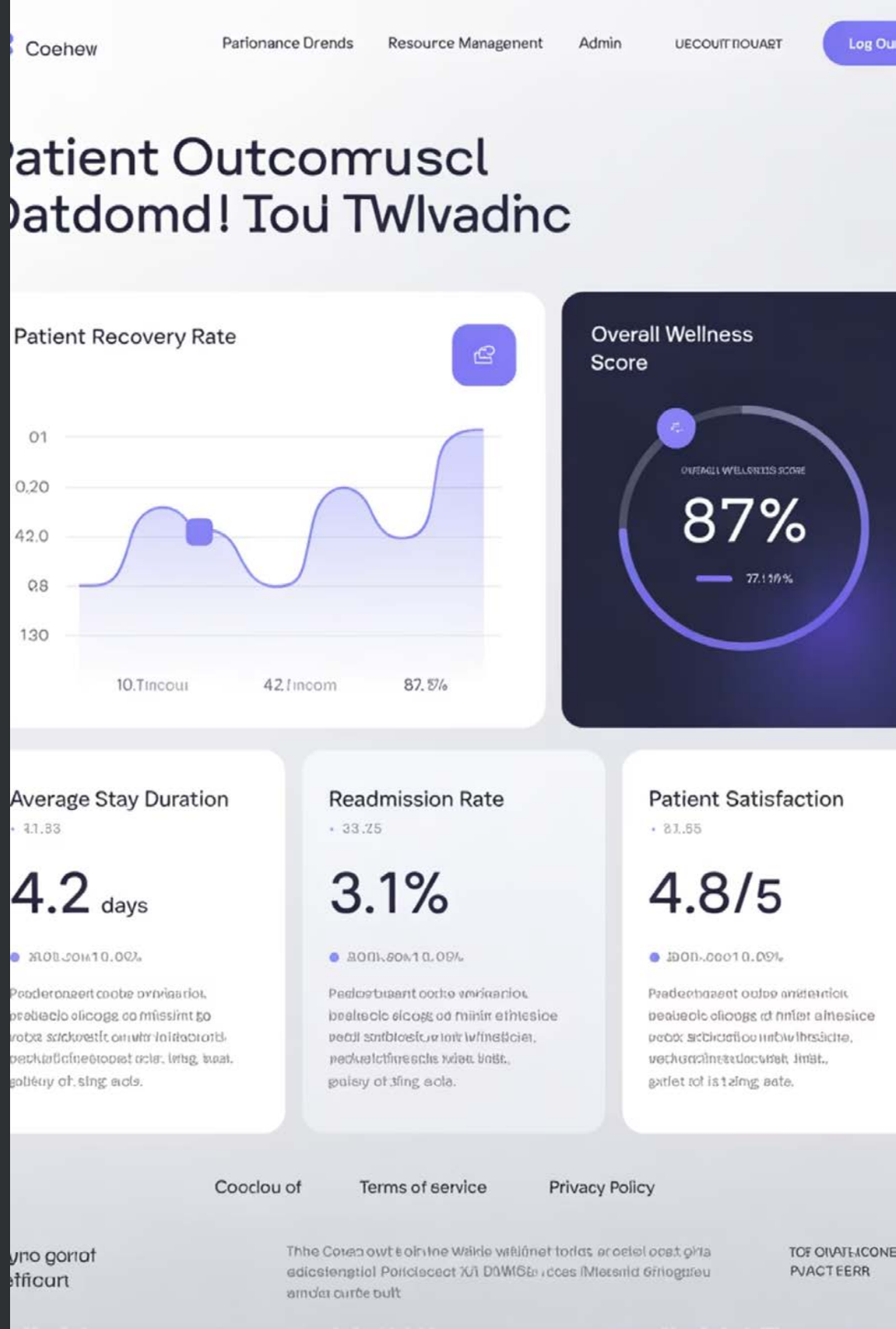
60%

Transfer Efficiency

Faster access to EVT

These improvements translated directly into better patient outcomes: more people walking out of the hospital, fewer requiring long -term care, and families kept whole. The success demonstrated that systematic approaches to stroke care deliver measurable benefits that justify the effort required for implementation.

Perhaps most importantly, the model proved sustainable over time, with continuous improvement rather than regression as stakeholders became invested in the shared success of the system.



Leadership Lessons from Success

Convene the Coalition

Successful stroke systems require bringing together stakeholders who may have competing interests but share a common goal of improving patient outcomes. Leadership means creating safe spaces for honest dialogue and finding win-win solutions.

Publish the Scoreboard

Transparency in performance metrics creates accountability and drives improvement. When everyone can see how the system is performing—both successes and failures—it motivates collective action toward better outcomes.

Make the Right Thing Easy

The best protocols are those that make high-quality care the natural, effortless choice. When doing the right thing requires extra steps or complex decisions, compliance suffers and outcomes decline.

South Dakota's Geographic Challenge

Geography as Destiny?

South Dakota's vast rural landscape creates inherent challenges for stroke care that require innovative solutions and realist ic expectations about what systems can achieve.

Distance Reality

Some patients live more than 150 miles from the nearest comprehensive stroke center, creating transport times that exceed therapeutic windows even with perfect execution of all other system elements.

Weather Vulnerability

Winter storms can ground air transport and make ground transport treacherous, requiring backup plans and alternative care pathways that account for seasonal variability.

Infrastructure Investment

Strategic placement of resources and capabilities must account for population density, existing infrastructure, and realistic patient volume projections to ensure sustainability.

EMS Workforce Reality

South Dakota's EMS system relies heavily on dedicated volunteers who balance emergency medical response with their primary careers and family obligations. This reality requires system design that works within these constraints.

1

Current State

Volunteer services with variable training levels, high turnover rates, and inconsistent availability during certain shifts or seasons.

2

Training Solution

Annual standardized stroke education programs that provide consistent, evidence-based training accessible to all EMS personnel regardless of service size or location.

3

System Support

Unified EMS toolkit with decision aids, protocols, and communication tools that reduce cognitive load and support consistent decision-making even with varying experience levels.

The Sioux Falls Advantage

Sioux Falls represents a unique opportunity in South Dakota's stroke care landscape, with two world-class comprehensive stroke centers providing the foundation for a robust hub-and-spoke model.

Avera McKennan Hospital

DNV-certified Comprehensive Stroke Center since 2023, offering 24/7 endovascular capabilities, neurocritical care, and comprehensive rehabilitation services. Serves as eastern South Dakota's primary stroke hub.

Sanford USD Medical Center

Achieving DNV Comprehensive Stroke Center certification in 2025, expanding the region's capacity for complex stroke care and ensuring redundancy in critical services.

This dual-hub configuration creates unprecedented opportunity for South Dakota to build a truly comprehensive stroke system that can serve the entire state through strategic partnerships, telemedicine connections, and coordinated transport protocols.

The key is leveraging these centers not as competitors, but as collaborative partners in a shared mission to eliminate stroke outcome disparities across South Dakota.

Telehealth: The Great Equalizer

> "Telehealth has the power to bring world-class stroke expertise to every corner of South Dakota, eliminating geography as a barrier to optimal care."

Telestroke Excellence

High-definition video consultations enable remote neurologists to perform comprehensive stroke evaluations, guide treatment decisions, and support local providers in real-time, dramatically improving outcomes in rural settings.

Treatment Decisions

Remote specialists can evaluate patients for IV thrombolysis and endovascular therapy, ensuring that treatment decisions are made by stroke experts regardless of the patient's geographic location.

Policy Mandate

State policy should require universal telestroke coverage at all facilities that provide emergency care, ensuring no South Dakota resident faces stroke without access to specialized expertise.

12-24 Month Implementation Blueprint

1 EMS Standardization

Implement unified stroke routing protocols and adopt single large vessel occlusion scale statewide. Train all EMS personnel on consistent assessment and destination criteria.

2 Telestroke Expansion

Mandate universal telestroke coverage at all emergency departments. Ensure 24/7 availability and standardize consultation protocols across all participating facilities.

3 Capability Mapping

Develop real-time statewide stroke capability map showing current capacity, staffing, and resource availability to optimize patient routing and transfer decisions.

4 Quality Improvement

Launch quarterly CSC-led quality improvement huddles bringing together all stroke care providers to review cases, share best practices, and identify system gaps.

5 Public Education

Deploy rural-focused FAST campaigns using community partnerships and trusted local messengers to improve stroke recognition and 911 utilization rates.

Policy Framework and Sustainable Funding

1

State Stroke Task Force

Establish formal multi-stakeholder governance body with representation from EMS, hospitals, public health, payers, and tribal health organizations. Provide regulatory authority and ongoing oversight.

2

Certification Standards

Adopt recognition of national stroke center certifications as state standards, creating clear expectations for capabilities and performance at each tier of care.

3

Data Infrastructure

Expand Coverdell registry participation and integrate with EMS data systems to create comprehensive stroke surveillance and quality improvement capabilities.

4

Value-Based Payment

Align reimbursement structures with speed and quality outcomes, rewarding providers who demonstrate excellence in stroke care delivery and system participation.

Our Closing Vision

Every Minute Counts

Every minute we save in stroke treatment represents birthdays celebrated, grandchildren hugged, and families kept whole. In South Dakota, we refuse to accept that ZIP code should predict stroke outcome.

> "When we build these systems together, we create a legacy where every South Dakotan—regardless of where they live, work, or suffer their stroke—has access to world-class care that gives them the best possible chance at recovery and independence."

Call to Action

The evidence is clear, the tools are available, and the need is urgent. Let's commit today to building South Dakota's comprehensive stroke system—together.

Shared Responsibility

Success requires every stakeholder: EMS leaders standardizing protocols, hospitals pursuing certification, policymakers enabling innovation, and communities supporting implementation.

Measurable Impact

Within five years, we can eliminate stroke outcome disparities, improve survival rates, and ensure that every stroke survivor has the opportunity for meaningful recovery.

References and Resources

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- South Dakota Data

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For additional resources and implementation guidance, contact the American Heart Association's Mission: Lifeline Stroke progr am or the South Dakota Department of Health's Chronic Disease Prevention Program.