Assessing The Impact Of State Stroke Systems Of Care Policy Interventions

Evaluation Findings Brief | April 2022

Since 2002, most states have adopted policies (i.e., legislation and/or regulations) to create and strengthen **stroke systems of care (SSOCs)** that improve access to time-sensitive and effective treatment for stroke victims.[1] This study assessed the impact of existing state SSOC laws on a range of stroke outcomes over time. The evaluation included an impact analysis of laws in all 50 states and Washington, DC, and case studies in three states that exceeded predicted performance on multiple stroke outcomes. State decision makers and public health organizations may consider study findings to support and improve SSOC in states and regions.

KEY FINDINGS

What is the estimated impact of SSOC policies on stroke outcomes?

- On average, states with at least one SSOC policy in effect demonstrated better performance on the following outcomes than predicted in the absence of any SSOC policies:

Higher proportion of certified Primary Stroke Centers

Higher brain scan rates within 45 minutes of hospital arrival

Lower in-hospital costs for stroke patients

Lower in-hospital mortality among stroke patients

Which SSOC policy interventions predicted better stroke outcomes?

- Requiring a **SSOC task force** was associated with having a higher proportion of certified Primary Stroke Centers (PSCs) in a state.
- Requiring a **statewide stroke continuous quality improvement (CQI) data system** for at least 1 year was associated with higher-than-predicted brain scan rates within 45 minutes of hospital arrival.
- Lower-than-predicted in-hospital costs were observed 3 years after an **SSOC task force** was authorized or required, or 1–2 years after an **SSOC task force** was authorized or required in states that also authorized or required **stroke center CQI data reporting system** without specifying the use of a stroke center tiered approach.
- Lower-than-predicted in-hospital mortality rates were associated with requirements for **inter-facility transfer agreements** in the absence of state standards for certifying acute stroke ready hospitals, after **emergency medical services (EMS) transportation protocols** became required, or after an **SSOC task force** was required.
- Three states with strong performance on stroke outcomes each had laws that authorized or required:

Tiered stroke centers based on national standards

Use of EMS stroke assessment tools

EMS transportation protocols

STUDY METHODS

Impact Analysis

Using a legal database of SSOC laws in all 50 states and Washington, DC, from 2002 to 2018 and annual data on seven state-level stroke outcome metrics, the study employed Bayesian additive regression trees (BART)[2] to predict outcomes in states with at least one SSOC policy intervention as if no policies were in effect. We compared the predicted outcomes (in the absence of policies) to the actual outcomes starting 1 year after the first SSOC policy was in effect to estimate the impact of having at least one SSOC policy intervention.

After the BART analysis, we used a regression tree procedure with an evolutionary algorithm to identify specific SSOC policy interventions, combinations of interventions, and/or intervention features that predicted the estimated effects on each outcome.

State Case Studies

We conducted case studies in **Florida**, **Rhode Island**, and **South Carolina** to understand how SSOC laws contributed to improved stroke outcomes and reduced health disparities in states that outperformed predictions in the impact analysis and have robust SSOC laws in effect. We reviewed each state's SSOC legal landscape, examined patterns of health disparities in stroke outcomes at the county level, and interviewed two to four key informants knowledgeable about SSOC policies and practices in each state.

What actions were taken by successful states that facilitated implementation of SSOC policy interventions?

- Established a formal advisory body with representation from key stroke practitioner groups (state or regional).
- Modeled SSOC after existing trauma response systems.
- Used statewide data systems that compel EMS and hospitals to improve on stroke performance metrics.
- Implemented SSOC policies that trigger a cascade effect—for example, transport bypass protocols can spur hospitals to become certified stroke centers.
- Used state laws to establish backbone features of SSOC while offering latitude for regional applications and updates to protocols that reflect the latest science and evidence.
- Educated SSOC practitioners to understand the "why" behind policies and procedures.

STUDY CONCLUSIONS[3]

- States with one or more state SSOC policies in effect achieved better stroke outcomes on average than they would have achieved without SSOC policies.
- Policies that established an SSOC task force, statewide stroke CQI data systems and reporting, inter-facility transfer agreements, EMS transport protocols, standardized EMS stroke assessment protocols, and/or tiered stroke center systems contributed to stronger outcomes.

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