What Is the Evidence for State Laws to Enhance In-hospital and Post-hospital Stroke Care?

A Policy Evidence Assessment Report

National Center for Chronic Disease Prevention and Health Promotion
Division for Heart Disease and Stroke Prevention
Suggested Citation


Disclaimer

The findings and conclusions of this document are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. Furthermore, this document is not intended to promote any particular legislative, regulatory, or other action.
The Big Picture

Background

Stroke is a leading cause of death and serious disability in the United States.¹ State and regional stroke systems of care coordinate and promote timely patient access to the full range of activities and services associated with stroke prevention, treatment, and rehabilitation.²

Policy is a tool that could be used to improve stroke systems of care. Policy can be defined as a law, regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions.³ Multiple states have enacted laws aimed at improving the care provided to stroke patients before, during, and after their stay at the hospital.⁴ In May 2017, the Centers for Disease Control and Prevention (CDC) Division for Heart Disease and Stroke Prevention (DHDSP) assessed the best available evidence for seven different policy interventions to improve pre-hospital stroke care, addressed in state law.⁵ Between May and August 2018, DHDSP assessed the best available evidence for nine additional policy interventions to improve acute-care in-hospital and post-hospital stroke care.

About This Report

This report assesses the strength and quality of the best available evidence for eight policy interventions to improve hospital stroke care and one policy intervention related to post-hospital stroke care. Each of these policy interventions a) is recommended by experts on stroke systems of care and b) was addressed in at least one state’s law in effect as of May 31, 2018.⁶ In this assessment, best available evidence included research and evaluation studies, as well as subject matter expert and practitioner recommendations, drawn from the published and grey literature. For more on the methods, see the Appendix.

Results of this assessment offer decision makers real-world, evidence-informed options for supporting stroke systems of care. The figure on the next page prioritizes the nine hospital/post-hospital stroke policy interventions addressed in state law by evidence level (“best,” “promising quality,” “promising impact,” or “emerging”). As of May 31, 2018, there were four policy interventions impacting in-hospital/post-hospital stroke care that were found to have “best” evidence and five found to have “emerging” or “promising” evidence (Figure).

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¹. Post-hospital stroke laws and post-hospital stroke policy interventions are still developing. This assessment identified one post-hospital stroke policy intervention addressed in both evidence and laws. Future assessments may examine more policy interventions impacting the post-hospital stage as these policy interventions emerge.

². Policy interventions related to primordial prevention, public and provider education on stroke, and telehealth for stroke rehabilitation services (including interstate licensure compacts for physicians) were not included in this assessment, because there are already high-quality evidence and law assessments for these topics. Health insurance coverage of stroke rehabilitation services was considered a dynamic, cross-cutting contextual factor affecting the implementation of the stroke policy interventions included in this assessment. Increased development of policy interventions to improve stroke rehabilitation is still needed.
State laws that address the policy interventions with “best” evidence that are expected to have the greatest potential for a positive health and associated economic impact were related to:

- Telestroke to Initiate Treatment On-site
- State-level Continuous Quality Improvement Registry
- Nationally Certified Primary Stroke Centers (PSCs)
- State Standards for Primary Stroke Centers

The following state laws that address the policy interventions with “promising” or “emerging” evidence could also have positive impacts, but the quantity and quality of the evidence for public health impact is limited at this time:

- State Standards for Comprehensive Stroke Centers (CSCs)
- Nationally Certified Comprehensive Stroke Centers (CSCs)
- Nationally Certified Acute Stroke-Ready Hospitals (ASRHs)
- Nationally Recognized Stroke Rehabilitation Facilities
- State Standards for Acute Stroke-Ready Hospitals

Researchers and evaluators could help build stronger evidence for these “promising” and “emerging” policy interventions. See the Appendix for a more detailed description of scoring and how the evidence for the policy interventions in this assessment could be strengthened.

**Figure. Nine policy interventions impacting in-hospital/post-hospital stroke care addressed in existing state law as of May 31, 2018**

*Use the links in this figure to navigate to an evidence summary for each policy intervention.*
In-depth Results

In this assessment, policy interventions addressing Stroke Telemedicine had the most robust evidence base in terms of evidence for potential public health impact and quality. Additionally, while both the Nationally Certified PSCs and State Standards for PSCs policy interventions had evidence bases that scored “best,” based on many high-quality studies finding positive outcomes, it is worth noting that there were also multiple studies of PSCs finding mixed or no outcomes, including suboptimal allocation.\(^c\)

The evidence base for Nationally Certified CSCs scored “promising evidence quality,” with several published recommendations from experts and one study comparing outcomes at nationally and state-certified CSCs with outcomes at certified PSCs; the CSCs in this study exceeded PSCs in timely acute reperfusion therapy for emergency department admissions, whereas PSCs had lower risk-adjusted in-hospital mortality.\(^6\) The policy intervention of State Standards for CSCs also scored “promising evidence quality” with several other supportive items of evidence, including a study finding CSCs meeting state standards were linked with increased access to appropriate stroke treatment and improved stroke recognition in New Jersey.\(^7\)

ASRHs, along with stroke telemedicine, are meant to help fill gaps in stroke care, particularly in rural areas.\(^8, 9\) The evidence base for Nationally Certified ASRHs scored “promising evidence for potential public health impact” in this assessment, based primarily on one study finding improved stroke recognition and increased access to appropriate stroke treatment and expert care at a hospital serving a rural community in North Carolina while seeking Joint Commission certification as an ASRH.\(^10\)

The evidence base for Nationally Recognized Stroke Rehabilitation Facilities scored “emerging,” with several recommendations from experts. The evidence base for State Standards for ASRHs also scored “emerging,” with one indirect link with health improvements suggested.\(^11\) Despite the current limitations in the evidence for the “emerging” policy interventions in this assessment, input from subject matter experts suggests continued innovation and testing in these areas.

How to Use This Report

State decision makers and public health organizations may consider presenting this report, along with facts about stroke rates and existing stroke policies and programs, to state stroke task forces and collaboratives, state and local public health agencies, health care providers and payers, and others interested in improving stroke outcomes.

State decision makers may consider planning for a state stroke policy that addresses multiple evidence-informed policy interventions to improve stroke care. State and local health agencies and their partners, state legislators, and task forces can help drive stroke policy development. State health departments often play a major role in implementing state stroke policies.\(^12\)

Stroke researchers may consider reviewing this report for evidence gaps to be addressed in future studies. This assessment identified several research gaps, including the following:

- What are the core components of CSCs, PSCs, and ASRHs?
- How do stroke systems of care impact the health of populations experiencing stroke disparities?
- What is the value added of establishing a state-level CQI registry for stroke?
- To what extent has telestroke filled the gap for stroke care in rural areas?
- Does regionalization of stroke systems help to optimize outcomes?
- What other state-level policy interventions facilitate access to the right level of post-hospital care for every stroke patient and follow-up data collection?

\(^c\) See the Evidence base section of each evidence summary for a full list of the studies with mixed or no outcomes.
Evidence Summaries

The next section provides evidence summaries of eight policy interventions impacting in-hospital stroke care and one policy intervention within post-hospital stroke care included in this assessment. These summaries could help state decision makers and public health organizations determine which policy interventions may be useful in their state. The links in the figure on the previous page can be used to navigate to the evidence summary for each policy intervention.

How to use an evidence summary. Evidence summaries describe the evidence used to score a policy intervention’s evidence base on potential public health impact and quality. Each evidence summary includes a full reference and evidence list and provides a list of the positive outcomes observed in intervention studies, as well as the specific states in which these outcomes were found. When there were no studies of a policy intervention, the rationale for the policy intervention, as described by experts and practitioners, is provided. See the Appendix for more on the method used to develop evidence summaries.

Additionally, each evidence summary includes a brief description of a state law that closely aligns with the policy intervention and may be listed among the states where the intervention achieved positive health outcomes. However, it is important to note that these states may not explicitly authorize the policy intervention through state statutes and regulations. These states may have authorized implementation of the policy intervention at the state, regional, and/or local levels under broader legal authorities and local laws and through state-level programs.

As a first step, state decision makers and public health organizations may consider researching the health status of their state’s population. CDC offers many state health facts on its website, including those about stroke. Next, state decision makers and public health organizations may consider using the evidence summaries in this report to identify policy interventions impacting in-hospital/post-hospital stroke care that may help improve stroke systems of care in their state setting.
References

5. Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. The evidence for pre-hospital emergency medical service systems policy interventions addressed in existing state laws. Atlanta, GA: Centers for Disease Control and Prevention; 2017.
Evidence Summaries
Telestroke to Initiate Treatment On-site

Evidence Level: BEST

Telemedicine involves the use of technology to provide health care, monitor health status, and share health information remotely. Telestroke involves using telemedicine to evaluate patients and initiate treatment for acute stroke care and provide access to acute stroke specialists in medically underserved, rural, and geographically remote areas.

Example of state law addressing this type of intervention
An Arizona statute requires all insurance contracts provided to subscribers by certain “hospital service corporations” and “medical service corporations” issued, delivered, or renewed on or after January 1, 2018, to provide coverage for stroke telemedicine services “if the health care service would be covered were it provided through in-person consultation...to a subscriber receiving the service in Arizona.” “Telemedicine” is defined as the “interactive use of audio, video or other electronic media for...diagnosis, consultation or treatment...beyond the sole use of an audio-only telephone, a video-only system, a facsimile machine, instant messages or electronic mail.” 2018 ARIZ. REV. STAT. §§ 20-841.09 & 20-822 (2018).

Evidence for Potential Public Health Impact:

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SCORE: VERY STRONG

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TOTAL: Moderate

SCORE: HIGH

Health-related outcomes
Telestroke was linked with improved neurological outcomes,1–8 mortality rates,2–10 stroke recognition,2, 6–9, 11, 57, 58 and access to care,2–10 as well as increased access to appropriate stroke treatment.2, 3, 10, 11, 13, 19, 57 Stroke systems of care that included telestroke were also linked with improved mortality rates25 and increased access to appropriate stroke care.23–25, 59–60

Population(s) impacted
Most studies reporting positive health-related outcomes examined the general population.1–3, 6, 8–9, 11–12, 14–25, 57–60 Two studies examined rural populations.10, 13

Economic highlights
Telestroke was linked with shorter hospital stays,8 cost savings,58 and cost-effectiveness.2, 57, 58, 10

States where interventions achieved positive health-related outcomes
Studies of local stroke systems of care including telestroke were set in Arizona,2, 6 California,22 Delaware,18 Georgia,16 Illinois,11 Louisiana,21 Montana,17 Massachusetts,24 Michigan,9 New Jersey,18 North Carolina,10, 16 Pennsylvania,18 South Carolina,19, 20 and Texas.12 Regional studies were set in Massachusetts,8 Maine,8 New Hampshire,8 Alaska,23 Idaho,23 Montana,23 Oregon,23 and Washington.23 There were also 10 national studies.1, 2, 13–15, 25, 57–60
Evidence base

Research-based studies


Practice-based studies


Mixed outcome—improved stroke recognition and increased access to appropriate stroke care but noted longer times for consultations, declines in neurological outcomes, and higher rates of mortality.

Mixed outcome—heavy upfront costs, but overall telemedicine was cost-effective.

Mixed outcome—Medicare reimbursement is possible, but issues remain, particularly if IV rt-PA is administered through the drip-and-ship model.

Mixed outcome—more patients received appropriate stroke care, but consultations were not occurring, because there was no two-way interaction video in place.

Mixed outcome—telestroke is a possible explanation for the increase in patients remaining at spoke facilities, but various factors that may impact the decision to transfer patients were not controlled for.

Mixed outcome—improved neurological outcomes but longer door-to-needle times.

Mixed outcome—younger populations fared well, but the elderly had less access to care.

Mixed outcome—patients had increased access to appropriate care but noted more incorrect treatment decisions occurring and a higher percentage of in-hospital mortality.

Mixed outcome—improved neurological outcomes but longer mean door-to-needle times, and fewer patients had door-to-needle within 60 minutes.

Negative outcomes—majority of negative outcomes from patients were treated with the drip-and-stay model compared to drip-and-ship, as well as increased odds of a length of stay despite lower risk of intubation and fever.

Mixed outcome—improved access to treatment; however, patients who received tPA at a remote ED by teleconsultation were more likely to have experienced a symptomatic intracranial hemorrhage (sICH) than those who received tPA after face-to-face consultations.

Mixed outcome—improved neurological outcomes but longer door-to-computed tomography and consult-to-tPA times.

Mixed outcome—higher mortality rates at 6 and 12 months, a lower percentage of patients with positive functional scores at 6 months, a higher percentage of patients with positive functional scores at 12 months, and a lower percentage of patients with recurrent stroke at 6 and 12 months.

Mixed outcome—improved neurological outcomes and mortality rates but longer times between stroke alert activation and initiation of intravenous thrombolytic treatment; increase in the length of hospital stay.

Mixed outcome—telestroke increased access to care and reduced geographical disparities; however, the shortage of specialized stroke treatment facilities in South Carolina is impeding these benefits.

Mixed outcome—increased access to treatment but noted higher rates of sICH.

Mixed outcome—increased access to treatment and lower rates of asymptomatic ICH but also reported longer onset-to-hospital and transfer duration times, higher rates of sICH and in-hospital mortality, and a higher rate of protocol deviations.

Mixed outcome—improved neurological outcomes but higher rates of mortality.


76. Silva GS, Schwamm LH. Use of telemedicine and other strategies to increase the number of patients that may be treated with intravenous thrombolysis. Current Neurology and Neuroscience Reports. 2012;12(1):10-16.

State-level Continuous Quality Improvement Registry

Evidence Level: **BEST**

A statewide continuous quality improvement (CQI) program, process, and/or plan is needed to ensure that stroke care delivery across the state applies to evidence-based national standards and best practices. As part of CQI, a state-level stroke database, data system, or registry helps to track nationally recognized consensus stroke care metrics.

*Nationally recognized consensus stroke metrics are provided by the following entities: American Heart Association, Paul Coverdell National Acute Stroke Program, National Committee for Quality Assurance, and Public Health Issues Management.

**Example of state law addressing this type of intervention**

All hospitals designated at any level (CSC, PSC, Remote Treatment Stroke Center, or other authorized level) by the Georgia Department of Public Health (DPH) as a stroke center must participate in the Georgia Coverdell Acute Stroke Registry and submit a minimum set of data elements to the Registry as required. DPH may suspend or revoke designation of non-compliant hospitals. Ga Comp. R. & Regs. 511-9-2-04 (2018).

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**Score: VERY STRONG**

**Evidence Quality:**

| Evidence Types: | 2 ⬤ ⬤ ⬤ | |
| Sources: | 2 ⬤ ⬤ ⬤ | |
| Evidence from Research: | 2 ⬤ ⬤ ⬤ | |
| Evidence from Translation & Practice: | 2 ⬤ ⬤ ⬤ | |

**Score: HIGH**

**Health-related outcomes**

State-level CQI registries were linked with increased access to appropriate stroke treatment,¹, ⁶, ⁷ lower rates of mortality,⁸ and improved neurological outcomes.² Stroke systems of care that included state-level CQI registries were also linked to improved neurological outcomes.³

**Population(s) impacted**

Studies reporting positive health-related outcomes examined the general population.¹⁴, ³, ⁶-⁸ One study examined a rural population.⁹

**Economic highlights**

No economic outcomes January 1, 2007, to May 31, 2018

**States where interventions achieved positive health-related outcomes**

Studies of local stroke systems of care including state-level CQI registries were set in Arizona,¹ California,¹ Florida,¹ Georgia,¹, ³, ⁸, ⁹ Illinois,² Kansas,³ Massachusetts,¹, ⁷ Michigan,¹ North Carolina,⁹ Ohio,¹ Pennsylvania,¹ and South Carolina,⁹ There were three national studies.², ⁴, ⁶
Evidence base

Research-based studies


Practice-based studies


Narratives and commentaries


a. Mixed outcome—mortality benefit was related to stroke center designation rather than to overall quality improvement efforts at designated stroke centers.

b. Mixed outcome—in a case study, one of the state health departments determined that operation of a stroke registry was cost-prohibitive.
Nationally Certified Primary Stroke Centers

Evidence Level: BEST

PSCs certified by nationally recognized accrediting bodies* must have infrastructure and demonstrated ability to stabilize and treat acute stroke patients, including timely provision of intravenous thrombolytic therapy utilizing alteplase, neuroimaging capabilities, and the management of intracranial pressure.41

*Nationally recognized accrediting bodies for PSCs include The Joint Commission/AHA/ASA, Center for Improvement in Healthcare Quality, Det Norske Veritas, and Healthcare Facilities Accreditation Program. State standards for PSCs are addressed in a separate policy intervention.

Example of state law addressing this type of intervention


Evidence for Potential Public Health Impact:

Weaker=↓↓↓↓    ⬅️=Stronger

Effectiveness: ••••
Equity & Reach: •••
Efficiency: •••
Transferability: •••

SCORE: STRONG

Evidence Quality:

Lower=↓↓↓    ⬅️=Higher

Evidence Types: ••
Sources: •
Evidence from Research: •
Evidence from Translation & Practice: ••

SCORE: HIGH

Health-related outcomes

PSCs certified by nationally recognized accrediting bodies were linked with improved neurological outcomes, decreased morbidity, increased access to appropriate stroke treatment, and improved mortality rates. Stroke systems of care that included PSCs certified by nationally recognized accrediting bodies were linked with increased access to appropriate stroke treatment.

Population(s) impacted

Studies reporting positive health-related outcomes examined the general population. One study examined a rural population.

Economic highlights

In one study, PSCs certified by The Joint Commission were linked with shorter hospital stays.

States where interventions achieved positive health-related outcomes

Studies of local stroke systems of care were set in Alaska, California, the District of Columbia, Georgia, Idaho, Illinois, Idaho, Michigan, Montana, New Jersey, New York, North Carolina, Oregon, Pennsylvania, South Carolina, and Washington. There were no national studies.
Evidence Base

Practice-based studies


Narratives and Commentaries


a. Mixed outcome—PSC certification was associated with significant changes in ED admission and radiographic utilization patterns, without measurable improvements in survival.

b. Mixed outcome—receiving treatment in PSCs was associated with a 30-day survival benefit for patients traveling less than 90 minutes, but traveling at least 90 minutes offset any benefit of PSC care.

c. Mixed outcome—total length of stay was slightly lower, but total in-hospital charges were significantly higher in certified PSCs.

d. No outcome—being a designated PSC and higher stroke patient volume were not significantly associated with better clinical outcome rates or lesser variations in outcomes at the hospital level.

e. Mixed outcome—although the proportions of hospitals using care maps and having tissue plasminogen activator (tPA) protocols, having prewritten stroke orders, and having a stroke team increased during a period of rapid PSC certification expansion, the rural–urban disparity in tPA use worsened because of increasing concentration of PSCs in urban areas.

f. No outcome—in-hospital mortality, complication rates, stroke severity, onset-to-needle time, and length of stay did not change significantly after PSC certification.

g. Mixed outcome—PSC-certified hospitals had better outcomes than non-certified hospitals before the certification program began.

h. No outcome—no difference in 30-day risk-adjusted readmission rates for patients with hemorrhagic stroke based on PSC certification status.

i. No outcome—readmission rates were similar between hospitals with PSC certification and those without certification.

j. Mixed outcome—certified CSCs exceeded certified PSCs in timely acute reperfusion therapy for emergency department admissions, whereas PSCs had lower risk-adjusted in-hospital mortality.

k. Mixed outcome—the association between PSC certification and rt-PA use was stronger in rural PSCs, but the study included a small number of hospitals and discharges in rural centers.

l. Mixed outcome—rates of thrombolysis administration for acute stroke patients in the study were low in both PSC-certified and noncertified hospitals, although a greater number of the eligible patients received thrombolysis in the certified centers.

m. No outcome—PSC designation was not a significant predictor of timely tPA use.

n. Mixed outcome—additional efforts are needed to extend regional stroke systems of care to the rest of the U.S.

o. No outcome—the impact of PSC certification on where patients were discharged was small and inconsistent.

p. No outcome—PSC certification did not significantly increase tPA use.

q. Mixed outcome—although the adjusted odds of intravenous tissue plasminogen activator administration were higher at PSCs compared to nonstroke centers, adjusted 90-day mortality was greater during weekend admissions to PSCs.
A state can designate a facility as a Primary Stroke Center (PSC) or the equivalent when the facility meets specific standards set by the state.* Currently, the following states use their own standards to designate some or all PSCs: Alabama, Florida, Massachusetts, Missouri, New Jersey, Oklahoma, and Texas.

*PSCs certified by nationally recognized accrediting bodies are addressed in a separate policy intervention.

Example of state law addressing this type of intervention
As of April 2017, a Massachusetts regulation allows hospitals to apply to the Department of Public Health for designation as a Primary Stroke Service (PSS) provider to provide emergency diagnostic and therapeutic services to acute stroke patients through a multidisciplinary team approach, available 24 hours per day, 7 days per week. Additional PSS criteria and standards include hospital-based emergency department and EMS staff education in acute stroke prevention, diagnosis, and treatment; hospital stroke CQI and submission of stroke data to the Department of Public Health; and EMS pre-hospital stroke notification. 105 Mass. Code Regs. §§130.1400 through 130.1413 (2018).

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SCORE: STRONG

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TOTAL: Weak  Moderate  High  Very High
SCORE: HIGH

Health-related outcomes
PSCs meeting state standards were linked with increased access to appropriate stroke treatment1-3 and reduced mortality.2-3 Stroke systems including PSCs meeting state standards were linked with increased access to appropriate stroke treatment4-5 and improved clinical outcomes.13

Population(s) impacted
Studies reporting positive health-related outcomes examined the general population.1,5,13

Economic highlights
No economic outcomes January 1, 2007, to May 31, 2018

States where interventions achieved positive health-related outcomes
Studies of PSCs meeting state standards were set in New York,2-3 New Jersey,1 and Massachusetts.4 There were two national studies.5,13
Evidence Base

Practice-based studies


Narratives and commentaries


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a. Mixed outcome—while state PSCs overall showed lower performance on many measures, when analyzed by individual states, certain state PSCs did have performance that matched or exceeded that of other certifying bodies.

b. Mixed outcome—certified CSCs exceeded certified PSCs in timely acute reperfusion therapy for emergency department admissions, whereas PSCs had lower risk-adjusted in-hospital mortality.

c. Mixed outcome—in New Jersey, state CSCs were more likely to adhere better to JC core performance measures than state PSCs. Median door-to-thrombolytic drug times were also significantly lower at the state CSCs.

d. No outcome—rural hospitals included in the study were unlikely to have state PSC designation and likely to lack stroke resources.
State Standards for Comprehensive Stroke Centers

Evidence Level: PROMISING EVIDENCE QUALITY

A state can designate a facility as a Comprehensive Stroke Center (CSC) or the equivalent when the facility meets specific standards set by the state. Currently, the following states use their own standards to designate some or all CSCs in the state: Florida, Massachusetts, Missouri, New Jersey, and Texas.

* CSCs certified by nationally recognized accrediting bodies are addressed in a separate policy intervention. This assessment only included studies in which the impact of CSCs could be differentiated from the impact of PSCs.

Example of state law addressing this type of intervention

Since 2004, hospitals in New Jersey must apply to the Commissioner of Health and Senior Services for designation as a Primary or Comprehensive Stroke Center. Designated CSCs are required to meet the minimum PSC criteria set forth in statute and regulation as well as additional statutory and regulatory CSC criteria and standards. N.J. Rev. Stat. §§ 26:2H-12.27 to 26:2H-12.32 (2018); N.J. Admin. Code §§ 8:43G-7A.1 to 8:43G-7A.10 (2018).

Evidence for Potential Public Health Impact:

Effectiveness: Weak=**** ⇐ ➔ Stronger
Equity & Reach: weaker=**** ➔ stronger
Efficiency: ○○○○
Transferability: ○○○

TOTAL: Weak Moderate Strong Very Strong
SCORE: MODERATE

Evidence Quality:

Evidence Types: Lower=**** ➔ Higher
Sources:
Evidence from Research: ○○○○
Evidence from Translation & Practice: ○○○

TOTAL: Low Moderate High Very High
SCORE: HIGH

Health-related outcomes

CSCs meeting state standards were linked with increased access to appropriate stroke treatment and improved stroke recognition.3

Population(s) impacted

The one study reporting positive health-related outcomes examined the general population.3

Economic highlights

No economic outcomes from January 1, 2007, to May 31, 2018

States where interventions achieved positive health-related outcomes

The study of CSCs meeting state standards was set in New Jersey.2
Evidence Base

Research-based studies

No research-based studies January 1, 2007, to May 31, 2018

Practice-based studies


Narratives and commentaries


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a. Mixed outcome—certified CSCs exceeded certified PSCs in timely acute reperfusion therapy for emergency department admissions, whereas PSCs had lower risk-adjusted in-hospital mortality.
### Nationally Certified Comprehensive Stroke Centers

**Evidence Level:** PROMISING EVIDENCE QUALITY

Nationally certified Comprehensive Stroke Centers (CSCs) provide highly specialized stroke care for patients who require more complex medical and surgical interventions. They also serve as a top-tier resource center for other facilities within the stroke system of care.

*Nationally recognized accrediting bodies for CSCs include The Joint Commission, the Center for Improvement in Healthcare Quality, Det Norske Veritas, and Healthcare Facilities Accreditation Program. State standards for CSCs are addressed in a separate policy intervention. This assessment only included studies in which the impact of CSCs could be differentiated from the impact of PSCs.

#### Example of state law addressing this type of intervention

As of August 30, 2016, the Delaware Department of Health and Social Services is required to designate an in-state acute health care facility, as well as out-of-state facilities upon request, as a Comprehensive Stroke Center if the facility is certified by either The Joint Commission (i.e., Advanced Certification for Comprehensive Stroke Centers) or another nationally recognized accrediting organization with an equivalent certification. Del. Code Ann. tit. 16 § 1019 (2018).

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**SCORE:** MODERATE

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**SCORE:** HIGH

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### Rationale for health-related outcomes

The American Heart Association and other stroke care experts and practitioners recommend certification of CSCs based on national standards and integration of nationally certified CSCs into stroke systems of care to improve health outcomes.

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### Population(s) impacted

No health-related outcomes from January 1, 2007, to May 31, 2018

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### Economic highlights

No economic outcomes from January 1, 2007, to May 31, 2018

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### States where interventions achieved positive health-related outcomes

No health-related outcomes January 1, 2007, to May 31, 2018
Evidence Base

**Practice-based studies**


**Narratives and commentaries**


---

a. Mixed outcome—the benefit of transfer to a CSC remains unclear, as younger, healthier patients were most likely to be transferred.

b. Mixed outcome—certified CSCs exceeded certified PSCs in timely acute reperfusion therapy for emergency department admissions, whereas PSCs had lower risk-adjusted in-hospital mortality.
Nationally Certified Acute Stroke-Ready Hospitals

Evidence Level: PROMISING EVIDENCE FOR POTENTIAL PUBLIC HEALTH IMPACT

Acute Stroke-Ready Hospital (ASRH) is a relatively new certification for facilities from nationally recognized accrediting bodies. ASRHs are intended to expand evidence-based stroke care to patients who are otherwise unable to access a Primary Stroke Center—for example, patients who live in rural areas.

*As of May 31, 2018, the only nationally recognized accrediting body for ASRHs is The Joint Commission. State standards for ASRHs are addressed in a separate policy intervention.

Example of state law addressing this type of intervention

The North Carolina Department of Health and Human Services is required to designate a hospital as a certified “Designated Stroke Center” if the hospital is certified by JC, AHA, ASA, HFAP, DNV, or another nationally accrediting body “that requires conformance to best practices for stroke care” as a PSC, CSC, or ASRH. 10A N.C. Admin. Code 14L.0201 (2018).

Evidence for Potential Public Health Impact:

<table>
<thead>
<tr>
<th>Effectiveness:</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity &amp; Reach:</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Efficiency:</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Transferability:</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Weaker=1-2 | 3-4 | 5-6 =Stronger

Score: STRONG

Evidence Quality:

<table>
<thead>
<tr>
<th>Evidence Types:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research:</td>
</tr>
<tr>
<td>Translation &amp; Practice:</td>
</tr>
</tbody>
</table>

Score: MODERATE

Health-related outcomes

One study found improved recognition and increased access to appropriate stroke treatment and expert care at a hospital seeking Joint Commission certification as an ASRH.¹

Population(s) impacted

The study reporting positive health-related outcomes examined a rural population.¹

Economic highlights

No economic outcomes January 1, 2007, to May 31, 2018

States where interventions achieved positive health-related outcomes

The study reporting positive health-related outcomes was set in a local stroke system of care in North Carolina.¹

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¹. The evidence base for nationally certified ASRHs scored “promising evidence for potential public health impact,” because while it only had three items of evidence supporting it, one item of evidence was a non-experimental study finding improved access to appropriate stroke treatment in an ASRH that was located in a rural community.
Evidence Base

Research-based studies

No research-based studies January 1, 2007, to May 31, 2018

Practice-based studies


Narratives and commentaries


Nationally Recognized Stroke Rehabilitation Facilities

Evidence Level: EMERGING

National standards and certification for stroke rehabilitation facilities* could assure quality and a commitment to continuous improvement of post-hospital stroke care and services.

*Entities providing rehabilitation facility certification/recognition based on national standards currently include The Joint Commission and the Commission on Accreditation of Rehabilitation Facilities (CARF).

Example of state law addressing this type of intervention
A Florida regulation requires Comprehensive Stroke Centers to ensure that patients meeting acute care rehabilitation admission criteria are transferred to a CARF- or JC-accredited acute rehabilitation facility. Fla. Admin. Code r. 59A-3.246(4) (2018).

Evidence for Potential Public Health Impact:

Effectiveness: ●●●
Equity & Reach: ○○○○
Efficiency: ●●●
Transferability: ○○○

Evidence Quality:

Evidence Types: ●●●
Sources: ●●●
Evidence from Research: ○○○
Evidence from Translation & Practice: ●●●

Rationale for health-related outcomes
The American Heart Association and other subject matter experts and practitioners recommend national standards and/or CARF certification for stroke rehabilitation facilities. The North Carolina Division for Public Health recommends performance measures and standards to improve post-hospital recovery from stroke.

Population(s) impacted
No health-related outcomes January 1, 2007, to May 31, 2018

Economic highlights
No economic outcomes January 1, 2007, to May 31, 2018

States where interventions achieved positive health-related outcomes
No health-related outcomes January 1, 2007, to May 31, 2018
Evidence Base

Narratives and commentaries


Evidence Level: **EMERGING**

A state can designate a facility as an Acute Stroke-Ready Hospital (ASRH) or the equivalent when the facility meets specific standards set by the state.* Currently, the following states use their own standards to designate some or all ASRHs in the state: Alabama, Florida, Georgia, Illinois, Minnesota, Missouri, Oklahoma, and Texas.

*ASRHs certified by nationally recognized accrediting bodies are addressed in a separate policy intervention.

**Example of state law addressing this type of intervention**

In 2016, Georgia required the establishment of at least three levels of stroke centers to serve acute stroke patients. The three levels of stroke centers include Comprehensive Stroke Centers for complex specialized care, Primary Stroke Centers, and Remote Treatment Stroke Centers (RTSCs) for rural and underserved areas. Georgia requires CSCs and PSCs to be certified by a “national health care accreditation body” recognized by the Department of Public Health (DPH) and requires Remote Treatment Stroke Centers to be certified and designated by DPH either through certification by a “national health care accreditation body” as an acute stroke-ready hospital or through a process developed by DPH. Ga. Code Ann. § 31-11-113 (2018). Hospitals seeking RTSC designation through the DPH process “will be evaluated on the standards and clinical practice guidelines established by the American Heart Association and American Stroke Association and must utilize current and acceptable telemedicine protocols relative to acute stroke treatment.” Ga. Comp. R. & Regs. 511-9-2-.04 (2018).

**Evidence for Potential Public Health Impact:**

<table>
<thead>
<tr>
<th>Effectiveness:</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity &amp; Reach:</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Efficiency:</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Transferability:</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Weaker=1,5 Stronger=2,4

For more on the scoring and summary methods see the Appendix

**Evidence for Potential Public Health Impact:**

<table>
<thead>
<tr>
<th>Effectiveness:</th>
<th>Weak Moderate Strong Very Strong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total:</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

SCORE: **WEAK**

**Evidence Quality:**

<table>
<thead>
<tr>
<th>Evidence Types:</th>
<th>Lower Higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources:</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Evidence from Research:</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Evidence from Translation &amp; Practice:</td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total:</th>
<th>Low Moderate High Very High</th>
</tr>
</thead>
</table>

SCORE: **MODERATE**

**Rationale for health-related outcomes**

State standards for designating facilities as ASRHs or the equivalent are still in development.¹ ³ Formal recommendations and outcome studies are needed.

**Population(s) impacted**

No health-related outcomes January 1, 2007, to May 31, 2018

**Economic highlights**

No economic outcomes January 1, 2007, to May 31, 2018

**States where interventions achieved positive health-related outcomes**

No health-related outcomes January 1, 2007, to May 31, 2018
Evidence Base

Narratives and commentaries

Appendix—Methods

Background

Public decision makers need to know which policies are feasible and most likely to achieve the desired impact. Early evidence assessment involves compiling and appraising all relevant, available evidence. This report uses an early evidence assessment approach called the Quality and Impact of Component Evidence Assessment, or QuIC. For more on the QuIC method, contact CDC DHDSP.

In a QuIC assessment, “best available evidence” refers to the written evidence base relevant to assessing the potential public health impact of a policy intervention reflected in state law, when there are no direct experimental studies assessing the law’s impact. A QuIC evidence base includes empirical and non-empirical analyses of public health policies, programs, activities, and using data or expert opinion that directly and/or indirectly link interventions of interest with actual or expected outcomes. Best available evidence can be found in journal articles, editorials, commentaries, and perspectives; policy briefs, statements, recommendations, and guidelines; evaluation and technical reports; conference papers; and white papers.

CDC DHDSP selected eight policy interventions within in-hospital stroke care and one intervention in post-hospital care stroke for this evidence assessment by comparing published recommendations by The Joint Commission, the Brain Attack Coalition, the American Heart Association (AHA), and the American Stroke Association (ASA) to the content of enacted state law. The nine policy interventions common to both published expert recommendations and existing state law were refined based on input from a group of four individuals with expertise in stroke systems of care.

Evidence Collection and Classification

The following search was completed in May 31, 2018, for best available evidence published between January 1, 2007, and May 31, 2018. A few additional important items of evidence published after May 31, 2018, were also included during the course of the assessment. Ten CDC policy staff classified the in-hospital/post-hospital stroke evidence base to the nine policy interventions. The evidence base is composed of 214 items of evidence that were relevant to assessing one or more of the nine policy interventions. These include 56 published recommendations from subject matter experts and practitioners as well as 92 practice-based studies that either included the policy interventions of interest or recommended the policy interventions based on study findings. There are only three research-based studies in the evidence base.

- 1,499 items from CDC library search of published and grey literature sources (years 2007-2018) using search terms: (stroke systems of care) OR (stroke center* OR stroke unit*) AND (hospital* OR rehabilitation OR inpatient* OR outpatient* OR in-patient* OR out-patient* OR transition* OR hub spoke) OR (telehealth OR telestroke OR telemedicine) OR primary stroke center* OR remote stroke center* OR comprehensive stroke center* AND United States
- 196 items found in hand searches (years 2007-2018)

Total: 1,695 items of evidence collected

- 1,481 items excluded for one or more of the following reasons: (1) Duplication; (2) Not best available evidence per QuIC definition; (3) Year: Evidence was published before January 1, 2007; (4) Non-U.S. setting; (5) Not relevant to one or more of the nine hospital and post-hospital policy interventions for stroke

- 214 items classified to one or more policy interventions and assessed for potential public health impact and quality
Coding and Scoring

To refine the codebook, the team abstracted and coded a sample of evidence for each policy intervention for potential public health impact and discussed coding issues as a group. Each item of evidence assigned to each policy intervention was then independently coded by two of the 10 coders.a Coding pairs reconciled coding discrepancies through discussion to reach consensus on every code.b

For each policy intervention, reconciled coding results were used to complete the QuIC Evidence Assessment Tool (page 9). One QuIC Tool was completed for each of the nine policy interventions; nine tools were completed in total. To calculate the evidence for potential impact level and the evidence quality level for each policy intervention, the four criteria scores for impact and the four criteria scores for quality from the QuIC Tool were each assigned a numeric score for the highest level reached (0-4 points), and then criteria scores were summed across impact and quality.

The numeric evidence for potential impact score and quality score were each converted into ordinal evidence levels.c Then each policy intervention’s evidence for potential impact level and evidence quality level were used to categorize policy interventions as “best,” “promising (quality),” “promising (impact),” or “emerging” (Table).

Table. Method for categorizing overall evidence level using evidence for potential impact and quality levels

<table>
<thead>
<tr>
<th>Evidence for Potential Public Health Impact Level</th>
<th>Evidence Quality Level</th>
<th>Evidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong or Very Strong</td>
<td>High or Very High</td>
<td>Best</td>
</tr>
<tr>
<td>Weak or Moderate</td>
<td>High or Very High</td>
<td>Promising Evidence Quality</td>
</tr>
<tr>
<td>Strong or Very Strong</td>
<td>Low or Moderate</td>
<td>Promising Evidence for Potential Public Health Impact</td>
</tr>
<tr>
<td>Weak or Moderate</td>
<td>Low or Moderate</td>
<td>Emerging</td>
</tr>
</tbody>
</table>

Evidence Summaries

Each pair of coders jointly developed an evidence summary for their policy intervention. This was done by summarizing the abstracted positive health-related outcomes observed; the populations and settings in which the positive health-related outcomes were observed; and any relevant economic outcomes. More general categories of outcomes, populations, and settings were created for the purposes of reporting; for example, if a study found increased alteplase administration, this was reported as “increased access to appropriate stroke treatment.” The list of specific outcomes and populations from this assessment could be useful to those evaluating stroke systems of care—please contact DHDSP for this list. Additionally, see page 10 for more information on how an evidence summary was developed.

Brief examples of state law in effect as of May 31, 2018, were chosen based on alignment with policy interventions. These examples were included in the evidence summaries as appropriate. A full inventory and description of stroke-related laws across the 50 states and D.C. will be provided in a separate DHDSP State Law Fact Sheet.

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a. Contact CDC DHDSP for the QuIC Evidence Assessment Handbook.
b. This method has been shown to achieve Very Good to Excellent inter-rater agreement within three previous QuIC assessments: a) Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. What Could Be Addressed in an Evidence-Informed State Workplace Health Promotion Law? Atlanta, GA: Centers for Disease Control and Prevention; 2017. b) Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. What Evidence Supports State Laws to Establish Community Health Worker Scope of Practice and Certification? Atlanta, GA: Centers for Disease Control and Prevention; 2017. c) Centers for Disease Control and Prevention. Division for Heart Disease and Stroke Prevention. What Evidence Supports State Laws to Enhance Public Access Defibrillation? Atlanta, GA: Centers for Disease Control and Prevention; 2017.
c. The evidence for potential impact level was determined using the following conversion: 1-4 points = weak; 5-8 points = moderate; 9-12 points = strong; 13-16 points = very strong. The evidence quality level was determined using the following conversion: 1-4 points = low; 5-8 points = moderate; 9-12 points = high; 13-16 points = very high. For example, if the Effectiveness criterion scored “very strong” and the Equity and Reach criterion scored “very strong” and the Efficiency criterion scored “strong” and the Transferability criterion scored “strong,” then 4 + 4 + 3 + 3 = 14 = “very strong” evidence for potential impact.
Recommendations

Across the policy interventions in this assessment, there was very little empirical evidence examining economic outcomes such as cost-effectiveness. While several studies in the evidence base examined the effectiveness of a few of the policy interventions in rural populations and settings, there is a lack of evidence of outcomes for other populations and communities known to experience disparities in stroke care.\textsuperscript{d}

Across the policy interventions assessed here, more rigorous research-based and practice-based studies are needed. Specifically, high-quality systematic and narrative reviews are needed to synthesize and interpret studies that found mixed outcomes in the telestroke and nationally certified PSC policy interventions.

### QuIC Evidence Assessment Tool

#### Section 1. Evidence for Potential Public Health Impact

<table>
<thead>
<tr>
<th>Criterion and what it measures</th>
<th>Weak Evidence</th>
<th>Moderate Evidence</th>
<th>Strong Evidence</th>
<th>Very Strong Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effectiveness</strong>&lt;br&gt;Does it work, i.e., improve outcomes relevant to health?</td>
<td>Indirect evidence for a positive expected outcome relevant to health</td>
<td>Direct evidence for a positive expected outcome relevant to health</td>
<td>Indirect evidence of mostly positive actual outcomes relevant to health</td>
<td>Direct evidence of mostly positive actual outcomes relevant to health</td>
</tr>
<tr>
<td><strong>Equity and Reach</strong>&lt;br&gt;Does it work for target population(s)?</td>
<td>Indirect evidence for a positive expected outcome relevant to equity and reach</td>
<td>Direct evidence for a positive expected outcome relevant to equity and reach</td>
<td>Indirect evidence of mostly positive actual outcomes relevant to equity and reach</td>
<td>Direct evidence of mostly positive actual outcomes relevant to equity and reach</td>
</tr>
<tr>
<td><strong>Efficiency</strong>&lt;br&gt;Is it a good use of resources?</td>
<td>Indirect evidence for a positive expected outcome relevant to efficiency</td>
<td>Direct evidence for a positive expected outcome relevant to efficiency</td>
<td>Indirect evidence of mostly positive actual outcomes relevant to efficiency</td>
<td>Direct evidence of mostly positive actual outcomes relevant to efficiency</td>
</tr>
<tr>
<td><strong>Transferability</strong>&lt;br&gt;Does it work across diverse settings?</td>
<td>Indirect evidence for a positive expected outcome relevant to health in two or more regions of the United States</td>
<td>Direct evidence for a positive expected outcome relevant to health in two or more regions of the United States</td>
<td>Indirect evidence of mostly positive actual outcomes relevant to health in two or more regions of the United States</td>
<td>Direct evidence of mostly positive actual outcomes relevant to health in two or more regions of the United States</td>
</tr>
</tbody>
</table>

Note: If none of its requirements are met, a criterion is assigned a score of 0 points.

#### Section 2. Evidence Quality

<table>
<thead>
<tr>
<th>Criterion and what it measures</th>
<th>Low Quality</th>
<th>Moderate Quality</th>
<th>High Quality</th>
<th>Very High Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evidence Types</strong>&lt;br&gt;What is the most rigorous design?</td>
<td>A narrative review or commentary suggests a positive outcome</td>
<td>A non-experimental study suggests a positive outcome</td>
<td>An experimental or quasi-experiment suggests a positive outcome</td>
<td>A systematic review suggests a positive outcome</td>
</tr>
<tr>
<td><strong>Sources</strong>&lt;br&gt;What is the most credible source?</td>
<td>A peer-reviewed journal or conference publication without conflict-of-interest disclosure suggests a positive outcome</td>
<td>A systematic review suggests a positive outcome</td>
<td>A peer-reviewed journal or conference publication with conflict of interest disclosure suggests a positive outcome</td>
<td>A publication by a public health authority suggests a positive outcome</td>
</tr>
<tr>
<td><strong>Evidence from Research</strong>&lt;br&gt;Relevance to controlled settings</td>
<td>A small amount of evidence from research suggests positive outcomes</td>
<td>A moderate amount of evidence from research suggests positive outcomes</td>
<td>A large amount of evidence from research suggests positive outcomes</td>
<td>A very large amount of evidence from research suggests positive outcomes</td>
</tr>
<tr>
<td><strong>Evidence from Translation and Practice</strong>&lt;br&gt;Relevance to real world</td>
<td>A small amount of evidence from translation and practice suggests positive outcomes</td>
<td>A moderate amount of evidence from translation and practice suggests positive outcomes</td>
<td>A large amount of evidence from translation and practice suggests positive outcomes</td>
<td>A very large amount of evidence from translation and practice suggests positive outcomes</td>
</tr>
</tbody>
</table>

Note: If none of its requirements are met, a criterion is assigned a score of 0 points.
## Policy Intervention

### Evidence Level:
This field provides the evidence level of policy interventions impacting in-hospital or post-hospital stroke care, which is meant to help inform its priority during decision making: BEST, PROMISING (QUALITY), PROMISING (IMPACT), or EMERGING.

### Example of state law addressing this type of intervention
This box briefly describes an example of a provision of state law addressing the policy intervention.

<table>
<thead>
<tr>
<th>Evidence for Potential Public Health Impact:</th>
<th>Evidence Quality:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness: ○○○○○</td>
<td>Lower=**** ← → ****=Higher</td>
</tr>
<tr>
<td>Equity &amp; Reach: ○○○○○</td>
<td>For more on how evidence for potential impact was assessed, see the Appendix</td>
</tr>
<tr>
<td>Efficiency: ○○○○○</td>
<td>Evidence Type: ○○○○</td>
</tr>
<tr>
<td>Transferability: ○○○○○</td>
<td>Source: ○○○○</td>
</tr>
<tr>
<td><strong>TOTAL:</strong> Weak Moderate Strong Very Strong</td>
<td>Evidence from Research: ○○○○</td>
</tr>
<tr>
<td><strong>SCORE:</strong> Weak, Moderate, Strong, or Very Strong</td>
<td>Evidence from Translation &amp; Practice: ○○○○</td>
</tr>
<tr>
<td><strong>TOTAL:</strong> Low Moderate High Very High</td>
<td><strong>SCORE:</strong> Low, Moderate, High, or Very High</td>
</tr>
</tbody>
</table>

### Reported health-related outcomes
If there are studies analyzing health-related outcomes in the evidence base, this field provides the positive outcomes found and whether they were for this policy intervention and/or for a stroke system including this policy intervention (among others). Non-positive outcomes are footnoted in the “Evidence base” list below. If there were no studies observing positive outcomes, this field provides expert recommendations for the policy intervention (i.e., the rationale for positive health-related outcomes). While studies projecting positive outcomes contribute to scoring evidence for impact, they are not listed in this table.

### Groups studied
If positive health-related outcomes were found, this field provides the groups who were studied and/or cites the studies looking at general populations.

### Economic highlights
If there are studies analyzing economic outcomes—such as cost-effectiveness, return on investment, or quality of life—positive findings are provided in this field. Otherwise, absence of economic outcomes is noted.

### Settings
This field provides the states in which the studies finding positive health-related outcomes were set and/or lists the national studies.

### Evidence Base
Here you will find the references supporting the description of the policy intervention.

#### Systematic reviews
Here you will find the studies for this policy intervention that are explicitly described as using “systematic review.” Systematic review is a design and method, often applied in public health research, for summarizing outcomes, populations, and settings across a group of high-quality studies of the same intervention.

#### Research-based studies
Here you will find the studies including this policy intervention that took place in a research context, in which researchers were able to allocate subjects into the intervention and the control groups.

#### Practice-based studies
Here you will find the studies of this policy intervention that took place under real-world circumstances. In these studies, evaluators were not able to allocate subjects into the intervention and the control groups.

#### Narratives and commentaries
Here you will find the evidence that provides recommendations for this policy intervention from subject matter experts and practitioners.
Acknowledgements

This policy evidence assessment report was completed by the Division for Heart Disease and Stroke Prevention (DHDSP) within the Centers for Disease Control and Prevention (CDC).

Authors

This document was conceptualized and authored by: Colleen Barbero, PhD, MPPA; Aunima Bhuiya, BSc; Sharada Shantharam, MPH; Lauren Taylor, MPH; Erika Fulmer, MHA; Farah M. Chowdhury, MD, MPH; Kaitlin Graff, MSW, MPH; Stephanie Bernard, PhD; and Siobhan Gilchrist, JD, MPH.

Contributors

The following individuals contributed subject matter expertise, identified tools and resources, advised on the assessment, and reviewed the document: Sallyann Coleman-King, MD, MPH; Erika Odom, PhD, MS; Mary G. George, MD, MSPH; Kim Kelley, MSW; Mary Whittington, RN; Colby Tiner, MA; Joel Stein, MD; Mallika Mahalingham, MPH; Andrew Kunka, JD.