

MODERATOR:

Welcome to today's Coffee Break presented by the Applied Research and Evaluation Branch in the Division for Heart Disease and Stroke Prevention at the Centers for Disease Control and Prevention.

We are fortunate to have **Dr. Colleen Barbero** as today's presenter, she is a **Health Scientist** on the **Applied Research and Translation Team**.

My name is **Lauren Taylor** and I am today's moderator. I am an **ORISE Fellow** on the **Applied Research and Translation Team**.

Before we begin

**All phones have been placed
in SILENT mode.**

Issues or questions:

- Q & A box on your screen**
- AREBheartinfo@cdc.gov**



MODERATOR:

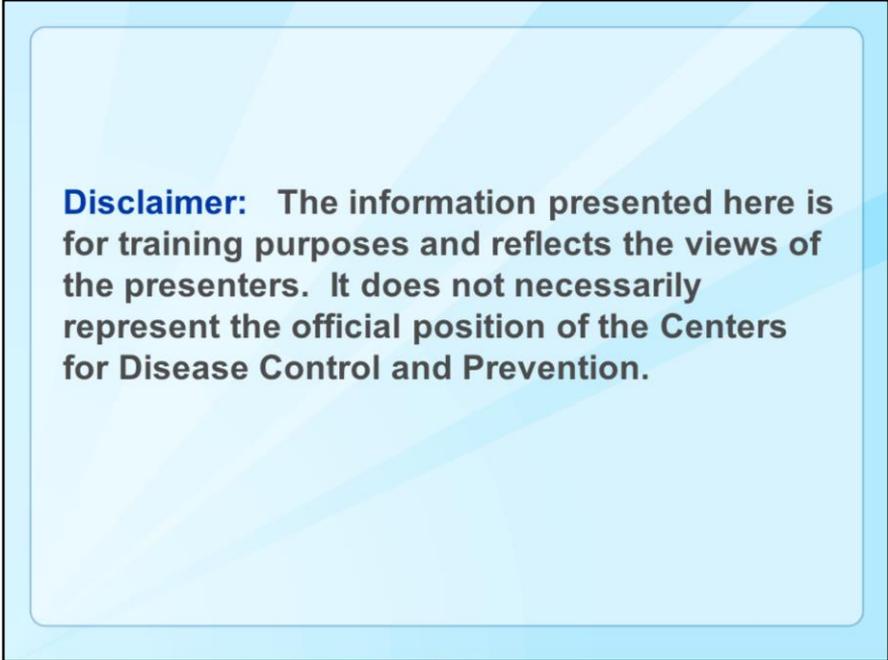
Before we begin we have a few housekeeping items.

All participants have been muted. However, to improve audio quality please mute your phones and microphones.

If you are having issues with audio or seeing the presentation, please message us using the chat box or send us an email at AREBheartinfo@cdc.gov

If you have a question during the presentation, please enter it on the chat box on your screen. We will address your questions at the end of the session.

Since this is a training series on applied research and evaluation, we do hope you will complete the poll and provide us with your feedback.



Disclaimer: The information presented here is for training purposes and reflects the views of the presenters. It does not necessarily represent the official position of the Centers for Disease Control and Prevention.

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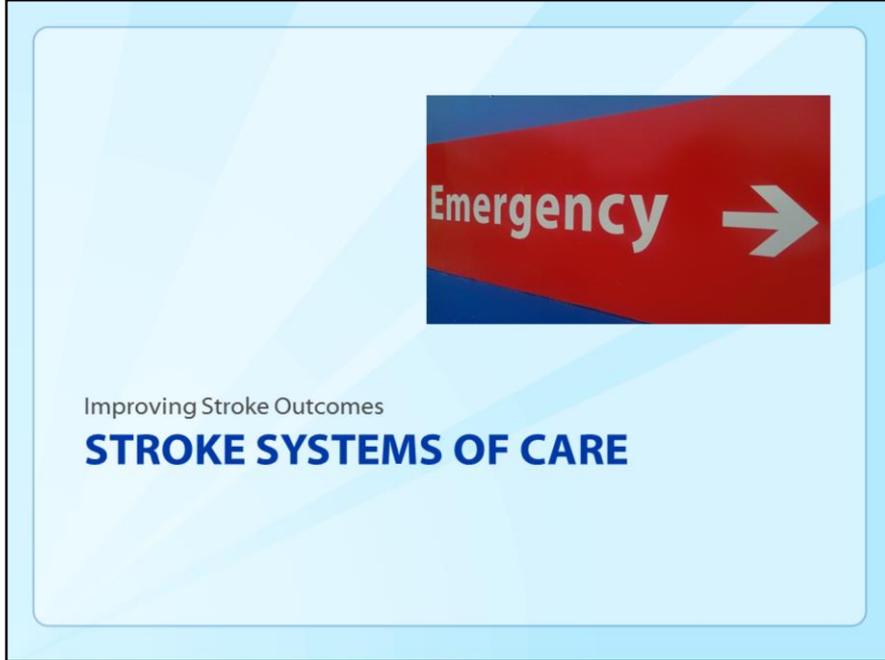
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So, without further delay. Let's get started. **Colleen**, the floor is yours.

Today's Coffee Break

- ❑ **Improving stroke outcomes with stroke systems of care**
- ❑ **Evidence-informed state law to improve pre-hospital Emergency Medical Service Systems (EMSS) for stroke**
- ❑ **Moving stroke evidence into action**

Thanks Lauren. Hello everyone and welcome to our Coffee Break on evidence-informed state policy to improve stroke outcomes. I'll begin the presentation by describing current trends in stroke and how stroke systems of care and EMS can improve stroke outcomes. Then I'll explain how state law relates to the EMS system for stroke. Lastly, I'll describe how evidence could be put into action to inform state policies.

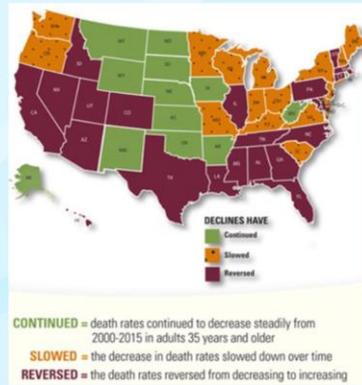


We can improve stroke outcomes through stroke systems of care.

Stroke in the U.S.

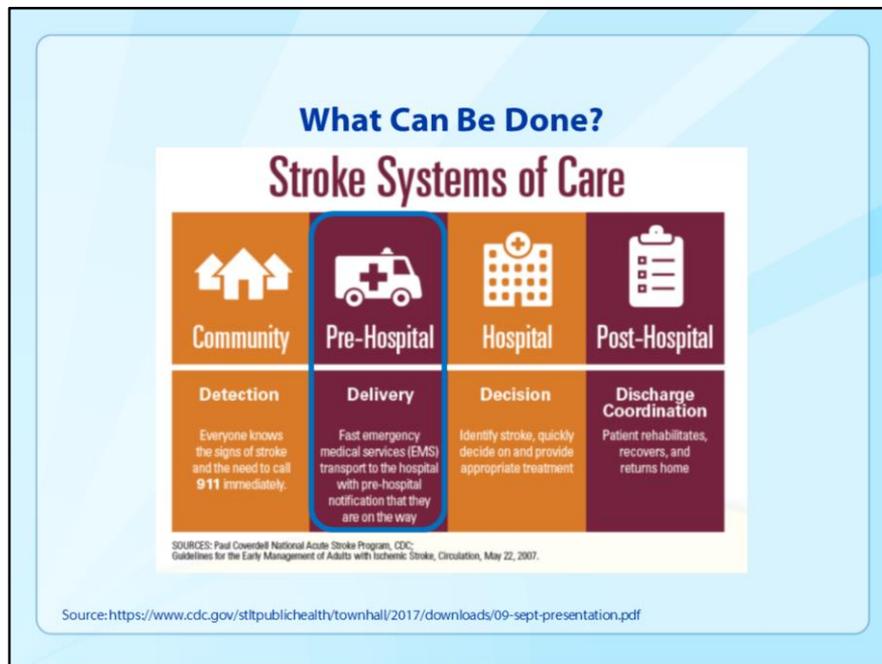
- **Someone in the U.S. has a stroke every 40 seconds**
 - Stroke is 5th leading cause of death

- **Stroke deaths had been declining since the 1960s, but recently, declines have stalled**



Source: <https://www.cdc.gov/vitalsigns/stroke/index.html>

Stroke is a major public health problem in the U.S. Every 40 seconds, someone has a stroke and in 2015 stroke was the 5th leading cause of death. This past year the CDC Vital Signs project assessed current trends in stroke death rates and found that declines since the 1960s have recently stalled. In 2013, in the Southeast and beyond, declines in stroke death rates have reversed.



We can do something to change this. Addressing key risk factors like obesity, tobacco use, physical inactivity, and hypertension can prevent stroke. Stroke systems could also provide better and more timely treatment to stroke patients. Since 2012 CDC has funded states through its Paul Coverdell National Acute Stroke Program to improve stroke systems of care. Stroke systems of care address the entire continuum for care from community detection of stroke to post-hospital rehabilitation and prevention of additional strokes. Today we are focusing on the pre-hospital side, or more specifically, the emergency medical service or EMS system. This is where we saw an opportunity for evidence-informed state law to help facilitate the improvement of stroke outcomes. In the future we'll also look at policy interventions that impact the hospital and post-hospital settings.

EMSS in Stroke Systems of Care

□ Emergency Medical Service Systems (EMSS) provide:

- Timely pre-hospital stroke recognition and care
- Transport to the most appropriate stroke facility



First, some terminology. “EMSS” refers to the delivery systems for EMS. EMSS provides timely pre-hospital stroke recognition and care as well as transport to the most appropriate stroke facility.

“Pre-hospital care” includes 9-1-1 dispatch and all emergency medical care provided prior to a stroke patient's treatment at a stroke facility.

“The most appropriate stroke facility” is the clinic, hospital, or stroke center best equipped to provide the right treatment for a patient’s specific type of stroke in the least amount of time.

Improving State EMSS for Stroke

- **Inequities in stroke care**
 - Many communities lack facilities with advanced treatments
 - EMSS is often fragmented across a state

- **State law could help increase the reach, consistency, coordination, and quality of EMSS stroke care**

The problem is that stroke systems of care and EMSS do not achieve the same outcomes across all states and communities. This is because there are inequities in stroke care. Many communities lack facilities with advanced treatments for stroke, and EMSS is often fragmented across a state, resulting in long response times. Additionally, many communities must depend on volunteer EMS personnel, who do not have the level of training that emergency medical technicians and paramedics have. State law could help increase the reach, consistency, coordination, and quality of pre-hospital EMSS stroke care. However, to increase its chance of being effective, efficient, and equitable, this law should be based on the most current and complete evidence base. The evidence for individual components of state stroke law needs to be systematically appraised.



Early Evidence Assessment

PRE-HOSPITAL EMSS POLICY INTERVENTIONS FOR STROKE

To promote evidence-informed policy decisions, my team assessed the early evidence for pre-hospital EMSS policy interventions for stroke. From now on, I'll call the policy interventions we studied "EMSS policy interventions" for short. But keep in mind that these policy interventions are for the pre-hospital, and not in-hospital or post-hospital, setting, and that their purpose is to improve stroke care and outcomes.

Early Evidence Assessment

- ❑ **Prioritize pre-hospital EMSS policy interventions based on levels of early evidence available as of May 31, 2017**
- ❑ **Used existing tool¹⁻³ and engaged stroke experts from CDC and the field**
- ❑ **Results could be used by state decision makers and health organizations and systems**

1. Barbero C et al. 2017. Doing more with more: How “early” evidence can inform public policies. *Public Administration Review*, 77(5): 646–649. doi: 10.1111/puar.12831.
2. CDC DHDSP. Navigating Uncharted Waters: Assessing Best Available Evidence for Emerging Areas of Public Health Policy. Quality and Impact of Component Evidence Assessment Version 2. Centers for Disease Control and Prevention: Atlanta, GA.
3. Barbero C et al. 2015. Appraising the evidence for public health policy components using the quality and impact of component evidence assessment. *Global Heart*, 10(1):3–11. doi: 10.1016/j.gheart.2014.12.013.

To begin our assessment we first identified seven policy interventions that were both recommended by experts on stroke systems of care as well as addressed in at least one state’s law in effect as of May 31, 2017. We determined that the policy interventions were addressed in law by collecting and reviewing state statutes, legislation, and regulations pertaining specifically to stroke.

We next used an existing tool to assess the level of early evidence for each EMSS policy intervention. This “early” evidence included evaluation studies of stroke systems of care as well as subject matter expert and practitioner recommendations drawn from the published and grey literature. Our researchers abstracted and coded the evidence, then applied the assessment tool. All discrepancies between coders were resolved through discussion, and a set of final coding rules was approved by the entire team.

To increase the relevance of our assessment to current policy decisions, we convened an expert group representing CDC, state stroke programs, and the American Heart Association. This group provided input throughout the assessment.

Results of this project could help state decision makers and health organizations and systems ensure that a state stroke policy addresses multiple EMSS policy interventions shown by the best available evidence to positively impact stroke outcomes.

Early Evidence Assessment Tool

Criterion Score	Weak Evidence ● ● ● ●	Moderate Evidence ● ● ● ●	Strong Evidence ● ● ● ●	Very Strong Evidence ● ● ● ●
Effectiveness <input type="checkbox"/> 0 points <input type="checkbox"/> 1 point <input type="checkbox"/> 2 points <input type="checkbox"/> 3 points <input type="checkbox"/> 4 points	Indirect evidence for a positive expected outcome relevant to health	Direct evidence for a positive expected outcome relevant to health	Indirect evidence of mostly positive actual outcomes relevant to health	Direct evidence of mostly positive actual outcomes relevant to health
Equity and Reach <input type="checkbox"/> 0 points <input type="checkbox"/> 1 point <input type="checkbox"/> 2 points <input type="checkbox"/> 3 points <input type="checkbox"/> 4 points	Indirect evidence for a positive expected outcome relevant to equity and reach	Direct evidence for a positive expected outcome relevant to equity and reach	Indirect evidence of mostly positive actual outcomes relevant to equity and reach	Direct evidence of mostly positive actual outcomes relevant to equity and reach
Efficiency <input type="checkbox"/> 0 points <input type="checkbox"/> 1 point <input type="checkbox"/> 2 points <input type="checkbox"/> 3 points <input type="checkbox"/> 4 points	Indirect evidence for a positive expected outcome relevant to efficiency	Direct evidence for a positive expected outcome relevant to efficiency	Indirect evidence of mostly positive actual outcomes relevant to efficiency	Direct evidence of mostly positive actual outcomes relevant to efficiency
Transferability <input type="checkbox"/> 0 points <input type="checkbox"/> 1 point <input type="checkbox"/> 2 points <input type="checkbox"/> 3 points <input type="checkbox"/> 4 points	Indirect evidence for a positive expected outcome relevant to health in two or more regions of the United States	Direct evidence for a positive expected outcome relevant to health in two or more regions of the United States	Indirect evidence of mostly positive actual outcomes relevant to health in two or more regions of the United States	Direct evidence of mostly positive actual outcomes relevant to health in two or more regions of the United States

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

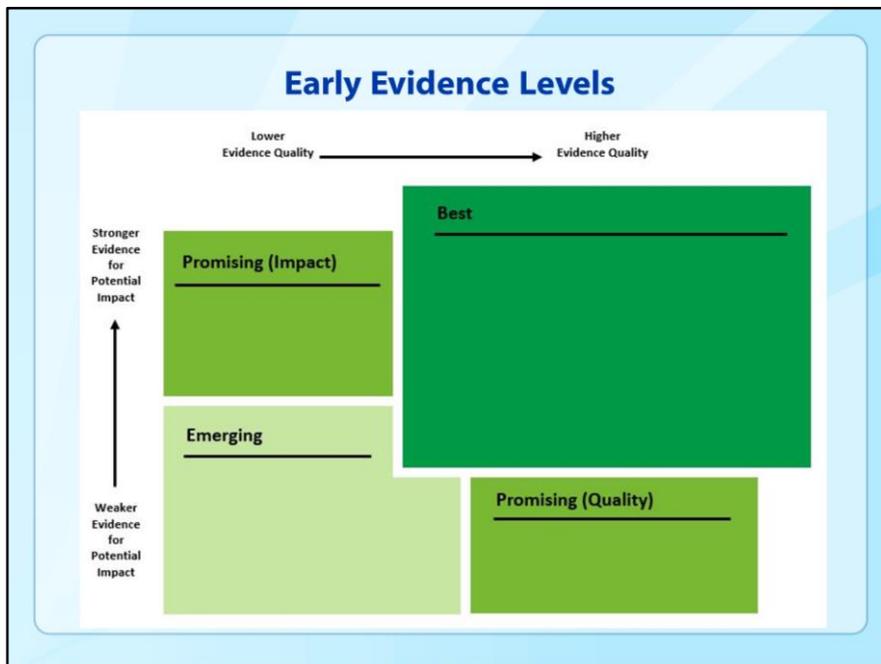
This slide shows the first section of the tool we used to assess the evidence base for each EMSS policy intervention. It gave us a score for evidence for potential public health impact through application of four criteria: effectiveness, equity and reach, efficiency, and transferability.

Early Evidence Assessment Tool

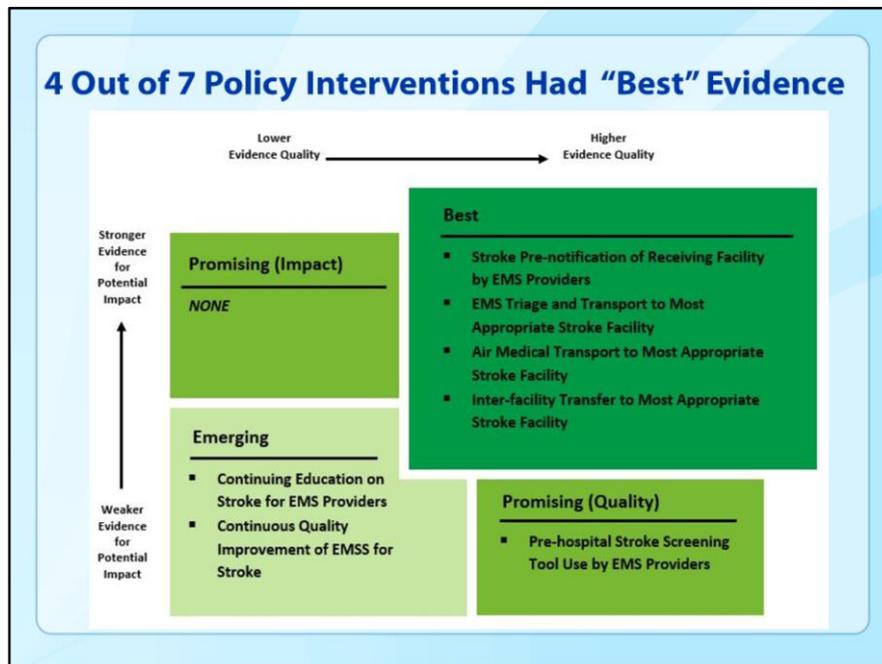
Criterion Score	Low Quality ● ● ● ●	Moderate Quality ● ● ● ●	High Quality ● ● ● ●	Very High Quality ● ● ● ●
Evidence Types				
<input type="checkbox"/> 0 points	A narrative review or commentary suggests a positive outcome	A non-experimental study suggests a positive outcome	An experimental or quasi-experiment suggests a positive outcome	A systematic review suggests a positive outcome
<input type="checkbox"/> 1 point				
<input type="checkbox"/> 2 points				
<input type="checkbox"/> 3 points				
<input type="checkbox"/> 4 points				
Sources				
<input type="checkbox"/> 0 points	A peer-reviewed journal or conference publication without conflict of interest disclosure suggests a positive outcome	A publication by a nonprofit or government organization suggests a positive outcome	A peer-reviewed journal or conference publication with conflict of interest disclosure suggests a positive outcome	A publication by a public health authority suggests a positive outcome
<input type="checkbox"/> 1 point				
<input type="checkbox"/> 2 points				
<input type="checkbox"/> 3 points				
<input type="checkbox"/> 4 points				
Evidence from Research				
<input type="checkbox"/> 0 points	A small amount of evidence from research suggests positive outcomes	A moderate amount of evidence from research suggests positive outcomes	A large amount of evidence from research suggests positive outcomes	A very large amount of evidence from research suggests positive outcomes
<input type="checkbox"/> 1 point				
<input type="checkbox"/> 2 points				
<input type="checkbox"/> 3 points				
<input type="checkbox"/> 4 points				
Evidence from Translation and Practice				
<input type="checkbox"/> 0 points	A small amount of evidence from translation and practice suggests positive outcomes	A moderate amount of evidence from translation and practice suggests positive outcomes	A large amount of evidence from translation and practice suggests positive outcomes	A very large amount of evidence from translation and practice suggests positive outcomes
<input type="checkbox"/> 1 point				
<input type="checkbox"/> 2 points				
<input type="checkbox"/> 3 points				
<input type="checkbox"/> 4 points				

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

This slide shows the second section of the tool we used to assess the evidence base for each EMSS policy intervention. It gave us a score for evidence quality through application of four criteria: evidence type or study design, source, amount of practice-based evidence, and amount of research-based evidence.



This slide shows the early evidence continuum we used to assign evidence levels. Our scoring process resulted in an evidence for potential public health impact and evidence quality score for each policy intervention. We plotted this pair of scores on the continuum to determine if a policy intervention had a “best,” “promising quality,” “promising potential public health impact,” or “emerging” evidence base. By scoring the evidence base for a policy intervention on this continuum we determined a potential priority for it in decision making.



This slide shows the results of our evidence assessment. In total, 915 items of evidence from the last ten years were collected from five published and three grey literature databases. After review for relevance to one or more policy intervention, 95 items of mostly published evidence were included in the assessment.

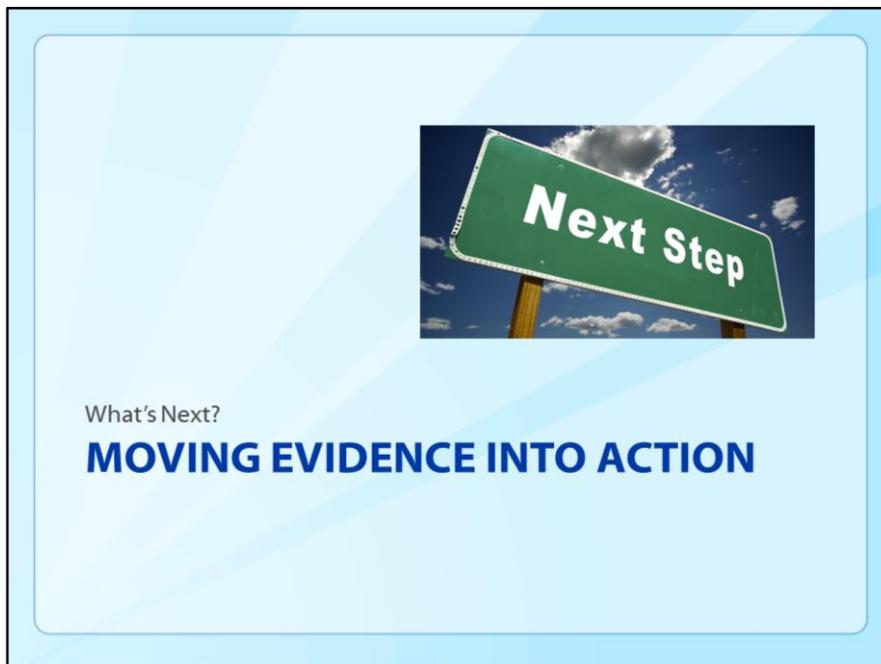
We found that four EMSS policy interventions had “best” early evidence. They are listed in the top-right dark-green quadrant of the continuum and included: stroke pre-notification of receiving facility by EMS providers; EMS triage and transport to the most appropriate stroke facility; air medical transport to the most appropriate stroke facility; and inter-facility transfer to the most appropriate stroke facility. These policy interventions have all been shown to be effective at directly or indirectly improving stroke-related outcomes, such as time to treatment or treatment administration. They were also found to be effective in more than one state.

Stroke pre-notification had the highest evidence score. States can encourage EMS providers to pre-notify receiving facilities of a suspected stroke patient by incorporating pre-notification into EMS protocol algorithms and checklists. EMS triage and transport plans are another evidence-based intervention addressed in existing state stroke laws, and the intervention of air transport was found to improve access to interventional stroke care in rural settings. Strong evidence also supported policies addressing inter-facility transfer agreements, which can include what is known as “drip and ship” protocols, in which tissue plasminogen activator or tPA administration is started before transferring a patient to a more advanced stroke facility.

The only policy intervention we found to have “promising” evidence was “stroke screening tool use by EMS providers,” shown in the bottom-right medium-green quadrant. It had a lower evidence for potential public health impact score because several studies of validated stroke screening tools indicated no-, mixed-, or negative-outcomes related to the specificity and sensitivity of the tools, when they were applied by EMS providers. In some of these studies, stroke was not identified by the tool or underreported.

The two policy interventions of continuing education on stroke for EMS providers and continuous quality improvement of EMSS for stroke, shown in the bottom-left light-green quadrant, had “emerging” evidence. These policy interventions were recommended by experts and practitioners. However, there were no studies to show that such ongoing efforts led to improved stroke outcomes, or that they are worth the resource investments made by stroke systems.

An overall limitation of the evidence base was a lack of empirical studies on economic outcomes and impacts on disparate populations including children.



The findings reported here and other important stroke evidence could next be put into action to inform state stroke policies.

Take-aways

- ❑ **State laws addressing policy interventions with “best” evidence are considered the most likely to have a positive impact**
- ❑ **State decision makers and health organizations and systems could consider a state stroke policy that addresses multiple evidence-based interventions**

There are two important take-aways from our evidence assessment. First, based on the theory of evidence-informed policy, state laws that address the EMSS policy interventions with “best” evidence would be expected to have the greatest potential for a positive public health impact.

Second, state decision makers and health organizations and systems could consider a state stroke policy that addresses multiple evidence-based EMSS policy interventions.

Example of State Law Addressing Evidence-based Pre-hospital EMSS Policy Interventions

Wyoming's policy approach to support pre-hospital EMSS for stroke.

As of 2015, a Wyoming law authorizes the Wyoming Department of Health (DOH) to designate hospitals as acute stroke ready, primary, or comprehensive stroke centers. In addition, the DOH must develop evidence-based EMS pre-hospital stroke assessment, treatment and transport protocols and work with the office of emergency medical services and EMS providers to develop **stroke triage and transport plans** to the closest most appropriate stroke center. **EMS providers must also issue a "Notification of a Stroke Alert" to the receiving stroke center** as soon as possible for patients with a positive FAST (Facial droop; Arm droop; Slurred speech; and Time to call for help) assessment. Stroke centers must have **inter-facility agreements** with higher level stroke centers as well as written agreements with EMS for ground or **air transport** of stroke patients. Wyo. Stat. Ann. § 35-2-1001 (West, 2017); 13 WYO. CODE R. §§ 1 through 7 (2017); 15 WYO. CODE R. §§ 1 through 6 (2017)

□ In June 2017, Wyoming's stroke law addressed:

- Triage and transport (plans)
- Pre-notification ("Stroke Alert")
- Inter-facility transfer (agreements)
- Air medical transport (written agreements)

We found several states that already had law to address the policy interventions we found to have "best" evidence. A summary of Wyoming's stroke law is provided on this slide. As you can see, the bolded text addresses stroke triage and transport, pre-notification, inter-facility transfer, and air medical transport. Wyoming's stroke law provides just one example of how a state has authorized evidence-based EMSS policy interventions in law.

Keep in mind that state stroke law is not the only way to make these policy interventions happen. Some states are working to implement the policy interventions at the state, regional, and local levels under broader legal authorities and through state-level programs. Also, the EMSS policy interventions we studied did not include those that have not yet been addressed in state law. For example, there are innovations in pre-hospital stroke care including clinical innovations that require modifications of EMSS. There are also technological advances such as mobile stroke units and telemedicine in ambulances. In the future, states can use this information to inform stroke policy including stroke law that may authorize such interventions. We plan to update our assessments as states enact new laws and there is new evidence.

Policy Evidence Assessment Report

- ❑ An **Evidence Summary** for each policy intervention includes:
 - Scoring information
 - Example of a state law addressing the policy intervention
 - List of outcomes, populations, and settings studied
 - List of evidence assessed
- ❑ **Detailed methods in Appendix**
- ❑ <https://www.cdc.gov/dhdsp/pubs/docs/Stroke-PEAR.pdf>

Stroke Pre-notification of Receiving Facility by EMS Providers

Evidence Level: B2B2

States can encourage EMS providers to pre-notify receiving facilities of a suspected stroke patient, for example, by incorporating pre-notification into EMS protocol algorithms and checklist, including pre-notification as a component of EMS training and continuing education, and increasing the use of pre-notification as a part of continuous quality improvement activities within stroke systems of care.¹⁰

Example of state law addressing the policy intervention

A training regulation requires EMS providers to have a "Notification of Stroke Alert" in the reporting Stroke Center to best or possible for patients with a positive NIST (National Stroke Alert) Stroke Check, and Time to Call for High Suspectors. (from EMS training manual)

Evidence for Potential Public Health Impact ¹⁰		Evidence Quality ¹⁰	
Effectiveness: ★★★★★	★★★★★	Evidence Type: ★★★★★	★★★★★
Equity & Reach: ★★★★★	★★★★★	Evidence from: ★★★★★	★★★★★
Efficiency: ★★★★★	★★★★★	Evidence from: ★★★★★	★★★★★
Transferability: ★★★★★	★★★★★	Evidence from: ★★★★★	★★★★★
TOTAL: ★★★★★	★★★★★	TOTAL: ★★★★★	★★★★★
SCORE: 100/100		SCORE: 100/100	

Reported health-related outcomes The notification only linked with improved stroke recognition¹⁰ and increased access to appropriate stroke treatment¹⁰. Stroke centers that received pre-notification were more likely to receive stroke recognition¹⁰ and increased access to appropriate stroke treatment¹⁰.

Groups studied Studies reporting positive health-related outcomes examined the general population.¹⁰

Economic highlights No economic outcomes January 1, 2007–May 31, 2017.

Settings There was one national study in the evidence base. Additional studies were set in local or state stroke systems in California¹⁰, Missouri¹⁰, and the UK¹⁰, North Carolina¹⁰, and Pennsylvania¹⁰.

To supplement and disseminate the findings from this and other early evidence assessments, we have developed a Policy Evidence Assessment Report or PEAR for short. The PEAR includes an “Evidence Summary” for each policy intervention included in the assessment. As an example, the evidence summary for the Pre-notification policy intervention is provided on this slide. The evidence summary offers evidence scoring information; an example of a state law addressing the policy intervention; a list of outcomes, populations, and settings studied; and a list of all the evidence assessed. The PEAR also provides a detailed account of assessment method including the early evidence assessment tool.

What's Next?

- ❑ **Focus on stroke and stroke policy interventions**
- ❑ **Consider using evidence to inform decision-making**
- ❑ **Consider evaluating impact**



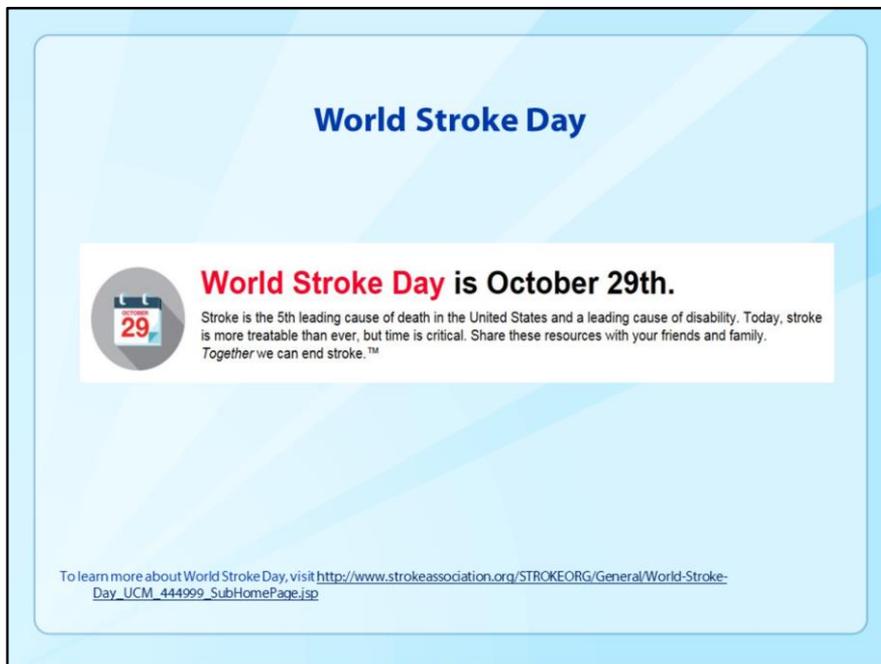
Our recent PEAR and other stroke evidence could be used to promote evidence-informed decision making to support stroke systems of care.

State decision makers and health organizations and systems could first review the evidence on state stroke morbidity and mortality and strategies to improve stroke systems by visiting the CDC Vital Signs and Coverdell program webpages. They may also read our policy evidence assessments reports to understand the evidence for stroke policy interventions. Our policy analysis products are found on the Division for Heart Disease and Stroke Prevention Policy Products webpage.

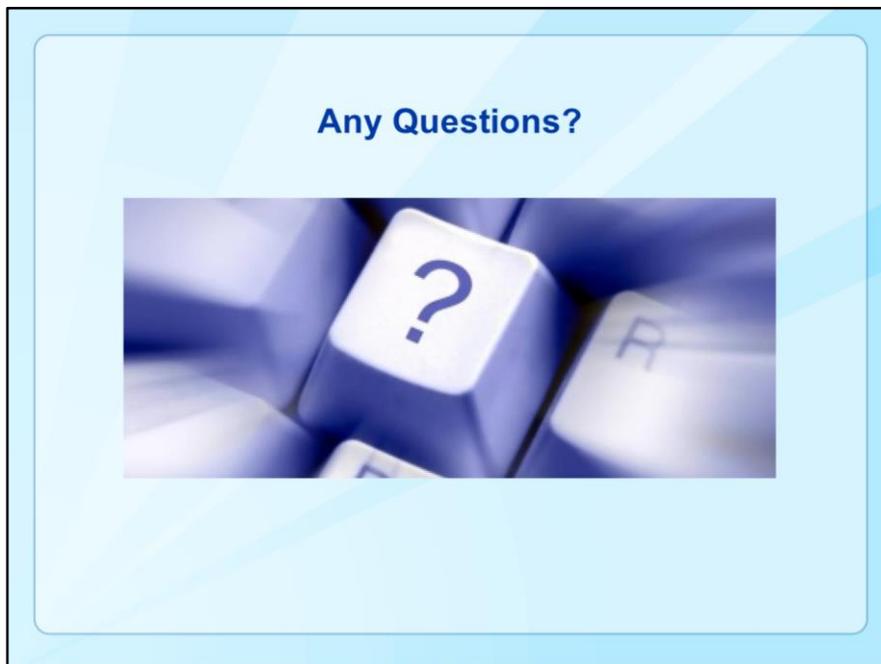
Stroke and stroke policy evidence may be shared to educate and inform. Audiences interested in this information may include the state health policy director, legislature, and regulatory agency staff. Audiences may also include relevant state task forces and local non-profit or voluntary health organizations.

Lastly, our early evidence assessment suggests the potential impact of state laws based on the assessment of best available evidence for policy interventions. To determine the actual impact of state stroke laws, we need rigorous studies evaluating their impact. Health organizations and systems could consider collecting and reporting data on stroke

outcomes to help address this evidence gap.



And remember that World Stroke Day is October 29! This day is an opportunity to spread awareness about stroke and the actions that state health departments, health and EMS systems, health professionals, workplaces, and communities can take to prevent and improve stroke outcomes.



At this time, we'll take an questions but first we'll check to see if any questions have come in through the Q&A tab.

You stated in the PowerPoint that you used an used an existing evidence assessment tool to complete your report, could you go into a brief overview of the tool used or provide us more information about the tool?

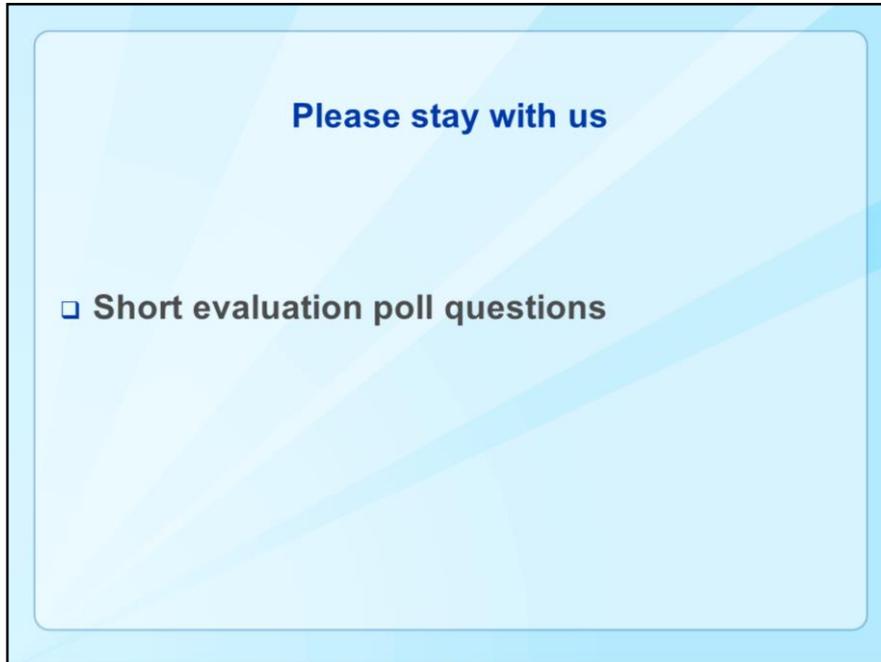
The Stroke Policy Evidence Assessment Report includes an Appendix with the detailed methods including the tool we used to score evidence bases. We've been using this approach and tool since 2013 to assess the evidence for policy components and have shared it in 3 published journal articles and multiple presentation and reports. There is also another Coffee Break presentation from June 2016 that provides an overview. All of these items are available on our website. If you are interested in learning more, email AREBheartinfo@cdc.gov.

What states other than Wyoming have stroke law?

There are several other states with stroke law which we use as examples in our report. A companion product to this report is the state law factsheet. We are working to develop a factsheet for state stroke laws which will show how many and which states have law addressing each evidence-based policy intervention as well as the level of authority of the law. It will also be published on our Policy Products webpage in 2018.

What populations were studied in the evidence base?

Most studies looked at outcomes among the general population served by EMSS and did not break findings out by subgroup. However, several studies did look at the outcomes on stroke systems in rural areas. One important question may be whether a state law requiring EMS pre-notification of receiving facilities really does increase rates of pre-notification across all communities in a state. It's important that once evidence-based policy interventions are addressed in state law that action is taken to implement law uniformly across a state, so all populations will benefit.



Please stay with us a few poll questions.

The level of information was

- Too basic
- About right
- Beyond my needs

The level of information fit my needs.

- Yes
- Somewhat
- A little
- No not at all

This coffee break was worthwhile for me.

- Yes, very worthwhile
- Somewhat
- A little
- No not at all

Reminders!

All sessions are archived and
the slides and script can be accessed at:

<http://www.cdc.gov/dhdsp/pubs/podcasts.htm>

If you have any questions, comments, or topic
ideas send an email to:

AREBheartinfo@cdc.gov

All sessions are archived and the slides and script can be accessed at our Division website. Today's slides will be available in 2-3 weeks.

If you have any ideas for future topics or questions, please contact us at the listed email address on this slide.

Next Coffee Break

When: Tuesday, November 14th at 2:30pm

Topic: Strategies to Highlight the Impact of Your Program

**Presenters: Rachel Davis and
Aisha Tucker-Brown**



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



Our next Coffee Break is scheduled for Tuesday, **November 14th** and is entitled **“Strategies to Highlight the Impact of Your Program”**.

Thank you for joining us. Have a terrific day everyone. This concludes today’s call.