

Barriers and Facilitators to Implementing Primary Stroke Center Policy in the United States: Results From 4 Case Study States

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Stroke is the third leading cause of death and the leading cause of long-term disability in the United States. Direct and indirect costs for stroke were estimated to reach \$73.7 billion in 2010.¹ Despite the knowledge advances of the past few decades for stroke prevention, treatment, and rehabilitation strategies,² only a small percentage of individuals experiencing stroke symptoms receive the recommended treatment in the crucial hours after symptom onset. Barriers to securing timely and effective treatment include the lack of public awareness of stroke symptoms and the need for timely treatment, as well as the logistical and coordinative challenges of providing appropriate treatment within the narrow window of opportunity after a stroke attack. Inadequate coordination of the various professionals involved in stroke care, such as 911 responders, emergency medical services staff, hospital emergency department staff, and acute stroke care team members in hospitals, exacerbates the problem.^{3–5}

To better coordinate the fundamental components of stroke care, The American Heart Association and American Stroke Association (AHA–ASA) recommends establishing “stroke systems of care.”² The AHA–ASA recommendation draws from an Institute of Medicine emphasis on coordinating systems of care to integrate prevention, treatment, and patient access to evidence-based practice. The Institute of Medicine recommendation comes from an observation that when different essential elements of stroke care, especially during the crucial prehospital period, occur in isolation from one another, the quality and effectiveness of the care is compromised.⁶ One rationale for establishing stroke systems of care is to ensure that all patients having signs or symptoms of stroke are transported to a facility that is capable of evaluation and treatment.² An example of an appropriate treatment facility is a Joint

Objectives. We identified barriers and facilitators to the state-level implementation of primary stroke center (PSC) policies, which encourage the certification or designation of specialized stroke treatment facilities and may address concerns such as transportation bypass, telemedicine, and treatment protocols.

Methods. We studied the experiences of 4 states (Florida, Massachusetts, New Mexico, and New York) selected from the 18 states that had enacted PSC policies or were actively considering doing so. We conducted semistructured interviews during fieldwork in each case study state.

Results. Our results showed that system fragmentation, gaps in human and financial resources, and complexity at the interorganizational and operational levels are common barriers and that policy champions, stakeholder support and communication, and operational adaptation are essential facilitators in the adoption and implementation of PSC policies.

Conclusions. The identification of barriers and facilitators reveals the contextual elements that can help or hinder policy implementation and may be useful in informing policy formulation and implementation in other jurisdictions. Proactively identifying jurisdictional challenges and opportunities may help facilitate the policy process for PSC designation and allow jurisdictions to develop more effective stroke systems of care. (*Am J Public Health.* 2011;101:561–566. doi:10.2105/AJPH.2010.197954)

Commission–certified primary stroke center (PSC). PSC will be used as a general term for stroke-ready facilities, because we recognize a variability across states on certification and designation terminology.

In addition, other state-specific models recognize stroke-ready facilities. Optimal treatment of stroke depends on the recognition of sometimes subtle symptoms and rapid access to stroke-ready facilities that are capable of administering appropriate treatment, regardless of certification. Transporting a patient to a PSC can facilitate rapid evaluation of and treatment of acute stroke patients and improve patient outcomes.^{2,7}

In the past 5 years, several states have proposed, adopted, and implemented policies that encourage certification and designation of PSCs. The detail and scope of these policies vary across states. Similarly, state policies vary regarding the implementation of such policies. The experiences of states with PSC policy are

not well documented. Through a collaborative project between the US Centers for Disease Control and Prevention’s Division for Heart Disease and Stroke Prevention and the National Association of Chronic Disease Directors, we studied the variability of PSC policy development and implementation within and between states, identifying key elements of successful PSC policy implementation, including the barriers and facilitators to PSC policy implementation based on the experience of 4 case study states.

METHODS

Our early 2009 review of publicly available information on government Web sites and in scholarly publications regarding state policies, including legislation, regulations, and other formal enactments, revealed that 18 states had either enacted policy to encourage the development of PSCs or were actively considering

doing so during the then-current year. Of these states, 5 had at least 3 years of PSC policy implementation experience, including Florida, Massachusetts, New Jersey, New Mexico, and New York. We selected 4 of these states for detailed fieldwork and analysis to better understand the policy processes, successes, and challenges experienced with policy implementation expected to improve health outcomes for stroke victims. We omitted New Jersey from our fieldwork, not for lack of interesting policy implementation issues but for geographic variability of case study states and an emphasis on access to health care for rural areas.

We spent several continuous days of fieldwork in New Mexico in March 2009, in New York in May 2009, and in Massachusetts in June 2009. Two trips within 2 weeks in July 2009 were required to complete interviews in Florida, primarily because of the decentralized nature of the health care delivery system and geographic dispersion of the stakeholder group. The fieldwork methodology was the same for each state and included (1) selection of members of the research team for the visit; (2) preparation for the site visit, including scheduling appointments and meetings; (3) researcher preparation, including requesting and reviewing documents and data; (4) completion of the site visit; (5) documentation of preliminary findings and field notes; (6) follow-up to gather missing or additional data; and (7) production of the case study report.

Two members of the research team, the project director and senior research associate, participated in all interviews in New Mexico, New York, Massachusetts, and the first trip to Florida. During the second trip to Florida, the senior research associate was accompanied by other research team members. More than 100 semistructured field interviews were conducted, and a wide variety of public documents and reports were reviewed both before and after the site visits. Large-group meetings were also convened with stakeholders in each of the case study states, in some cases via conference call in part because of the geographical spread of the state or the difficulty of assembling such a diverse group for this purpose. In each of the interviews (and when possible in large-group meetings and conference calls) stakeholders were asked to identify barriers and facilitators to implementation of PSC policy.

We selected study participants through a variety of methods. We asked state public health officials and representatives of the AHA–ASA to identify both stakeholder types and key individuals representing each type. We invited members of state stroke advisory committees and task forces to volunteer for interviews. We used a snowball sampling technique; multiple stakeholders in each state would recommend additional individuals as pertinent to the project. The resulting study participants were queried by using a common interview guide and data-gathering format⁸ that also permitted customization to particular state contexts. The research team agreed to interview all persons identified as being able to offer important input, including representatives of health care delivery, government, advocacy groups, telemedicine firms, and pharmaceutical companies. All of those contacted agreed to be interviewed, but we note 4 interview cancellations across the 4 states. All state stakeholders interviewed, were informed of the interview protocol in advance. Of 113 scheduled interviews, 109 were completed, for a 96% response rate.

Table 1 shows the distribution of completed interviews by the self-described primary role or title of the participant. For the sake of simplicity we categorized stakeholders by their

primary role but note that many of the interviewees held multiple roles. For example, a self-described neurologist in Florida is also an academic, advocate of telemedicine, and active in the AHA–ASA. The diversity of the group is striking. This count does not include several hundred attendees at a full-day Stroke Conference sponsored by the New York State Department of Health, which we attended, 30-plus members of the Florida State Stroke Advisory Board sponsored by the AHA–ASA who participated in a 90-minute conference call with us, or 30-plus members of the Massachusetts Primary Stroke Service Steering Committee to the Division of Health Care Quality who met with us. Individuals who participated in these latter 3 events could not be identified by name and are not included in the counts below. Their input was, however, included in our findings.

On completion of the fieldwork, researchers prepared individual field notes and reviewed recommended documents, articles, and Web-based information identified during interviews. All project team members reviewed the field notes and identified areas of interest and concern for follow-up or clarification. The research team and Centers for Disease Control and Prevention staff met in person

TABLE 1—Summary of Completed Interviews Regarding Barriers and Facilitators to Implementing Primary Stroke Center (PSC) Policy, by Stakeholder Type, March–July 2009

| Stakeholder Type | Number of Interviews | | | | Total |
|--|----------------------|---------------|------------|----------|-------|
| | Florida | Massachusetts | New Mexico | New York | |
| Academics | 0 | 0 | 2 | 0 | 2 |
| AHA-ASA | 2 | 3 | 2 | 1 | 8 |
| Emergency department physicians or nurses | 5 | 1 | 4 | 0 | 10 |
| Emergency medical services | 11 | 3 | 5 | 1 | 20 |
| Hospital representatives or advocates | 0 | 0 | 0 | 1 | 1 |
| Insurance, payors, or advocates | 0 | 0 | 1 | 1 | 2 |
| Neurologists and other medical specialists | 9 | 2 | 4 | 0 | 15 |
| Telemedicine | 4 | 1 | 1 | 4 | 10 |
| Underserved populations | 0 | 0 | 1 | 0 | 1 |
| State department of health | 1 | 3 | 3 | 4 | 11 |
| State regulatory agency | 1 | 3 | 0 | 1 | 5 |
| Stroke coordinators in hospitals | 9 | 3 | 3 | 1 | 16 |
| Stroke survivors | 0 | 1 | 3 | 0 | 4 |
| Other | 1 | 0 | 2 | 1 | 4 |
| Total | 43 | 20 | 31 | 15 | 109 |

Note. AHA-ASA = American Heart Association and American Stroke Association representatives.

or by phone monthly to discuss emerging themes. The categorization framework of “barriers and facilitators” emerged during these meetings.

RESULTS

We note wide variation among and within our case study states on geography, demographics, procedures for PSC certification and designation, regulatory authority and responsibility, available resources, and quality improvement and assurance initiatives. Despite this variation we were able to identify common themes concerning barriers and facilitators to state PSC policy implementation. The key points are briefly summarized in Table 2 and described in more detail in the following paragraphs.

Barriers

Stakeholders often noted that as early adopters of state PSC policy, they face an evolving and constantly changing certification landscape. Some states have a policy that specifically ties PSC certification to the formal process provided by the Joint Commission. Three of our 4 case study states (New York, Massachusetts, and Florida) have customized their certification and designation processes. All of their state policy is based on the Brain Attack Coalition or AHA–ASA

recommendations,⁹ and they encourage hospitals to pursue Joint Commission certification at their own expense. Although many of these certification processes may appear similar to outsiders, stakeholders from each state emphasized the unique nuances of their state’s policy.

Stakeholders in all 4 states described that, because of the importance of rapid response to stroke, the lack of coordination between the emergency medical dispatch and the emergency medical services systems is a major barrier for patients with stroke-like symptoms to access the most appropriate facility. Emergency medical dispatchers, usually organizationally and operationally distinct from emergency medical services, must recognize stroke symptoms and determine the timing and type of emergency medical services response. Many stakeholders expressed concern that dispatch system operators lacked emergency medicine dispatch experience and are not able to properly recognize stroke symptoms and appropriately direct the transport via emergency medical services. With access to satellite technology, the barrier to rapid response for stroke victims seems to be more a problem of interagency coordination than of availability and functionality of communications technology.

Stakeholders in most case study states noted that their state’s PSC policy gives emergency medical services the authority to bypass any

hospital that is not stroke-ready (i.e., a PSC). For this circumventing to occur, emergency medical services responders must recognize patients with acute stroke symptoms, guide the transportation of patients to the most appropriate facilities, and then initiate stroke-specific life support.² However, stakeholders reported that emergency medical services budget constraints often limit training of their responders on acute stroke emergency care and lessen their ability to recognize stroke symptoms in patients. In addition, several interviewees mentioned the challenges for rapid transport to PSCs from rural areas because local emergency medical services cannot dedicate ambulances for out-of-area transportation needs.

Stakeholders in all case study states noted too few neurologists and neurosurgeons to adequately diagnose and treat acute stroke events. If not contraindicated, ischemic stroke patients should receive intravenous (IV) tissue plasminogen activator, as soon as possible according to currently established guidelines.¹⁰ However, study participants reported that emergency department doctors were hesitant to administer IV tissue plasminogen activator, a drug with potentially hemorrhagic results, without neurology consult. The lack of neurologic support is amplified in rural areas that lack computed tomography imaging resources and access to telemedicine. The study participants providing neurologic support to an acute stroke team also noted the tension among physician specialties, noting that not all neurologists are stroke neurologists and not all emergency physicians are comfortable with administration of IV tissue plasminogen activator. The burden of being on call for stroke—an unpredictable condition that can occur at any time and requires rapid response—discourages some neurologists from providing stroke assessment and care.

Telemedicine has been proposed as a cost-effective method to increase access to stroke and brain imaging expertise, especially for geographically remote areas that often have limited access to a neurologist with stroke expertise.^{11,12} Our study participants mentioned several challenges at the state level to use of telemedicine, including (1) lack of telecommunications connectivity in rural areas, (2) complexities of credentialing and licensure for neurologists providing diagnosis and treatment via telemedicine across jurisdictional lines,¹³ and (3)

TABLE 2—Barriers and Facilitators to Implementing Primary Stroke Center (PSC) Policy

| Barriers | Facilitators |
|---|--|
| Determining the standards for PSC certification | Statewide or regional champions for stroke systems of care |
| Lack of coordination between emergency medical dispatch and emergency medical services and health care delivery systems | Stakeholder communication |
| Lack of neurology specialists for the acute stroke team | Statewide programs focused on improving the quality of stroke care |
| Intrastate and interstate barriers to telemedicine | Stroke care policies focused on quality |
| Complexity at the hospital and health care delivery system level | Stroke policies informed by the medical community |
| The complexity of public administration and government entity coordination of health care delivery | Stroke policies flexible to local context |
| | Prehospital care coordination |
| | Sharing data across the continuum of health care delivery |
| | Hospital competition for market share |

the need for improved insurance policies that allow reimbursement for telemedicine.^{12,14}

Many stakeholders noted that PSC policy can create a new level of complexity for hospital and medical providers already overburdened by voluminous, complex, and often counterproductive regulations.¹⁵ Study participants noted myriad related issues, including the observation that readiness of hospitals for acute stroke care sometimes conflicts with other regulations, such as licensure, Certificate of Need, and Medicare and Medicaid reimbursement rules.¹⁴ For example, transfer of a stroke patient from one hospital emergency room to another before patient admission results in Medicare reimbursement penalties for the sending hospital. Also, several interviewees mentioned that medical providers in different jurisdictions must be able to share information about stroke patients quickly, but privacy laws limit their ability to do so. Other interviewees complained about the dense policy environment of health care in which disparate policies often work at cross-purposes. For example, they pointed out that seemingly unrelated policies such as hospital cost containment measures and state failure to limit medical malpractice liability awards can weaken stroke systems of care.

According to our study participants, a PSC policy that promotes a state stroke system of care is based on a variety of assumptions that may not be practical for hospitals. First, the policy assumes that hospitals share equally in the burden of indigent care and care for the uninsured, yet this assumption is an unrealistic one, especially for the academic and tertiary care centers that often bear the burden of unreimbursed care. Some hospitals cannot afford to treat additional uninsured patients and, because of PSC policies that allow ambulances to bypass any hospital that is not stroke-ready, they have less control over the indigent care obligation. Second, PSC policy assumes that hospitals coordinate their efforts with community counterparts, but overlooks the fact that hospitals are often competitive. Because of excess regulatory burden, interhospital networks are often not collegial unless there are financial incentives to be so. Finally, PSC policy often creates the perception that hospitals designated as PSCs have comparable access, capacity, and quality. However, hospitals have different bed, staffing, and facility capacity, and

the amount of care and quality of care may vary among hospitals. Only when they work together in a coordinated system of care do hospitals, emergency medical dispatchers, and emergency medical services provide best care for stroke victims.¹⁶

Our stakeholder interviews identified several other barriers related to hospital care delivery, including observations that (1) stroke care has traditionally been unprofitable for hospitals, resulting in advocacy for improved Medicare reimbursement; (2) hospitals' focus on efficient use of resources poses challenges to making computed tomography (and accompanying staffing) available for time-limited stroke diagnostic procedures; and (3) the science of stroke care is advancing, and hospitals are challenged in terms of money and other resources to continually update protocols and to train and retrain staff.

Stakeholder interviews revealed a common understanding that, for stroke care, a unique and complex relationship exists between public health and regulatory agencies that includes (1) the delicate nuances of information-sharing between public health and providers¹⁷; (2) the blurred lines between agency roles in ensuring compliance with state regulations and in providing support to hospitals to enhance patients' quality of care; and (3) the hierarchy of authority in state health agencies, specifically when determining who is accountable at each stage of policy implementation and administration. In addition, some study participants noted a dependence on advocacy groups, such as AHA–ASA, for data collection and monitoring resources considered critical to ensuring optimal patient care and quality improvement. Study participants also voiced a desire to maintain autonomy and authority from these advocacy groups for policy implementation and compliance, not for lack of appreciation and respect for their work, but in recognition of their advocacy role and political agenda.

Facilitators

In every case study state, stakeholder interviews indicated the importance of “champions” or “fixers” for successful PSC policy implementation.¹⁸ These champions often have varying backgrounds with experience in areas, including politics, public administration, and clinical expertise; the champions all possess

knowledge of policy processes and knowledge regarding ways to influence widespread support for improved stroke care. They might be neurologists or “stroke care coordinators” or non-clinicians such as attorneys working in hospitals or state agencies. Policy implementation is facilitated by their ability to (1) motivate and focus stakeholders on key issues, (2) coordinate several public health agencies, and (3) attend to health care regulation and reimbursement issues.

The field interviewees emphasized the importance of communication between and among stakeholders as facilitated by state and regional entities such as the state department of health or the AHA–ASA. Communication between stakeholders includes sharing stroke treatment protocols among facilities, sharing current science and findings concerning treatment regimens such as IV tissue plasminogen activator among providers, and organizing regular meetings of a diverse group of stakeholders to discuss best practices, issues, and problems in stroke care. Our research team participated in several of these large-group meetings and observed impressive open dialogue and multidisciplinary discourse.

Stakeholders reported the benefits of having state-based programs focused on improving the quality of stroke care. In Massachusetts, the Stroke Collaborative Reaching for Excellence,¹⁹ a program funded as a part of the Paul Coverdell National Acute Stroke Registry,²⁰ supports state-designated primary stroke service hospitals to improve the quality of acute stroke care. The collaborative assists primary stroke service hospitals in monitoring and improving the quality of stroke care for acute, inpatient, and secondary prevention performance measures. In addition, in every state visited, interviewees and meeting attendees highlighted AHA–ASA resources focused on improving quality of stroke care, including their quality improvement directors and technical offerings such as *Get With the Guidelines—Stroke*.¹

A subset of our stakeholder interviewees with direct experience with state PSC policy indicated the importance of having certification and inspection processes that are reasonable, focused on quality of care, cost-effective, and consistent with current science. They noted that state mandates for PSC criteria should come with state resources to advise and assist hospitals and prehospital providers with

specific policy, legal, and regulatory processes. A key facilitator of state PSC policy implementation is having resources to assist hospitals with (1) achieving PSC administrative standards, (2) monitoring performance, and (3) enforcing regulations on a long-term basis. Licensure regulations that support flexible credentialing for multihospital stroke systems of care also facilitate the use of telemedicine such as making neurology specialty resources available in rural areas.

Stroke treatment options are the byproduct of a constantly evolving science, and practical stroke care is dependent on cooperation with and coordination of a multidisciplinary prehospital and hospital-based team.²¹ Our stakeholder interviewees suggest that having members of the medical community such as stroke neurologists, hospital stroke coordinators, and emergency medical services directors continually advising state PSC policy efforts results in better policy and coordination between state agencies and providers.

One of the consistent themes in our research concerned the benefits of flexible PSC policy that allows hospitals and physicians to render care consistent with local needs and resources. For example, a bypass and notification system that allows hospitals to opt in and out of readiness to render stroke care makes sense if it is not used to avoid care of the indigent. Residents of rural areas have different health care needs and resources than residents of urban areas. Although stroke can occur at any age, it is more likely to occur in older persons; communities with more retirees will likely need to plan more for stroke care than will communities with a younger population.

Interviewees described the benefits of a well-coordinated emergency medical services and dispatch system. They noted that where emergency medical services and dispatch personnel receive ongoing training, diagnostic algorithms such as stroke scales, and treatment protocols based on the current stroke care science, stroke victims receive more timely access to appropriate hospital treatment. Furthermore, respondents noted the importance of coordination between stroke care policy and trauma system policy, while maintaining an understanding of the differences between the 2 in terms of patient needs and provider resources. Interviewees noted that when acute

stroke systems of care are built onto existing systems of care, such as trauma networks or neonatal systems, stroke systems of care can utilize preexisting resources of these systems, increase public awareness about early detection of symptoms, and leverage the availability of early responders.

Stakeholders noted that PSC policies can be more easily implemented when data can be accessed and transferred among all appropriate facilities and providers. Sharing patient data enhances collaboration across the continuum of stroke care, including prehospital care, hospital care, and posthospital rehabilitation, and facilitates sharing of best practices for stroke care among and between hospitals, emergency medical services, and rehabilitation-based providers. Furthermore, stakeholders pointed to the value of using patient data to implement quality improvement initiatives designed to improve stroke patient care. Yet barriers exist to widespread data sharing, including the Health Insurance Portability and Accountability Act, which mandates stringent requirements for the protection of patient personal health information.¹⁷

State PSC policies that allow ambulances to bypass any hospital that is not stroke-ready take hospitals' competitive strategies to a new and more complex level. Despite the controversy concerning health care competition, participants in our stakeholder interviews generally agreed that hospital competition facilitates wider adoption of PSC status and, in turn, promotes improved quality of patient care. Stakeholders reported that because PSC designation can give PSC-designated hospitals an edge in the market, many hospitals are motivated to earn PSC designation. Furthermore, representatives from hospitals in highly competitive markets reported pursuing PSC designation to build their reputation for quality care, even if reimbursement rates are lagging behind.

DISCUSSION

To our knowledge, this is the first detailed qualitative study of PSC policy implementation in the United States. Many of the barriers identified in this study parallel challenges noted by others to developing effective and well-integrated stroke systems of care.^{11,12} Furthermore, many of the barriers and facilitators

identified in this study parallel those noted in other fields of policy research. Barriers such as system fragmentation, gaps in human and financial resources, and complexity at the interorganizational and operational levels, have often been noted in the research literature on policy implementation. Likewise, facilitators such as policy champions, stakeholder support and communication, and operational adaptation are well documented.²²

Key actors in at least 3 of the 4 case study states indicated that they were using some of our findings to make or propose improvements in state policy or seek enhanced funding for PSC policy implementation. During our study, the research team noted improvements in state Web sites concerning PSC policy and data. We experienced more communication among stakeholders, perhaps triggered by our reports, which were sometimes provocative, albeit unintendedly so. Because of the complexity of stroke care and the number of stakeholder groups involved, we suggest that this type of research can be beneficial for states grappling with stroke care policy implementation.

Our practical advice for states considering adopting and implementing PSC policy is that policy statements concerning PSC certification and designation are less important than communication and coordination among many disparate stakeholders addressing policy implementation for the stroke victims served. For example, states should include relevant members of the medical community in their policymaking processes at the legislative and state agency levels. Similarly states should encourage policy champions representing many stakeholders including emergency medical services, medicine, academics, the AHA-ASA, and health care delivery.

A growing interest exists among states in adopting policies to support stroke systems of care, including policies for PSC certification and designation. In developing such policies, state and federal policymakers should consider the barriers and facilitators identified by the broad stakeholder group interviewed in this study. These barriers and facilitators point out contextual elements that can help or hinder policy implementation and may be useful in informing policy formulation and implementation in other jurisdictions. Proactively identifying jurisdictional challenges and opportunities may

help to facilitate the policy process for PSC designation and allow jurisdictions to develop more effective stroke systems of care. ■

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L.J. O'Toole Jr was the principal investigator and project director. C.P. Slade was the senior research associate for the project. G.A. Brewer served as project consultant. L.N. Gase served as a coauthor and liaison to the Centers for Disease Control and Prevention.

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Human Participant Protection

No institutional review board approval was required. The contractor, the Centers for Disease Control and Prevention, evaluated the project in detail and determined that it was not a research project but a public health evaluation project focused on analyzing policy implementation.

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