The Connecticut Hospital Stroke Care Survey

A project sponsored by:
The Connecticut Department of Public Health

Conducted by:
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Department of Public Policy
The University of Connecticut

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www.dph.state.ct.us

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Executive Summary and Key Findings

The Connecticut Department of Public Health commissioned the University of Connecticut's Department of Public Policy to conduct a survey of all thirty Connecticut adult acute care hospitals. The goals of this survey were to determine what types of stroke care services exist within Connecticut adult acute care hospitals, the extent of these services, how hospitals in Connecticut process stroke care patients, and what types of educational tools are provided for stroke patients and their families.

Stroke care services and the extent of such services differ across Connecticut hospitals. A majority of adult acute care hospitals in Connecticut have a formal stroke protocol. In addition, a majority of hospitals also have, or are in the process of creating, a "stroke team" or multi-disciplinary group available to evaluate suspected stroke patients within 15 minutes of the patient's arrival. Nearly all of Connecticut adult acute care hospitals provide a variety of diagnostic services for suspected stroke patients. Regardless of the current stroke services offered, hospitals expressed interest in and/or specific plans for the improvement of services available for monitoring stroke patients. A plurality (41%), have or are in the process of implementing a quality improvement system related to such monitoring.

The following are the key findings from the "Connecticut Hospital Stroke Care Survey":

1. Two-thirds of all Connecticut adult acute care hospitals surveyed have a formal stroke protocol. Hospitals having a formal stroke protocol are also more likely than are hospitals without a formal stroke protocol to have several other important components of stroke care services, such as:
   - An acute stroke team;
   - A quality improvement system related to the monitoring of stroke patients;
   - A pre-hospital stroke alert protocol; and
   - Administering the National Institutes of Health Stroke Scale (NIHSS) to all stroke patients.

2. Fifty-two percent of hospitals surveyed have an acute "stroke team" or multi-disciplinary group available to evaluate suspected stroke patients within 15 minutes of the patient's arrival. An additional 7% are in the process of creating an acute stroke team.

3. A majority of adult acute care hospitals surveyed (52%) do not have a pre-hospital "Stroke Alert Protocol" for EMS services.

4. t-PA for stroke patients is available to the ED 24 hours a day, 7 days a week at all hospitals.

5. All hospitals surveyed provide MR angiography and Carotid Doppler (ultrasound) study as diagnostic services.

6. All hospitals surveyed have stroke relevant laboratory services available 24 hours a day, 7 days a week in person, and nearly 83% of all hospitals have results back from such services within 45 minutes of being ordered.

7. Nearly all (97%) Connecticut hospitals surveyed discharge stroke patients with a long-term rehabilitation plan.

8. Hospitals are more likely to provide continuing education credit for cerebrovascular disease care to acute-care physicians (55% of hospitals surveyed) than nurses (35% of hospitals surveyed) on staff.

9. Only 35% of Connecticut hospitals surveyed sponsor public education programs about stroke prevention at their hospital at least twice annually, as recommended by the Brain Attack Coalition.

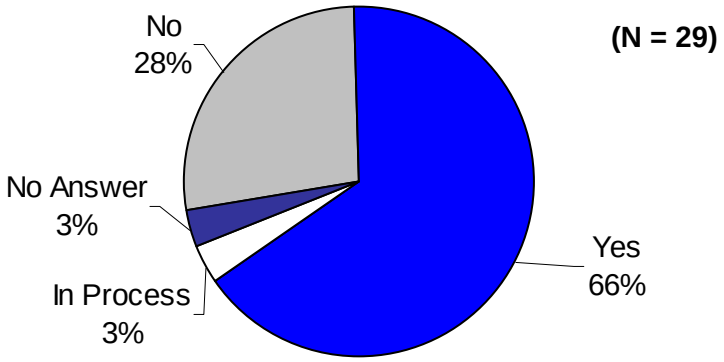
10. There is widespread support for a recognition program sponsored by the Department of Public Health for all Connecticut acute care hospitals that meet certain standards of care related to primary stroke services, with a majority of CT hospitals (55%) being very likely to apply.

Each of these key findings is explored in some detail in the section that follows.

Formal Stroke Protocol

Stroke care services available in Connecticut vary across hospitals. Two-thirds of all Connecticut adult acute care hospitals surveyed (66%) have a formal stroke protocol, and an additional hospital is in the process of implementing such a protocol. Seventy-one percent of teaching hospitals responding to this survey have a formal stroke protocol, compared to only 58% of non-teaching hospitals.

Does your hospital have a formal stroke protocol?



Stroke Team Members

Hospitals were asked whether they have a "stroke team" (defined as a "multidisciplinary group available to evaluate a suspected stroke patient within 15 minutes of the patient's arrival") and, if so, the availability of team members. A majority of Connecticut adult acute care hospitals either have (52%) or are in the process of creating (7%) an acute "stroke team" or multi-disciplinary group available to evaluate suspected stroke patients within 15 minutes of the patient's arrival. Follow up discussion for clarity between researchers and hospitals indicated that a number of hospitals have components of a multi-disciplinary group but do not have this group classified as and organized in a stroke team structure.

As could be expected, hospitals that have a stroke protocol are more likely to also have an acute "stroke team" to evaluate suspected stroke patients (74%) than hospitals that do not have an official hospital stroke protocol (13%).

Larger hospitals, those with more than 250 licensed beds, are more likely to have an acute "stroke team" available to evaluate suspected stroke patients (67%), than smaller hospitals, with 250 beds or less (36%). Eighty percent of hospitals that discharge over 15,000 patients per year have an acute stroke team that is available to evaluate suspected stroke patients within 15 minutes of the patient's arrival. Only 50% of hospitals that discharge 7,001-15,000, and 22% that discharge less than 7,000 annually, have such a team. Teaching hospitals are more likely to have a "stroke team" (75%) than non-teaching hospitals (25%).

An overwhelming majority of hospitals that discharge more than 300 stroke patients each year, have a stroke team to evaluate suspected stroke patients (86%), compared to only 50% of those that discharge 121 to 300 stroke patients, and 33% of the hospitals that discharge 120 or below each year.

Stroke Team Availability

Hospitals that do have a "stroke team" were asked what team members are present for evaluation, available for phone consultation, and/or available 24 hours a day, 7 days a week in person. Of those hospitals that do have a "stroke team" or multi-disciplinary group, team members available to evaluate suspected stroke care patients, and when they are available, varied across hospitals. As noted, only hospitals that indicated they have a stroke team were asked about the availability of team members.

TABLE 1: Stroke Team Member Availability at Hospitals with a Stroke Team (N = 16)

	Present for evaluation	Available for phone consultation	Available 24 hours a day, 7 days a week in person
Neurologist	44%	75%	69%
Neurosurgeon	44%	81%	63%
Radiologist	44%	81%	63%
Emergency physician	88%	31%	75%
Emergency nurse	88%	31%	75%
CT Technologist	75%	31%	81%
Other	44%	38%	38%

NOTE: Includes multiple mentions, meaning that respondents can select as many categories as apply, among the 48% of hospitals that indicated that they have a "stroke team."

Three quarters (75%) of the hospitals that have a "stroke team" have a neurologist available for phone consultation, 69% have a neurologist available 24 hours a day, 7 days a week in person, and 44% have such team members present for evaluation. Of the hospitals that indicated that they have a "stroke team," 81% have a neurosurgeon available for phone consultation, while 63% have one available 24 hours a day, 7 days a week in person. Only 44% of such hospitals have a neurosurgeon present for evaluation of suspected stroke patients.

An additional 81% of hospitals that indicated that they have a multi-disciplinary group to evaluate suspected stroke patients, have a radiologist available for phone consultation. Sixty-three percent of such hospitals have a radiologist available 24 hours a day, 7 days a week in person, while only 44% have one present for evaluation.

Most (88%) of the hospitals that have a team to evaluate stroke care patients have emergency physician and emergency nurses that are present for evaluation. Seventy-five percent have emergency physicians and nurses available 24 hours a day, 7 days a week in person. Yet, nearly a third (31%) can rely on phone consultations from emergency physicians and nurses to evaluate suspected stroke patients.

Of hospitals that have a multi-disciplinary group to evaluate suspected stroke patients, 81% have CT technologists available for such evaluations 24 hours a day, 7 days a week in person. Seventy-five percent of such hospitals have CT Technologists present for evaluation, while 31% can rely on phone consultations with such professionals to evaluate suspected stroke patients (Table 1).

Forty-four percent mentioned some other team member beyond those offered initially that are present for evaluation. Other team members that were offered included: Neurology Resident, Nursing Supervisor, Pharmacist, Radiology Resident, Interventional Neuro-radiologist, as well as collaboration with other hospitals. Similarly, 38% that have a stroke team offered other team members that are available 24 hours a day, 7 days a week in person. These included: Neurology Resident, Nursing Supervisor, Pharmacist, "M.A.R.", and collaboration with other hospitals. Thirty-eight percent of hospitals that have a "stroke team" provided other team members beyond those that were initially offered that are available for phone consultation. These other team members included: Nursing Supervisor, Pharmacist, Radiology Resident, Interventional Neuro-radiologist, Neurology Physician Assistant, and collaboration with other hospitals (Table 1).

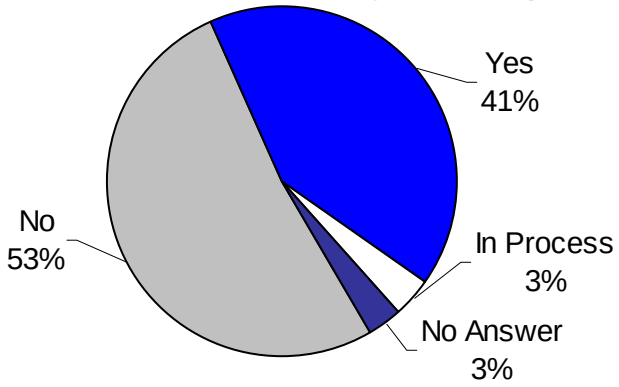
In addition, of the hospitals that indicated that they do have a "stroke care team" to evaluate suspected stroke patients, the availability of this multi-disciplinary group varied with the size of the hospital. Smaller hospitals are less likely to have team members present at all times. On a continuum from being available 24 hours a day, 7 days a week, to only being available for phone consultation, all smaller hospitals (less than 250 beds) have neurologists, CT-technologist, and emergency physicians and nurses at least present for evaluations, while all small hospitals have a neurosurgeon and radiologists available at least by phone.

Quality Improvement System

Forty-one percent of hospitals surveyed have implemented a specific quality improvement system related to stroke patients, and one other hospital is in the process of implementing such a system. Of the hospitals that have implemented a quality improvement system, most indicated that they collect quality data on all ten JCAHO stroke performance measures.

Has your hospital implemented a quality improvement system related to the monitoring of stroke patients?

(N = 29)



Hospitals with a formal stroke protocol are more likely to have implemented a quality improvement system related to the monitoring of stroke patients (58%) than hospitals that do not have a formal stroke protocol (13%). More teaching hospitals (53%) than non-teaching (25%) have implemented such a system.

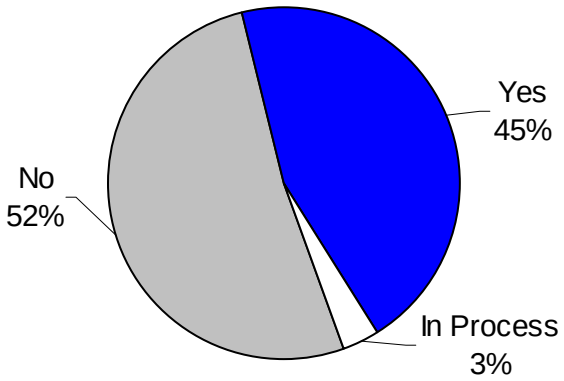
Hospital volume, capacity, and size play a role in whether hospitals have implemented a quality improvement system. A majority of hospitals with more than 250 licensed beds have implemented such a system, while only 29% of hospitals with less than 250 beds have also done so. Only 11% of hospitals that discharge less than 7,000 patients annually have implemented such a system, compared to 60% of hospitals that discharge more than 15,000 patients each year.

Pre-hospital Stroke Alert Protocol

A majority of adult acute care hospitals surveyed (52%) do not have a pre-hospital "Stroke Alert Protocol" for EMS services. An additional hospital (3%) reports that it is in the process of creating such a protocol for EMS services. Hospitals that have a formal stroke protocol are more likely to also have a pre-hospital "Stroke Alert Protocol" for EMS services (53%) than hospitals that do not have a formal stroke protocol (38%).

Does your hospital have a pre-hospital "Stroke Alert Protocol" for EMS services?

(N = 29)



The size of the hospital also appears to influence whether or not hospitals have a pre-hospital "Stroke Alert Protocol" or not. Hospitals with more than 250 beds are more likely to have this pre-hospital protocol (67%) than hospitals with fewer than 250 beds (21%).

The discharge volume of hospitals also plays a role in the whether hospitals have a pre-hospital protocol for EMS services. Hospitals that discharge more than 15,000 patients annually are more likely to have a pre-hospital stroke protocol (80%) than hospitals that discharge 7,000 to 15,000 patients annually (30%), and those that discharge less than 7,000 patients every year (22%).

Teaching hospitals (59%) are more likely to have a pre-hospital "Stroke Alert Protocol" for EMS providers than non-teaching hospitals (25%).

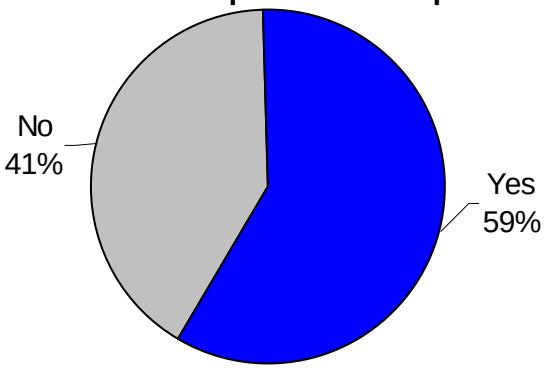
In addition, 86% of hospitals that discharge more than 300 stroke patients each year have a pre-hospital protocol for EMS services, compared to only 30% of hospitals with 121 to 300 stroke discharges, and 33% of hospitals that have less than 120 stroke discharges per year.

Pre-hospital Stroke Assessment Tool

Fifty-nine percent of hospitals surveyed have a pre-hospital stroke assessment tool used by ED physicians and EMS providers for suspected stroke patients. Once again, whether hospitals have a formal stroke protocol impacts the existence of stroke services within such hospitals. A majority of hospitals that have a formal stroke protocol (63%) have a pre-hospital stroke assessment tool used by ED physicians and EMS providers for suspected stroke patients.

Does your hospital have a pre-hospital stroke assessment tool used by ED physicians and EMS providers for suspected stroke patients?

(N = 29)



Larger hospital patient capacity correlates with a greater chance that the hospital will have a pre-hospital stroke assessment tool for suspected stroke patients. Nearly three quarters (73%) of all hospitals with more than 250 beds have such a tool, compared to only 43% of those that have less than 250 beds.

Ninety percent of hospitals that make more than 15,000 discharges annually have a pre-hospital assessment tool used by ED physicians and EMS providers, while only 60% of hospitals that have 7,001 to 15,000 discharges each year, and only 22% of those that have less than 7,000 annually also have this pre-hospital assessment tool.

More than eight in ten teaching hospitals (82%) have a pre-hospital stroke assessment tool used by ED physicians and EMS providers, compared to only one-quarter (25%) of non-teaching hospitals. An overwhelming majority (86%) of hospitals with over 300 stroke patient discharges each year have a pre-hospital stroke assessment tool, compared to only 25% of the hospitals with 120 stroke discharges or less per year.

Diagnostic Services

Connecticut hospitals provide a variety of different diagnostic services for stroke care patients. All hospitals surveyed provide MR angiography and Carotid Doppler (ultrasound) study as diagnostic services. Eighty-three percent surveyed provide CT angiography as a diagnostic service, while 90% of all hospitals surveyed provide MRI diffusion services. An additional 93% of hospitals surveyed provide Echocardiography-TEE as a diagnostic service, and 86% provide Echocardiography-TTE services (Table 2).

TABLE 2: Diagnostic Services Available for Stroke Care Patients (N = 29)

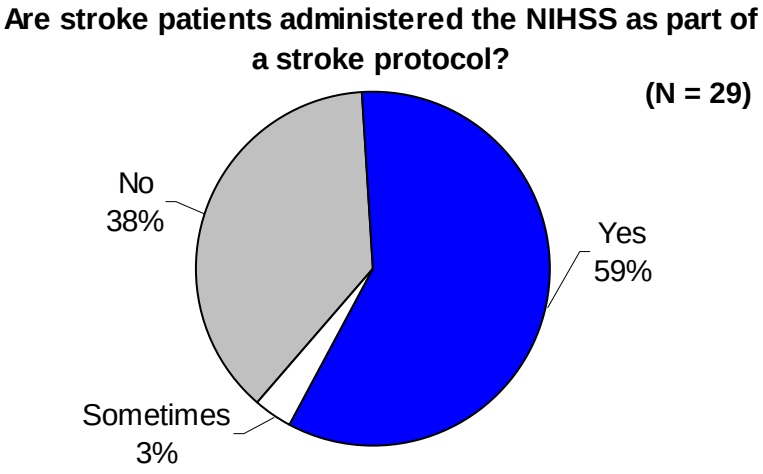
	% Yes
CT Angiography	83%
MR Angiography	100%
Diffusion MRI	90%
Carotid Doppler (ultrasound) study	100%
Echocardiography – TTE	86%
Echocardiography – TEE	93%

Diagnostic services that are available at hospitals vary depending on some hospitals' characteristics. All teaching hospitals have CT Angiography as a diagnostic service compared to only 58% of non-teaching hospitals. This is the only diagnostic service that varied across teaching and non-teaching hospitals, suggesting that differences may be a result of some other hospital characteristic.

Whether a hospital provides CT Angiography as a diagnostic service also varies with the number of total patient discharges and stroke discharges at each hospital. Only a bare majority, 56% of hospitals with less than 7,000 discharges annually provide CT Angiography services, compared to 90% of hospitals with 7,001 to 15,000 discharges, and 100% of the hospitals with 15,000 or more discharges per year. Similarly, only 58% of hospitals that make below 120 stroke discharges each year have these services, compared to all hospitals that make 121 to 300, and more than 300 stroke discharges each year.

NIHSS Usage

Fifty-nine percent of hospitals surveyed administer the National Institutes of Health Stroke Scale (NIHSS) to all stroke patients as part of the stroke protocol. One hospital (3%) reports that stroke patients are "sometimes" administered the NIHSS.



Hospitals that have a formal stroke protocol are more likely to administer the NIHSS to all stroke patients (79%) than hospitals that do not have a formal stroke protocol (13%). Seventy-one percent of teaching hospitals administer NIHSS to stroke patients, compared to 42% of non-teaching hospitals who also administer the scale.

Other Stroke Services

The extent of other services available to stroke patients also varies across Connecticut hospitals. t-PA for stroke patients is available to the ED 24 hours a day, 7 days a week at all hospitals. In addition, an overwhelming majority (86%) of Connecticut hospitals surveyed have a neurologist consult stroke patients' care within 24 hours from ED arrival. Only 35% of the hospitals have MRI neuroimaging testing and interpretation services available 24 hours a day, 7 days a week, and more than one-third (35%) of the hospitals that do have such services require a call-in technician after hours (Table 3).

TABLE 3: Other Services Available for Stroke Care Patients (N = 29)

	% Yes
t-PA	100%
Neurologist Consultation	86%
CT Neuroimaging Testing and Interpretation	97%
MRI Neuroimaging Testing and Interpretation	35%

A majority (53%) of hospitals that have over 250 licensed beds have MRI neuroimaging services available 24 hours a day, 7 days a week, compared to only 14% of hospitals with less than 250 beds. Teaching hospitals are more likely to have MRI neuroimaging services (47%) than non-teaching hospitals (17%). Only 11% of hospitals that discharge less than 7,000 patients each year have MRI neuroimaging testing and interpretation services available 24 hours a day, 7 days a week, compared to 30% of hospitals that discharge 7,001 to 15,000 patients, and 60% of hospitals that discharge over 15,000 patients annually.

Timing of Service Availability

All hospitals surveyed have stroke relevant laboratory services available 24 hours a day, 7 days a week in person, and nearly 83% of all hospitals have results back from such services within 45 minutes of being ordered. X-ray services are also available 24 hours a day, 7 days a week in person at all Connecticut hospitals surveyed, with 8 in 10 hospitals having these x-ray results available back within 45 minutes of being ordered. Nearly all hospitals (97%) have EKG services available 24 hours a day, 7 days of week in person, with 86% of all those hospitals with such services have results back within 45 minutes of being ordered. Stroke relevant laboratory services and x-ray results are available back within 45 minutes of being ordered at 94% of all teaching hospitals, but only at 67% of all non-teaching hospitals (Table 4).

TABLE 4: Timing of Service Availability (N = 29)

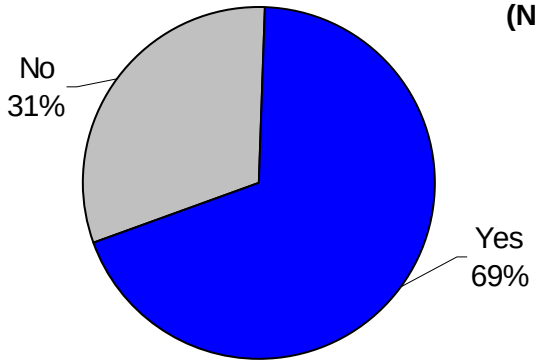
	Available 24 hours a day, 7 days a week in person	Results available back within 45 minutes of being ordered
Stroke relevant laboratory services	100%	83%
X-ray	100%	83%
EKG	97%	86%

Rehabilitation and Stay Plans

Connecticut hospitals also provide a variety of other services that are important in processing stroke patients. Nearly all (97%) Connecticut hospitals surveyed discharge stroke patients with a long-term rehabilitation plan. In addition, 69% of hospitals have a critical pathway, care-map, or collaborative pathway for stroke patients during their inpatient stay.

Does your hospital have a critical pathway, care-map, or collaborative pathway for stroke patients during their inpatient stay?

(N = 29)



Larger hospitals with more than 250 beds are more likely to have a care-map or collaborative pathway for stroke patients during their stay (93%), than smaller hospitals with fewer than 250 beds (43%). Teaching hospitals are more likely to have a critical pathway, care-map, or collaborative pathway for stroke patients (94%), than non-teaching hospitals (33%). Only 11% of hospitals that discharge less than 7,000 patients each year have a critical pathway, compared to all hospitals that discharge 7,001 to 15,000 patients, and 90% of hospitals that discharge over 15,000 patients annually.

Therapist Evaluations

Within 24 hours of admissions, stroke patients' functional status is evaluated by a physical therapist in 83% of the hospitals surveyed. Of the two remaining hospitals, one reported that functional status is evaluated by a physical therapist if needed, and the other reported that a physical therapist evaluates functional status only sometimes. One hospital also reported that a physical therapist evaluates functional status of stroke patients at least within 72 hours of admission.

Seventy-two percent of all hospitals surveyed have an occupational therapist evaluate functional status of stroke patients within 24 hours of admission. One hospital reported that functional status is evaluated by an occupational therapist if needed, and an additional 3% of hospitals have an occupational therapist evaluate functional status within 24 hours of admission sometimes, but not always. Furthermore, an occupational therapist evaluates functional status of stroke patients at least within 72 hours of admission in 3% of the hospitals.

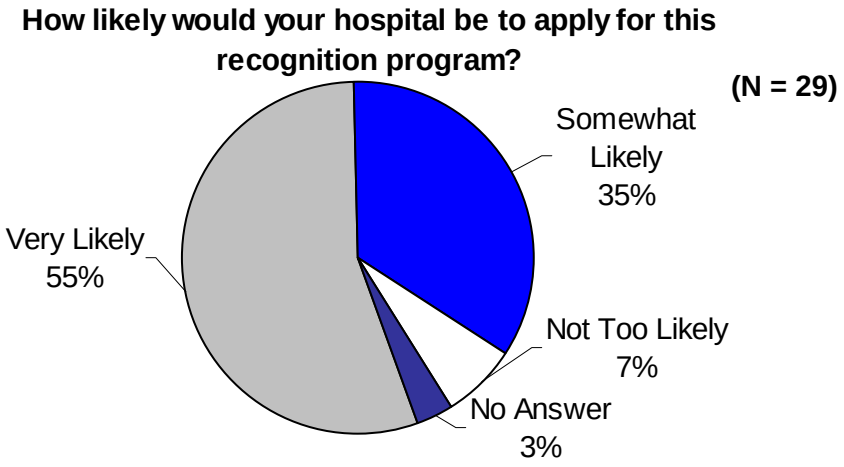
Within 24 hours of admission, stroke patients' functional status is evaluated by a speech therapist in nearly 7 in 10 Connecticut hospitals (69%). An additional 3% have a speech therapist evaluate functional status within 72 hours of admission. Seven percent of all hospitals reported that the functional status is evaluated within 24 hours of admission by a speech therapist if needed. An additional 3% of hospitals have a speech therapist evaluate functional status of stroke patients within 24 hours of admission sometimes, but not always.

TABLE 5: Therapists Evaluating within 24 Hours Of Admission (N = 29)

	% Yes
Physical therapist	83%
Occupational therapist	72%
Speech therapist	69%

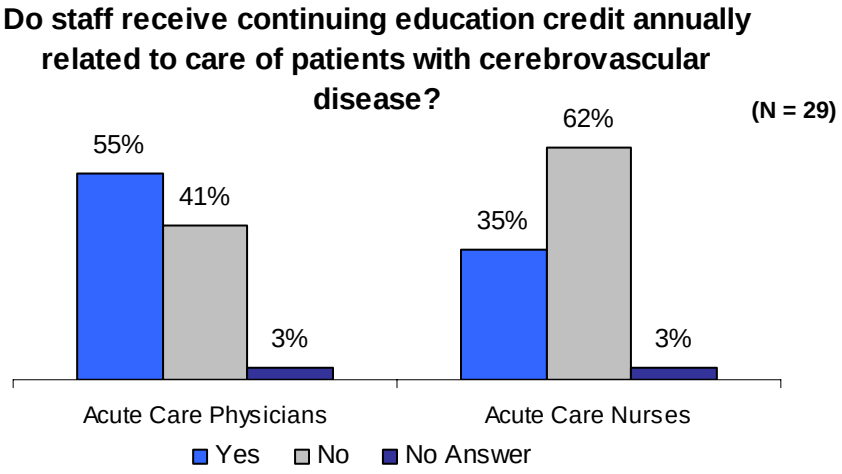
Recognition Program

Overall, there is widespread support for a recognition program sponsored by the Department of Public Health for all Connecticut acute care hospitals that meet certain standards of care related to primary stroke services, with a majority of CT hospitals (55%) being very likely to apply. An additional 35% would be somewhat likely to apply for this program. The three remaining hospitals that are not at least somewhat likely to apply for the program are all smaller hospitals with fewer than 250 licensed beds. Large, teaching hospitals are the most likely to apply for a recognition program, with 82% being at least somewhat likely to apply.



Hospital Staff

Hospitals are more likely to provide continuing education credit to physicians than nurses on staff with regard to the care of patients with cerebrovascular disease. Acute care physicians on staff at a majority of Connecticut hospitals (55%) receive continuing medical education credit annually related to care of patients with cerebrovascular disease. Only a little over one-third of Connecticut hospitals (35%) have acute care nurses on staff receiving continuing medical education credit annually related to care of patients with cerebrovascular disease.



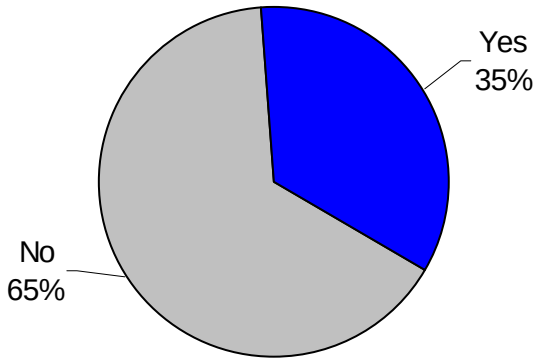
A majority of hospitals that have a formal stroke protocol grant continuing education credit to physicians on staff (63%), compared to only 38% of hospitals that do not have a formal stroke protocol. A majority of hospitals that have more than 250 licensed beds grant continuing education credit related to care of patients with cerebrovascular disease to nurses on staff (53%), compared to only 14% of hospitals with fewer than 250 beds. Forty-seven percent of teaching hospitals report that acute care nurses on staff receive continuing medical education credit annually related to care of patients with cerebrovascular disease, while only 17% of non-teaching hospitals offer such credit to nurses on staff.

General Public

Seventy-nine percent of Connecticut hospitals surveyed provide stroke care resources to stroke patients and/or their caregivers. Only 35% of hospitals in Connecticut sponsor public education programs about stroke prevention at their hospital at least twice annually.

Are public education programs about stroke prevention sponsored by your hospital at least twice annually?

(N = 29)



Hospitals size also appears to influence such education programs, with a majority of hospitals with more than 250 beds (53%) sponsoring such public programs related to stroke prevention, compared to only 14% of hospitals with less than 250 beds. Teaching hospitals (53%) are more likely than non-teaching hospitals (8%) to sponsor public education programs about stroke prevention twice annually.

Hospital discharge volume plays a role in whether education programs regarding stroke prevention are sponsored at hospitals. For example, six in ten hospitals (60%) that discharge more than 15,000 patients each year sponsor such education programs, compared to only three in ten (30%) hospitals that discharge 7,001 to 15,000 patients each year, and 11% of those that discharge less than 7,000 annually.

Appendix A: Connecticut Adult Acute Care Hospitals Contacted

1. The William W. Backus Hospital
2. Bradley Memorial Hospital and Health Center
3. Bridgeport Hospital
4. Bristol Hospital
5. Danbury Hospital
6. Day Kimball Hospital
7. John Dempsey Hospital
8. Greenwich Hospital
9. Griffin Hospital
10. Hartford Hospital
11. The Charlotte Hungerford Hospital
12. Johnson Memorial Hospital
13. Lawrence & Memorial Hospital
14. Manchester Memorial Hospital
15. Middlesex Hospital
16. MidState Medical Center
17. Milford Hospital
18. New Britain General Hospital
19. New Milford Hospital
20. Norwalk Hospital
21. Rockville General Hospital
22. Saint Francis Hospital and Medical Center
23. Saint Mary's Hospital
24. Hospital of Saint Raphael
25. St. Vincent's Medical Center
26. Sharon Hospital
27. The Stamford Hospital
28. Waterbury Hospital
29. Windham Community Memorial Hospital
30. Yale-New Haven Hospital

Appendix B: Survey Methodology

The Department of Public Policy (DPP) at the University of Connecticut was commissioned by the Connecticut Department of Public Health to conduct this study of all Connecticut adult acute care hospitals' stroke care services and processes. The principal investigator was Christopher Barnes, a faculty member at the University of Connecticut. Christopher Barnes oversaw the data collection by DPP. Under the direction of Christopher Barnes, Linda Crane and Heather Mills assisted in collecting data, analyzing the findings, and drafting the report. The University of Connecticut's Institutional Review Board (IRB) provided the framework for ethical conduct of this research involving human subjects.

DPP is a non-partisan, non-profit organization. The Department is nationally and internationally recognized as a leader in the field of public opinion research. The scope of DPP projects ranges from national and international studies of public opinion and public policy to local community-based surveys. During the past two years alone, Christopher Barnes has conducted more than seventy national, regional and local survey projects. Some of his clients include: the National Institute of Health, the Center for Addiction and Substance Abuse, and the University of Connecticut Health Center.

In the first stage of administration, a personalized letter and email message was sent to the 30 Connecticut adult acute-care hospitals from Connecticut Department of Public Health Commissioner Robert Galvin. These communications described the purpose of the survey and the importance of each hospital's participation (see Appendix D).

Next, the survey was administered by mail. Questionnaires were sent to the entire population of Connecticut adult acute-care hospitals. A variety of hospital personnel, but primarily doctors involved in stroke care and upper level administrators, completed the questionnaire. For hospitals with stroke teams, most surveys were completed by team members. A minimum of 7 reminder contacts were made. The completed questionnaires were returned to the Department of Public Policy in one of three ways, including: postal mail, facsimile, or email. Twenty-nine of the 30 (97%) returned a completed questionnaire. The data collection period extended just over a month, from March 17, 2006 until April 22, 2006.

Finally, to ensure high quality data, DPP re-contacted respondents. Respondents who provided ad hoc answers to questions were asked for clarification. One hospital that provided two returned surveys was also re-contacted to verify the correct responses. Data were further verified using standard data cleaning procedures.

Appendix C: Instrument Design

Connecticut Department of Public Health epidemiologist, Margaret Hynes, Ph.D. M.P.H., developed the survey instrument based on the content of similar surveys conducted in other states (Massachusetts, Oregon, West Virginia, and North Carolina) and questions from the American Stroke Association.
The instrument includes questions related to primary stroke services, including acute stroke team staffing, acute stroke protocols, Emergency Medical Services (EMS) and Emergency Department staff coordination; support services, including diagnostic, laboratory, and discharge planning services; hospital quality improvement; and continuing education for staff, patient education, and public education (see Appendix D). These content areas cover the important components of stroke care identified by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the Brain Attack Coalition, and the American Stroke Association (Alberts, Hademenos, Latchaw, et al. 2000; Joint Commission on Accreditation of Healthcare Organizations 2005; American Stroke Association Task Force on the Development of Stroke Systems 2005a, 2005b).

A group of Connecticut-based physicians who comprise Commissioner Galvin's Stroke Advisory Committee reviewed the content and questions in the survey. The survey instrument was revised based on their comments as well as on pretests completed by Connecticut hospital-based clinicians working in stroke care. Hospitals selected for the pretest differed by size and geographic location.

Instrument Design References

Alberts, M.J., G. Hademenos, R.E. Latchaw, et al. 2000. Recommendations for the establishment of primary stroke centers. *JAMA*. 283(23): 3102-3109.

American Stroke Association Task Force on the Development of Stroke Systems. 2005. Recommendations for the establishment of stroke systems of care. *Stroke* 36: 690-703. http://www.strokeassociation.org

Joint Commission on Accreditation of Healthcare Organizations. 2005a. *Joint Commission's Certificate of Distinction for Primary Stroke Centers.* http://www.jcaho.org/

Joint Commission on Accreditation of Healthcare Organizations. 2005b. *Stroke Disease Specific Care Performance Measures.* http://www.jcaho.org/

Appendix D: Commissioner Galvin's Letter to CEOs

[DATE]

[HOSPITAL ADDRESS]

Dear [HOSPITAL CEO],

As you know from a recent email from the Connecticut Hospital Association, the Connecticut Department of Public Health (DPH) is seeking your assistance in a survey of stroke care services in our state. Stroke is the third leading cause of death in Connecticut and a major cause of disability. As part of our effort to support secondary prevention of cardiovascular disease in Connecticut, DPH is interested in learning about Connecticut acute care hospitals' responses to stroke. This information will help us develop a comprehensive plan with our statewide partners to address cardiovascular health in Connecticut.

While your hospital's participation in this survey is entirely voluntary, your assistance with this project is crucial. The information obtained from the attached survey will be used to describe current stroke care capacity in Connecticut and to serve as a basis for improving acute stroke care services statewide.

The University of Connecticut Department of Public Policy (DPP) Center for Survey Research & Analysis (CSRA) will conduct this survey for the DPH. CSRA is a nationally recognized, non-partisan, non-profit survey research organization with extensive experience in public opinion and policy. Please assist us by forwarding the survey to someone within your organization, such as your chief medical officer, stroke center director, or other appropriate clinician, who will complete and return it to us. Your hospital's responses to this survey are completely confidential. No individual hospital name will be identified with any answer. I want to assure you that the Office of the Attorney General has advised the DPH that confidentiality of this information is protected under Connecticut General Statute 19a-25.

Your staff can return the completed survey by U.S. mail, university secure fax machine, or email to: Christopher Barnes, Director of Project Development-UConn DPP CSRA, 1800 Asylum Avenue, West Hartford, CT 06117-2697 at (860) 570-9281 (facsimile) or email:christopher.barnes@uconn.edu by April 7, 2006. If you have any questions about this survey, or if you decide not to participate, please contact Christopher Barnes at (860) 570-9094. This study protocol has been reviewed and approved by the University of Connecticut Institutional Review Board (IRB).

I have convened a statewide stroke advisory committee, which has devoted a great deal of time and effort to this project. We feel that this initiative will greatly improve our coordinated efforts at providing primary, secondary, and tertiary prevention, including emergency services in Connecticut. I would appreciate your thoughtful consideration of this request.

Sincerely,

J. Robert Galvin, M.D., M.P.H.
Commissioner

Appendix E: Survey Instrument

Connecticut Department of Public Health
2006 Hospital Stroke Care Survey

Thank you for agreeing to participate in this important survey for the Connecticut Department of Public Health (DPH) about stroke care services.

While your participation in this survey is entirely voluntary, your assistance with this project is crucial. The information obtained from the survey will be used to describe current stroke care capacity in Connecticut and to serve as a basis for improving acute stroke care services statewide.

The following are a series of questions regarding your hospital's stroke care management practices. Your hospital's responses are completely confidential. Although we ask that you provide the name of your hospital on this cover page for the purpose of tracking completion rates, all data will be reported in aggregate form only and in no way will be connected to you or your hospital.

In addition, if your hospital does have a stroke protocol(s), please attach a copy of that protocol(s) (for both ED management and patient care services) to this completed survey.

You can return the completed survey by U.S. mail, university secure fax machine, or email to:
Christopher Barnes
Director of Project Development
University of Connecticut
Department of Public Policy
1800 Asylum Avenue
West Hartford, CT 06117-2697
Fax: (860)570-9281
Email: Christopher.Barnes@UConn.edu
Phone: (860)570-9094

Thank you in advance for your response to this important survey!

NAME OF HOSPITAL:_____

(Please Print)

Note: This study protocol has been reviewed and approved by the University of Connecticut Institutional Review Board (IRB).

Connecticut Department of Public Health
Hospital Stroke Care Survey

The following are a series of hospital practices related to the management of stroke patients. Please answer to the best of your knowledge. Thank you for your time.

1. Does your hospital have a pre-hospital "Stroke Alert Protocol" for EMS services?

☐ Yes ☐ No ☐ Does Not Apply

2. Does your hospital have a pre-hospital stroke assessment tool used by ED physicians and EMS providers for suspected stroke patients?

☐ Yes ☐ No ☐ Does Not Apply

3a. Does your hospital have an acute "stroke team" or multi-disciplinary group available to evaluate a suspected stroke patient within 15 minutes of the patient's arrival?

☐ Yes ☐ No ☐ Does Not Apply

3b. **If yes**, please identify team members by specialty by placing a check next to whether they are present for the evaluation, available for phone consultation, and/or available 24 hours a day, 7 days a week in person (check all that apply):

	Present for evaluation	Available for phone consultation	Available 24 hours a day, 7 days a week in person
a. Neurologist			
b. Neurosurgeon			
c. Radiologist			
d. Emergency physician			
e. Emergency nurse			
f. CT Technologist			
g. Other (specify): _____ _____			

4. Are stroke patients administered the National Institutes of Health Stroke Scale (NIHSS) as part of a stroke protocol?

☐ Yes ☐ No ☐ Does Not Apply

5. Is t-PA for stroke patients available to the ED 24 hours a day, 7 days a week?

☐ Yes ☐ No ☐ Does Not Apply

Over →

6. Is a neurologist consulted in stroke patients' care within 24 hours from ED arrival?

☐ Yes ☐ No ☐ Does Not Apply

7a. Are CT neuroimaging testing and interpretation services available 24 hours a day, 7 days a week?

☐ Yes ☐ No ☐ Does Not Apply

7b. **If yes**, does this require call-in of a technician after hours?

☐ Yes ☐ No ☐ Does Not Apply

8a. Are MRI neuroimaging testing and interpretation services available 24 hours a day, 7 days a week?

☐ Yes ☐ No ☐ Does Not Apply

8b. **If yes**, does this require call-in of a technician after hours?

☐ Yes ☐ No ☐ Does Not Apply

9. Which of the following are available at your hospital 24 hours a day, 7 days a week, and are the results available within 45 minutes of being ordered? (check all that apply)

	Available 24 hours a day, 7 days a week in person	Results available back within 45 minutes of being ordered
a. Stroke relevant laboratory services		
b. X-ray		
c. EKG		

10. Place a check next to each of the following diagnostic services that your hospital provides. (check all that apply):

	Yes	No	Does Not Apply
a. CT Angiography			
b. MR Angiography			
c. Diffusion MRI			
d. Carotid Doppler (ultrasound) study			
e. Echocardiography – TTE			
f. Echocardiography – TEE			

11. Does your hospital have a critical pathway, care-map, or collaborative pathway for stroke patients during their inpatient stay?

☐ Yes ☐ No ☐ Does Not Apply

Over →

12. Within 24 hours of admission, are stroke patients' functional status evaluated by the following people?

	Yes	No	Does Not Apply
a. Physical therapist			
b. Occupational therapist			
c. Speech therapist			

13. Are patients discharged with a long-term rehabilitation plan?

☐ Yes ☐ No ☐ Does Not Apply

14. Do acute care physicians on staff receive continuing medical education credit annually related to care of patients with cerebrovascular disease?

☐ Yes ☐ No ☐ Does Not Apply

15. Do acute nurses on staff receive continuing medical education credit annually related to care of patients with cerebrovascular disease?

☐ Yes ☐ No ☐ Does Not Apply

16. Are stroke education and resources provided to stroke patients and/or caregivers?

☐ Yes ☐ No ☐ Does Not Apply

17a. Are public education programs about stroke prevention sponsored by your hospital at least twice annually?

☐ Yes ☐ No ☐ Does Not Apply

17b. **If yes**, how frequently are these education programs about stroke prevention sponsored by your hospital?

_____

_____

_____

Over →

18a. Has your hospital implemented a quality improvement system related to the monitoring of stroke patients?

☐ Yes ☐ No ☐ Does Not Apply

18b**. If yes**, please indicate in the space below what type(s) of quality indicator data are collected on stroke patients.

_____

_____

_____

_____

_____

19. Does your hospital have a formal stroke protocol(s)?
(**If yes**, please attach a copy of your hospital's stroke protocol(s) for both ED management and patient care services to this survey when completed.)

☐ Yes ☐ No ☐ Does Not Apply

20. The Department of Public Health is considering the implementation of a recognition program for all Connecticut acute care hospitals that meet certain standards of care related to primary stroke services. How likely would your hospital be to apply for this recognition program?

☐ Very likely ☐ Somewhat likely ☐ Not too likely ☐ Not at all likely

21. Please supply any additional comments you would like to provide:

_____

_____

_____

_____

_____

_____

_____

_____

Appendix F: Annotated Questionnaire

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Number of discharges per hospital

	Count	Percent
7,000 or below	9	30.0
7,001 to 15,000	11	36.7
15,001 or more	10	33.3
Total	30	100.0

Number of stroke discharges per hospital

	Count	Percent
120 or below	12	40.0
121 to 300	11	36.7
301 or more	7	23.3
Total	30	100.0

Number of licensed beds per hospital

	Count	Percent
250 or below	15	50.0
251 or more	15	50.0
Total	30	100.0

Does your hospital have a pre-hospital "Stroke Alert Protocol" for EMS services?

	Count	Percent
No	15	51.7
Yes	13	44.8
In process (VOL)	1	3.4
Total	29	100.0

Does your hospital have a pre-hospital stroke assessment tool used by ED physicians and EMS providers for suspected stroke patients?

	Count	Percent
No	12	41.4
Yes	17	58.6
Total	29	100.0

Does your hospital have an acute "stroke team" or multi-disciplinary group available to evaluate a suspected stroke patient within 15 minutes of the patient's arrival?

	Count	Percent
No	12	41.4
Yes	15	51.7
In process (VOL)	2	6.9
Total	29	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Is a neurologist present for evaluation?

	Count	Percent
No	9	56.3
Yes	7	43.8
Total	16	100.0

Is a neurologist available for phone consultation?

	Count	Percent
No	4	25.0
Yes	12	75.0
Total	16	100.0

Is a neurologist available 24 hours a day, 7 days a week in person?

	Count	Percent
No	5	31.3
Yes	11	68.8
Total	16	100.0

Is a neurosurgeon present for evaluation?

	Count	Percent
No	12	75.0
Yes	4	25.0
Total	16	100.0

Is a neurosurgeon available for phone consultation?

	Count	Percent
No	3	18.8
Yes	13	81.3
Total	16	100.0

Is a neurosurgeon available 24 hours a day, 7 days a week in person?

	Count	Percent
No	6	37.5
Yes	10	62.5
Total	16	100.0

Is a radiologist present for evaluation?

	Count	Percent
No	8	50.0
Yes	7	43.8
Does not apply	1	6.3
Total	16	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Is a radiologist available for phone consultation?

	Count	Percent
No	3	18.8
Yes	13	81.3
Total	16	100.0

Is a radiologist available 24 hours a day, 7 days a week in person?

	Count	Percent
No	6	37.5
Yes	10	62.5
Total	16	100.0

Is an emergency physician present for evaluation?

	Count	Percent
No	2	12.5
Yes	14	87.5
Total	16	100.0

Total

Is an emergency physician available for phone consultation?

	Count	Percent
No	10	62.5
Yes	5	31.3
Does not apply	1	6.3
Total		100.0

Is an emergency physician available 24 hours a day, 7 days a week in person?

	Count	Percent
No	4	25.0
Yes	12	75.0
Total	16	100.0

Is an emergency nurse present for evaluation?

	Count	Percent
No	2	12.5
Yes	14	87.5
Total	16	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Is an emergency nurse available for phone consultation?

	Count	Percent
No	10	62.5
Yes	5	31.3
Does not apply	1	6.3
Total	16	100.0

Is an emergency nurse available 24 hours a day, 7 days a week in person?

	Count	Percent
No	4	25.0
Yes	12	75.0
Total	16	100.0

Is a CT technologist present for evaluation?

	Count	Percent
No	3	18.8
Yes	12	75.0
Does not apply	1	6.3
Total	16	100.0

Is a CT technologist available for phone consultation?

	Count	Percent
No	10	62.5
Yes	5	31.3
Does not apply	1	6.3
Total	16	100.0

Is a CT technologist available 24 hours a day, 7 days a week in person?

	Count	Percent
No	3	18.8
Yes	13	81.3
Total	16	100.0

Other team members present for evaluation? (VOL)

	Count	Percent
	25	83.3
Collaboration with other hospitals	1	3.3
Neurology Resident	1	3.3
Nursing supervisor	1	3.3
Pharmacist	1	3.3
Radiology Resident	1	3.3
Total	30	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Other team members present for evaluation? (VOL)

	Count	Percent
	28	93.3
Interventional Neuroradioologist	1	3.3
Radiology Resident	1	3.3
Total	30	100.0

Other team members available for phone consultation? (VOL)

	Count	Percent
	26	86.7
Collaboration with other hospitals	1	3.3
Nursing supervisor	1	3.3
Pharmacist	1	3.3
Radiology Resident	1	3.3
Total	30	100.0

Other team members available for phone consultation? (VOL)

	Count	Percent
	28	93.3
Interventional Neuroradioologist	1	3.3
Neurology PA	1	3.3
Total	30	100.0

Other team members available 24 hours a day, 7 days a week in person? (VOL)

	Count	Percent
	25	83.3
Collaboration with other stroke care center	1	3.3
Neurology Resident	1	3.3
Nursing supervisor	1	3.3
Pharmacist	1	3.3
Pharmacist	1	3.3
Total	30	100.0

Other team members available 24 hours a day, 7 days a week in person? (VOL)

	Count	Percent
M.A.R.	1	3.3

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Are stroke patients administered the National Institutes of Health Stroke Scale (NIHSS) as part of a stroke protocol?

	Count	Percent
No	11	37.9
Yes	17	58.6
Sometimes (VOL)	1	3.4
Total	29	100.0

Is t-PA for stroke patients available to the ED 24 hours a day, 7 days a week?

	Count	Percent
Yes	29	100.0

Is a neurologist consulted in stroke patients' care within 24 hours from ED arrival?

	Count	Percent
No	2	6.9
Yes	25	86.2
Depends (VOL)	2	6.9
Total	29	100.0

Are CT neuroimaging testing and interpretation services available 24 hours a day, 7 days a week?

	Count	Percent
No	1	3.4
Yes	28	96.6
Total	29	100.0

If yes, does this require a call-in of a technician after hours?

	Count	Percent
No	19	65.5
Yes	10	34.5
Total	29	100.0

Are MRI neuroimaging testing and interpretation services available 24 hours a day, 7 days a week?

	Count	Percent
No	19	65.5
Yes	10	34.5
Total	29	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

If yes, does this require a call-in of a technician after hours?

	Count	Percent
No	4	17.4
Yes	8	34.8
Does not apply	10	43.5
No answer	1	4.3
Total	23	100.0

Are stroke relevant laboratory services available at your hospital 24 hours a day, 7 days a week in person?

	Count	Percent
Yes	29	100.0

Are stroke relevant laboratory services results available within 45 minutes of being ordered?

	Count	Percent
No	5	17.2
Yes	24	82.8
Total	29	100.0

Results of stroke relevant laboratory services are back and available within some other specified time frame. (VOL)

	Count	Percent
most in less than an hour	1	3.3

Are X-ray services available at your hospital 24 hours a day, 7 days a week in person?

	Count	Percent
Yes	29	100.0

Are X-ray results available within 45 minutes of being ordered?

	Count	Percent
No	5	17.2
Yes	24	82.8
Total	29	100.0

Are EKG available at your hospital 24 hours a day, 7 days a week in person?

	Count	Percent
No	1	3.4
Yes	28	96.6
Total	29	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Are EKG results available within 45 minutes of being ordered?

	Count	Percent
No	4	13.8
Yes	25	86.2
Total	29	100.0

Does your hospital provide CT angiography as a diagnostic service?

	Count	Percent
No	5	17.2
Yes	24	82.8
Total	29	100.0

Does your hospital provide MR angiography as a diagnostic service?

	Count	Percent
Yes	29	100.0

Does your hospital provide MRI diffusion as a diagnostic service?

	Count	Percent
No	3	10.3
Yes	26	89.7
Total	29	100.0

Does your hospital provide Carotid Doppler (ultrasound) study as a diagnostic service?

	Count	Percent
Yes	29	100.0

Does your hospital provide Echocardiography-TTE as a diagnostic service?

	Count	Percent
No	4	13.8
Yes	25	86.2
Total	29	100.0

Does your hospital provide Echocardiography-TEE as a diagnostic service?

	Count	Percent
No	2	6.9
Yes	27	93.1
Total	29	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Does your hospital have a critical pathway, care-map, or collaborative pathway for stroke patients during their inpatient stay?

	Count	Percent
No	9	31.0
Yes	20	69.0
Total	29	100.0

Within 24 hours of admission, are stroke patients' functional status evaluated by a physical therapist?

	Count	Percent
No	2	6.9
Yes	24	82.8
Within 72 hours of admission (VOL)	1	3.4
Yes, if needed (VOL)	1	3.4
Sometimes, but not always	1	3.4
Total	29	100.0

Within 24 hours of admission, are stroke patients' functional status evaluated by a occupational therapist?

	Count	Percent
No	5	17.2
Yes	21	72.4
Within 72 hours of admission (VOL)	1	3.4
Yes, if needed (VOL)	1	3.4
Sometimes, but not always (VOL)	1	3.4
Total	29	100.0

Within 24 hours of admission, are stroke patients' functional status evaluated by a speech therapist?

	Count	Percent
No	5	17.2
Yes	20	69.0
Within 72 hours of admission (VOL)	1	3.4
Yes, if needed (VOL)	2	6.9
Sometimes, but not always (VOL)	1	3.4
Total	29	100.0

Are patients discharged with a long-term rehabilitation plan?

	Count	Percent
No	1	3.4
Yes	28	96.6
Total	29	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Do acute care physicians on staff receive continuing medical education credit annually related to care of patients with cerebrovascular disease?

	Count	Percent
No	12	41.4
Yes	16	55.2
No answer	1	3.4
Total	29	100.0

Do acute care nurses on staff receive continuing medical education credit annually related to care of patients with cerebrovascular disease?

	Count	Percent
No	18	62.1
Yes	10	34.5
No answer	1	3.4
Total	29	100.0

Are stroke education and resources provided to stroke patients and/or caregivers?

	Count	Percent
No	6	20.7
Yes	23	79.3
Total	29	100.0

Are public education programs about stroke prevention sponsored by your hospital at least twice annually?

	Count	Percent
No	19	65.5
Yes	10	34.5
Total	29	100.0

Has your hospital implemented a quality improvement system related to the monitoring of stroke patients?

	Count	Percent
No	15	51.7
Yes	12	41.4
In process (VOL)	1	3.4
No answer	1	3.4
Total	29	100.0

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Keeping Connecticut Healthy

DPH Stroke Care Survey

Annotated Questionnaire

5/24/2006

Does your hospital have a formal stroke protocol?

	Count	Percent
No	8	27.6
Yes	19	65.5
In process (VOL)	1	3.4
No answer	1	3.4
Total	29	100.0

How likely would your hospital be to apply for this recognition program?

	Count	Percent
Very likely	16	55.2
Somewhat likely	10	34.5
Not too likely	2	6.9
No answer	1	3.4
Total	29	100.0