



**Setting standards in**  
**stroke care**  
**Rush University Medical Center, Chicago**



## May the dance go on and on.

**Siemens innovations help neuro experts  
keep patients in step with the music.**

As human beings, we aspire to long, happy and independent lives spent with the people we care about. For as long as the music plays, we want to be able to dance. Neurologic disorders such as stroke, brain tumors and Alzheimer's Disease can threaten this fundamental hope.

Siemens provides advanced and scalable imaging, laboratory and IT systems that help clinicians provide clear and early diagnosis, precise and timely treatment, and efficient, well-coordinated management of neurologic disorders – all with the goal of helping patients achieve their highest potential independence.

By helping to minimize or altogether avoid costly dependence on caregivers, Siemens innovations ultimately help providers deliver more sustainable care of neurological disorders.



**Find out how a partnership between industry and provider helped to:**

- Develop and advance a vision based on in-depth know-how and transfer of best practices.
- Transform the infrastructure for the provision of stroke care, encompassing a new building, workflow and mindset change.
- Achieve impressive results across financial, operational and clinical key performance indicators in just one year.

## Content

### Rush University Medical Center

Joining forces in stroke care	4
Value achieved with the Siemens Stroke Approach	5
Entering long-term partnerships to support future sustainability	6
Maximizing financial performance by eliminating inefficiencies	7
Reducing door-to-needle time through standardized clinical pathways	7

### Siemens Healthineers Stroke Approach

How can Siemens Healthineers support me in setting up and improving my stroke service?	8
How can Siemens Healthineers tailor modalities to fit my workflow?	10
Thrombectomy promises improved clinical outcomes	11
What benefits does Siemens Healthineers imaging technology provide?	12

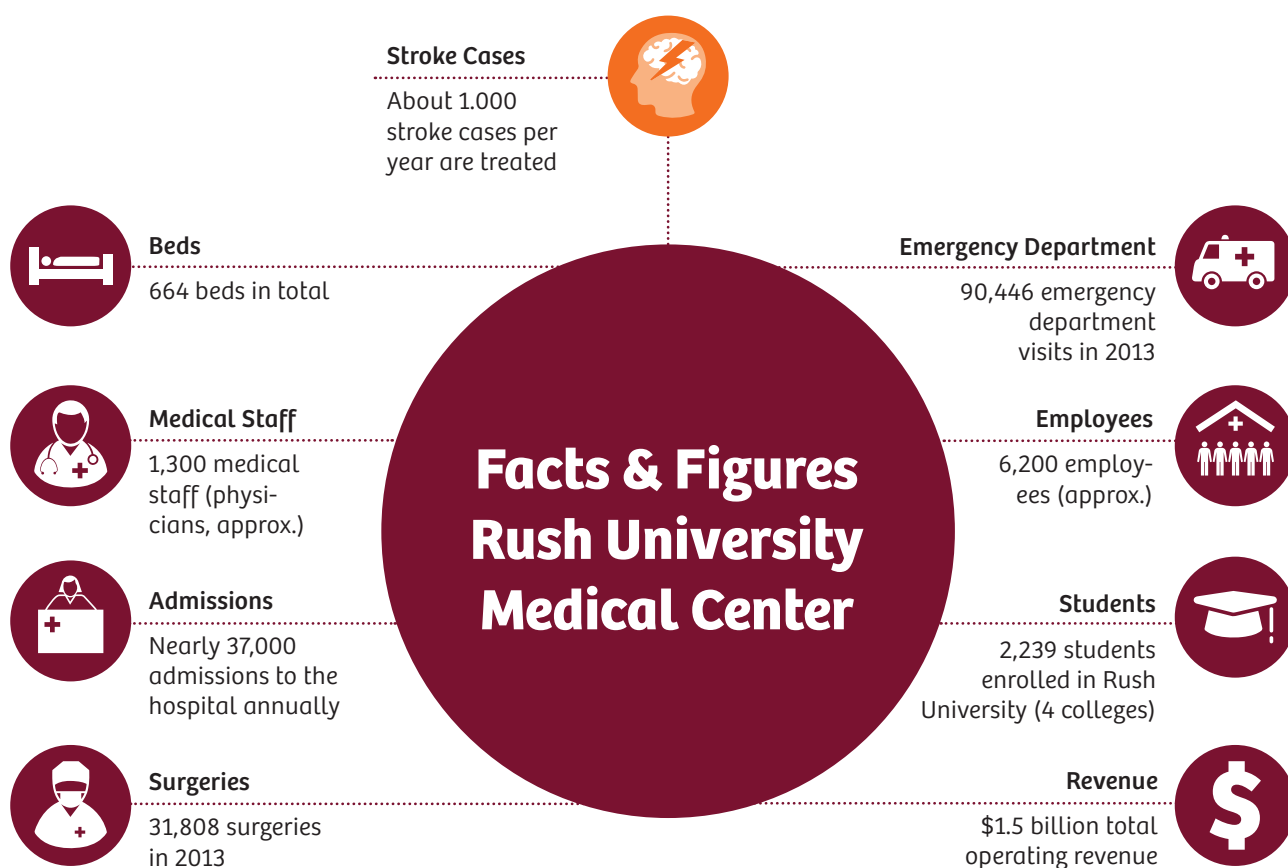
# Joining forces in stroke care

## Challenges in stroke care

With 17 million new strokes each year, of which about 6 million result in death<sup>1</sup>, strokes are a major public health challenge worldwide. Population growth and aging will contribute to a further increase in the incidence of strokes in the years to come. Improving patient outcomes while reducing costs has thus become a priority in stroke care management.

## Local situation

Due to the rising need in the community and to remain at the forefront of stroke care provision and research, Rush University Medical Center embarked upon redesigning its stroke service, choosing Siemens Healthcare as its partner to move forward. Best practices and insights from other hospitals brought into the partnership by Siemens Healthineers enabled joint visions to be set for the future. The execution phase stretched across all levels of the organization, ranging from infrastructure to people and processes.



<sup>1</sup> Feigin, V. L., Forouzanfar, M.H. et al. (2014). Global and regional burden of stroke during 1990–2010: findings from the global Burden of Disease Study 2010. Lancet 383.

# Value achieved with the Siemens Healthineers Stroke Approach

## Comprehensive support:

- Support throughout the entire redesign process with expertise and on-site project management.
- Research collaboration to further strengthen reputation.
- All steps required for the modernization process carried out within just one year.



## Improved financial performance:

- Higher overall profitability: number of cases increased by 15.1 % while the cost per case was reduced by 11.2 %.
- Initiation of an investment cycle where savings could be re-invested into further improvements in stroke care.



## Optimized process efficiency:

- Onset-to-treatment time reduced via seamless integration of hospital environment with Emergency Medical Services (EMS)
- Door-to-needle time improved by 27.0 % with standardized clinical pathways.
- Door-to-intervention time improved by 25.6 %.
- Smooth workflow achieved by the optimal interoperability of modalities.



## Excellent patient outcomes & advanced clinical capabilities:

- Certification as a comprehensive stroke center.
- Degree of severity of symptoms (based on NIH Stroke Scale) at discharge improved by 33.0 %.



Results based on Act On Stroke assessment (2011, 2013).

## Entering long-term partnerships to support future sustainability

“Our goal was for Rush University Medical Center to rank among the top ten percent of the nation’s hospitals” commented CEO Larry Goodman, MD. To achieve this, the hospital team was looking for a partner who could not only deliver the technological solutions but also support the project with its expertise and competence. Siemens Healthineers was involved in all the key phases of the facility.

The long-term partnership between Rush University Medical Center and Siemens Healthcare was covered by a 5-year contract and included:

- Support during the planning and construction phase.
- Site planning taking into account process efficiency aspects and on-site coordination via a dedicated project manager.
- Consulting for optimization of clinical processes and workflows.
- State-of-the art imaging modalities to advance clinical capabilities and drive reputation.
- Asset and fleet optimization via IT analytics to standardize quality of care and ensure maximized returns.
- Leveraging the workforce via training.

*“When we pick a technology, we also pick the company and the people. They’re the ones who are critical to the smooth implementation of the new technology. Our partnership with Siemens has been very successful.”*

**Larry Goodman,**  
CEO, Rush University Medical Center<sup>2</sup>



<sup>2</sup> The statements by Siemens’ customers described herein are on results that were achieved in the customer’s unique setting. Since there is no “typical” hospital and many variables exist, e.g., hospital size, case mix, level of IT adoption, there can be no guarantee that others will achieve the same results.

## Maximizing financial performance by eliminating inefficiencies

Usually an increase in the number of cases leads to growing costs, as the infrastructure need to be adjusted and additional staff need to be hired. Although the case volume grew by 15.1% as a consequence of the modern-ization of Rush, the costs per case were reduced. It was possible to achieve this through the “Act on Stroke” consulting which helped to avoid redundant examinations, leverage synergy effects and drive process efficiency.

*“Jointly with Siemens Healthcare we uncovered potential for cost reduction, bringing the cost per stroke case down by 11.2 %. While we increased our case volume we also considerably improved our financial KPIs.”*

**Wendy Stark-Riemer,**  
MHA Neurosciences Service Line Administrator<sup>2</sup>

## Reducing door-to-needle through standardized clinical pathways time

Time is brain in stroke treatment. Processes are the key driver of door-to-needle time and are thus intricately linked with the quality of patient outcomes. Eliminating inefficiencies along the treatment pathway was therefore the main goal of the Rush University Medical Center and the cornerstone to becoming a comprehensive stroke center. The Siemens unique clinical consulting tool “Act on Stroke” provided a neutral evaluation scale via interhospital benchmarking and best practice sharing that enabled an objective localization of Rush’s market position and prioritized suggestions for improvement. As a result, Rush University Medical Center:

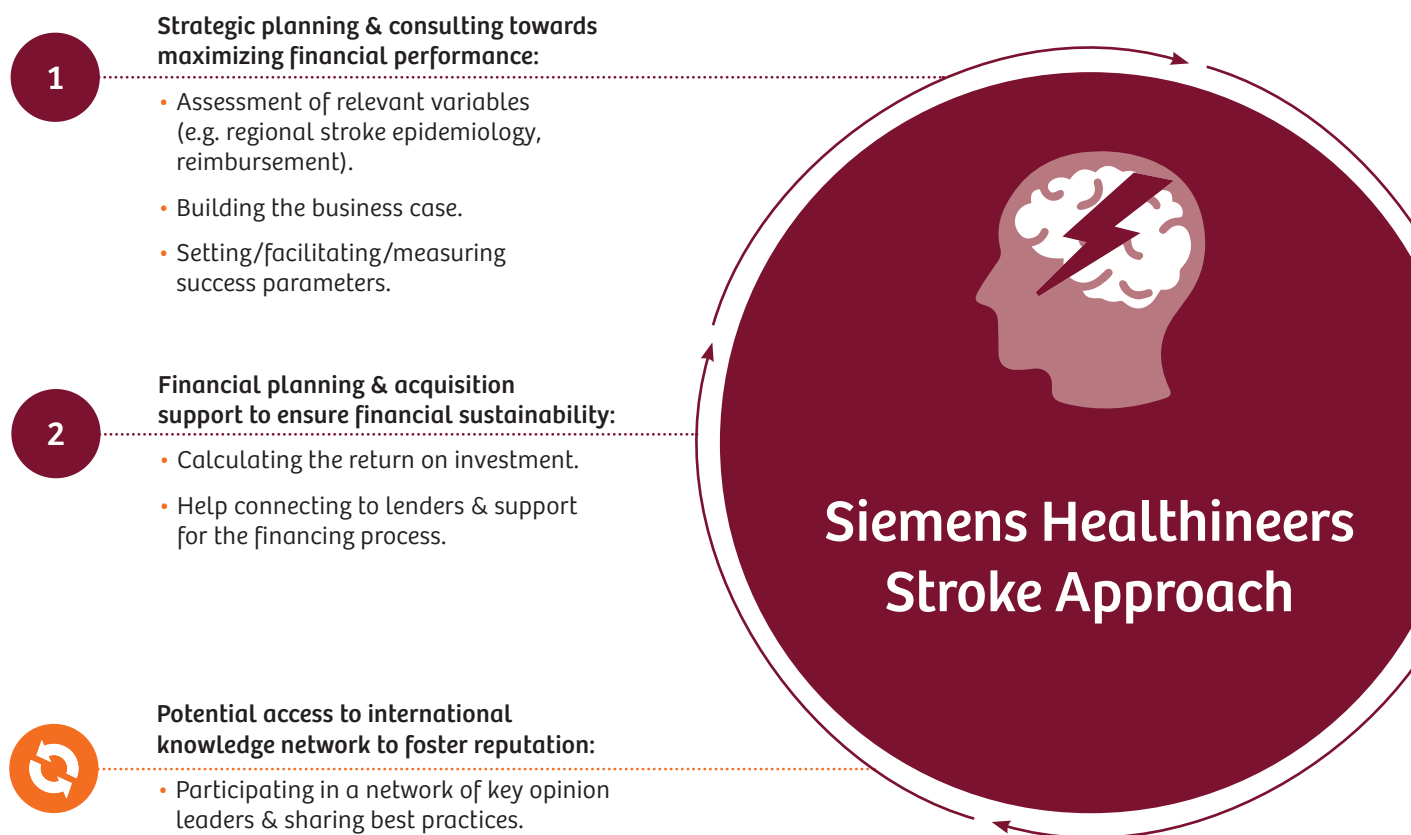
- Improved its door-to-needle time by 27.0 %.
- Improved its door-to-intervention time by 25.0 %.

*“The Siemens transformation advisory service approach helped us identify optimization potential within our workflow and thus reach certification as a comprehensive stroke center.”*

**Demetrius Lopes,**  
Professor, Section Chief  
of Cerebrovascular Surgery,  
Head of Stroke Program<sup>2</sup>



# How can Siemens Healthineers support me in setting up and improving my stroke service?



## What is Act on Stroke?

### Unique transformation advisory tool

Siemens Healthineers offers the only consultancy approach on the market which specializes in clinical processes and workflows.

### Beyond treatment pathway

Looks at clinical pathway and beyond: patient flow, guideline adherence, IT, process management, organization, community outreach, infrastructure ...

**Site planning, modalities & IT platforms supporting process efficiency:**

3

- Modeling optimal stroke center set-up.
- Modality placement according to workflow requirements.
- Defining infrastructure, IT & connectivity requirements.

**Stroke service implementation, upgrades & replacement to drive clinical capabilities:**

4

- On-site project management for smooth implementation.
- Staff training to better leverage workforce.
- Access to latest technology via automatic system upgrades and replacement.

**Clinical workflow optimization for higher process efficiency:**



- Standardized clinical pathways & quality of care with the “Act on Stroke” methodology.
- Benchmarking with leading hospitals within different regions and insights into trends in stroke care.
- Systematic analysis of individual situation and development of a tailored action plan with periodical follow-up.

**Systematic yet individual**

Individual analysis of clinical structures and processes, covering up to 450 criteria, resulting in concrete, prioritized suggestions for improvement.

**In-depth and best-practice-based**

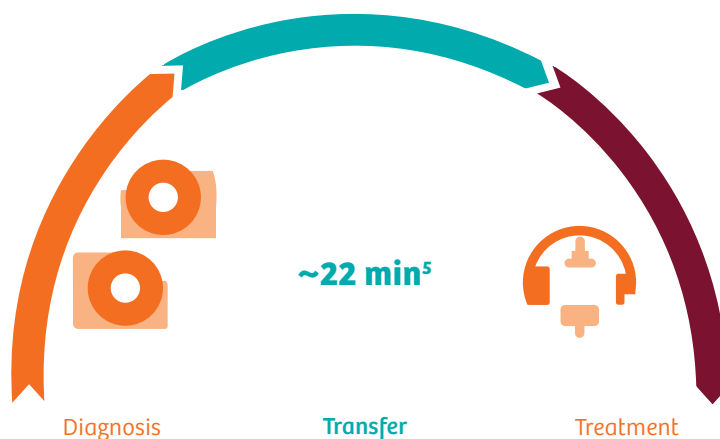
Structured and comprehensive, based on medical guidelines, recommendations of medical societies, and examples from leading hospitals.

# How can Siemens Healthineers tailor modalities to fit my workflow?

## Sequential Workflow (standard today)

### CT or MR followed by Angio Suite

- For highlights in terms of imaging capabilities of the individual modalities see clinical questions.



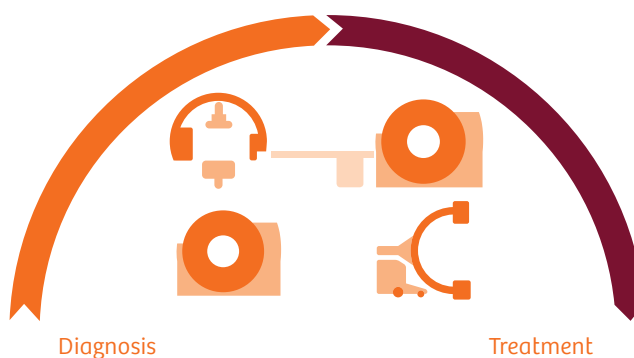
## Integrated Workflow via combined solution (trend)

### MIYABI Angio-CT<sup>3</sup>

- Covers full range of neurointerventional cases: diagnostic capabilities of sliding gantry CT combined with interventional imaging capabilities of the angio suite.
- Flexible set up as one room/two room solution.
- Angio system and CT slide over the same patient table, removing the need for patient transfer.

### CT and C-arm Cios Alpha<sup>4</sup>

- Affordable back-up for the angio suite in thrombectomy cases.
- One room set-up.
- Eliminates time loss due to patient transfer.



## Integrated Workflow on one modality (potential)

### Angio Suite

- After clinical patient pre-selection, bypassing of diagnostic modalities (CT/MRI).
- Assessment of the current case directly within the angio, removing need to transfer patient.
- Guidance for a broad range of neuroradiological interventions.



# Thrombectomy promises improved clinical outcomes

Interventional therapy has been backed by recent clinical studies published in the New England Journal of Medicine (2015, issue 372), in which thrombectomy was shown to reduce the adverse long-term neurological effects of stroke. This opens up the field of stroke treatment for new pathways, in which combining capabilities for diagnostic imaging and intervention becomes increasingly important to save time and improve patient outcome.

Today's standard stroke workflow consists of sequential imaging, where transferring the patient after the diagnos-

tic scan on the CT/MRI to the angiography suite for treatment takes around 22 minutes<sup>5</sup>.

Siemens Healthineers offers three options for combining diagnosis and therapy into one workflow in order to save valuable time in stroke care.

As reimbursement is becoming increasingly outcomeoriented, these new workflow options could generate additional sources of revenue and become a point of differentiation for your institution.

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<sup>3</sup> MIYABI Angio-CT is a customized solution and not commercially available in all countries. Due to regulatory reasons the future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

<sup>4</sup> Product not yet commercially available. Please contact your local Siemens organization for further details.

<sup>5</sup> Around 22 minutes or more are being lost with the sequential workflow (Pfaff, J., Bendszus, M. et al. (2015) Mechanical thrombectomy using a combined CT/C-arm X-ray system. J Neurointerv Surg, ESCAPE, SWIFT PRIME, REVASCAT)

**1. Is the stroke caused by bleeding?**

- Neuro BestContrast on SOMATOM Definition scanners with CT Neuro Engine improves greywhite matter differentiation.
- GoBrain, clinically validated push-button brain examination in only 5 minutes<sup>6</sup> on MRI.
- Exclude hemorrhage by CT-like data acquisition and visualization on native DynaCT.

**2. What is the length and location of the clot?**

- 4D visualization of collateral flow and occlusion length with 4D CT Angiography.
- Flexible coverage of the brain for dose-efficient CT exams with the unique Adaptive 4D Spiral mode on SOMATOM Definition scanners.
- Detection of occlusion site and collateral status by CT-like data acquisition and visualization on intra-venously injected DynaCT-Angio.

**3. How big is the infarct?**

- Dynamic perfusion of the whole brain to evaluate tissue at risk and core infarct with Adaptive 4D Spiral mode on SOMATOM Definition scanners.
- Anatomy-true diffusion-weighted-imaging (DWI) with RESOLVE on MRI scanners.
- Perfusion analysis in less than a minute in the angio suite with *syngo*<sup>®</sup> DynaPBV Neuro imaging software.

**4. Was the intervention successful?**

- CT-like data acquisition, visualization and perfusion analysis in less than a minute in the angio suite with *syngo*<sup>®</sup> Dyna PBV Neuro imaging software for evaluation of the patient right at the site of intervention. Dynamic Perfusion or 4D CTA on SOMATOM Definition scanners to evaluate treatment outcome.
- Real-time motion compensation with CLEARmatch during DSA and roadmap for improved device guidance.
- Increased level of confidence during device deployment with *syngo*<sup>®</sup> DynaCT Micro, boosting the level of detail in the images.

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<sup>6</sup> Achieved on a MAGNETOM Skyra with the Head 32 coil. Total examination time can take up to 6 minutes depending on system field strength and coil density.

The products/features and/or service offerings (here mentioned) are not commercially available in all countries and/or for all modalities. If the services are not marketed in countries due to regulatory or other reasons, the service offering cannot be guaranteed.

Please contact your local Siemens Healthineers organization for further details.

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