White paper

Transforming stroke care through strategic collaboration

How Vall d'Hebron University Hospital implemented changes to improve survivorship

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SIEMENS Healthineers

The global burden of stroke: The urgent need for faster, more efficient care

For stroke patients, every second counts. Stroke is among the leading causes of disabilities and death. In their lifetime, 1 in 4 people will have a stroke.[1] Each year, 12.2 million people worldwide experience a stroke, of which 6.5 million die annually.[1] More than 100 million people live with stroke aftermath, causing hardship for individuals, their families, and economic burden to society.[1]

Studies show that reducing door-to-groin time by just 30 minutes improves clinical outcomes by 10%.[1] Timely diagnosis and treatment can make a difference for both patient outcomes and survivorship. Proven procedures like mechanical thrombectomy can dramatically reduce disability when patients with ischemic stroke receive timely intervention.[2] Yet, only 8.4% of eligible stroke patients in the U.S. receive a thrombectomy, with even lower rates in many other countries.[3]

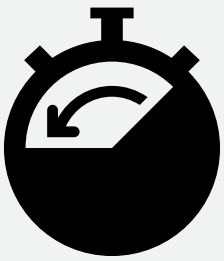
Recognizing the need for faster, more efficient stroke care, Vall d'Hebron University Hospital – one of the leading smart hospitals in Europe[4] – partnered with Siemens Healthineers in a Value Partnerships | Stroke to determine value-added, lasting solutions. By doing so, the hospital made lifesaving stroke care improvements and uncovered broader operational benefits and digitalized stroke workflows across the hospital.

Vall d'Hebron University Hospital's stroke care transformed

Outcomes

Vall d'Hebron University Hospital prioritized how care could be initiated earlier and accelerated thereby improving the prognosis and well-being for stroke survivors. Its goal was to deliver a superior, person-centered patient experience through innovative, impactful, and intelligent solutions.

Time savings



Reduction in procedure times for **mechanical thrombectomy**: **10 minutes**

\+ Reduction in **door-to-groin time**: **30 minutes**

= Time savings for the **entire stroke pathway**: **40 minutes**

At Vall d'Hebron University Hospital, stroke care efficiency dramatically improved, saving about 40 minutes from stroke onset to post-thrombectomy. Documented time savings on the following operational KPIs:

- 30 minutes in adopting a direct-to-angio pathway (One Step Stroke Approach), bypassing emergency and CT scanning in radiology
- Door-to-groin time dropped 67%, from 45 minutes to 15
- Mechanical thrombectomy procedures were 10 minutes faster
- Door-to-needle time decreased from 27 to 24 minutes – each minute potentially preserving 2–4 million brain cells

These time savings translated into improved outcomes and operational benefits:

- Fewer patient transfers and shorter wait times via the One Step Stroke Approach
- 42% reduction in average hospital stay for moderate stroke patients
- Improved functional outcomes at 3 months (mRS):
  – Moderate strokes: from 62% to 72% favorable status
  – Severe strokes: from 24% to 50%
- 20% drop in unfavorable outcomes, from 34% to 14%
- Up to 15% reduction in 3 month readmissions and reoccurrences
- 12% decrease in post-stroke anxiety and depression, from 27% to 15%

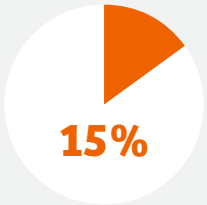
Systematic use of the NIH Stroke Scale (NIHSS) enabled earlier detection of large vessel occlusions. Patients scoring ≥7 within 3 to 6 hours were highly predictive of anterior circulation blockages (Positive Predictive Value 84.4%), accelerating access to thrombectomy. Only 5% of central occlusion cases had NIHSS <4, highlighting the value of early, structured assessment.[5]

The hospital also benefitted system-wide:

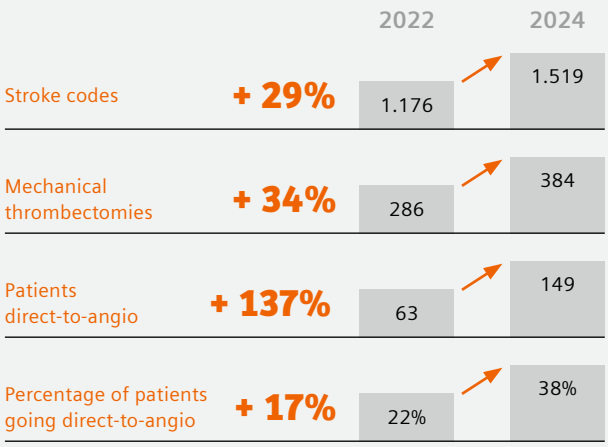
- Adoption of advanced therapies positions the hospital at the forefront of stroke care
- Fewer readmissions and better outcomes helped lower healthcare costs
- The improved well-being of survivors strengthened the community
- Clinical aspects aside, One Step Stroke Approach contributes to more resource-efficient workflows and may help reduce environmental impact

Together with the hospital team, Siemens Healthineers established the One Step Stroke Approach Unit – an acute care hub within the neuroradiology department. Here, all stroke patients are assessed immediately and routed to the most appropriate pathway. Since its launch, the number of patients going direct-to-angio has increased by 137% (2022 vs 2024), with 76% entries in those receiving a mechanical thrombectomy. Overall, thrombectomy rates have climbed from 22% to 38.8%, marking a major advance in access to critical stroke care.

Operational benefits



Reduction in re-admissions and reoccurrences by **up to 15% at 3 months**



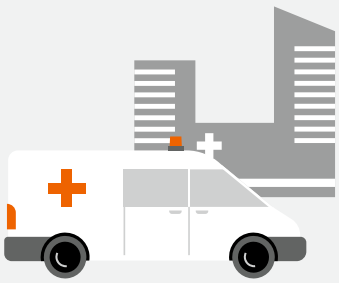
Solutions implemented at Vall d'Hebron University Hospital

Together, Siemens Healthineers and Vall d'Hebron University Hospital transformed stroke care through a Value Partnerships | Stroke. Key improvements include:

1

Change management and implementation

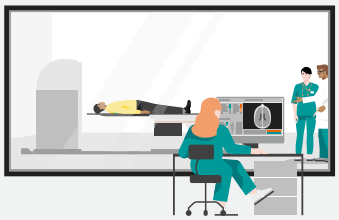
Stroke care processes were re-engineered through consulting services and advanced cross-functional training. All stakeholders – neurologists, neuro interventionalists, nurses, and administration staff – were part of change management and design during the transition to the new care model.



2

Optimized patient workflow

Using the One Step Stroke Approach, patients bypass emergency and radiology, going directly to the Nexaris Angio-CT Suite. Door-to-groin time was cut by 30 minutes with this **direct-to-angio** approach.[6] Post-treatment care is supported by the **Nora** app, which helps patients manage follow-ups and monitor symptoms.



3

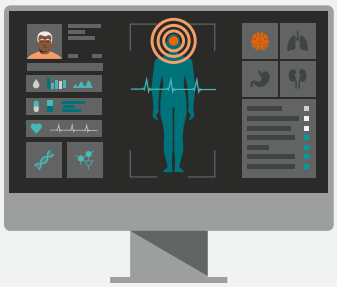
Innovative facility design and planning

The existing space was redesigned to be a 2-in-1 Nexaris Angio-CT Suite, which integrates CT and angiography, while minimizing the amount of remodeling to the existing building. The new layout eliminated patient transfers and now facilitates optimal workflow and streamlines patient movements through clearly defined internal and public spaces.

Data-driven optimization

ActExcell combines real-time KPIs and digital dashboards with expert guidance to identify workflow bottlenecks and drive improvement. Vall d'Hebron and Siemens Healthineers co-defined relevant performance KPIs before implementing digital dashboards for data visualization. Dashboards were then used in regular reviews to optimize technology use, and insights from actual cases and patient-reported outcomes guide decisions, ultimately fostering a culture of continuous improvement.

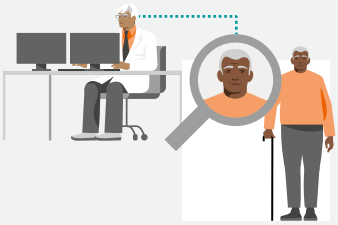
4



Proactive emergency response

Remote patient examinations to identify stroke risks early and improved data-sharing between health centers and emergency services accelerates care decisions.

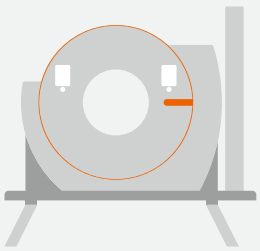
5



Enhanced resource utilization

A CT scanner on rails serves both acute and routine imaging, improving equipment ROI for multiple departments. Using ActExcell helps consolidate stroke data from various IT systems for valuable equipment insights. Additionally, a new materials management solution enhances supply chain efficiency, delivers comprehensive traceability to meet compliance and quality control standards, and supports continuity of care.

6



How was Vall d'Hebron University Hospital able to achieve such results?

The challenges the hospital faced

Vall d'Hebron University Hospital faced significant challenges throughout the entire stroke pathway, from early risk assessment to post-treatment recovery. Inefficiencies at multiple stages led to delays, making it critical to streamline processes and improve patient outcomes.

Pre-hospital alignment and coordination: Disconnects between health centers and emergency services complicated early stroke risk assessment, delaying intervention.

Arrival at emergency: Conventional pathways, including going through the emergency department, caused delays, slowing critical decision-making in already high-pressure situations.

In-hospital workflow: The distance between CT room and interventional rooms added to further delays and multiple transfers contributed to patient instability.

Recovery and follow-up: Spaces were not designed with patients in mind, resulting in inefficient flow and a longer care pathway that included unnecessary steps.

General challenges in the approach for patients with ischemic stroke:

Infrastructure	Systems may be in use, availability of trained and prepared staff
Diagnostic imaging	Cone beam CT image quality for key anatomy, perfusion data availability and accessibility
Interventional imaging	Challenges included 3D image processing workflows, CT acquisition time and the need to park the side plane
Operations	Lack of operational transparency, difficulty managing medical devices, inefficient spaces in near-infrared spectroscopy (NIR) spaces

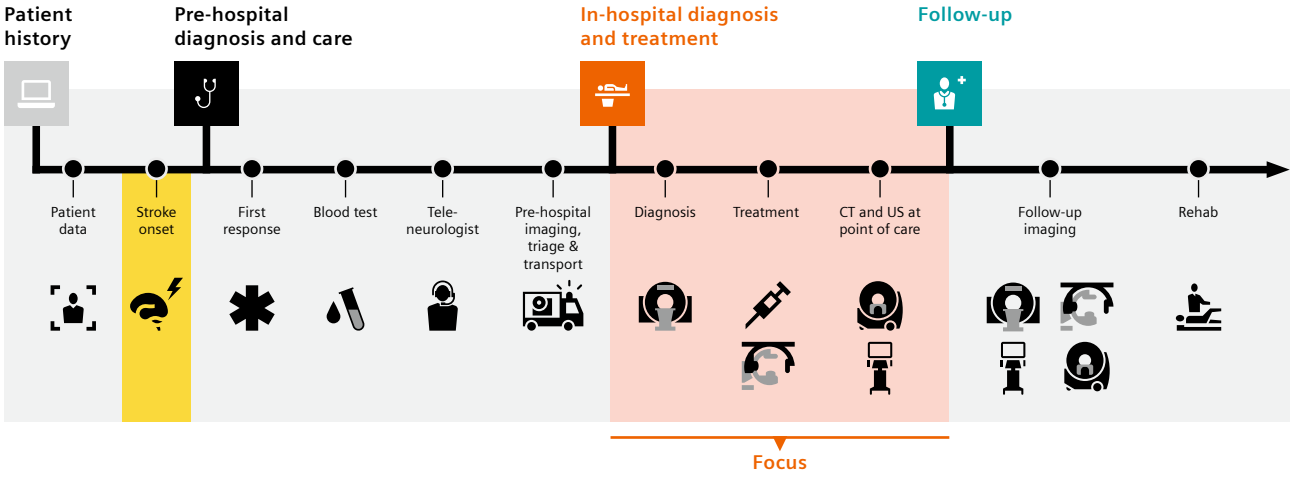
About Value Partnerships | Stroke

Siemens Healthineers helped Vall d'Hebron University Hospital achieve faster, more efficient stroke care – and we can do the same for your hospital. Value Partnerships | Stroke are long-term, performance-driven collaborations designed to improve stroke outcomes, from reducing door-to-treatment time to making thrombectomy more accessible, potentially increasing stroke survivability and quality of life post-stroke.

Value Partnerships | Stroke are built on three key pillars:

- **Innovative Portfolio**
  empowers clinical value
- **Intelligent Coordination**
  empowers operational excellence
- **Impactful Transformation**
  empowers high-quality care

In close collaboration with your team, we strive to impact performance, efficiency, and innovation along the entire stroke care pathway, from early detection through therapy to recovery:



Conclusion

Siemens Healthineers is ready to partner with you to elevate stroke care at your organization. Whether you're building, expanding, or elevating your stroke care center, we'll co-create solutions tailored to your needs and those of your patients – just like we did with Vall d'Hebron University Hospital. Together, Siemens Healthineers can help your organization achieve better patient outcomes, and clinical excellence, improve operational efficiency, and access to high-quality stroke care.

Contact us to learn more about **Value Partnerships I Stroke** today.

At Siemens Healthineers, we pioneer breakthroughs in healthcare. For everyone. Everywhere. Sustainably. As a market leader, we want to advance a world in which breakthroughs in healthcare create new possibilities with a minimal impact on our planet. We've been pushing the boundaries in medical technology for more than 125 years. By consistently bringing innovations to the market, we enable healthcare professionals to innovate personalized care, achieve operational excellence, and transform the system of care.

With the unique combination of our strengths in patient twinning[1], precision therapy, as well as digital, data, and artificial intelligence (AI), we are well positioned to take on the greatest challenges in healthcare. We will continue to build on these strengths to help overcome the world's most threatening diseases, enable efficient operations, and expand access to care.

Our portfolio, spanning in vitro and in vivo diagnostics to image-guided therapy and cancer care, is crucial for clinical decision-making and treatment pathways. We are committed to improving healthcare access for all, limiting our environmental impact as we pioneer breakthroughs, and engaging our diverse Healthineers to achieve this impact on a global scale.

Motivated by our purpose and guided by our values, we are building an inclusive culture, where we embrace diversity in all its forms. We are a team of more than 73,000 Healthineers in over 70 countries passionately pushing the boundaries of what is possible in healthcare to help improve the lives of people around the world.

[1]*Personalization of diagnosis, therapy selection and monitoring, aftercare, and managing health.*

[1] *Masouris I, Kellert L, Pradhan C, et al. Telemedical stroke care significantly improves patient outcome in rural areas: Long-term analysis of the German NEVAS network. Int J Stroke. 2024;19(5):577-586. doi:10.1177/17474930241234259*

[2] *Rai AT, Seldon AE, Boo S, et al. A population-based incidence of acute large vessel occlusions and thrombectomy eligible patients indicates significant potential for growth of endovascular stroke therapy in the USA. Journal of NeuroInterventional Surgery. 2017;9(8):722-726. doi:https://doi.org/10.1136/neurintsurg-2016-012515*

[3] *Aroor SR, Asif KS, Potter-Vig J, et al. Mechanical Thrombectomy Access for All? Challenges in Increasing Endovascular Treatment for Acute Ischemic Stroke in the United States. Journal of Stroke. 2022;24(1):41-48. doi:https://doi.org/10.5853/jos.2021.03909*

[4] *World's Best Smart Hospitals 2025. Newsweek. Published 2025. https://rankings.newsweek.com/worlds-best-smart-hospitals-2025*

[5] *Heldner MR, Zubler C, Mattle HP, et al. National Institutes of Health Stroke Scale Score and Vessel Occlusion in 2152 Patients With Acute Ischemic Stroke. Stroke. 2013;44(4):1153-1157. doi:https://doi.org/10.1161/strokeaha.111.000604*

[6] *Siemens Healthineers. Smart Stroke Platform (ActExcell). 2019.*

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