SITS International Report 2023

Dear Reader,

SITS started as an internet-based registry for intravenous thrombolysis in acute ischaemic stroke (AIS) already in 1996. In 2002 it was given a broader international role when European Union authorities requested that all AIS patients treated with intravenous thrombolysis should be registered in SITS for a period of three years.

In 2013, SITS launched the data entry form for capturing data on endovascular treatment (EVT) in AIS. Primary results of the SITS EVT studies were published in 2021 and since then several scientific articles have been published based on SITS EVT registry.

In 2019, SITS launched the first version of the spontaneous intracerebral haemorrhage (ICH) registry which has been updated Q4 2023 to capture the essential data for the SITS-ICH study. SITS ICH study has started data collection from January 2024 and our plan is collect about 5000 ICH data by Q4 2025.

In 2022, SITS launched the data entry form for capturing data on cerebral venous thrombosis (CVT). The SITS CVT protocol enables documentation of risk factors, pathophysiology, clinical presentation etc. Due to the low incidence compared to arterial stroke, our aim is to enable SITS global network to capture high-volume real-world data on CVT.

Today, over 400 000 unique patients are included from more than 90 countries in the SITS Registry. One hundred and twelve scientific reports have been published in international peer-reviewed journals based solely or partly on SITS data, and many abstracts have been presented at different stroke conferences. This year (2024), four abstracts based on SITS data have been accepted for presentation at ESOC 2024 in Basel, Switzerland: 2 oral and 2 poster presentation.

We take the opportunity to acknowledge the contributions of more than 400 authors involved in SITS publications since its beginning. International, regional, national, and centre coordinators at participating centres are also acknowledged in this report, in the Appendix.

We thank our present and previous Scientific Committee members who oversee scientific activities within SITS and contribute with their expert knowledge. We thank all patients participating in the registry and all the hard-working local users who enter data in the registry. Finally, we are grateful for our team members at the SITS Coordination Office who have been involved in the preparation of this report.

Kind regards,

Niaz Ahmed

SITS Chairman

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About SITS

Background and purpose

SITS (Safe Implementation of Treatment in Stroke) is a non-profit, research-driven, independent, international collaboration. It is an initiative by the medical profession to assure excellence in acute treatment and secondary prevention of stroke, as well as to facilitate clinical trials.

SITS started in 1996 as an initiative by participants in the European-Australian randomised stroke thrombolysis studies (ECASS). In 2002, the European Medicines Agency (then EMEA, currently EMA) endorsed SITS as the registry for follow-up on thrombolysis treatment in acute ischemic stroke. SITS has since developed its services to enable follow-up of other evidence-based treatments in acute stroke such as thrombectomy, as well as secondary prevention.

The purpose of this report is to demonstrate how the registry has developed since 2002 with updated data since the previous report of 2021 and summarize how SITS has contributed to the body of knowledge on modern stroke treatment. The time span of the presented data is December 2002 – December 2023, illustrating the growth of SITS over 19 years. 112 scientific articles based solely or partly on SITS data have been published/are accepted for publication in peer reviewed journals since 2007, with more than 400 co-authors. This would not have been possible without the dedicated efforts of SITS national, regional, and local coordinators, as well as local users.

The SITS network is expanding. More than 1500 stroke centres in over 90 countries on five continents have contributed with data to the registry. This makes SITS one of the world's largest stroke treatment databases and networks, with participation of many leading stroke experts.

Support and Funding

SITS is financed from an unrestricted sponsorship from Boehringer-Ingelheim. SITS has previously been financed directly and indirectly by grants from Karolinska Institutet, Stockholm County Council, the Swedish Heart and Lung Foundation, the Swedish Order of St. John, Friends of Karolinska Institutet, and private donors, as well as received grants from the European Union Framework 7, the European Union Public Health Authority and Ferrer Internacional. SITS has completed studies supported by EVER Pharma and Biogen, as well as in collaboration with Karolinska Institutet, supported by the Swedish Heart and Lung Foundation, Stryker, Covidien, Phenox, Codman. SITS is currently conducting studies supported by Boehringer-Ingelheim and AstraZeneca.

SITS World Map

Countries in SITS

A
Albania
Algeria
Argentina
Armenia
Australia
Austria

B
Bahrain
Belgium
Bermuda
Bolivia
Bosnia and Herzegovina
Brazil
Bulgaria

C
Chile
China
Colombia
Costa Rica
Croatia
Cyprus*
Czech Republic
Democratic Republic of the Congo

D
Denmark
Dominican Rep.

E
Ecuador
Egypt
El Salvador
Estonia
Ethiopia*

F
Finland
France

G
Germany
Greece
Guatemala

H
Honduras
Hong Kong
Hungary

I
Iceland
India
Iran
Iraq
Ireland
Israel
Italy

J
Japan

K
Kazakhstan
Kenya*
Kuwait
Kyrgyzstan

L
Lebanon
Libya
Lithuania

M
Malta
Mexico
Moldova, Rep of.
Montenegro
Morocco

N
Netherlands
New Zealand
Nicaragua
Nigeria
North Macedonia
Norway

O
Oman

P
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal

Q
Qatar

R
Romania
Russian Federation

S
Saudi Arabia
Serbia
Singapore
Slovakia
Slovenia
South Africa*
South Korea
Spain
Sri Lanka
Sudan*
Sweden
Switzerland
Syria

T
Tanzania*
Thailand
Tunisia
Türkiye

U
Ukraine
United Arab Emirates
United Kingdom
Uzbekistan*
Uruguay

V
Venezuela
Vietnam

** Not yet recruiting patients*

SITS Studies

Ongoing and Upcoming Studies / Projects

SITS AF Studies

Three observational studies are ongoing based on data collected in the SITS AF registry.

One study is investigating the timing of initiation of DOACs following AIS treated with acute reperfusion therapy and its association to safety and outcomes. Results of this study is in manuscript form and will be submitted to an international journal for publication.

Another study is investigating the safety and outcomes of IV thrombolysis in patients taking direct OACs (DOACs) prior to stroke onset. Preliminary results was presented at ESOC 2023 and the final results of this study is in manuscript form and will be submitted to an international journal for publication.

A third study is investigating the safety and outcomes of IV thrombolysis in AIS patients received dabigatran reversal with idarucizumab. Preliminary result of this study will be presented in ESOC 2024 as oral presentation.

The presentation: “SAFETY AND OUTCOMES OF DABIGATRAN REVERSAL WITH IDARUCIZUMAB PRIOR TO IVT TREATMENT IN PATIENTS WITH ACUTE ISCHEMIC STROKE: A SITS REGISTRY STUDY”
When: Thursday, 16 May, 15:55 - 16:03 CEST Where: Sydney

Pre-stroke disability

This study results will be presented in ESOC 2024 as oral presentation.
The presentation: CLINICAL OUTCOMES OVER TIME IN PATIENTS WITH PRE-STROKE DISABILITY IN THE SITS REGISTRY: A PROSPECTIVE COHORT STUDY.
Epidemiology, 8:30-10:00 CEST on Wed May 15 in the Delhi room.

Intracerebral Haemorrhage (ICH) Registry and Study

Intracerebral haemorrhage (ICH) is the most devastating form of stroke, with 30-day mortality reaching 50% and half of the survivors suffering from severe disability. With emerging treatments, new diagnostic techniques and updated management guidelines for ICH, there is a need for a large international collaborative registry to enable better follow-up, care quality assurance, and research studies in this field. The SITS ICH data entry form is already becoming a valuable tool and network for clinicians and researchers striving to improve outcomes in the most severely afflicted stroke patients. Data collection for the SITS ICH study started in January 2024. The SITS-ICH study investigates acute management and outcomes in patients with spontaneous intracerebral haemorrhage (ICH) and examines the association of care bundle protocol implementation with outcomes in routine clinical practice. Data from approximately 5 000 patients with ICH will be collected over 2 years, and we are very pleased to see that 36 hospitals from 17 countries have contributed to the study already in Q1 2024. Of course, we hope to see many more hospitals join the study along the way. Participating centre coordinators will be invited to join as co-authors.

SITS IVT Paediatric Study

Until recently, IVT with alteplase was not approved in patients with acute ischaemic stroke aged under 18 years. Based on observational data, regulatory authorities in several countries have now approved the use of IVT with alteplase in patients 16-18 years if other Summary of Product Criteria (SmPC) are fulfilled. Regulatory authorities have requested monitoring of treatment in this age group and SITS will therefore perform a study of IVT in patients with acute ischaemic stroke aged 16-17 years.

SITS Tenecteplase study

Intravenous thrombolysis (IVT) with alteplase has until recently been the only approved pharmacological treatment for acute ischemic stroke (AIS). Tenecteplase is a genetically modified variant of alteplase, which has several advantages over alteplase including greater fibrin specificity, higher thrombolytic efficacy, and easier administration. Two recent randomized controlled trials (RCT) demonstrated non-inferiority of tenecteplase to alteplase in AIS. European Medicine Agency (EMA) has very recently approved tenecteplase 25 mg vial as IVT in AIS. SITS is aiming to investigate the safety and outcomes of IVT with tenecteplase in patients with AIS in routine clinical practice. More information of this study will be coming soon.

SITS Collaborative Project with Angels, ESO and WSO.

The Angels Initiative in collaboration with The European Stroke Organisation (ESO) and World Stroke Organisation (WSO) are currently conducting a Europe-wide and a world-wide project respectively, aiming to stimulate high quality in stroke management by awarding excellent performance in key quality factors, such as high proportion of ischaemic stroke patients undergoing reperfusion treatment, door-to-needle time, and proportion of patients treated in stroke units. To be able to participate in the Angels Award program through SITS, hospitals can use our quality data entry form called SITS-QR to qualify for several awards.

SITS Collaborative Project with AHA/ASA

SITS is collaborating with the American Heart Association/American Stroke Association (AHA/ASA) on a certification program to evaluate and provide hospitals with needed tools and support to achieve long-term success in improving stroke patient outcomes. Through this robust performance improvement program and dedicated staff, centres can achieve the goal to provide high quality stroke care. Certification provides a positive framework to guide hospitals on this journey. Currently this program has been launched in collaboration with AHA/ASA and Middle East and North Africa Stroke Organization (MENASO). Since 2023, Mexico is also able to certify through this program.

SITS Collaborative Project: MonitorISA (MISA)

MonitorISA is a quality improvement program initiated by the Italian Stroke Association and the Angels Initiative. SITS has been working closely with Professor Danilo Toni and the Italian Angels representatives to develop and translate an add-on to the SITS-QR protocol for Italian centres to be able to participate in the MISA program.

QR Latin America

In 2021, SITS developed a new add-on to the SITS-QR protocol in collaboration with Tony Fabian Alvarez Guzman and Sheila Martins from Brazil. This add-on gives centres the opportunity to register data not only for the Angels award, but also for the WSO certification program, Certificación de los Centros de ACV en Latinoamérica.

SITS APPNA-MERIT Collaboration

SITS has started a collaboration with the Association of Physicians of Pakistani Descent of North America and Medical Education, Research, International Training and transfer of Technology (the APPNA-MERIT organization). Together with SITS, a new ground-breaking research project is focusing on medical education and quality improvement in stroke care in Pakistan. A new QR version for Pakistan was developed during 2023.

IV thrombolysis in India

There are currently limited data on iv thrombolysis (IVT) in acute ischemic stroke (AIS) from India. In collaboration with Indian National Coordinators, we aim to investigate the safety and outcome after IVT in AIS in India and to compare the results with available global data. The results of this study will be submitted for publication in an international peer revied journal.

Completed Studies

SITS-MOST

An open, prospective, non-randomised observational study of safety and efficacy of treatment with intravenous rt-PA within 3 hours of onset of acute ischaemic stroke, based on the SITS International Stroke Thrombolysis Register. Performed in European Union countries.

SITS-NEW

An observational study of safety and efficacy of intravenous rt-PA within 3 hours of symptom onset in acute ischaemic stroke patients, according to the Summary of Product Characteristics (SPC) of the countries involved. Performed in India, People´s Republic of China, Singapore, and South Korea.

SITS-UTMOST

A prospective, post-approval registry study of intravenous rt-PA (0.9 mg/kg) up to 4.5 hours after symptom onset in acute ischaemic stroke patients. The study has been completed and the main results were published in the European Stroke Journal in 2016.

SITS-OPEN

An international, multicentre, prospective, controlled, blinded evaluation study of safety and efficacy of thrombectomy in acute occlusive stroke. The SITS-OPEN trial results were published in Stroke in 2021.

SITS Thrombectomy Studies

Implementation of thrombectomy in large artery occlusive stroke in routine clinical practice was published in 2021. Until now more than 10 scientific articles have been published based soley or partly on thrombectomy data from the SITS Registry.

SITS Dabigatran Study
A retrospective study on timing of dabigatran initiation after acute ischaemic stroke in patients with atrial fibrillation was published in 2020.

SITS IVT > 80 years Study
A retrospective study based on prospective, post-approval registry of intravenous rt-PA (0.9 mg/kg) in acute ischaemic stroke patients over 80 years within the SITS-ISTR. Although IVT in patients > 80 years has been used off-label in many countries, treatment in patients > 80 years will probably increase further after approval. This study has been completed recently and the results of this study is under review for publication.

SITS Cerebral Oedema Study
Large hemispheric infarction often leads to high morbidity and mortality, and real-world data on clinical management, outcomes and healthcare utilization is limited. There is also a growing interest in understanding the efficacy and effectiveness on thrombectomy in patients with large infarcts. The number of incidents, current clinical management, recurrent strokes and functional outcomes, including how thrombectomy modifies the risk of cerebral oedema in patients with large hemispheric infarction, forms the basis for this study.

SITS-Thrombectomy in large artery occlusive stroke with minor stroke symptom
Safety and efficacy of endovascular thrombectomy plus intravenous thrombolysis versus intravenous thrombolysis alone in mild symptoms stroke with large vessel occlusion: propensity score matched analysis.

SITS Registries / Data entry forms

SITS Registry

A range of SITS data entry forms allow centres to collect data on patients receiving treatments during the acute stroke phase, care quality parameters and long-term outcomes.

SITS data entry forms are electronic forms that are automatically enabled in the registry depending on the chosen acute phase intervention. They can also be downloaded as Case Record Forms in PDF format.

Current data entry forms

Thrombolysis data entry forms - suitable for all stroke patients treated with IV thrombolysis.

- **Intravenous Thrombolysis, standard version (IVT-s) -** for registering stroke patients treated with IV thrombolysis.
- **Intravenous Thrombolysis, minimal version (IVT-m) -** for registering all stroke patients treated with IV thrombolysis. The minimal version omits certain variables at various time points, making it less extensive compared to IVT-s.

General Stroke data entry forms - suitable for any stroke and TIA patients who have not received IV thrombolysis or thrombectomy or for centres which do not use the IV thrombolysis or thrombectomy data entry forms.

- **All Patients, standard version (APP-s) -** for registering stroke and TIA patients who have not been treated with IV thrombolysis or thrombectomy or for centres which do not use the IV thrombolysis or thrombectomy data entry forms.
- **All Patients, minimal version (APP-m) -** for registering stroke and TIA patients who have not been treated with IV thrombolysis or thrombectomy. The minimal version omits certain baseline and imaging variables, 2-, and 24-hour follow-up.

Thrombectomy data entry forms - suitable for all stroke patients treated with thrombectomy.

- **Thrombectomy, standard version (TBYs) -** for registering stroke patients treated with thrombectomy with (bridging data entry forms) or without prior treatment with IV thrombolysis.
- **Thrombectomy, minimal version (TBY-m)** - for registering stroke patients treated with thrombectomy without prior treatment with IV thrombolysis. The minimal version omits certain variables.

Data entry forms for Atrial Fibrillation and Oral Anticoagulation in Acute Stroke and TIA - suitable for all patients admitted to hospital with an acute ischemic stroke or TIA, diagnosed with atrial fibrillation. This data entry form provides additional data entry options for details surrounding atrial fibrillation and the use of oral anticoagulation for secondary stroke prevention.

SITS Quality data entry form (SITS-QR) – suitable for SITS centres that prefer a short and simple stroke care quality data entry form, which can be completed in under 5 minutes. It can be used by all centres to participate in the Angels Award Program.

SITS COVID-19 - SITS received a request from investigators to add COVID-19 specific variables to the registry. We prioritized this project considering the global pandemic and the COVID-19 data entry options were launched in June 2020.

SITS Cerebral Venous Thrombosis data entry form (SITS CVT) – enables documentation of CVT risk factors, aetiology, management, and outcomes of patients.

SITS ICH Registry

SITS International has created a large, international, collaborative protocol to document, evaluate and conduct research on intracerebral haemorrhage with the aim to help reduce the burden of the most severe type of stroke.

SITS Intracerebral Haemorrhage data entry form (SITS ICH) – suitable for all stroke patients suffering intracerebral haemorrhage and/or intraventricular haemorrhage. The layout and data entry form for the SITS ICH Registry is separate from the traditional SITS registry, which aims to simplify data entry.

SITS Data overview

The data presented in this section provides an overview of the progress of data collection across all data entry forms in the SITS Registry until December 31, 2023. Whereas the tables illustrate the overall number of patients entered, the graphs represent the number of registered patients for each data entry form over time. The development of patient characteristics for stroke treatment and care is also presented in the trend charts, based on patient data entered in the thrombolysis (IVT) and thrombectomy (TBY) data entry forms.

General SITS data overview

Data presented in this general overview is based on all unique patient files entered in the SITS registries between December 25, 2002 and December 31, 2023. Patient recruitment is calculated using unique patient files with both confirmed and unconfirmed data.

Figure 1. Cumulative patient recruitment in SITS:

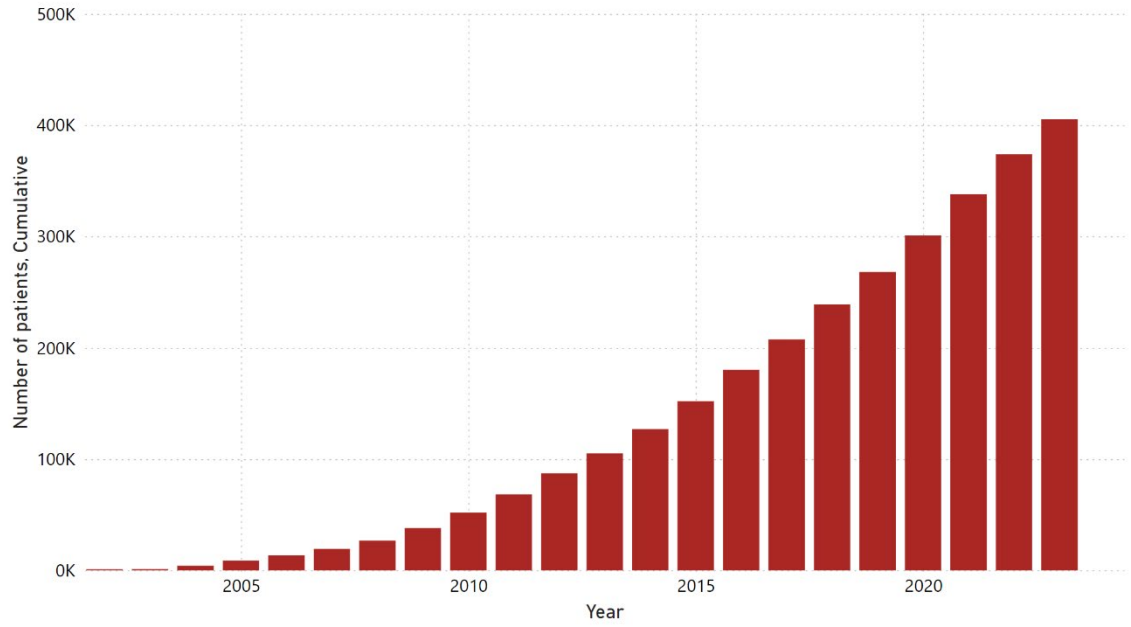


Table 1. Top 20 recruiting countries in SITS, all data entry forms

Country	Patient files
Italy	183391
Brazil	50095
Czech Republic	33121
United Kingdom	30161
Iran	22668
Sweden	15796
India	14065
Qatar	13813
Egypt	12989
Portugal	11262
Belgium	11016
Poland	9997
Germany	8341
Slovakia	7259
Estonia	6564
Spain	5460
Bulgaria	5208
Russian Federation	5195
Lithuania	4241
Türkiye	4161

**Based on patient files in SITS, copies can occur.*

Table 2. Number of patients registered per data entry form in SITS

Data entry forms	Patients files
IVT	228405
APP	139125
QR	112760
Bridge	16126
TBY	13614
CVT	398
Totalt	**510428**

**Based on patient files in SITS, copies can occur.*

SITS Thrombolysis data overview

Data is based on all patient files entered between December 25, 2002 and December 31, 2023 using the standard and minimal SITS IV Thrombolysis data entry forms. Patient recruitment is calculated using unique patients with both confirmed and unconfirmed data.

Figure 2. Cumulative registration of patients in the IV thrombolysis data entry forms

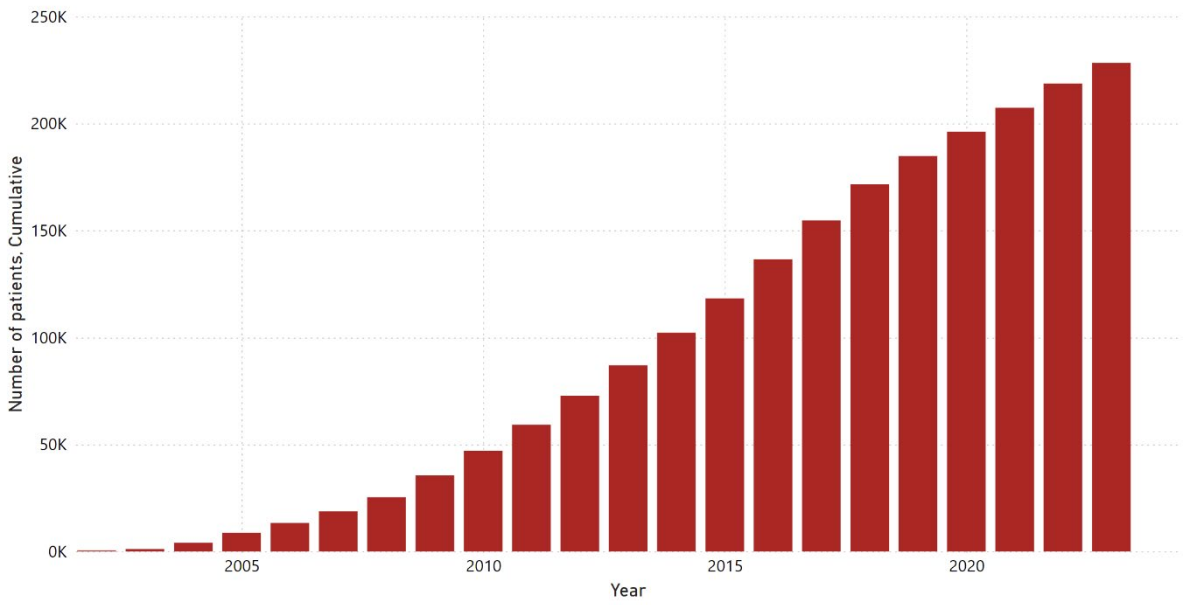


Table 3. Top 20 recruiting countries in SITS using the IV thrombolysis data entry form

Country	Patient files
Italy	75824
Czech Republic	29083
United Kingdom	28251
Sweden	9078
Poland	7782
Germany	7254
Slovakia	5550
Brazil	5503
Belgium	5432
Estonia	5288
Iran	5285
Portugal	4620
Spain	4164
Finland	3302
Australia	3057
Lithuania	3044
Greece	2741
Denmark	2375
Norway	2094
Hungary	1807

Figure 3. Change in median age per year in patients with acute ischaemic stroke treated with IVT

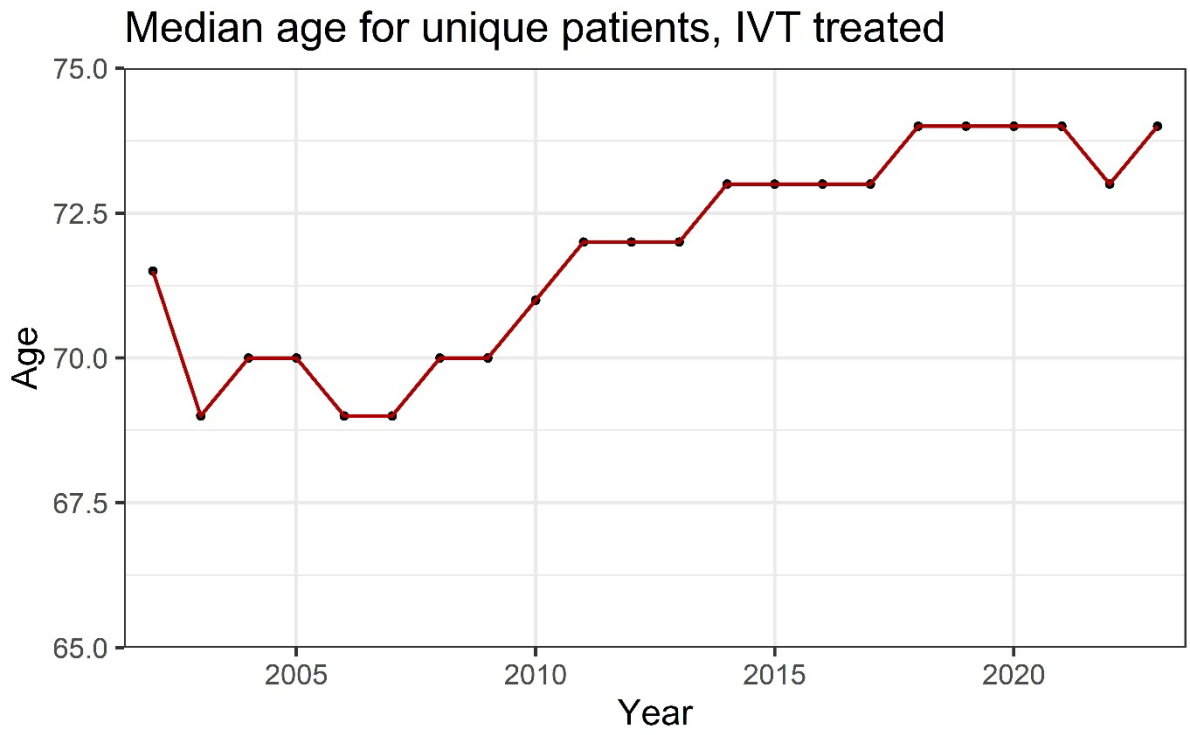


Figure 4. Change in median NIHSS score per year in patients with acute ischaemic stroke treated with IVT

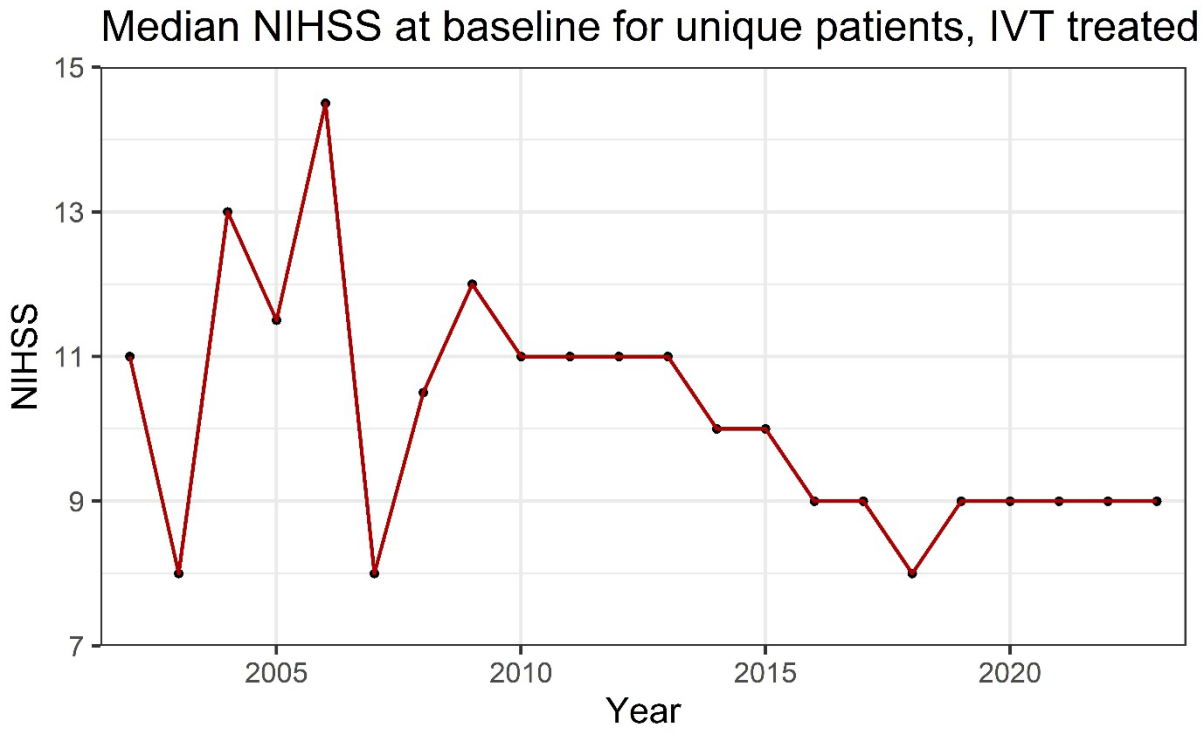


Figure 5. Change in median time logistics in minutes in IV thrombolysis treated patients - Onset to Door (OTD)

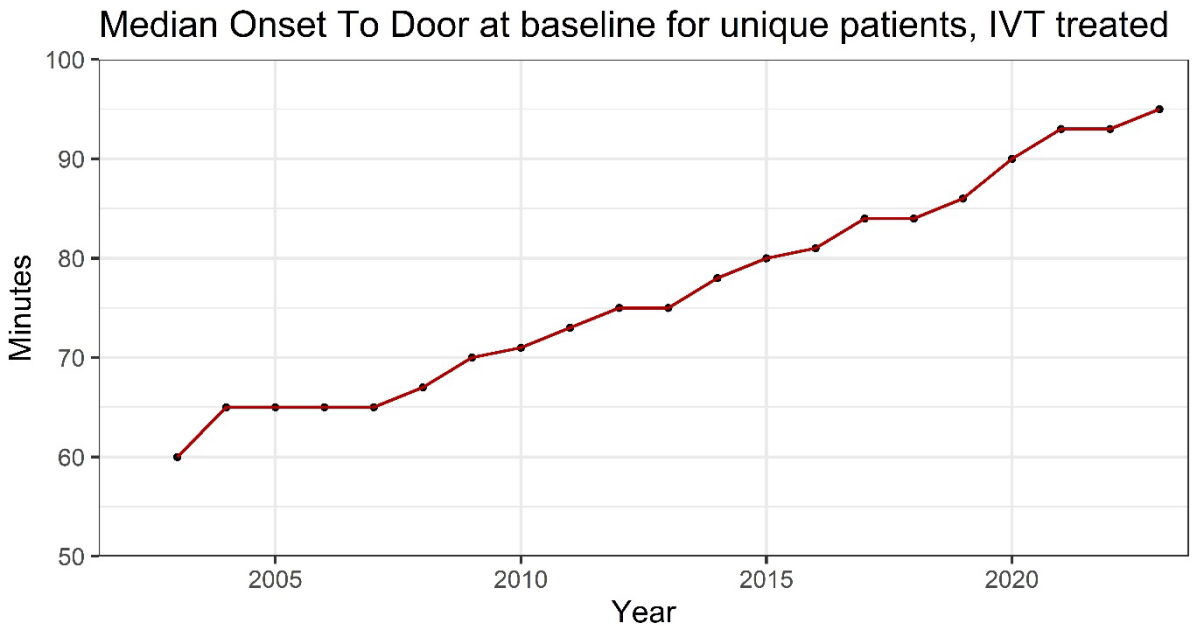


Figure 6. Change in median time logistics in minutes in IV thrombolysis treated patients - Onset to Treatment (OTT)

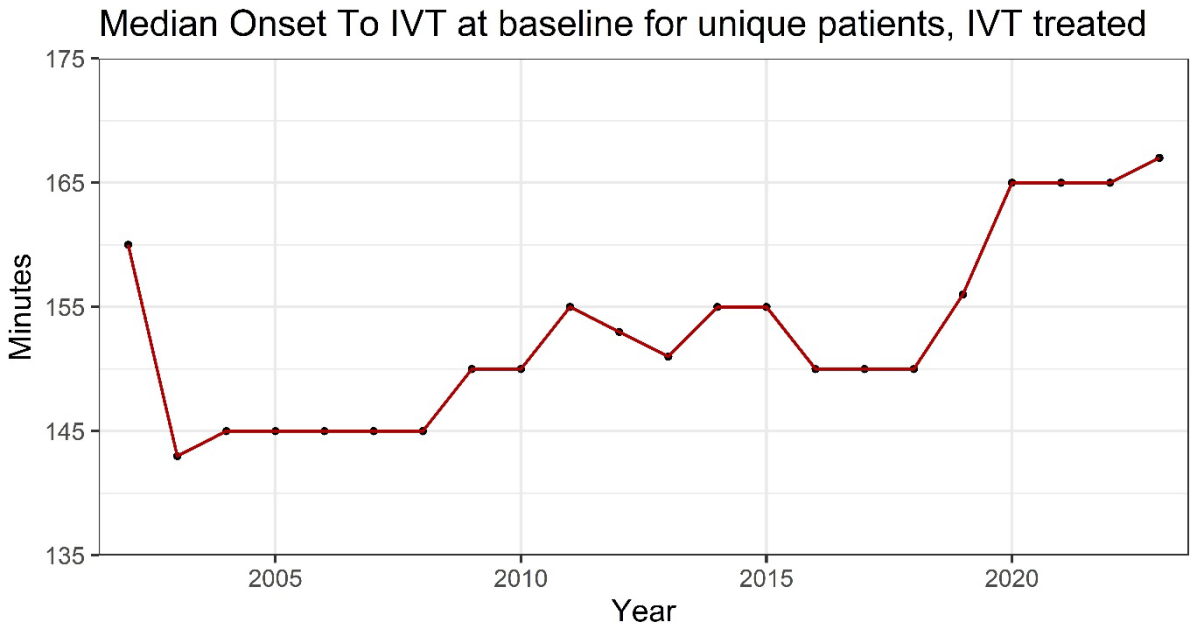
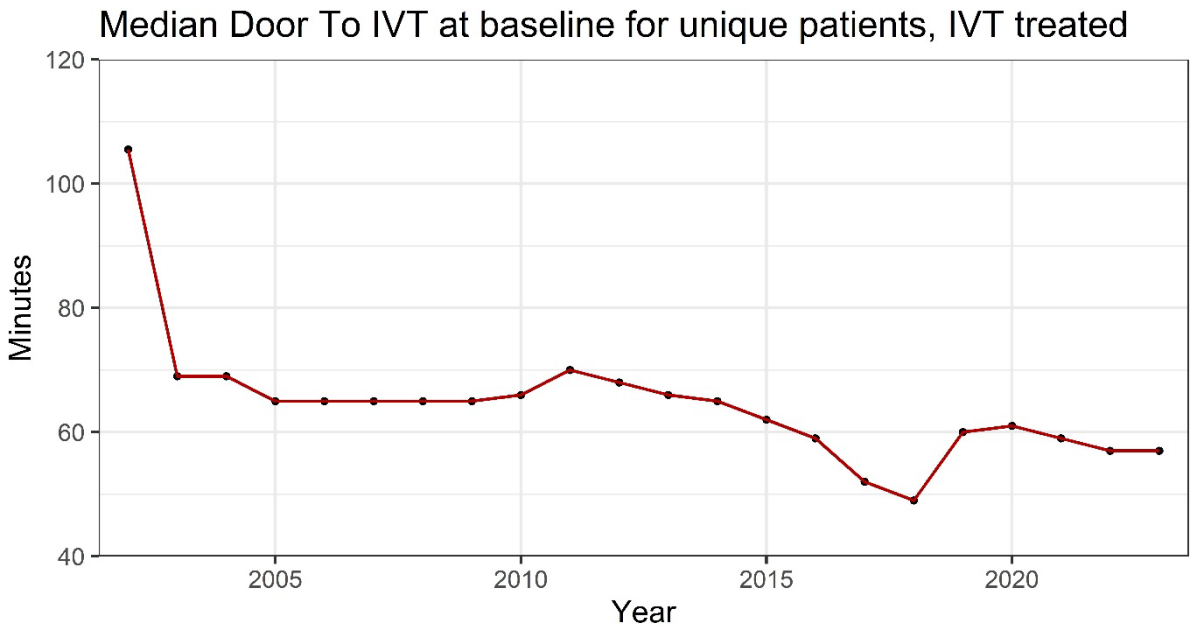


Figure 7. Change in median time logistics in minutes in IV thrombolysis treated patients - Door to Needle (DTN)



Outcome data

Intracerebral haemorrhage in patients treated with IVT

In the table below, frequency of intracerebral haemorrhage (ICH) of various types, and of symptomatic intracerebral haemorrhage (SICH) by three definitions, in patients treated with IV thrombolysis is presented. Data is based on more than 300 000 patients.

Table 4 Proportions of patients with intracerebral haemorrhage*

Bleedings, IVT treated	Percentage
HI1	4.7%
HI2	3%
PH1	2.5%
PH2	2.5%
PHr1	1.7%
PHr2	0.9%
SAH	3.9%
SICH SITS-MOST	0.9%
SICH modified SITS-MOST	1.1%
SICH ECASS	3.4%
SICH NINDS	4.6%

Haemorrhagic transformation Definitions

Haemorrhagic infarction type 1 (HI1): small petechiae along the margins of the infarct.

Haemorrhagic infarction type 2 (HI2): confluent petechiae within the infarcted area without space-occupying effect.

Parenchymal haemorrhage type 1 (PH1): local, or intra-ischemic confluent hematoma in ≤ 30% of the infarcted area with at the most some slight space-occupying effect.

Parenchymal haemorrhage type 2 (PH2): local, or intra-ischemic confluent hematoma >30% of the infarcted area with a substantial space-occupying effect.

Remote parenchymal haemorrhage type 1 (PHr1): small to medium sized hematoma located remote from the infarct(s), with mild space occupying effect.

Remote parenchymal haemorrhage type 2 (PHr2): large confluent hematoma in an area remote from the actual infarct(s), with substantial space occupying effect.

Symptomatic intracerebral haemorrhage (SICH) Definitions

SICH SITS-MOST: a local or remote parenchymal haemorrhage type 2 on the 22- to 36-h post-treatment imaging scan or earlier if clinically indicated, combined with a neurological worsening of ≥4 points between baseline and 24 h, or leading to death.

Modified SITS-MOST: any subarachnoid haemorrhage in the 22-36 hours post-thrombectomy imaging scans was added in addition to standard SITS-MOST definition.

SICH per ECASS II: Any intracranial haemorrhage with neurologic deterioration as indicated by an increase in NIHSS ≥4 compared to baseline or the lowest value within 7 days or leading to death.

SICH per NINDS: Any intracerebral haemorrhage on any post-treatment imaging scans combined with any decline in neurologic status as measured by NIHSS between baseline and 7d.

Figure 8. Outcome at 3 months in IVT treated patients

Data shows the distribution of patients on the modified Rankin Scale (mRS) as assessed at three months after the acute stroke.

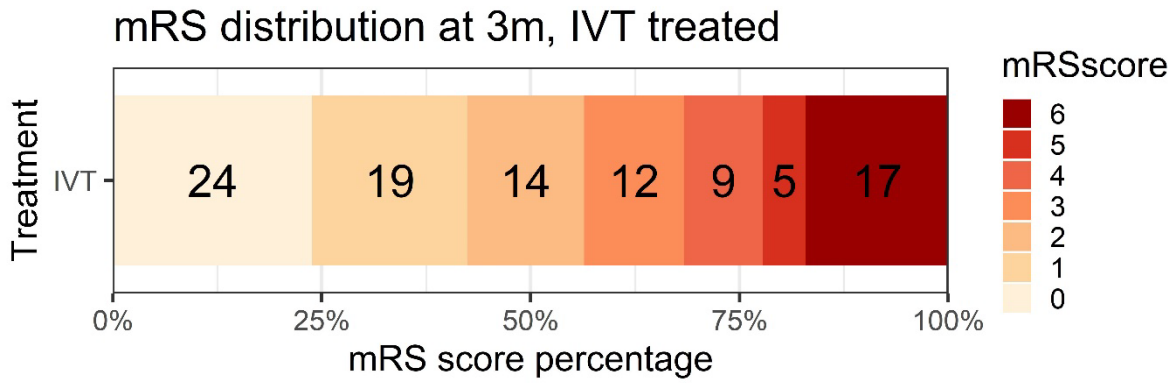


Table 5. Outcome at 3 months in IVT treated patients

Proportion of grouped mRS results
Excellent outcome (0-1), functional independence (0-2), death (6).

Outcomes, IVT treated	Percentage
mRS 0-1	42.4%
mRS 0-2	56.4%
Death	16.6%

SITS Thrombectomy data overview

Data is based on all patient files entered between 2014 and December 31, 2023, using the standard and minimal Thrombectomy forms and bridging of thrombectomy with IV thrombolysis. Patient recruitment is calculated using unique patients with both confirmed and unconfirmed data.

Figure 9. Cumulative registration of patients in the thrombectomy data entry forms

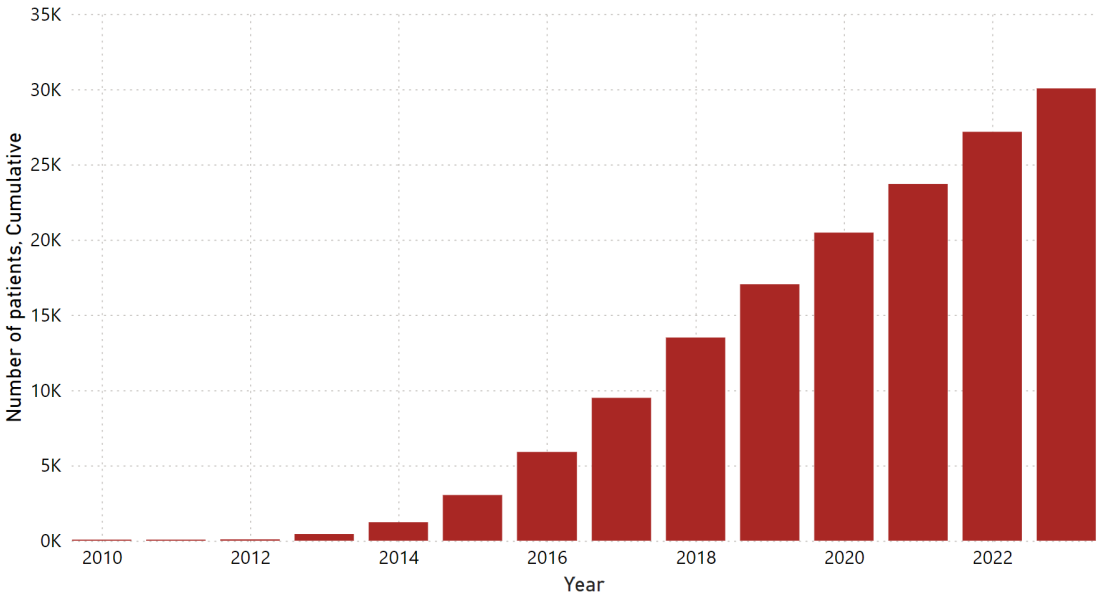


Table 6. Top 20 recruiting countries in SITS using the thrombectomy data entry forms

Country	Patient files
Italy	11284
Portugal	3960
Czech Republic	3512
Sweden	1732
Belgium	1343
Estonia	1255
Spain	1112
Slovakia	1110
Lithuania	986
Finland	748
United Kingdom	543
Türkiye	436
Greece	296
Poland	234
United Arab Emirates	206
Germany	202
India	155
Egypt	150
Russian Federation	116
Brazil	111

TBY trends

Figure 10. Change in median age per year in patients with acute ischaemic stroke treated with TBY

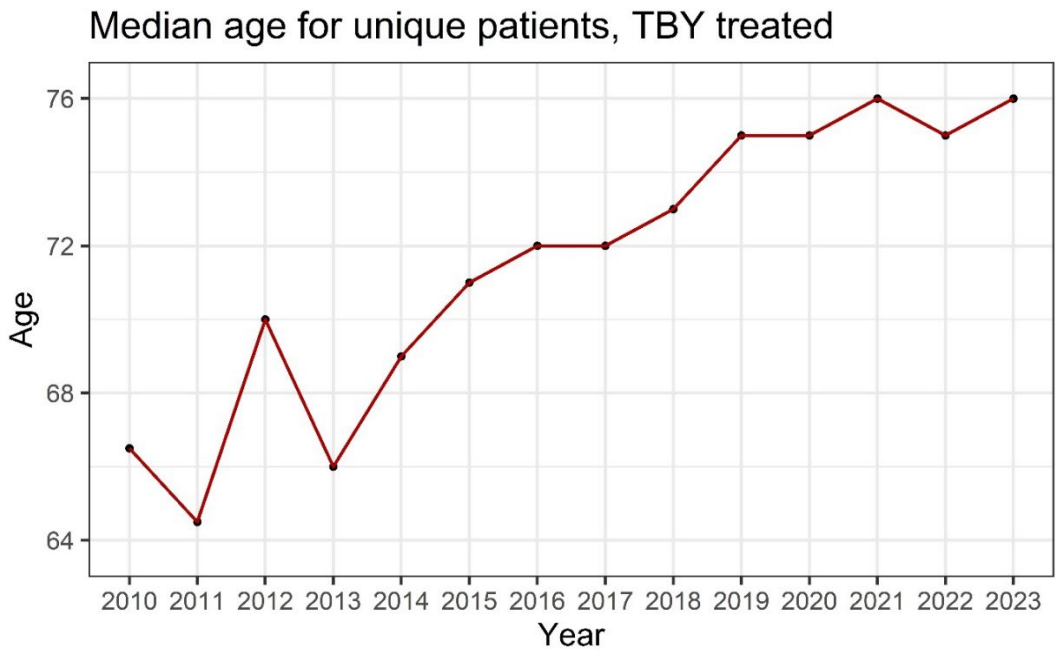


Figure 11. Change in median NIHSS score per year in patients with acute ischaemic stroke treated with TBY

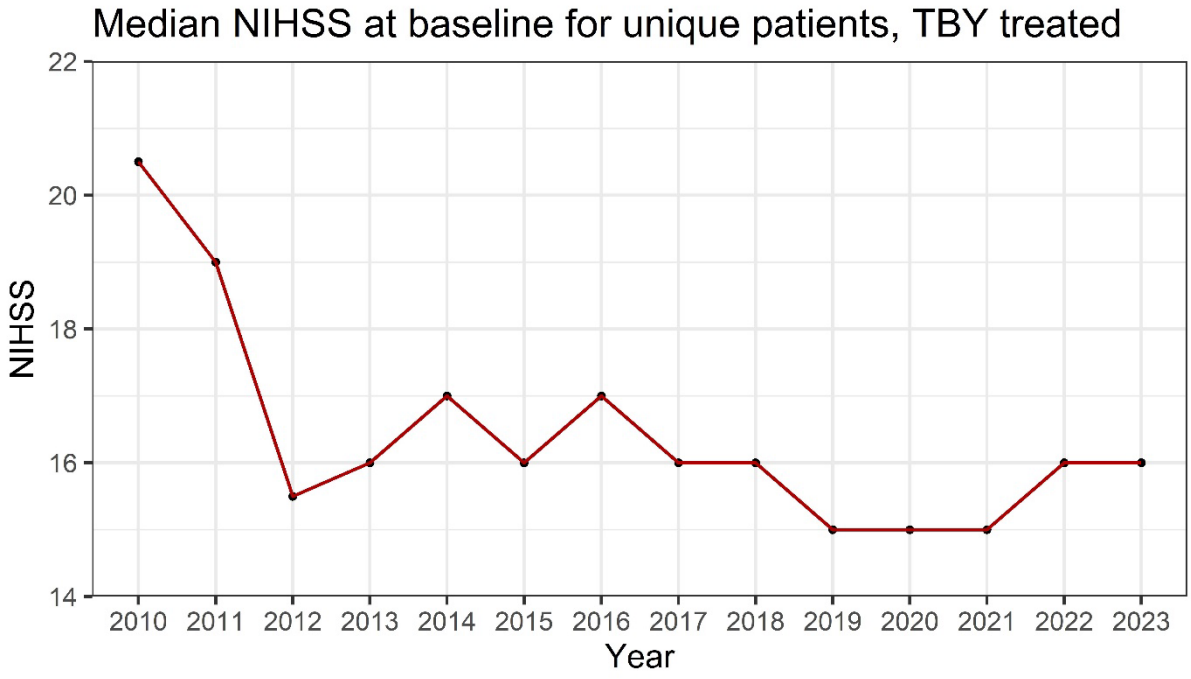
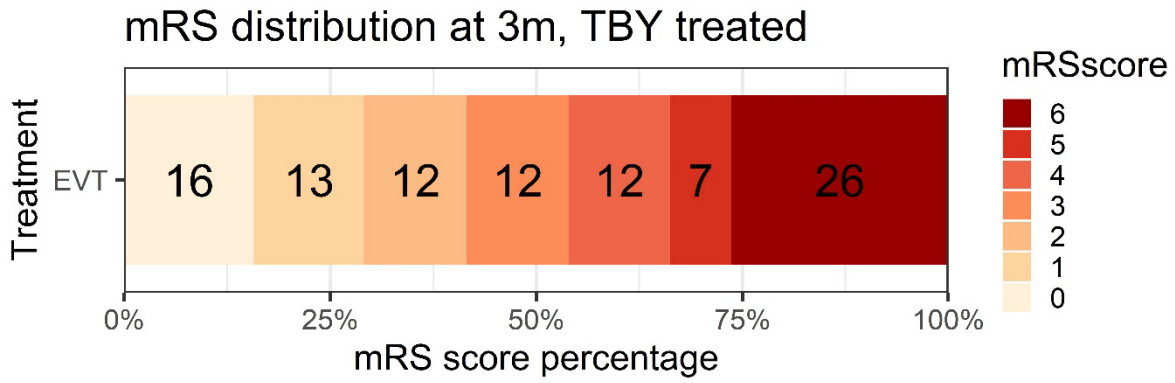


Figure 12. Outcome at 3 months in TBY treated patients



SITS General Stroke data overview (APP)

The SITS data entry form for general strokes is aimed at registering all stroke and TIA patients. This is done in our APP data entry forms. Recruitment numbers presented below are based on unique patients with confirmed and unconfirmed data entered until December 31, 2023.

Figure 13. Cumulative registration of patients in the general stroke data entry forms

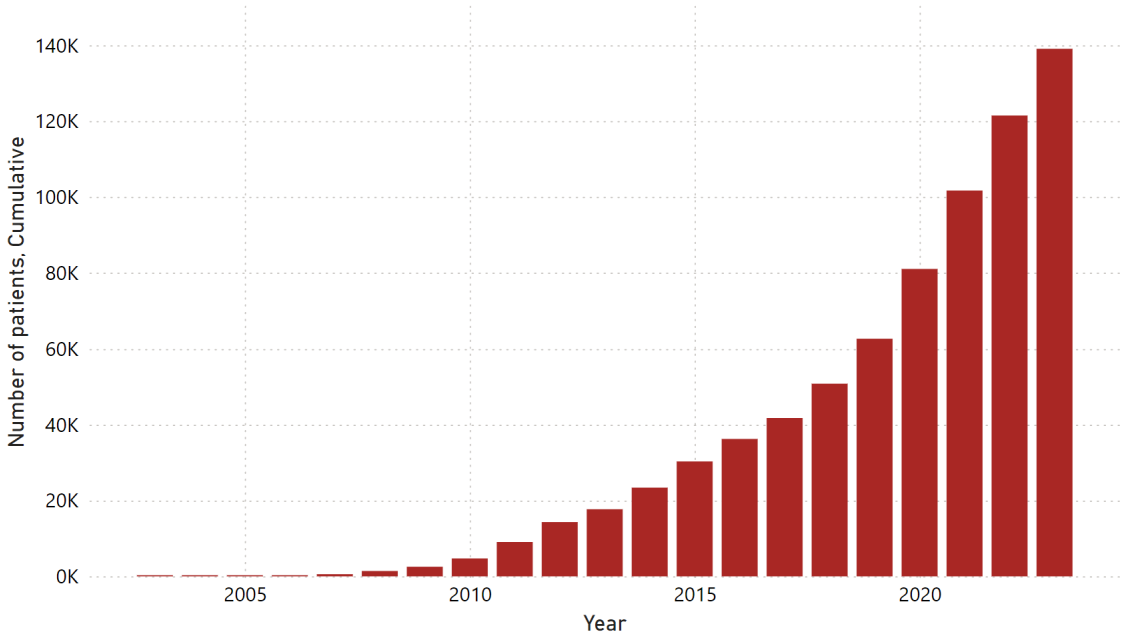


Table 7. Top 20 recruiting countries in SITS using general stroke data entry forms

Country	Patient files
Italy	38316
Brazil	21492
India	9480
Egypt	9312
Qatar	6271
Iran	6091
Bulgaria	4181
Belgium	3835
Russian Federation	3240
Tunisia	3219
Sri Lanka	2934
Sweden	2478
Peru	2435
Venezuela	2059
United Arab Emirates	1933
Türkiye	1709
Poland	1665
Moldova	1506
Kyrgyzstan	1479
Chile	1419

SITS ICH Registry

The SITS ICH registry is aimed at registering all ICH patients. Until December 31, 2023, 461 patients had been entered in this data entry form, and since the launch of the SITS ICH study in January 2024, the number of patients is rapidly increasing. In next year's SITS Report, we will be able to share the progression of patient recruitment and top contributing countries in the ICH Registry.

SITS network

SITS EAST

SITS–EAST is a regional network in Central and Eastern Europe.
It started as a study of implementation of evidence-based stroke therapy supported by the SITS International Registry. This initiative started in 2007 with the support of a grant from the European Union. It is now an ongoing collection of data within the registry for the documentation and statistical evaluation of stroke management in Eastern Europe. Recruitment numbers presented below are based on unique patients with confirmed and unconfirmed data entered until December 31, 2023.

Contributing countries*:
Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Greece, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, North Macedonia, Moldova, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Türkiye, Ukraine.
**See the Appendix for contributing centres.*

Figure 14. Cumulative recruitment of patients within the SITS-EAST network– all data entry forms

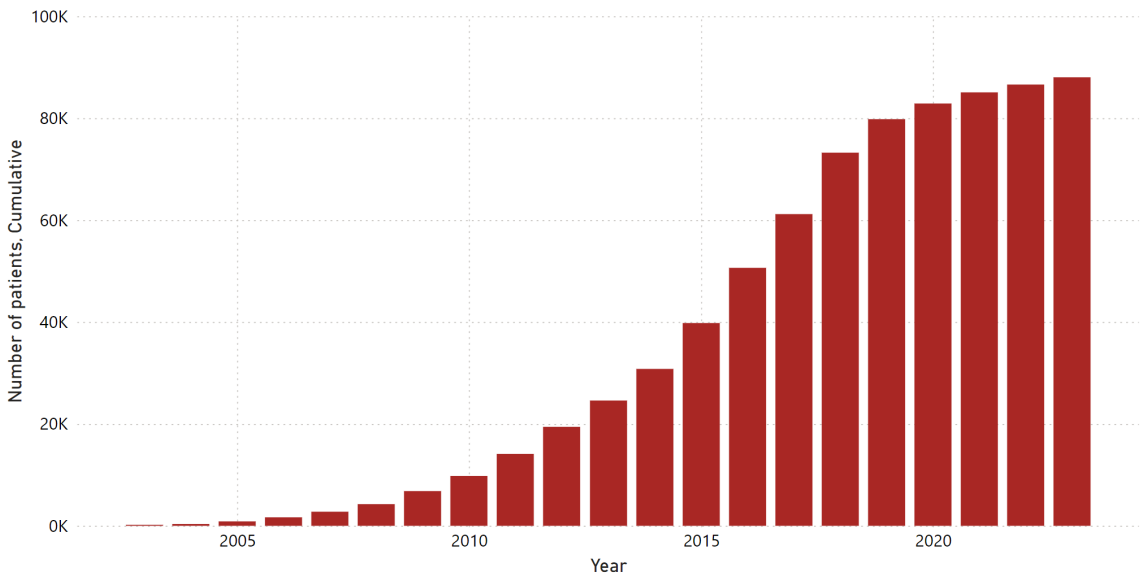


Table 8. Number of patient files registered per data entry form within the SITS-EAST network

Data entry form	Patient files
IVT	62531
APP	16226
Bridge	5200
TBY	2790
QR	1942
Total	**88689**

**Based on patient files in SITS, copies can occur.*

Table 9. Top 10 recruiting countries in SITS-EAST, all data entry forms

Country	Patient files
Czech Republic	33121
Poland	9997
Slovakia	7259
Estonia	6564
Bulgaria	5208
Russian Federation	5195
Lithuania	4241
Türkiye	4161
Greece	3817
Hungary	2049

**Based on patient files in SITS, copies can occur.*

SIECV-SITS

The SIECV-SITS is a regional network in Central- and South America. It was initiated through a joint venture by Sociedad Iberoamericana de Enfermedades Cerebrovasculares (SIECV) and SITS. Recruitment numbers presented below are based on unique patients with confirmed and unconfirmed data, entered until December 31, 2023. Since 2018, Sheila Martins functions as the International Regional Coordinator for SIECV-SITS.

Contributing countries*:
Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela.
**See the Appendix for contributing centres.*

Figure 15. Cumulative recruitment of patients within the SIECV-SITS network – all data entry forms

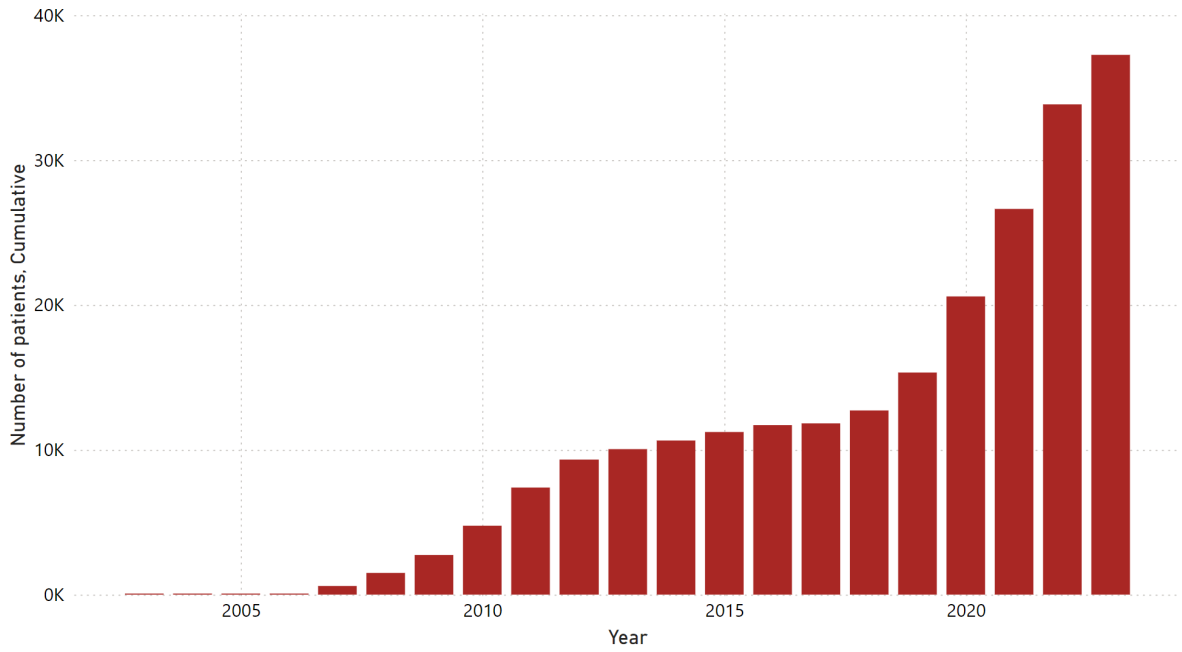


Table 10. Number of patient files registered per data entry form within the SIECV-SITS network

Data entry form	Patient files
APP	32119
QR	23527
IVT	6240
TBY	87
Bridge	33
CVT	5
Totalt	**62011**

**Based on patient files in SITS, copies can occur.*

SITS Sub-Saharan Africa

The SITS Sub-Saharan Africa is a regional network south of Sahara. Since 2018, Foad Abd-Allah functions as the International Regional Coordinator for SITS Sub-Saharan Africa. Recruitment numbers presented below are based on unique patients with confirmed and unconfirmed data, entered until December 31, 2023. This is a region where we are currently working on recruiting hospitals. With more hospitals comes more data, hence research and quality will be the aim for the future.

Contributing countries*:
Democratic Republic of the Congo, Ethiopia, Kenya, Nigeria, Tanzania.
**See the Appendix for contributing centres.*

Table 11. Number of patient files registered per data entry form within the SITS Sub-Saharan Africa network

Protocol	Patient files
APP	48
Total	**48**

SITS-MENA

The SITS-MENA regional network was initiated in 2013 and includes countries in the Middle East and North Africa. Several countries and centres in the network are participating in several prospective observational studies based on IVT, TBY and CVT data in SITS. Since 2018, Suhail Al Rukn functions as the International Regional Coordinator for the SITS-MENA region. Recruitment numbers presented below are based on patient files with confirmed and unconfirmed data, entered until December 31, 2023.

Contributing countries*:
Algeria, Bahrain, Egypt, Iran, Iraq, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Israel, and Sudan*.
**See the Appendix for contributing centres.*

Figure 16. Cumulative recruitment of patients within the SITS-MENA network – all data entry forms

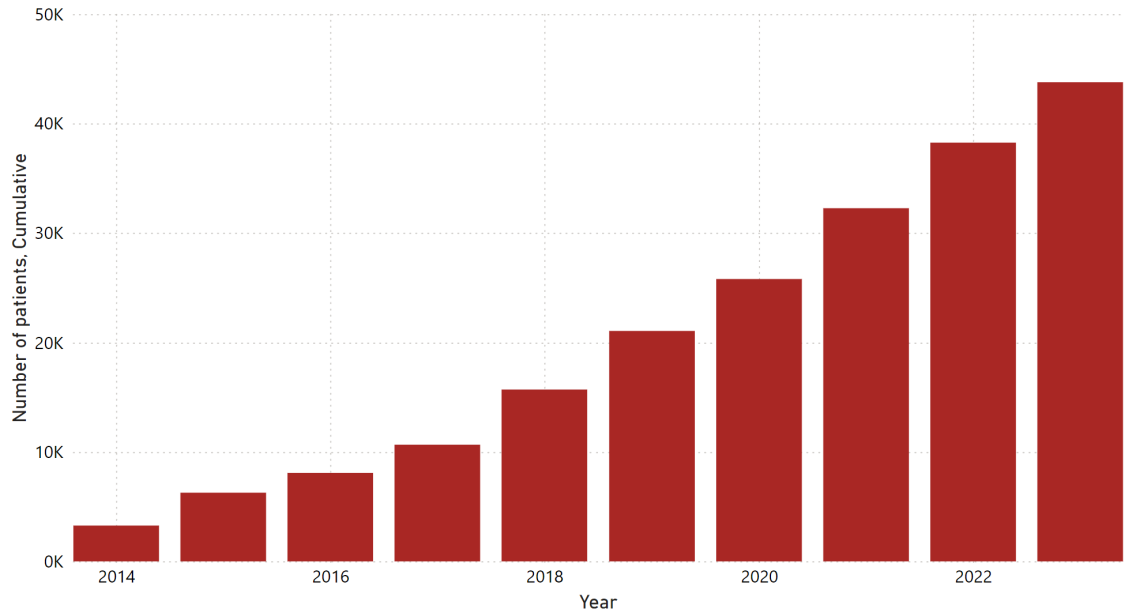


Table 12. Number of patient files registered per data entry form within the SITS-MENA network

Data entry form	Patient files
APP	28815
QR	20538
IVT	9316
Bridge	254
TBY	213
CVT	195
Totalt	**59331**

**Based on patient files in SITS, copies can occur.*

Table 13. Top 5 countries in SITS-MENA, all data entry forms

Country	Patient files
Iran	22668
Qatar	13813
Egypt	12989
Tunisia	3341
United Arab Emirates	2677

**Based on patient files in SITS, copies can occur.*

SITS Award 2023

Each year, SITS selects the top 20 centres fulfilling the highest standards of data collection into the SITS Registry over the last year (2023). The SITS Top Centres list is initiated to encourage centres to continue to enter high quality data into the SITS Registry and in keeping with our mission - to assure excellence in acute treatment and secondary prevention of stroke, as well as to facilitate clinical research.

The following centres received a diploma as the 2023 top centre in SITS using the IVT/TBY/APP data entry forms:

IV Thrombolysis:

Country	Centre	Local coordinator
Estonia	Tartu University Hospital	Janika Kõrv
Portugal	Hospital Sao Jose - CHLC	Ana Paiva Nunes
United Kingdom	Newcastle upon Tyne Hospitals NHS Foundation Trust	Anand Dixit, Janna Byers
Iran	Imam Reza	Elyar Sadeghi-Hokmabadi, Mehdi Farhoudi
Belgium	CHU St. Luc - Woluwe	Andre Peeters
United Kingdom	Northampton General Hospital	Magdalena Karwacka-Cichomska
Spain	Hospital San Carlos	Jose Egido
Egypt	Ain Shams Universities	Tamer Roushdy
Italy	Azienda Ospedaliera Cannizzaro	Davide Maimone
Egypt	Cairo university hospitals	Husam Mourad
Pakistan	Hayatabad Medical Complex	Mian Ayaz ul Haq
Italy	Policlinico Bari	Marco Petruzzellis
Qatar	Hamad General Hospital	Naveed Akhtar
United Arab Emirates	Rashid Hospital	Syed Habib Ullah Syed, Jai Perkash Hira Lal, Maria Khan
Italy	San Paolo	Cinzia Finocchi
Italy	Santissima Annunziata	Mara Rosso

Thrombectomy:

Country	Centre	Local coordinator
Portugal	Hospital Sao Jose - CHLC	Ana Paiva Nunes
Spain	Hospital San Carlos	Jose Egido
Belgium	CHU St. Luc - Woluwe	Andre Peeters
Italy	Policlinico Bari	Marco Petruzzellis
Estonia	Tartu University Hospital	Janika Kõrv
United Arab Emirates	Rashid Hospital	Syed Habib Ullah Syed, Jai Perkash Hira Lal, Maria Khan

All Patients:

Country	Centre	Local coordinator
Qatar	Hamad General Hospital	Naveed Akhtar
Egypt	Ain Shams Universities	Tamer Roushdy
Egypt	Ain Shams Specialized Hospital	Hossam Shokri, Nevine El Nahas
Italy	San Paolo	Cinzia Finocchi
Egypt	Cairo university hospitals	Husam Mourad
Italy	R. Dimiccoli	Ruggiero Leone
Sri Lanka	Sri Jayewardenepura General Hospital	Harsha Gunasekara
Tunisia	Institut National Mongi ben Hamida de Neurologie	Dina Ben Mohamed, Samia Ben Sassi
Italy	Policlinico Bari	Marco Petruzzellis
Italy	Azienda Ospedaliera Cannizzaro	Davide Maimone
Portugal	Hospital Sao Jose - CHLC	Ana Paiva Nunes

What is new in SITS – current and future

Currently in SITS

The number of centres and countries participating in SITS has increased further during 2023, with patient input reaching new high levels. This is a strong indicator that SITS remains highly relevant for centres treating acute stroke patients worldwide.

We have made significant advancements in our data entry protocols this year, including customised forms for Pakistan and French translations of the QR data entry form. These enhancements, such as Angels Award deadline reminders and indication of different QR subforms, improve the user experience and demonstrate our commitment to improving stroke care through research and quality.

Our presence at events such as ESOC and various national conferences has allowed us to engage with collaborators, new investigators, and industry leaders. We have also expanded our global reach in the MENA region at MENASO, fostering meaningful connections and partnerships in a dynamic environment.

The ICH study launched in January 2024, but the preparation started in 2023. We are so excited for the interest our network has shown, and we hope that the data entry continues to grow at the same pace. The enrolment of patients in the ICH registry is progressing well and the number of patients is steadily increasing towards our study target. Our survey in late 2023 recorded that over 100 hospitals in 34 countries were interested in participating in the ICH study. Already in the first quarter, 36 centres from 17 countries have contributed data by entering their patients into the ICH registry.

While we celebrate our successes, we also recognize the loss of Professor Hany Aref, whose invaluable contributions to the field of medicine have touched countless lives. Thank you, Professor Hany for all the lives you saved, touched, and inspired. Your legacy will continue to inspire us as we strive to improve stroke care worldwide.

SITS FUTURE

SITS is dedicated to fostering collaboration and promoting research in the field of stroke treatment and prevention. We strongly encourage users to participate in research projects at all levels - from local to international. With our robust online real-time reporting tool, users have easy access to data and reports that can aid their research endeavours.

The SITS Coordination Office is continuously working to enhance the user experience, and we are excited to announce that a new platform for the registry is currently in development. This platform will further streamline the data collection and reporting process, making it even easier for users to contribute to ongoing research efforts.

We are pleased to acknowledge the outstanding efforts of centres that have achieved high recruitment rates and data completeness in the SITS registry. By highlighting their success, we aim to inspire others to strive for excellence in recruitment and data quality.

In this report, we provide an overview of patient and centre recruitment status, along with details of ongoing and upcoming activities. Our next report is scheduled for release in spring 2025, and we welcome feedback and suggestions for future report content.

We value input from our users and collaborators, and we invite you to share your views and ideas on how we can further improve the SITS registry. Your input is vital in helping us fulfil our mission of advancing stroke research and improving patient outcomes worldwide. Thank you for your continued support of SITS.

SITS Publications

These publications are solely or partly based on data collected in the SITS International registry.

112. Halúsková S, Herzig R, Mikulík R, Bělašková S, Reiser M, Jurák L, Václavík D, Bar M, Klečka L, Řepík T, Šigut V, Tomek A, Hlinovský D, Šaňák D, Vyšata O, Vališ M, On Behalf Of The Czech Sits Investigators. **Intravenous Thrombolysis in Posterior versus Anterior Circulation Stroke: Clinical Outcome Differs Only in Patients with Large Vessel Occlusion.** Biomedicines. 2024 Feb 9;12(2):404. doi: 10.3390/biomedicines12020404. PMID: 38398006; PMCID: PMC10887309. [PubMed]

111. Cappellari M, Pracucci G, Saia V, Fainardi E, Casetta I, Sallustio F, Ruggiero M, Longoni M, Simonetti L, Zini A, Lazzarotti GA, Giannini N, Da Ros V, Diomedi M, Vallone S, Bigliardi G, Limbucci N, Nencini P, Ajello D, Marcheselli S, Burdi N, Boero G, Bracco S, Tassi R, Boghi A, Naldi A, Biraschi F, Nicolini E, Castellan L, Del Sette M, Allegretti L, Sugo A, Buonomo O, Dell'Aera C, Saletti A, De Vito A, Lafe E, Mazzacane F, Bergui M, Cerrato P, Feraco P, Piffer S, Augelli R, Vit F, Gasparotti R, Magoni M, Comelli S, Melis M, Menozzi R, Scoditti U, Cavasin N, Critelli A, Causin F, Baracchini C, Guzzardi G,

Tarletti R, Filauri P, Orlandi B, Giorgianni A, Cariddi LP, Piano M, Motto C, Gallesio I, Sepe FN, Romano G, Grasso MF, Pauciulo A, Rizzo A, Comai A, Franchini E, Sicurella L, Galvano G, Mannino M, Mangiafico S, Toni D, On Behalf Of The Iretas Group. **IV thrombolysis plus thrombectomy versus IV thrombolysis alone for minor stroke with anterior circulation large vessel occlusion from the IRETAS and Italian SITS-ISTR cohorts.** Neurol Sci. 2023 Dec;44(12):4401-4410. doi: 10.1007/s10072-023-06948-w. Epub 2023 Jul 17. PMID: 37458843. [PubMed]

110. Klail T, Sedova P, Vinklarek JF, Kovacova I, Bar M, Cihlar F, Cernik D, Kočí L, Jura R, Herzig R, Husty J, Kocher M, Kovar M, Nevšímalová M, Raupach J, Rocek M, Sanak D, Sevcik P, Skoloudik D, Sramek M, Vanicek J, Vaško P, Vaclavik D, Tomek A, Mikulik R. **Safety and Efficacy of Baseline Antiplatelet Treatment in Patients Undergoing Mechanical Thrombectomy for Ischemic Stroke: Antiplatelets Before Mechanical Thrombectomy.** J Vasc Interv Radiol. 2023 Sep;34(9):1502-1510.e12. doi: 10.1016/j.jvir.2023.05.017. Epub 2023 May 14. PMID: 37192724. [PubMed]

109. Cappellari M, Saia V, Pracucci G, Casetta I, Fainardi E, Sallustio F, Ruggiero M, Romoli M, Simonetti L, Zini A, Lazzarotti GA, Orlandi G, Vallone S, Bigliardi G, Renieri L, Nencini P, Semeraro V, Boero G, Bracco S, Tassi R, Castellano D, Naldi A, Biraschi F, Nicolini E, Del Sette B, Malfatto L, Allegretti L, Tassinari T, Tessitore A, Ferraù L, Saletti A, De Vito A, Lafe E, Cavallini A, Bergui M, Bosco G, Feraco P, Bignamini V, Mandruzzato N, Vit F, Mardighian D, Magoni M, Comelli S, Melis M, Menozzi R, Scoditti U, Cester G, Viario F, Stecco A, Fleetwood T, Filauri P, Sacco S, Giorgianni A, Cariddi LP, Piano M, Motto C, Gallesio I, Sepe F, Romano G, Grasso MF, Lozupone E, Fasano A, Comai A, Franchini E, Bruni S, Silvestrini M, Chiumarulo L, Petruzzelli M, Pavia M, Invernizzi P, Puglielli E, Casalena A, Pedicelli A, Frisullo G, Amistà P, Russo M, Allegritti M, Caproni S, Mangiafico S, Toni D; IRETAS Group. **Stroke with large vessel occlusion in the posterior circulation: IV thrombolysis plus thrombectomy versus IV thrombolysis alone**. J Thromb Thrombolysis. 2023 Oct;56(3):454-462. doi: 10.1007/s11239-023-02844-4. Epub 2023 Jun 28. PMID: 37378700. [PubMed]

108. Tsivgoulis G, Palaiodimou L, Stefanou MI, Theodorou A, Kõrv J, Nunes AP, Candelaresi P, Dall'Ora E, Sariaslani P, Provinciali L, Conforto AB, Cidrao AAL, Karapanayiotides T, Ahmed N. **Predictors of functional outcome after symptomatic intracranial hemorrhage complicating intravenous thrombolysis: results from the SITS-ISTR**. Eur J Neurol. 2023 Oct;30(10):3161-3171. doi: 10.1111/ene.15968. Epub 2023 Jul 14. PMID: 37410547. [PubMed]

107. Aref, Hany & El Nahas, Nevine & Shokri, Hossam & Roushdy, Tamer. (2023). **The budget impact of alteplase in the treatment of acute ischemic stroke in Egypt**. Frontiers in Neurology. 10.3389/fneur.2023.1220615. [Frontiers]

106. El Nahas N, Aref H, Kenawy FF, Georgy S, Abushady EM, Dawood NL, Hamdy S, Abdelmohsen N, Hassan Abdel Hamid Y, Roushdy T, Shokri H. **Stroke in women: experience in a developing country**. BMC Neurol. 2023 Jul 17;23(1):271. doi: 10.1186/s12883-023-03314-3. PMID: 37460962; PMCID: PMC10351134. [PubMed]

105. Thorén M, Escudero-Martínez I, Andersson T, Chen SY, Tsao N, Khurana D, Beretta S, Peeters A, Tsivgoulis G, Roffe C, Ahmed N. **Reperfusion By Endovascular Thrombectomy And Early Cerebral Edema In Anterior Circulation Stroke: Results From The Sits- International Stroke Thrombectomy Registry**. Int J Stroke. 2023 May 24:17474930231180451. doi: 10.1177/17474930231180451. Epub ahead of print. PMID: 37226337. [PubMed]

104. Escudero-Martínez I, Thorén M, Matusevicius M, Cooray C, Zini A, Roffe C, Toni D, Tsivgoulis G, Ringleb P, Wahlgren N, Ahmed N. **Association of cholesterol levels with hemorrhagic transformation and cerebral edema after reperfusion therapies.** Eur Stroke J. 2023 Mar;8(1):294-300. doi: 10.1177/23969873221148229. Epub 2022 Dec 28. PMID: 37021184; PMCID: PMC10069196. [PubMed]

103. Jalali N, Sadeghi Hokmabadi E, Ghoreishi A, Sariaslan P, Rafie S, Borhani-Haghighi A, Moghadam Ahmadi A, Azin H, Vakilian A, Khalili P, Farhoudi M. **Outcome predictors in anterior and posterior ischemic strokes: a study based on the Iranian SITS registry.** Sci Rep. 2023 Jan 21;13(1):1231. doi: 10.1038/s41598-023-28465-8. PMID: 36681721; PMCID: PMC9867737. [PubMed]

102. Schwarz G, Cascio Rizzo A, Matusevicius M, Giussani G, Invernizzi P, Melis F, Lesko N, Toni D, Agostoni EC, Ahmed N. **Reperfusion Treatments in Disabling Versus Nondisabling Mild Stroke due to Anterior Circulation Vessel Occlusion**. Stroke. 2023 Mar;54(3):743-750. doi: 10.1161/STROKEAHA.122.041772. Epub 2023 Feb 27. PMID: 36848431. [AHA Journals]

101. Schwarz G, Bonato S, Lanfranconi S, Matusevicius M, Ghione I, Valcamonica G, Tsivgoulis G, Paiva Nunes A, Mancuso M, Zini A, Candelaresi P, Rand VM, Comi GP, Mazya MV, Ahmed N. **Intravenous thrombolysis + endovascular thrombectomy versus thrombolysis alone in large vessel occlusion mild stroke: a propensity score matched analysis**. Eur J Neurol. 2023 Feb 6. doi: 10.1111/ene.15722. Epub ahead of print. PMID: 36746650. [PubMed]

100. Escudero-Martínez I, Thorén M, Ringleb P, Nunes AP, Cappellari M, Rand VM, Sobolewski P, Egido J, Toni D, Chen SY, Tsao N, Ahmed N. **Cerebral Edema in Patients with severe Hemispheric Syndrome: Incidence, Risk Factors, and Outcomes-Data from SITS-ISTR**. J Stroke. 2023 Jan;25(1):101-110. doi: 10.5853/jos.2022.01956. Epub 2022 Dec 6. PMID: 36470246; PMCID: PMC9911855. [Journal of Stroke]

99. Ferreira Cristina S, Fior A, Alves M, Papoila AL, Nunes AP. **Functional Outcome of Endovascular Treatment in Patients With Acute Ischemic Stroke With Large Vessel Occlusion: Mothership Versus Drip-and-Ship Model in a Portuguese Urban Region**. Cureus. 2022 Dec 18;14(12):e32659. doi: 10.7759/cureus.32659. PMID: 36660499; PMCID: PMC9844243. [PubMed]

98. Tsivgoulis G, Katsanos AH, Christogiannis C, Faouzi B, Mavridis D, Dixit AK, Palaiodimou L, Khurana D, Petruzzellis M, Psychogios K, Macleod MJ, Ahmed N. **Intravenous Thrombolysis with Tenecteplase for the Treatment of Acute Ischemic Stroke**. Ann Neurol. 2022 Sep;92(3):349-357. doi: 10.1002/ana.26445. Epub 2022 Jul 7. PMID: 35713213. [PubMed]

97. Escudero-Martínez I, Matusevicius M, Pavia-Nunes A, Sevcik P, Nevsimalova M, Rand VM, Kõrv J, Cappellari M, Mikulik R, Toni D, Ahmed N. **Association of statin pre-treatment with baseline stroke severity and outcome in patients with acute ischemic stroke and received reperfusion treatment: An observational study**. Int J Stroke. 2022 May 11;17474930221095965. doi: 10.1177/17474930221095965. Online ahead of print. PMID: 35403505.

96. Feil K, Matusevicius M, Herzberg M, Tiedt S, Küpper C, Wischmann J, Schönecker S, Mengel A, Sartor-Pfeiffer J, Berger K, Dimitriadis K, Liebig T, Dieterich M, Mazya M, Ahmed N, Kellert L. **Minor stroke in large vessel occlusion: A matched analysis of patients from the German Stroke Registry-Endovascular Treatment (GSR-ET) and patients from the Safe Implementation of Treatments in Stroke-International Stroke Thrombolysis Register (SITS-ISTR)**. Eur J Neurol. 2022 Feb 4. doi: 10.1111/ene.15272. Epub ahead of print. PMID: 35122371.

95. Janssen PM, van Overhagen K, Vinklárek J, Roozenbeek B, van der Worp HB, Majoie CB, Bar M, Černík D, Herzig R, Jurák L, Ostrý S, Mikulik R, Lingsma HF, Dippel DWJ; **MR CLEAN Registry investigators and the SITS TBY Registry investigators from the Czech Republic. Between-Center Variation in Outcome After Endovascular Treatment of Acute Stroke: Analysis of Two Nationwide Registries**. Circ Cardiovasc Qual Outcomes. 2022 Mar;15(3):e008180. doi: 10.1161/CIRCOUTCOMES.121.008180. Epub 2022 Jan 31. PMID: 35094522; PMCID: PMC8920023.

94. Aref H, Zakaria M, Shokri H, Roushdy T, El Basiouny A, El Nahas N. **Changing the landscape of stroke in Egypt.** Cerebrovasc Dis Extra. 2021 Dec 3. doi: 10.1159/000521271. Online ahead of print. PMID: 34864736. [PubMed]

93. El Nahas NM, Shokri HM, Roushdy TM, Dawood NL, Abushady EM, Georgy SS, Zaki AS, Bedros RV, Aref HM. **Door to Needle Count Down: A 3 Years Experience in an Egyptian University Stroke Center.** Neurologist. 2021 Nov 30. doi: 10.1097/NRL.0000000000000372. Online ahead of print. PMID: 34855665. [PubMed]

92. Sadeghi-Hokmabadi E, Ghoreishi A, Rikhtegar R, Sariaslani P, Rafie S, Vakilian A, Sharifipour E, Mehrpour M, Saadatnia M, Mirza-Aghazadeh-Attari M, Farhoudi M. **Low-dose versus standard-dose alteplase for intravenous thrombolysis in patients with acute ischemic stroke in Iran: Results from the safe implementation of treatments in stroke registry**. Curr J Neurol. 2021 Oct 7. doi: http://dx.doi.org/10.18502/cjn.v20i4.8346. [Current Journal of Neurology]

91. Matusevicius M, Cooray C, Rand VM, Nunes AP, Moreira T, Tassi R, Egido JA, Ollikainen JP, Bigliardi G, Holmin S, Ahmed N. **Stroke Etiology and Outcomes after Endovascular Thrombectomy: Results from the SITS Registry and a Meta-Analysis.** J Stroke. 2021 Sep;23(3):388-400. doi: 10.5853/jos.2021.00850. Epub 2021 Sep 30. PMID: 34649383. [PubMed]

90. Ahmed N, Mazya M, Nunes AP, Moreira T, Ollikainen JP, Escudero-Martinez I, Bigliardi G, Dorado L, Dávalos A, Egido JA, Tassi R, Strbian D, Zini A, Nichelli P, Herzig R, Jurák L, Hurtikova E, Tsivgoulis G, Peeters A, Nevšímalová M, Brozman M, Cavallo R, Lees KR, Mikulik R, Toni D, Holmin S. **Safety and Outcomes of Thrombectomy in Ischemic Stroke With vs Without Intravenous Thrombolysis.** Neurology. 2021 Jun 4:10.1212/WNL.0000000000012327. doi: 10.1212/WNL.0000000000012327. Epub ahead of print. PMID: 34088873. [PubMed]

89. Ahmed N, Mazya M, Nunes AP, Moreira T, Ollikainen JP, Escudero-Martinez I, Bigliardi G, Dorado L, Dávalos A, Egido JA, Tassi R, Strbian D, Zini A, Nichelli P, Herzig R, Jurák L, Hurtikova E, Tsivgoulis G, Peeters A, Nevšímalová M, Brozman M, Cavallo R, Lees KR, Mikulik R, Toni D, Holmin S. **Safety and outcomes of routine endovascular thrombectomy in large artery occlusion recorded in the SITS Register: An observational study.** J Intern Med. 2021 May 17. doi: 10.1111/joim.13302. Epub ahead of print. PMID: 33999451. [PubMed]

88. Anadani M, Matusevicius M, Tsivgoulis G, Peeters A, Nunes AP, Mancuso M, Roffe C, de Havenon A, Ahmed N. **Magnitude of blood pressure change and clinical outcomes after thrombectomy in stroke caused by large artery occlusion.** Eur J Neurol. 2021 Jun;28(6):1922-1930. doi: 10.1111/ene.14807. Epub 2021 Mar 19. PMID: 33682232. [PubMed]

87. Ahmed N, Lees KR, von Kummer R, Holmin S, Escudero-Martinez I, Bottai M, Jansen O, Wahlgren N; Collaborators. **The SITS Open Study: A Prospective, Open Label Blinded Evaluation Study of Thrombectomy in Clinical Practice.** Stroke. 2021 Mar;52(3):792-801. doi: 10.1161/STROKEAHA.120.031031. Epub 2021 Feb 10. PMID: 33563015. [PubMed]

86. Tsivgoulis G, Katsanos AH, Ahmed N.Ann Neurol. **Reply to "Prior Dual Antiplatelet Therapy and Thrombolysis in Acute Stroke".** 2020 Oct;88(4):859-860. doi: 10.1002/ana.25851. Epub 2020 Aug 5. PMID: 32683728 [PubMed]

85. Cooray C, Karlinski M, Kobayashi A, Ringleb P, Kõrv J, Macleod MJ, Dixit A, Azevedo E, Bladin C, Ahmed N. **Safety and early outcomes after intravenous thrombolysis in acute ischemic stroke patients with prestroke disability.** Int J Stroke. 2020 Sep 2:1747493020954605. doi: 10.1177/1747493020954605. Online ahead of print. PMID: 32878588 [PubMed]

84. Hossam M. Shokri, Nevine M. El Nahas, Hany M. Aref, Noha L. Dawood, Eman M. Abushady, Eman H. Abd Eldayem, Shady S. Georgy, Amr S. Zaki, Rady Y. Bedros, Mona M. Wahid El Din, Tamer M. Roushdy. **Factors related to time of stroke onset versus time of hospital arrival: A SITS registry-based study in an Egyptian stroke center.** Plos One 2020 Sep 11;15(9):e0238305. doi: 10.1371/journal.pone.0238305. eCollection 2020 [PubMed]

83. Yu WM, Abdul-Rahim AH, Cameron AC, Körv J, Sevcik P, Toni D, Lees KR and SITS Scientific Committee. **The Incidence and Associated Factors of Early Neurological Deterioration After Thrombolysis, Results From SITS Registry**. Stroke. 2020 Aug 19:STROKEAHA119028287. doi: 10.1161/STROKEAHA.119.028287 AHA Journals

82. Irene Escudero-Martínez, Michael V. Mazya, Christine Teutsch, Norbert Lesko, Zuzana Gdovinova, Leonardo Barbarini, Waldemar Fryze, Michal Karlinski, Adam Kobayashi, Georgi Krastev, Ana Paiva Nunes, Katarina Pasztoova, Andre Peeters MD, Piotr Sobolewski, Aleksandras Vilionskis, Danilo Toni, Niaz Ahmed MD; on behalf of the SITS Investigators. **Dabigatran initiation in patients with non-valvular AF and first acute ischemic stroke: a retrospective observational study from the SITS registry.** BMJ Open 2020;10:e037234. doi: 10.1136/bmjopen-2020-037234

81. Keselman B, Gdovinová Z, Jatuzis D, Melo TPE, Vilionskis A, Cavallo R, Frol S, Jurak L, Koyuncu B, Nunes AP, Petrone A, Lees KR, Mazya MV, **Safety and Outcomes of Intravenous Thrombolysis in Posterior Versus Anterior Circulation Stroke: Results From the Safe Implementation of Treatments in Stroke Registry and Meta-Analysis.** Stroke. 2020 Mar;51(3):876-882. doi:10.1161/STROKEAHA.119.027071. Epub 2020 Jan 9 [PubMed]

80. Alhazzani A, Al-Rukn S, Khan M, Moreira T, Wahlgren N. **Changing the face of stroke care in the Middle East North Africa region.** Stroke. 2020 February, Journal of the Neurological Sciences vol. 412, doi:10.1016/j.jns.2020.116727 [Epub ahead of print] [ScienceDirect]

79. Thorén M, Dixit A, Escudero-Martinez I, Gdovinová Z, Klecka L, Rand VM, Toni D, Vilionskis A, Wahlgren N, Ahmed N. **Effect of Recanalization on Cerebral Edema in Ischemic Stroke Treated**

With Thrombolysis and/or Endovascular Therapy. Stroke. 2020 Jan;51(1):216-223. doi: 10.1161/STROKEAHA.119.026692 [PubMed]

78. Matusevicius M,Cooray C, Bottai M, Mazya M, Tsivgoulis G, Nunes AP, Moreira T, Ollikainen J, Tassi R, Strbian D, Toni D, Holmin S, Ahmed N. **Blood Pressure After Endovascular Thrombectomy: Modeling for Outcomes Based on Recanalization Status.** Stroke. 2019 Dec 11:STROKEAHA119026914.
doi:10.1161/STROKEAHA.119.026914. [Epub ahead of print] [PubMed]

77. Al-Rukn S, Mazya M, Akhtar N, Hashim H, Mansouri B, Faouzi B, Aref H, Abdulrahman H, Kesraoui S, Hentati F, Gebelly S, Ahmed N, Wahlgren N, Abd-Allah F, Almekhlafi M, Moreira T. **Stroke in the Middle-East and North Africa: A 2-year prospective observational study of intravenous thrombolysis treatment in the region. Results from the SITS-MENA Registry.** Int J Stroke. 2019 Oct 8:1747493019874729.
doi: 10.1177/1747493019874729. [Epub ahead of print] [PubMed]

76. Charith Cooray, Michael Mazya,Robert Mikulik, Jurak Lubomir, Miroslav Brozman, Peter Ringleb, Anand Dixit, Danilo Toni, Niaz Ahmed. **Safety and outcome of intravenous thrombolysis in acute ischaemic stroke patients on prophylactic doses of low-molecular-weight heparins at stroke onset.** Stroke 2019 May;50(5):1149-1155. doi: 10.1161/STROKEAHA.118.024575.[PubMed]

75. Charith Cooray, Michael Mazya, Robert Mikulik, Jurak Lubomir, Miroslav Brozman, Peter Ringleb, Anand Dixit, Danilo Toni, Niaz Ahmed. **Safety and outcome of intravenous thrombolysis in acute ischaemic stroke patients on prophylactic doses of low-molecular-weight heparins at stroke onset.** Stroke. Accepted for publication 7 March 2019

74. Keselman B, Cooray C, Vanhooren G, Bassi P, Consoli D, Nichelli P, Peeters A, Sanak D, Zini A, Wahlgren N, Ahmed N, Mazya MV. **IV thrombolysis in stroke mimics - Results from the SITS International Stroke Thrombolysis Register (SITS-ISTR)**. European Journal of Neurology. Accepted for publication, 2019-02-19.

73. Marius Matusevicius, Maurizio Paciaroni, Valeria Caso, Matteo Bottai, Dheeraj Khurana, Mario de Bastos, Sheila Cristina Ouriques Martins, Yakup Krespi, Charith Cooray, Danilo Toni, Niaz Ahmed. **Outcome after intravenous thrombolysis in patients with acute lacunar stroke, an observational study based on SITS international registry** Int J Stroke. 2019 Dec;14(9):878-886. doi: 10.1177/1747493019840947.

72. Rukn SA, Mazya MV, Hentati F, Sassi SB, Nabli F, Said Z, Faouzi B, Hashim H, Abd-Allah F, Mansouri B, Kesraoui S, Gebeily S, Abdulrahman H, Akhtar N, Ahmed N, Wahlgren N, Aref H, Almekhlafi M, Moreira T. **Stroke in the Middle-East and North Africa: A 2-year prospective observational study of stroke characteristics in the region-Results from the Safe Implementation of Treatments in Stroke (SITS)-Middle-East and North African (MENA).** Int J Stroke. 2019 Oct;14(7):715-722. doi: 10.1177/1747493019830331. Epub 2019 Mar 12. PubMed PMID: 30860454.

71. Cooray C, Mazya MV, Bottai M, Scheitz JF, Abdul-Rahim AH, Moreira TP, Mikulik R, Krajina A, Nevsimalova M, Toni D, Wahlgren N, Ahmed N. **Are you suffering from a large arterial occlusion? Please raise your arm!** Stroke Vasc Neurol. 2018 Sep 3;3(4):215-221. doi: 10.1136/svn-2018-000165. eCollection 2018 Dec.

70. Tsivgoulis G, Katsanos AH, Mavridis D, Gdovinova Z, Karliński M, Macleod MJ,Strbian D, Ahmed N. **Intravenous Thrombolysis for Ischemic Stroke Patients on Dual Antiplatelets.** Ann Neurol. 2018 Jul;84(1):89-97. doi: 10.1002/ana.25269. Epub 2018 Jul 30. PubMed PMID: 30048012.

69. Tsivgoulis G, Geisler F, Katsanos AH, Kõrv J, Kunz A, Mikulik R, Rozanski M, Wendt M, Audebert HJ. **Ultraearly Intravenous Thrombolysis for Acute Ischemic Stroke in Mobile Stroke Unit and Hospital Settings: A Comparative Analysis.** Stroke. 2018 Jul 9. pii: STROKEAHA.118.021536. doi: 10.1161/STROKEAHA.118.021536. [Epub ahead of print] PubMed PMID: 29986934

68. Tsivgoulis G, Kargiotis O, Rudolf J, Komnos A, Tavernarakis A, Karapanayiotides T, Ellul J, Katsanos AH, Giannopoulos S, Gryllia M, Safouris A, Papamichalis P, Vadikolias K, Mitsias P, Hadjigeorgiou G. **Intravenous thrombolysis for acute ischemic stroke in Greece: the Safe Implementation of Thrombolysis in Stroke registry 15-year experience.** Ther Adv Neurol Disord. 2018 Jun 28;11:1756286418783578. doi: 10.1177/1756286418783578. eCollection 2018. PubMed PMID: 30034535; PubMed Central PMCID: PMC604860

67. Mazya MV, Ahmed N, Azevedo E, Davalos A, Dorado L, Karlinski M, Lorenzano S, Neumann J, Toni D, Moreira TP; SITS Investigators. **Impact of Transcranial Doppler Ultrasound on Logistics and Outcomes in Stroke Thrombolysis: Results From the SITS-ISTR**. Stroke. 2018 Jul;49(7):1695-1700. doi: 10.1161/STROKEAHA.118.021485. Epub 2018 May 29.
PMID: 29844031

66. Vaclavik D, Vilionskis A, Jatuzis D, Karlinski MA, Gdovinova Z, Kõrv J, Tsivgoulis G, Mikulik R. **Clinical outcome of cardioembolic stroke treated by intravenous thrombolysis.** Acta Neurol Scand. 2018 Mar;137(3):347-355.

65. Cappellari M, Turcato G, Forlivesi S, Zivelonghi C, Bovi P, Bonetti B, Toni D. **TARTING-SICH Nomogram to Predict Symptomatic Intracerebral Hemorrhage After Intravenous Thrombolysis for Stroke.** Stroke. 2018 Feb;49(2):397-404.

64. Mundiyanapurath S, Hees K, Ahmed N, Wahlgren N, Uhlmann L, Kieser M, Ringleb PA, Hacke W, Nagel S. **Predictors of symptomatic intracranial haemorrhage in off-label thrombolysis: an analysis of the Safe Implementation of Treatments in Stroke registry.** Eur J Neurol. 2018 Feb;25(2):340-e11.

63. Volny O, Krajina A, Belaskova S, Bar M, Cimflova P, Herzig R, Sanak D, Tomek A, Köcher M, Rocek M, Padr R, Cihlar F, Nevsimalova M, Jurak L, Havlicek R, Kovar M, Sevcik P, Rohan V, Fiksa J,

Menon BK, Mikulik R. **Mechanical thrombectomy performs similarly in real world practice: a 2016 nationwide study from the Czech Republic**. J Neurointerv Surg. 2018 Aug;10(8):741-745.

62. Ahmed N, Lees KR, Ringleb PA, Bladin C, Collas D, Toni D, Ford GA; The SITS Investigators. **Outcome after stroke thrombolysis in patients >80 years treated within 3 hours vs >3-4.5 hours.** Neurology. 2017 Oct 10;89(15):1561-1568.

61. Thorén M, Azevedo E, Dawson J, Egido JA, Falcou A, Ford GA, Holmin S, Mikulik R, Ollikainen J, Wahlgren N, Ahmed N. **Predictors for Cerebral Edema in Acute Ischemic Stroke Treated With Intravenous Thrombolysis.** Stroke. 2017 Sep;48(9):2464-2471.

60. Kellert L, Hametner C, Ahmed N, Rauch G, MacLeod MJ, Perini F, Lees KR, Ringleb PA; SITS Investigators. **Reciprocal Interaction of 24-Hour Blood Pressure Variability and Systolic Blood Pressure on Outcome in Stroke Thrombolysis.** Stroke. 2017 Jul;48(7):1827-1834.

59. Tsivgoulis G, Katsanos AH, Kadlecová P, Czlonkowska A, Kobayashi A, Brozman M, Švigelj V, Csiba L, Fekete K, Kõrv J, Demarin V, Vilionskis A, Jatuzis D, Krespi Y, Liantinioti C, Giannopoulos S, Mikulik R. **Intravenous thrombolysis for ischemic stroke in the golden hour: propensity-matched analysis from the SITS-EAST registry.** J Neurol. 2017 May;264(5):912-920.

58. Dorado L, Ahmed N, Thomalla G, Lozano M, Malojcic B, Wani M, Millán M, Tomek A, Dávalos A. **Intravenous Thrombolysis in Unknown-Onset Stroke: Results From the Safe Implementation of Treatment in Stroke-International Stroke Thrombolysis Registry.** Stroke. 2017 Mar;48(3):720-725.

57. Anani N, Mazya MV, Chen R, Prazeres Moreira T, Bill O, Ahmed N, Wahlgren N, Koch S. **Applying openEHR's Guideline Definition Language to the SITS international stroke treatment registry: a European retrospective observational study**. BMC Med Inform Decis Mak. 2017 Jan 10;17(1):7.

56. Scheitz JF, Abdul-Rahim AH, MacIsaac RL, Cooray C, Sucharew H, Kleindorfer D, Khatri, P, Broderick JP, Audebert HJ, Ahmed N, Wahlgren N, Endres M, Nolte CH, Lees KR. **Clinical selection strategies to identify stroke patients with large anterior vessel occlusion-Results from SITS-ISTR**. (Stroke, In press December 2016)

55. Cooray C, Mazya M, Bottai M, Dorado L, Skoda O, Toni D, Ford GA, Wahlgren N, Ahmed N. **External Validation of the ASTRAL and DRAGON Scores for Prediction of Functional Outcome in Stroke.** Stroke. 2016 Jun;47(6):1493-9.

54. Ahmed N, Hermansson K, Bluhmki E, Danays T, Nunes AP, Kenton A, Lakshmanan S, Toni D, Mikulik R, Ford GA, Lees KR and Wahlgren N. **The SITS-UTMOST: A registry-based prospective study in Europe investigating the impact of regulatory approval of intravenous Actilyse in the extended time window (3–4.5 h) in acute ischaemic stroke.** European Stroke Journal, first published on July 29, 2016 doi:10.1177/2396987316661890

53. Lundström E, Zini A, Wahlgren N, Ahmed N. **How common is isolated dysphasia among patients with stroke treated with intravenous thrombolysis, and what is their outcome? Results from the SITS-ISTR**. BMJ Open. 2015 Nov 25;5(11):e009109. doi: 10.1136/bmjopen 2015-009109. PMID: 26608637

52. Anani N, Mazya MV, Bill O, Chen R, Koch S, Ahmed N, Wahlgren N, Prazeres Moreira T. **Changes in European Label and Guideline Adherence After Updated Recommendations for Stroke Thrombolysis: Results From the Safe Implementation of Treatments in Stroke Registry.** Circ Cardiovasc Qual Outcomes. 2015 Oct;8(6 Suppl 3):S155-62. doi: 10.1161/CIRCOUTCOMES.115.002097. PMID: 26515204

51. Mazya MV, Lees KR, Collas D, Rand VM, Mikulik R, Toni D, Wahlgren N, Ahmed N. **IV thrombolysis in very severe and severe ischemic stroke: Results from the SITS-ISTR Registry**. Neurology. 2015 Nov 6. pii: 10.1212/WNL.0000000000002199.

50. Karlinski M, Kobayashi A, Czlonkowska A, Mikulik R, Vaclavik D, Brozman M, Gdovinova Z, Švigelj V, Csiba L, Fekete K, Kõrv J, Demarin V, Bašic-Kes V, Vilionskis A, Jatuzis D, Krespi Y, Shamalov N, Andonova S, Ahmed N, Wahlgren N; **Safe Implementation of Treatments in Stroke–East Registry (SITS-EAST) Investigators. Intravenous Thrombolysis for Stroke Recurring Within 3 Months From the Previous Event**. Stroke. 2015 Oct 8. pii: STROKEAHA.115.010420.

49. Abdul-Rahim AH, Fulton RL, Sucharew H, Kleindorfer D, Khatri P, Broderick JP, Lees KR; SITS-MOST Steering Committee. **National Institutes of Health Stroke Scale Item Profiles as Predictor of Patient Outcome: External Validation on Safe Implementation of Thrombolysis in Stroke-Monitoring Study Data**. Stroke. 2015 Oct;46(10):2779-85. doi: 10.1161/STROKEAHA.115.010380.

48. Tsivgoulis G, Kadlecová P, Kobayashi A, Czlonkowska A, Brozman M, Švigelj V, Csiba L, Kõrv J, Demarin V, Vilionskis A, Jatuzis D, Katsanos AH, Rudolf J, Krespi Y, Mikulik R. **Safety of Statin Pretreatment in Intravenous Thrombolysis for Acute Ischemic Stroke.** Stroke. 2015 Sep;46(9):2681-4. doi: 10.1161/STROKEAHA.115.010244..

47. Flint AC, Rao VA, Chan SL, Cullen SP, Faigeles BS, Smith WS, Bath PM, Wahlgren N, Ahmed N, Donnan GA, Johnston SC; **SITS International and VISTA-plus investigators. Improved ischemic stroke outcome prediction using model estimation of outcome probability: the THRIVE-c calculation**. Int J Stroke. 2015 Aug;10(6):815-21. doi: 10.1111/ijs.12529.

46. Cooray C, Fekete K, Mikulik R, Lees KR, Wahlgren N, Ahmed N. **Threshold for NIH stroke scale in predicting vessel occlusion and functional outcome after stroke thrombolysis**. Int J Stroke. 2015 Aug;10(6):822-9. doi: 10.1111/ijs.12451.

45. Strbian D, Ahmed N, Wahlgren N, Lees KR, Toni D, Roffe C, Surakka IL, Tatlisumak T; SITS Investigators. **Trends in Door-to-Thrombolysis Time in the Safe Implementation of Stroke Thrombolysis Registry: Effect of Center Volume and Duration of Registry Membership.** Stroke. 2015 May;46(5):1275-80. doi: 10.1161/STROKEAHA.114.007170.

44. Novotná J, Kadlecová P, Czlonkowska A, Brozman M, Švigelj V, Csiba L, Kõrv J, Demarin V, Vilionskis A, Mikulík R; SITS-EAST Investigators. **Hyperdense cerebral artery computed tomography sign is associated with stroke severity rather than stroke subtype**. J Stroke Cerebrovasc Dis. 2014 Nov-Dec;23(10):2533-9. doi:10.1016/j.jstrokecerebrovasdis.2014.04.034.

43. Haršány M, Kadlecová P, Švigelj V, Kõrv J, Kes VB, Vilionskis A, Krespi Y, Mikulík R; SITS-EAST Investigators. **Factors influencing door-to-imaging time: analysis of the safe implementation of treatments in Stroke-EAST registry**. J Stroke Cerebrovasc Dis. 2014 Sep;23(8):2122-9. doi: 10.1016/j.jstrokecerebrovasdis.2014.03.019.

42. Flint AC, Gupta R, Smith WS, Kamel H, Faigeles BS, Cullen SP, Rao VA, Bath PM, Wahlgren N, Ahmed N, Donnan GA; SITS International and VISTA-plus investigators. **The THRIVE score predicts symptomatic intracerebral hemorrhage after intravenous tPA administration in SITS-MOST.** Int J Stroke. 2014 Aug;9(6):705-10. doi: 10.1111/ijs.12335.

41. Mazya MV, Ahmed N, Ford GA, Hobohm C, Mikulík R, Nunes AP, Wahlgren N; **Remote or extraischemic intracerebral hemorrhage-an uncommon complication of stroke thrombolysis: results from the Safe Implementation of Treatments in Stroke-International stroke thrombolysis register.** Stroke. 2014 Jun;45(6):1657-63. doi: 10.1161/STROKEAHA.114.004923.

40. Karlinski M, Kobayashi A, Czlonkowska A, Mikulík R, Vaclavik D, Brozman M, Svigelj V, Csiba L, Fekete K, Kõrv J, Demarin V, Vilionskis A, Jatuzis D, Krespi Y, Ahmed N, Wahlgren N; **Safe Implementation of Treatments in Stroke–Eastern Europe (SITS-EAST) Investigators. Role of preexisting disability in patients treated with intravenous thrombolysis for ischemic stroke**. Stroke. 2014 Feb 4.

39. Lorenzano S, Ahmed N, Tatlisumak T, Gomis M, Dávalos A, Mikulík R, Sevcik P, Ollikainen J, Wahlgren N, Toni D; SITS Investigators **Within-day and weekly variations of thrombolysis in acute Ischemic stroke: results from Safe Implementation of Treatments in Stroke-International stroke thrombolysis register**. Stroke 2014 Jan;45(1):176-84. doi: 10.1161/STROKEAHA.113.002133.

38. Lorenzano S, Ahmed N, Falcou A, Mikulík R, Tatlisumak T, Roffe C, Wahlgren N, Toni D; SITS Investigators. **Does sex influence the response to Intravenous Thrombolysis in ischemic stroke? : Answers from Safe Implementation of Treatments in Stroke-International Stroke Thrombolysis Register.** Stroke. 2013 Dec;44(12):3401-6. doi: 10.1161/STROKEAHA.113.002908.

37. Kõrv J, Vibo R, Kadlecová P, Kobayashi A, Czlonkowska A, Brozman M, Svigelj V, Csiba L, Fekete K, Demarin V, Vilionskis A, Jatuzis D, Krespi Y, Ahmed N, Mikulík R; for the Safe Implementation of Treatments in Stroke − East (SITS-EAST) Registry Investigators. **Benefit of thrombolysis for stroke is maintained around the clock: results from the SITS-EAST Registry** Eur J Neurol. 2013 Sep 16. doi: 10.1111/ene.12257.

36. Kharitonova TV, Castillo J, Wahlgren N; SITS investigators. **Importance of cerebral artery recanalization in patients with stroke with and without neurological improvement after Intravenous Thrombolysis** Stroke 2013 Sep;44(9):2513-8. doi: 10.1161/STROKEAHA.111.000048.

35. Mazya MV, Lees KR, Markus R, Roine RO, Seet RC, Wahlgren N, Ahmed N; for the SITS investigators. **Safety of IV thrombolysis for ischemic stroke in patients treated with Warfarin**. Ann Neurol. 2013 Jun 6. doi: 10.1002/ana.23924.

34. Ahmed N, Kellert L, Lees KR, Mikulík R, Tatlisumak T, Toni D; for the SITS Investigators. **Results of Intravenous Thrombolysis Within 4.5 to 6 Hours and Updated Results Within 3 to 4.5 Hours of Onset of Acute Ischemic Stroke Recorded in the Safe Implementation of Treatment in Stroke International Stroke Thrombolysis Register (SITS-ISTR): An Observational Study**. JAMA Neurol. 2013 May 20:1-8. doi: 10.1001/jamaneurol.2013.406.

33. Mazya MV, Bovi P, Castillo J, Jatuzis D, Kobayashi A, Wahlgren N, Ahmed N; **External Validation of the SEDAN Score for Prediction of Intracerebral Hemorrhage in Stroke Thrombolysis**. Stroke 2013 Jun;44(6):1595-600. doi: 10.1161/STROKEAHA.113.000794. Epub 2013 Apr 30. PMID: 23632975

32. Cappellari M, Bovi P, Moretto G, Zini A, Nencini P, Sessa M, Furlan M, Pezzini A, Orlandi G, Paciaroni M, Tassinari T, Procaccianti G, Di Lazzaro V, Bettoni L, Gandolfo C, Silvestrelli G, Rasura M, Martini G, Melis M, Calloni MV, Chiodo-Grandi F, Beretta S, Guarino M, Altavista MC, Marcheselli S, Galletti G, Adobbati L, Del Sette M, Mancini A, Orrico D, Monaco S, Cavallini A, Sciolla R, Federico F, Scoditti U, Brusaferri F, Grassa C, Specchio L, Bongioanni MR, Sparaco M, Zampolini M, Greco G, Colombo R, Passarella B, Adami A, Consoli D, Toni D. **The THRombolysis and STatins (THRaST) study**. Neurology. 2013 Feb 12;80(7):655-61.

31. Rha JH, Shrivastava VP, Wang Y, Lee KE, Ahmed N, Bluhmki E, Hermansson K, Wahlgren N; for the SITS investigators. **Thrombolysis for acute ischemic stroke with alteplase in an Asian population: results of the multicenter, multinational, Safe Implementation of Thrombolysis in Stroke-Non European Union World (SITS-NEW)**. In J Stroke 2012, Epub 2012 Sep 18

30. Strbian D, Ahmed N, Wahlgren N, Kaste M, Tatlisumak T; for SITS investigators. **Intravenous thrombolysis in ischemic stroke patients with isolated homonymous hemianopia: analysis of Safe Implementation of Thrombolysis in Stroke - International Stroke Thrombolysis Register (SITS-ISTR).** Stroke 2012; 43: 2695-2698, Epub 2012 Jul 17

29. Mazya M, Egido J, Ford G, Lees K, Mikulík R, Toni D, Wahlgren N, Ahmed N; For the SITS investigators. **Predicting the Risk of Symptomatic Intracerebral Hemorrhage in Ischemic Stroke Treated With Intravenous Alteplase: Safe Implementation of Treatments in Stroke (SITS) Symptomatic Intracerebral Hemorrhage Risk Score**. Stroke 2012; 43:1524-1531, Epub 2012 March 22

28. Mikulík R, Kadlecová P, Czlonkowska A, Kobayashi A, Brozman M, Svigelj V, Csiba L, Fekete K, Kõrv J, Demarin V, Vilionskis A, Jatuzis D, Krespi Y, Ahmed N; for the Safe Implementation of Treatments in Stroke-East Registry (SITS-EAST) Investigators. **Factors Influencing In-Hospital Delay in Treatment With Intravenous Thrombolysis**. Stroke. 2012 Mar 15 [Epub ahead of print]

27. Karlinski M, Kobayashi A, Mikulík R, Sanak D, Wahlgren N, Czlonkowska A. **Intravenous alteplase in ischemic stroke patients not fully adhering to the current drug license in Central and Eastern Europe.** Int J Stroke. 2012 Feb 7.

26. Toni D, Ahmed N, Anzini A, Lorenzano S, Brozman M, Kaste M, Mikulík R, Putaala J, Wahlgren N; For the SITS investigators. **Intravenous thrombolysis in young stroke patients: Results from the SITS-ISTR**. Neurology. 2012 Mar 7.

25. Mishra NK, Ahmed N, Davalos A, Iversen HK, Melo T, Soinne L, Wahlgren N, Lees KR; SITS and VISTA collaborators. **Thrombolysis outcomes in acute ischemic stroke patients with prior stroke and diabetes mellitus**. Neurology. 2011 Nov 22;77(21):1866-72. Epub 2011 Nov 16. PMID: 22094479

24. Zinkstok SM, Vergouwen MD, Engelter ST, Lyrer PA, Bonati LH, Arnold M, Mattle HP, Fischer U, Sarikaya H, Baumgartner RW, Georgiadis D, Odier C, Michel P, Putaala J, Griebe M, Wahlgren N, Ahmed N, van Geloven N, de Haan RJ, Nederkoorn PJ. **Safety and functional outcome of thrombolysis in dissection-related ischemic stroke: a meta-analysis of individual patient data.** Stroke 2011 Sep;42(9):2515-20. Epub 2011 Jul 28. Review.

23. Kharitonova T, Mikulík R, Roine RO, Soinne L, Ahmed N, Wahlgren N; for the Safe Implementation of Thrombolysis in Stroke (SITS) Investigators. **Association of Early National Institutes of Health Stroke Scale Improvement With Vessel Recanalization and Functional Outcome After Intravenous Thrombolysis in Ischemic Stroke**. Stroke 2011 Jun;42(6):1638-43. Epub 2011 Apr 21

22. Diedler J, Ahmed N, Glahn J, Grond M, Lorenzano S, Brozman M, Sykora M, Ringleb P; **Is the Maximum Dose of 90 mg Alterplase Sufficient for Patients With Ischemic Stroke Weighing > 100 kg?** Stroke 2011 Jun;42(6):1615-20. Epub 2011 Apr

21. Topakian R, Brainin M, Eckhardt R, Kiechl S, Ahmed N, Ferrari J, Iglseder B, Wahlgren NG, Lang W, Fazekas F, Willeit J, Aichner FT; for the SITS-Austria group. **Thrombolytic therapy for acute stroke in Austria: data from the Safe Implementation of Thrombolysis in Stroke (SITS) register.** Eur J Neurol. 2011 Feb;18(2):306-11.

20. Mishra, NK, Ahmed N, Andersen G, Egido J, Lindsberg P, Ringleb PA, Wahlgren N, Lees KR; for the VISTA and SITS collaborators. **Thrombolysis in the very elderly: controlled comparison of SITS International Stroke Thrombolysis Registry and Virtual International Stroke Trials Archive.** BMJ. 2010 Nov 23;341:c6046.

19. Ford GA, Ahmed N, Azevedo E, Grond M, Larrue V, Lindsberg P, Toni D, Wahlgren N. **Intravenous alteplase for stroke in those older than 80 years old.** Stroke 2010 Nov;41(11):2568-74. Epub 2010 Oct 7

18. Ahmed N, Wahlgren N, Grond M, Hennerici M, Lees KR, Mikulík R, Parsons M, Roine RO, Toni D, Ringleb P; for the SITS Investigators. **Implementation and outcome of thrombolysis with alteplase 3-4.5 h after an acute stroke: an updated analysis from SITS-ISTR**. Lancet Neurol 2010; 9; 866-74

17. Ahmed N, Dávalos A, Eriksson N, Ford GA, Glahn J, Hennerici M, Mikulík R, Kaste M, Lees KR, Lindsberg P, Toni D; for the SITS Investigators. **Association of admission blood glucose and outcome in patients treated with intravenous thrombolysis** Arch Neurol 201; 67(9): 1123-1130.

16. Diedler J, Ahmed N, Sykora M, Uyttenboogaart M, Overgaard K, Luijckx G-J, Soinne L, Ford GA, Lees KR, Wahlgren N, Ringleb P; **Safety of intravenous thrombolysis for acute ischemic stroke in patients receiving antiplatelet therapy at stroke onset**. Stroke 2010 Feb;41(2):288-94. Epub 2010 Jan 7.

15. Simpson MA, Dewey HM, Churilov L, Ahmed N, Bladin CF, Schultz D, Mrkus R, Stur JW, Levi CR, Blacker DJ, Jannes J, Lindley RI, Parsons MW; **Thrombolysis for acute stroke in Australia: outcomes from the Safe Implementation of Thrombolysis in Stroke registry (2002-2008).** Med J.Aust 2010 Oct 18;193(8):439-43.

14. Vanacker P, Thijs V, Peeters A, BruneelB, Laloux P, Druwé P, De DeynP, Ahmed N, Wahlgren N, Vanhooren G; Belgian SITS-collaboration group. **The Belgian experience with intravenous thrombolysis for acute ischemic stroke**. Acta Neurol Belg. 2010 Jun;110(2):157-62.

13. Wahlgren N; **Systemic thrombolysis in clincal practice: what have we learned after the Safe Implementation of Thrombolysis in Stroke Monitoring Study?** Cerebrovasc Dis. 2009;27 Suppl 1:168-76. Epub 2009 Apr 3. Review.

12. Kharitonova T, Ahmed N, Thoren M, et al. **Hyperdense middle cerebral artery sign on admission CT scan - prognostic significance for ischaemic stroke patients treated with intravenous thrombolysis in the safe implementation of thrombolysis in Stroke.** Cerebrovasc Dis. 2009;27(1):51-9.

11. Mikulík R, Václavík D, Sanák D, Bar M, Sevcík P, Kalita Z, Wahlgren N; **A nationwide study on topography and efficacy of the stroke treatment network in the Czech Republic**. J Neurol. 2010 Jan;257(1):31-7. Epub 2009 Jul 23.

10. Kharitonova T, Thorén M, Ahmed N, Wardlaw JM, von Kummer R, Thomassen L, Wahlgren N; for the SITS investigators. **Disappearing Hyperdense Middle Cerebral Artery Sign in ischemic stroke patients treated**. J Neurol Neurosurg Psychiatry. 2009 Mar;80(3):248. Epub 2008 Oct 17.

9. Kobayashi A, Czlonkowska A, Ahmed N, Romanowicz S, Glonek M, Nyka WM, Opala G, Wahlgren N; for the SITS Poland Collaborative Group. **Intravenous recombinant tissue plasminogen activator for acute stroke in Poland: an analysis based on the Safe Implementation of Thrombolysis in Stroke (SITS) Registry**. Acta Neurol Scand. 2010 Oct;122(4):229-36.

8. Roje-Bedeković M, Vargek-Solter V, Corić L, Sabolek K, Breitenfeld T, Supanc V, Demarin V; **Thrombolysis for acute ischemic stroke-our experiences as part of SITS-MOST.** Acta Clin Croat. 2009 Sep;48(3):287-93.

7. Ahmed N, Wahlgren N, Brainin M, et al. **Relationship of blood pressure, antihypertensive therapy, and outcome in ischemic stroke treated with intravenious thrombolysis: retrospective analysis from Safe Implementation of Thrombolysis in Stroke - International Stroke Thrombolysis Register (SITS-ISTR)**. Stroke 2009 Jul;40(7):2442-9. Epub 2009 May 21.

6. Rodríguez-Yáñez M, Alvarez-Sabín J, Dávalos A, Díez-Tejedor E, Castillo J; **Thrombolytic therapy for acute ischemic stroke. Experience of SITS (Safe Implementation of Thrombolysis in Stroke) register.** Neurologia. 2009 Jun;24(5):288-91. Spanish.*

5. Lorenzano S, Ahmed N, Rosselli A, Marcello N, Inzitari D, Sterzi R, Wahlgren N, Prencipe M, Toni D; **Safe implementation of thrombolysis in stroke-monitoring study in Italy**. Eur J Neurol. 2010 Jan;17(1):163-7. Jun 15.

4. Wahlgren N, Ahmed N, Dávalos A, Hacke W, Millán M, Muir K, Roine RO, Toni D, Lees KR; **Thrombolysis with alteplase 3-4.5 h after acute ischaemic stroke (SITS-ISTR): an observational study**. Lancet 2008; 372: 1303-1309.

3. Lees KR, Ford GA, Muir KW, Ahmed N, Dyker AG, Atula S, Kalra L, Warburton EA, Baron JC, Jenkinson DF, Wahlgren NG, Walters MR; SITS-UK Group. **Thrombolytic therapy for acute stroke in the United Kingdom: experience from the safe implementation of thrombolysis in stroke (SITS) register.** QJM. 2008 Nov;101(11):863-9. Epub 2008 Aug 11

2. Wahlgren N, Ahmed A, Eriksson N, Aichner F, Bluhmki E, Dávalos A, Erilä T, Ford GA, Grond M, Hacke W, Hennerici M, Kaste M, Köhrmann M, Larrue V, Lees KR, Machnig T, Roine RO, Toni D, Vanhooren G; for the SITS-MOST investigators. **Multivariable analysis of outcome predictors and adjustment of main outcome results to baseline data profile in randomized controlled trials; Safe Implementation of Thrombolysis in Stroke Monitoring Study (SITS-MOST).** Stroke 2008; 39: 3316-3322.

1. Wahlgren N, Ahmed N, Davalos A, Ford GA, Grond M, Hacke W, Hennerici MG, Kaste M, Külkens S, Larrue V, Lees KR, Roine RO, Soinne L, Toni D, Vanhooren G; **Thrombolysis with alteplase for acute ischaemic stroke in the Safe Implementation of Thrombolysis in Stroke-Monitoring Study (SITS-MOST): an observational study**. Lancet 2007; 369:275-282.

Appendix

List with centres contributing with data to the SITS Registry between December 25, 2002 and December 31, 2023.