RIKSSTROKE

QUALITY OF THE SWEDISH STROKE CARE 2022



A BRIEF SUMMARY OF DATA FOR THE FULL YEAR 2022



Preface

The Swedish stroke registry, Riksstroke, publishes yearly quality of care reviews of the Swedish stroke care. For the last decade, the reviews of transitory ischemic attack (TIA) and stroke have been combined into one report. We publish this brief overview in English where the highlights of the data are presented. The present report contains data of the quality of care for patients with a TIA or stroke in 2022. In the Swedish reports, data are presented on hospital-level to enable benchmarking and local quality improvement projects. In the present brief report, all data is presented on a regional level. The aim of Riksstroke is to review the quality of the acute care and outcome. Riksstroke is also part of the European Stroke Organisation's (ESO) Stroke Action Plan for Europe (SAP-E) 2018–2030. There, key data is reported on an aggregated level and indicators of good stroke care are presented openly at the SAP-E's Stroke Service Tracker (https://actionplan.ke.org/sap-e-stroke-service-tracker). Riksstroke collaborates with the EndoVascular treatment of Acute Stroke registry (EVAS). In this registry details on thrombectomy can be found. We have a joint report on endovascular treatment of stroke in Sweden that is updated quarterly.

Without the continuous reporting from all stroke units and hospitals caring for acute stroke, this report would not be possible. Also, the reporting on three months follow-up by stroke survivors and their relatives is crucial for the report and is gratefully acknowledged. I would also like to thank the statisticians Agnes Holma Weister and Fredrik Jonsson for their careful work with the database. Finally, thank you to the steering committee and the Riksstroke office for their continuous work developing the registry.

Mie - hal

Mia von Euler Professor of Neurology Chair Riksstroke

A brief summary of data for the full year 2022

TIA

Number of registrations and coverage

- During 2022, there were 8,797 TIA events registered at 71 out of the 72 emergency hospitals that treat acute TIA. Compared to 2021, there were 164 fewer TIA events registered during 2022.
- The coverage of the register for TIA was 84 % in 2022 (register entries compared with official administrative data). All hospitals but one treating TIA and stroke reported during 2022.
- The ratio between the number of TIAs and ischemic stroke is about 1:2 and has been stable for several years.

Demographics, risk factors, type of care, and length of stay

- Slightly more men than women were registered, 52 % and 48 %, respectively. The mean age was 74 years, 73 among men and 76 among women, about one year younger than patients with stroke.
- At time of onset, 61 % of the patients with TIA had treatment for high blood pressure, 21 % had a known atrial fibrillation, 19 % diabetes mellitus, and 8 % were smokers.
- Similar to previous years, 88 % of the TIA patients sought health care at an emergency room as a first instance, 10 % at primary care level and 2 % at some other health care facility.
- Of the registered TIA patients, 46 % arrived at the hospital within three hours from symptom onset and 90 % within 24 hours. Roughly half (54 %) of the patients arrived by ambulance.
- 82 % of the TIA patients were directly admitted to a stroke care unit. The median length of stay was three days.

Diagnostics

- Practically all patients had a computer tomography (CT) scan examination, while 17 % had an MRI scan. During the last years the use of CT angiography has increased, and this is now the most common vascular examination method. In all, 82 % were examined regarding carotid vessels and the most common method to visualize the carotid arteries was CT angiography (61 %), followed by ultra-sonography (36 %).
- For cardiac arrhythmia detection, 75 % of the patients without known atrial fibrillation had a long-term ECG recording. An additional 12 % had a planned long-term ECG recording after discharge.

Secondary prevention

- Of the TIA patients with atrial fibrillation, 92 % were prescribed oral anticoagulants at discharge, mainly NOACs. There was no significant geographical variation in OAC treatment.
- For those without atrial fibrillation, 97 % were treated with antiplatelets. Aspirin in monotherapy was used by 42 %, clopidogrel in monotherapy in 15 %, and a combination of aspirin and clopidogrel in 42 %. There was a considerable regional variation in choice of antiplatelet regime between hospitals.
- Antihypertensive medicine was prescribed for 72 %, and statins for 87 % of the patients, both numbers unchanged from 2021. There was still a considerable regional variation in usage.
- Roughly half of the smokers (55 %) received advice about smoking cessation and 66 % of those with a driver's license received advice about driving after TIA. Information about smoking cessation or driving was missing in 28 % and 11 % of TIA patients, respectively.

• As previous year, almost all TIA-patients, 95 %, had a planned follow-up visit at the hospital or in primary care.

STROKE

Number of registrations and coverage

- During 2022 there were 20,115 stroke events registered in Riksstroke, which is 113 fewer stroke events compared to 2021 (Figure 1). Of all 72 hospitals treating acute stroke, all but one reported to Riksstroke during 2022. As in 2021, 20% of the events were recurrent strokes, the lowest proportion in the history of Riksstroke.
- The coverage of the register was 86 % (calculated as register entries compared with official administrative data, first ever strokes for both sources).

Demography, risk factors, type of care, and length of stay

- Mean age and the distribution in terms of sex was unchanged compared to previous years. Slightly more men than women had a stroke, 54 % and 46 %, respectively. The mean age was 75 years, 73 years among men and 77 years among women.
- 86 % of the patients were fully conscious at hospital arrival. The proportion of patients in whom NIHSS was registered was 73 %. There was a considerable variation in the proportions of NIHSS registrations among the hospitals.
- 63 % of the stroke patients had high blood pressure, 28 % atrial fibrillation, 23 % diabetes, and 13 % were smokers.
- 13 % of all stroke events were intracerebral hemorrhages. Among the 2 503 patients with intracerebral bleedings, one in four (25 %) had ongoing anticoagulant treatment. Of these, 81 % were treated with non-vitamin K oral anticoagulants and 19 % with warfarin (Figure 2). In relation to the number of persons being treated with respective OAC in Sweden, that represents 0.2 % of persons treated with warfarin and 0.1 % of those treated with NOAC. Half of the patients (50 %) were treated with reversal of anticoagulation.
- A third of the stroke patients arrived at hospital within three hours from onset and 45 % arrived as a thrombolysis/thrombectomy alarm.
- The proportion of acute stroke patients receiving care at a stroke care unit at some point during their hospital stay remained high, 93 % (Figure 3). The variation between hospitals is small.
- Still, many of the stroke patients, 17 %, received treatment at an observation- or other nonstroke care unit during the first critical day (Figure 4).
- The median length of stay at the hospital was 7 days, which is unchanged from the last couple of years. There was a considerable variation in length of stay between the hospitals; a partial explanation could be various usage of early supported discharge with stroke rehabilitation at home.

Diagnostics

- The use of CT for diagnostic imaging was at a very high level at all hospitals, mean 98 %.
- The average usage of MRI examinations of the brain was 35 % with large variations between hospitals.
- CT-angiography in association with the initial CT keeps increasing and was performed in 57 % of the patients with ischemic stroke (52 % in 2021), with large variations between hospitals.
- CT perfusion to visualize potentially salvageable brain tissue was performed in around half of the hospitals and in 16 % of the patients with ischemic stroke.

- For patients with ischemic stroke, CT-angiography was the most common method for vascular examination (75 %), followed by ultra-sonography (25 %) and MR-angiography (2 %). The usage of CT-angiography is increasing.
- The proportion of patients with ischemic stroke examined with long-term ECG with the purpose of diagnosing an atrial fibrillation was 82 % and an additional 6 % had the investigation planned after discharge. This varied between the hospitals.
- A swallowing assessment was performed for 86 % of the stroke patients.

Reperfusion therapy (to restore the blood flow with thrombolysis and thrombectomy)

- The proportion of patients who received reperfusion therapy was 19 % in 2022 (Figure 5). 11 % received thrombolysis only, 3 % received both thrombolysis and thrombectomy, and 5 % received thrombectomy only. There was no difference between men and women.
- A third of the treated patients were 80 years or older. There were 1,348 thrombectomies registered in Riksstroke for 2022. The absolute number of thrombectomies has increased compared with 2021 and the proportion of thrombectomies in 2022 was 8% in all ischemic stroke patients.
- The largest proportions of patients with ischemic stroke receiving thrombectomy treatment were found in the Uppsala/Örebro area, and the urban areas Gothenburg and Stockholm. (Figure 6)
- The differences in the proportions of patients who received reperfusion therapy varied substantially between the hospitals and the treatment still seems under-used in several hospitals.
- In all, there were 3,756 contacts (22 %) with hospitals with a thrombectomy center from other hospitals. Slightly more than a third of these resulted in a thrombectomy treatment.
- The time from arrival at the hospital to the start of thrombolysis treatment (door-to-needle time) shows large variations between the hospitals. 47 % of all patients had a door-to-needle time within 30 minutes, 16 % in the interval 31-40 minutes, 19 % in the interval 41-60 minutes and 18 % more than 60 minutes.
- The majority of the ischemic stroke patients who received reperfusion treatment improved in NIHSS. In Figure 8.1 and 8.2, NIHSS before and after thrombolysis and thrombectomy, respectively, is shown.

Neurosurgical operation performed for patients with intracerebral hemorrhages

• In patients with intracerebral hemorrhages, 8 % had a neurosurgical procedure.

Physical therapy and occupational therapy

• In all, 87 % of the patients were evaluated by a physical therapist and 86 % were evaluated by an occupational therapist. Around half of these patients were evaluated within 24 hours after arrival at the hospital.

Speech therapist

• Two out of five patients had their speech- or swallow function evaluated by a speech therapist during the hospital stay.

Secondary prevention

- Data on information about smoking cessation was missing in every third patient and the efforts to encourage patients to not smoke seems to be insufficient at many hospitals. Half of the smokers received information about smoking cessation.
- The proportion of patients with an embolic stroke (defined as ischemic stroke associated with atrial fibrillation, 28 %) that received secondary prevention with oral anticoagulants continued to increase and was now 83 % with no difference between men and women (Figure). Of these, 78 % were treated with one of the non-vitamin K oral anticoagulants (NOAC) at discharge.
- 94 % of the patients with ischemic stroke and no atrial fibrillation were treated with antiplatelets after the stroke. A combination of Aspirin and Clopidogrel was most common, 45 % while 37 % and 16 % had monotherapy with Aspirin or Clopidogrel, respectively.
- The proportion of patients with antihypertensive medicine at discharge remained at a relatively high level, 78 %, with relatively small variation between the hospitals.
- The use of statins after an ischemic stroke increased further to 84 % (88 % in men and 80 % in women) during 2022. The variation between the hospitals remained large.

Driving

• For patients with a driver's license, two out of five (40 %) had received information about driving after stroke. Data was missing for 10 % of the patients.

Accommodation after discharge and planned rehabilitation

- Of those discharged alive, 77 % returned to their own home after discharge while 21 % were discharged to an assisted living facility.
- Early supported discharge with rehabilitation at home from a multidisciplinary team associated to the stroke unit was planned for 19 % of the patients who were discharged to their own home. There were large variations in the proportions with rehabilitation at home and in a hospital-based day rehabilitation clinic (Figure 9).
- 95 % of the stroke patients had a planned follow-up visit at the hospital or in primary care.

3-MONTH FOLLOW-UP STROKE

Follow-up

• Out of the 20,103 stroke events in 2022, 74 % answered a follow-up survey or were deceased 3 months after their stroke. The proportion of patients being followed up has decreased slightly compared to previous years.

Survival

- In all, 17 % of the patients were deceased within 90 days after their stroke and 33 % were deceased or ADL dependent at the 3 months follow up after stroke.
- The proportion of deceased and deceased or ADL-dependent varied significantly between the hospitals, but the differences were small between the regions after statistical adjustment for age, sex, and level of consciousness at hospital admission.

Function

• The proportion of patients who were dependent in ADL 3 months after stroke was 15 % (Figure).

• Patient characteristics can partly explain the differences in proportion of ADL-dependent patients between the hospitals but there are still considerable differences between the hospitals even after statistical adjustment. Data might be affected by transfers between hospitals for thrombolysis and thrombectomy in the acute phase.

Accommodation

• Three months after stroke, 69 % of the surviving patients lived in their own home without community service, 18 % in their own home with community service, 11 % in assisted living and 2 % in some other living facility.

Symptoms and quality of life

- In all, 79 % percent of the patients reported their general health to be very good or good 3 months after stroke, with substantial variation between the hospitals.
- 29 % stated that they had gone back to the life and activities they had before their stroke, 41 % percent answered "yes, but not quite like before" and 30 % answered "no".
- Fatigue, depression, pain, speech difficulties and memory difficulties are common after a stroke. However, about half of the patients report no such difficulties.

Need of support

- 43 % of the patients were satisfied with the support from the hospitals and the municipality after discharge. The proportion of patients who were satisfied with the support varied substantially between the hospitals (30-58 %).
- Three months after stroke, more than half of the stroke patients who lived at home stated that they were fully or partly dependent on the help from a relative (this proportion is unchanged compared to the previous year). This was more common in women than in men. Even among the patients living in a nursing home, the proportion in need of help from a relative was very high. This was regardless of sex or age.

Patient reported experience measures of hospital care

- The proportion of patients who reported being satisfied or very satisfied with the rehabilitation during the hospital stay (among those who received rehabilitation) was high (91 %) for the whole nation, with a moderate variation between the regions. The proportion of patients who were satisfied or very satisfied with the rehabilitation after hospitalization was slightly lower, 87 %.
- The proportion who stated that they had received early supported discharge with rehabilitation from the hospital at home was 19 %. There are still large variations across regions.
- Of all stroke patients 40 % were evaluated by a speech therapist. The variations between the regions were large.
- The proportion of stroke patients who quit smoking was 43 %. Of the 13% who were smoking at time of stroke, barely half reported to have received advice on smoke cessation.
- Of the patients who responded to the question about lifestyle changes, 54 % reported receiving such advice, 49 % and 58 % of women and men, respectively.
- Most of the stroke patients were satisfied with the acute care, and the differences in satisfaction between the hospitals were moderate.

SUBARACHNOIDAL HEMORRHAGE

- The report includes data from five of six neurosurgical departments and, therefore the numbers are not fully representative for Sweden and need to be interpreted with care.
- In all, 402 patients were reported, 60 % women and 40 % men. The median age was 62 years.
- Of patients with a SAH, 74 % were admitted to a neurosurgical ward. Among these, ventricular drainage was inserted in 42 % and 14 % had invasive treatment for vasospasm.
- In 114 patients, a bleeding site was treated with neurointerventional procedures and 38 patients with neurosurgery. The remaining 117 patients had no treatment, in most of these patients no bleeding site was identified.
- At 3 months, 16 % were deceased. The response rate to the follow up questionnaire was 44 %, substantially lower compared to other stroke types. Increased fatigue stood out as a common problem.

Figures



NUMBER OF STROKE EVENTS IN RIKSSTROKE 1994-2022

Figure 1. Number of stroke events registered in Riksstroke from 1994 to 2022. Separate lines for first-time events and recurrent stroke events. In 2022 a total of 20,115 patients with stroke were reported to Riksstroke.



ANTICOAGULANTS AT ADMISSION AMONG PATIENTS WITH INTRACEREBRAL HEMORRHAGES

Figure 2. The proportion of patients with intracerebral hemorrhages who were on anticoagulant treatment at admission, 2012-2022.



Figure 3. A map showing the proportion of patients with acute stroke receiving care at a stroke care unit at some time during their hospital stay.

DIRECT ADMISSION TO STROKE UNIT CARE (AS FIRST LEVEL OF CARE)

Stroke Care Unit (73%) Neurosurgical unit (1%) ICU (8%) General/Other Ward (13%) Admission/Observational Ward (4%)



Figure 4. Proportions of acute stroke patients directly admitted to stroke unit, intensive care unit, neurosurgical unit or other type of ward, 2022.



REPERFUSION THERAPY

Figure 5. The proportion of patients with ischemic stroke receiving reperfusion therapy, 2010-2022.

PROPORTIONS OF STROKE PATIENTS TREATED WITH REPERFUSION THERAPY OVER TIME



Figure 6. Map showing the proportions of patients treated with reperfusion therapy during the years of 2015, 2018 and 2022, by region.

ANTICOAGULANTS AMONG PATIENTS WITH ISCHEMIC STROKE AND ATRIAL FIBRILLATION



Figure 7. Proportion of patients with ischemic stroke and atrial fibrillation who were prescribed anticoagulant treatment (NOAC or warfarin) at discharge, 2001-2022.

PRE- AND POST-THROMBOLYSIS NIHSS SCORE

at 10 701	Deceased: 3%
21-42: 7% 16-20: 9%	Missing: 16%
	21-42: 4%
5-15: 51%	16-20 ⁻ 3%
	5-15: 17%
	1-4: 31%
0: 2%	0: 27%
0:2%	

NIHSS at arrival N = 2192 Post-thrombolysis NIHSS score N = 1788



PRE- AND POST-THROMBECTOMY NIHSS SCORE



NIHSS at arrival N = 1162 Post-thrombectomy NIHSS score N = 954



PLANNED REHABILITATION AMONG PATIENTS DISCHARGED TO THEIR OWN HOME



Figure 9. The proportion of patients with planned rehabilitation among those discharged to their own home, by region 2022.



ADL-DEPENDENCY 3 MONTHS AFTER STROKE

Figure 10. *The proportion of patients who were ADL-dependent three months after stroke, 2001-2022. Patients who were ADL-dependent before their stroke were excluded from the calculations.*