CRCS-5 Statistics – 2013 Report

Global Statistics of CRCS-5

Acute Treatment Statistics of CRCS-5

Outcome Statistics of CRCS-5

Selected Subgroup Statistics of CRCS-5

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About CRCS-5 and these statistics

Clinical Research Center for Stroke (director: Byung-Woo Yoon, Seoul National University Hospital) established in 2006 to facilitate multi-center collaborations in clinical research and to develop clinical practice guideline, with research support from the Korea Healthcare Technology R&D Project, Ministry of Health and Welfare, Republic of Korea (HI10C2020). CRCS is consisted of six divisions, and CRCS-5 (principal investigator: Hee-Joon Bae, Seoul National University Bundang Hospital) is engaged in epidemiological researches. From the commencement of CRCS-5, stroke physicians from academic and regional centers have constructed multicenter cohort and gather prospective outcomes of acute ischemic stroke patients.

In April 2008, 9 centers (Eulji General Hospital, Eulji University Hospital, Dong-A University Hospital, Seoul National University Bundang Hospital, Seoul Medical Center, Soonchunhyang University Hospital Seoul, Yeungnam University Medical Center, Inje University Ilsan Paik Hospital, and Hallym University Sacred Heart Hospital) established a prospective registry of consecutive acute stroke patients based on web-database system (http://www.stroke-crc.or.kr/ecrf/). At this stage, CRCS-5 aimed to improve quality of stroke care in participating centers as well as to develop and spread e-QI system to Korean hospitals. CRCS-5 data manager collects and audits all the data registered by each participating center. In November 2009, 5 centers kicked off prospective capture of stroke outcomes including modified Rankin Scale (mRS) scores at 3 month and 1 year after stroke.

In January 2011, two stroke centers (Dongguk University Ilsan Hospital, Chonnam National University Hospital) were introduced to CRCS-5, expanding

CRCS-5's regional coverage to southwestern part of South Korea. Also in this year, all the participating centers started prospective outcome capture system, and its collecting information was expanded to occurrence of early neurological deterioration (END), NIHSS scores and mRS scores at 3 month and 1 year after stroke, and medication adherence with patients' self-knowledge. Jeju National University Hospital, at the southernmost island of Korea, joined CRCS-5 in October 2011. CRCS-5 registry further expanded to include Ulsan University Hospital, located in the industrial Ulsan metropolitan city, and Chungbuk National University Hospital, located in the geographical center of South Korea. As current of May 2013, 14 stroke centers consist of CRCS-5, and the number of registered stroke cases reached 24,798.

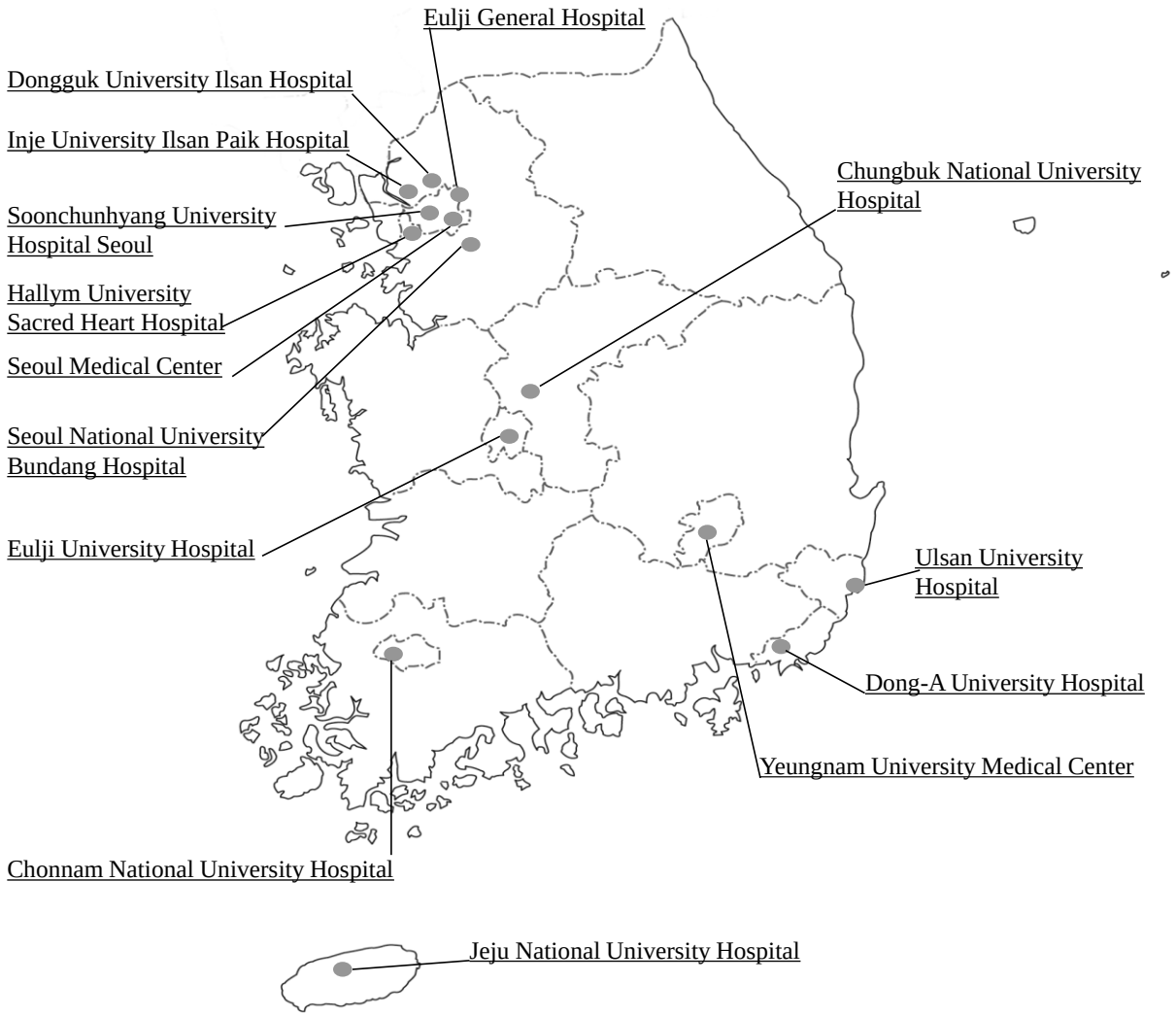

Figure 1 Participating centers and their geographic location

Participating stroke centers and site investigators

- Seoul National University Bundang Hospital: Hee-Joon Bae (director), Moon-Ku Han, Beom Joon Kim
- Eulji General Hospital: Jong-Moo Park, Kyusik Kang
- Eulji University Hospital: Soo Joo Lee, Youngchai Ko
- Dong-A University Hospital: Jae-Kwan Cha, Dae-Hyun Kim, Hyun-Wook Nah
- Seoul Medical Center: Tai Hwan Park, Sang-Soon Park

- Soonchunhyang University Hospital Seoul: Kyung Bok Lee
- Yeungnam University Medical Center: Jun Lee
- Inje University Ilsan Paik Hospital: Keun-Sik Hong, Yong-Jin Cho
- Hallym University Sacred Heart Hospital: Byung-Chul Lee, Kyung-Ho Yu, Mi-Sun Oh
- Dongguk University Ilsan Hospital: Dong-Eog Kim, Wi-Sun Ryu
- Chonnam National University Hospital: Joon-Tae Kim, Ki-Hyun Cho
- Jeju National University Hospital: Jay Chol Choi
- Ulsan University Hospital: Wook-Ju Kim
- Chungbuk National University Hospital: Dong-Ick Shin

Statistical advisors

- Juneyoung Lee, Department of Biostatistics, Korea University College of Medicine.
- Ji Sung Lee, Biostatistical Consulting Unit, Soonchunhyang University Medical Center

cf. List of sites and investigators is as of December 2013.

List of Tables and Figures

Global Statistics of CRCS-5

Recruitment of acute stroke patients

- A total of 24,798 acute strokes were registered in the CRCS-5 database until May 2013 (Table 1 Number of registered acute stroke patients).
- Number of monthly recruitment was 400 cases on average. Monthly numbers of recruitment on average were 460 in year 2011, 506 in year 2012, and 566 in year 2013 (January to May 2013).
- Recruitment profiles of participating hospitals differ according to the volume of acute stroke patients and the time of joining CRCS-5. Seoul National University Bundang Hospital topped on the list as registered 4256 cases until May 2013 and 69 subjects per month on average (Figure 2 Number of acute stroke patients since April 2008). However, Cheonnam National University Hospital has been most rapidly recruiting acute stroke patients, as 92 cases per month on average (Figure 3 Number of registered acute stroke patients from each center).

Demographic profile of acute ischemic stroke

- Number of acute ischemic strokes in CRCS-5 was 22,519 (91%).

  cf. Hemorrhagic stroke patients are customarily admitted to neurosurgical department in usual Korean stroke centers. So that above statistics should not be interpreted as 91% of acute stroke patients are ischemic stroke in Korea.

- Number of male was 13,124 (58%) and female was 9395 (42%).
- Average age at onset was 68 ± 13 and median 70 [interquartile range, 60 – 77] years old with minimum 12 and maximum 105. Young-age stroke patients (age of

onset < 45 year-old) were 1127 (5%), and oldest olds (age ≥85 year-old) were 1482 (7%).

- Female stroke patients exceeded male counterpart in a group of more than 75 year-old (Table 2 Number of acute ischemic stroke patients stratified by sex and age group).

- Among male stroke patients, the largest age-group was 65-74 year-old (32%). However, female patients were most frequent in 75-84 year-old group (34%) (Figure 4 Distribution of acute ischemic strokes according to sex or age-group).

Characteristics of Acute Ischemic Strokes

- Among a total of 22,519 acute ischemic strokes, large artery atherosclerosis (LAA) accounted for 38%, small vessel occlusion (SVO) for 19%, and cardioembolism (CE) for 22%. Ischemic strokes due to other specified etiology (ODE) were 2% (Table 3 Fractions of TOAST classification components in CRCS-5 and Figure 5 TOAST classification).

- Undetermined etiology (UDE) was 19%; two or more etiologies for 4%, negative etiology (cryptogenic stroke) for 8%, and incomplete work-ups for 7%.

- Fifty-eight percent of ischemic strokes were located in middle cerebral artery (MCA) territories. As for anatomical territories, 47% located at cerebral cortex, 30% at corona radiate or adjacent white matters, and 33% at deep structures including putamen, internal capsule or thalamus. Thirty percent of strokes have infratentorial lesions (Table 4 Arterial territory of ischemic stroke (multiple choices permitted), Table 5 Anatomical location of ischemic stroke (multiple choices permitted) and Table 6 Angiographic location of steno-occluded arteries (multiple choices permitted)).

- Regarding steno-occluded arteries, MCA accounted for 31% and extracranial internal carotid artery (ICA) for 13% (Figure 6 Arterial territories of ischemic strokes (multiple choices permitted), Figure 7 Anatomical locations of ischemic strokes (multiple choices

permitted) and Figure 8 Angiographic locations of steno-occluded arteries (multiple choices permitted)).

- NIHSS score at hospital arrival was 6.0 ± 6.3 on average and median 4 [interquartile range, 2 – 8] points, with range between 0 and 40. NIHSS score ≤4 was documented in 57%, NIHSS score of 5 – 8 in 18%, and NIHSS score ≥25 in 1% of acute ischemic stroke patients (Figure 9 Distribution of NIHSS score at hospital arrival).

- Onset (last normal time) to hospital arrival time was 43.9 ± 238.6 hour on average and median 13.8 [interquartile range, 3.8 – 43.4] hour, for whose time-related record is available. Twenty-nine percent of patients arrived within 3 hours and 43% within 6 hours. Sixty-seven percent of ischemic strokes admitted within 24 hours after onset (Figure 10 Onset (last normal time) to hospital arrival time).

- At the time of discharge, NIHSS score was 4.9 ± 3.2 on average and median 2 [interquartile range, 0 – 6]; mRS score is 2.3 ± 1.7 on average and median 2 [interquartile range, 1 – 4]. Functional independence at discharge (mRS score 0 or 1) was achieved in 5514 (25%) cases, and catastrophic consequences at discharge (mRS score 5 or 6) was documented in 2867 (13%) cases. Missing cases were 183 and 27, respectively. In-hospital mortality was 679 (3%) (Figure 11 NIHSS score at discharge (missing in 183 cases) and Figure 12 mRS score at discharge (missing in 27 cases)).

- Duration of hospitalization was 11.6 ± 17.7 days on average and median 8 [interquartile range, 6 – 12].

- In-hospital mortality was occurred in 679 (3%) subjects, after 12.3 ± 23.8 days after stroke on average and median 8 [interquartile range, 6 – 13] days. Among the mortality cases, 437 (64%) were directly related to stroke; 199 (29%) were from complications related to stroke; 43 (6%) were from other causes unrelated to stroke.

- Twenty-one percent of stroke cases (4802 subjects) had experienced stroke events before, and 80% of them were ischemic. Frequencies of other vascular events before index stroke were less than 5 percent.

- Frequencies of major vascular risk factors were as follows; hypertension in 15,200 (68%) cases, diabetes in 7380 (33%) cases, dyslipidemia in 6868 (31%) cases, habitual smoking in 8821 (39%) cases, and atrial fibrillation in 4467 (20%) cases (Table 7 History of vascular events in CRCS-5 registered strokes, Table 8 Major modifiable vascular risk factors and Figure 13 Percentages of major modifiable vascular risk factors in CRCS-5 database).

- Potential sources of cardioembolic stroke are detected in 4333 (19%) for high risk sources and in 1424 (6%) for medium risk sources. Atrial fibrillation was the most common high risk source (88%); patent foramen ovale (37%) and congestive heart failure (29%) were leading sources of medium risk cardioembolism (Table 9 Frequencies of potential cardioembolic sources (risk stratification according to the TOAST classification scheme)).

- Magnetic resonance images (MRI) including diffusion-weighted image (DWI) or gradient-echo contrast image (GRE) were performed in more than 90% of registered strokes. Most common cardiac evaluation was transthoracic echocardiography (72%), followed by 24-hour electrocardiogram (Holter) monitoring (30%), transesophageal echocardiography (13%) and 24-hour blood pressure monitoring (3%). Only 30% had carotid Doppler, but MR angiography was done in 86% of strokes (Table 10 Frequency of etiological work-ups and Table 11 Profile of laboratory tests).

- Hyperacute revascularization treatments were performed in 2889 (13%) cases. Combined intravenous and intraarterial thrombolysis comprised 33% of hyperacute revascularization, increased from 19% of CRCS-5 statistics 2012. Regarding pharmacological modality of thrombolysis, recombinant tissue plasminogen activator was the most frequently utilized medication (86%) (Table 12 Profile of hyperacute treatment for ischemic strokes and Figure 14 Composition of hyperacute revascularization treatment modalities).

- Regarding acute stroke medications, aspirin (81%) and clopidogrel (32%) were the two most frequently prescribed drugs (Table 13 Profile of acute stroke medications (multiple choices permitted) and Figure 15 Percentages of acute stroke medications (multiple choices permitted)).

- As with acute stroke medications, aspirin (69%) and clopidogrel (35%) were the two most frequently utilized medications for secondary prevention of stroke at discharge (Table 14 Profile of secondary preventive medications at discharge (multiple choices permitted) and Figure 16 Percentages of secondary preventive medications at discharge (multiple choices permitted)).

- Surgical or radiological interventions were not frequently performed (n=550; 2%) in CRCS-5 registered stroke cases (Table 15 Profile of surgical interventions during acute period of stroke (multiple choices permitted) and Figure 17 Percentages of surgical interventions during acute period of stroke (multiple choices permitted)).

- Regarding major vascular risk factors, hypertension and diabetes were fairly well documented before stroke (89% and 82%, respectively) and on regular management (79% and 76%, respectively). However, detection rates of dyslipidemia and atrial fibrillation were below expectation (49% and 44%, respectively) and regular treatment for these risk factors was less than adequate (43% and 43%) (Table 16 Major vascular risk factors and their management before index strokes, Figure 18 Percentages of regular treatment for vascular risk factors and Figure 19 Percentages of undocumented vascular risk factors).

- Habitual smoking was reported from 8821 (39%) and 32% of them were ex-smokers. Mean smoking doses were 33.5 ± 18.6 pack-years.

- Before index stroke, 87% of stroke cases (19,669 subjects) maintained independent living, mRS score of 0 or 1 (Table 17 Distribution of premorbid mRS score in the included stroke cases).

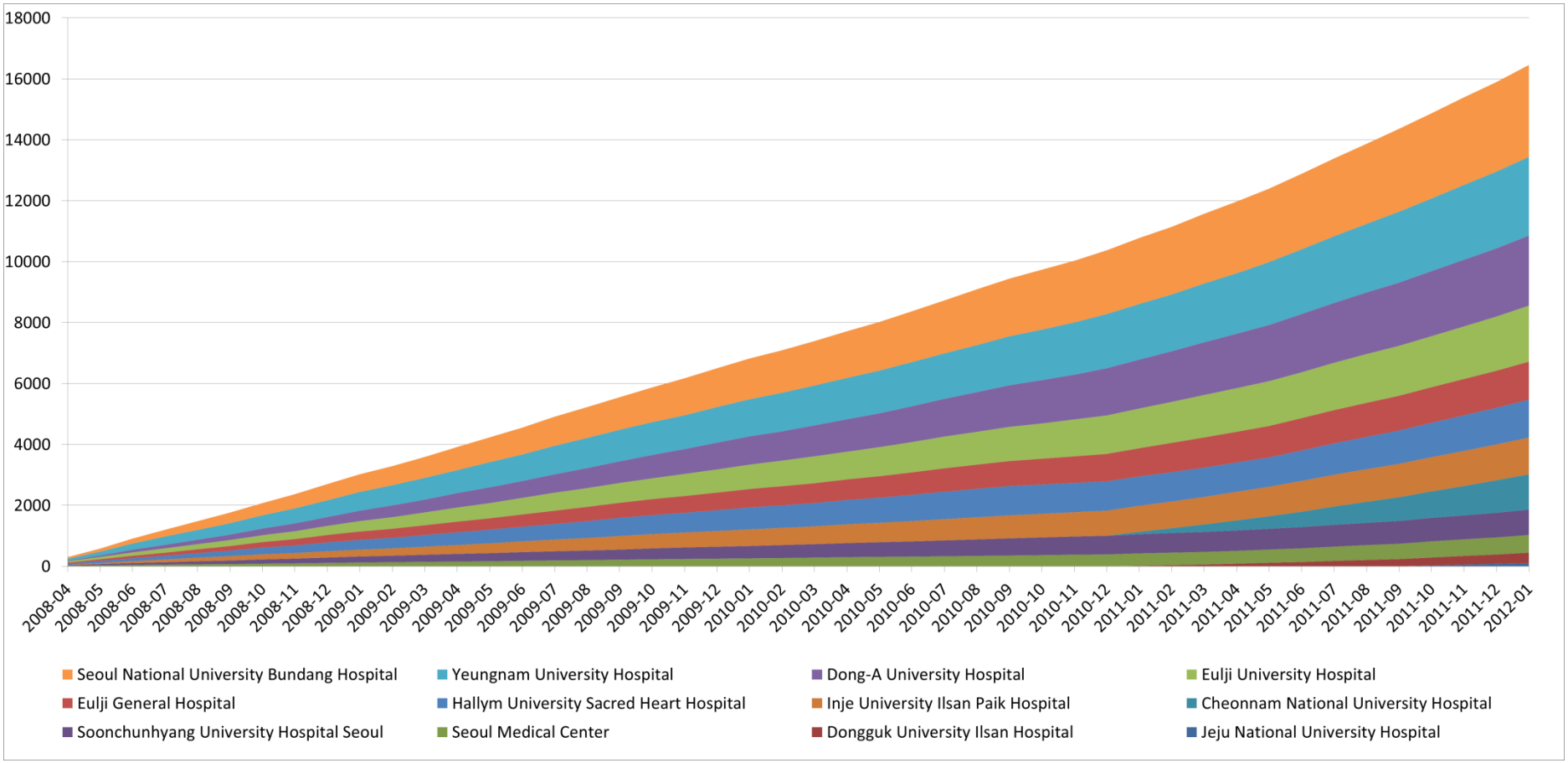

Figure 2 Number of acute stroke patients since April 2008

Table 1 Number of registered acute stroke patients

Participating center	`08 2Q	`08 3Q	`08 4Q	`09 1Q	`09 2Q	`09 3Q	`09 4Q	`10 1Q	`10 2Q	`10 3Q	`10 4Q	`11 1Q	`11 2Q	`11 3Q	`11 4Q	`12 1Q	`12 2Q	`12 3Q	`12 4Q	`13 1Q	`13 2Q	Sum
Ulsan University Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	76	116
Chungbuk National University Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	71	98
Jeju National University Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	86	50	63	47	60	44	431
Dongguk University Ilsan Hospital	0	0	0	0	0	0	0	0	0	0	0	60	81	96	69	92	64	68	67	69	41	707
Seoul Medical Center	43	32	38	34	33	38	34	34	31	37	35	23	37	54	58	48	50	43	47	58	40	847
Soonchunhyang University Hospital Seoul	65	51	60	56	55	43	62	49	61	60	52	43	41	52	58	61	70	56	67	70	35	1167
Cheonnam National University Hospital	0	0	0	0	0	0	0	0	0	0	0	245	260	272	292	300	293	265	290	273	197	2687
Inje University Ilsan Paik Hospital	62	81	60	62	88	96	67	71	79	89	68	81	106	86	79	102	94	92	83	92	52	1690
Hallym University Sacred Heart Hospital	94	85	114	92	94	114	88	79	101	101	0	0	37	95	109	117	99	110	108	101	63	1801
Eulji General Hospital	82	71	92	76	82	93	83	75	84	84	79	89	72	79	76	87	81	91	79	84	58	1697
Eulji University Hospital	110	86	101	122	125	105	111	123	111	127	141	131	111	135	139	148	150	123	125	143	98	2565
Dong-A University Hospital	90	88	113	130	133	157	168	137	160	189	185	180	182	163	164	163	160	148	167	190	125	3192
Yeungnam University Hospital	201	174	173	165	157	166	132	140	142	158	171	151	195	202	190	192	150	174	179	198	134	3544
Seoul National University Bundang Hospital	163	185	186	153	195	187	206	184	209	225	200	196	190	243	220	246	229	232	218	209	180	4256
Sum	910	853	937	890	962	999	951	892	978	1070	931	1199	1312	1477	1535	1642	1490	1465	1477	1614	1214	24798

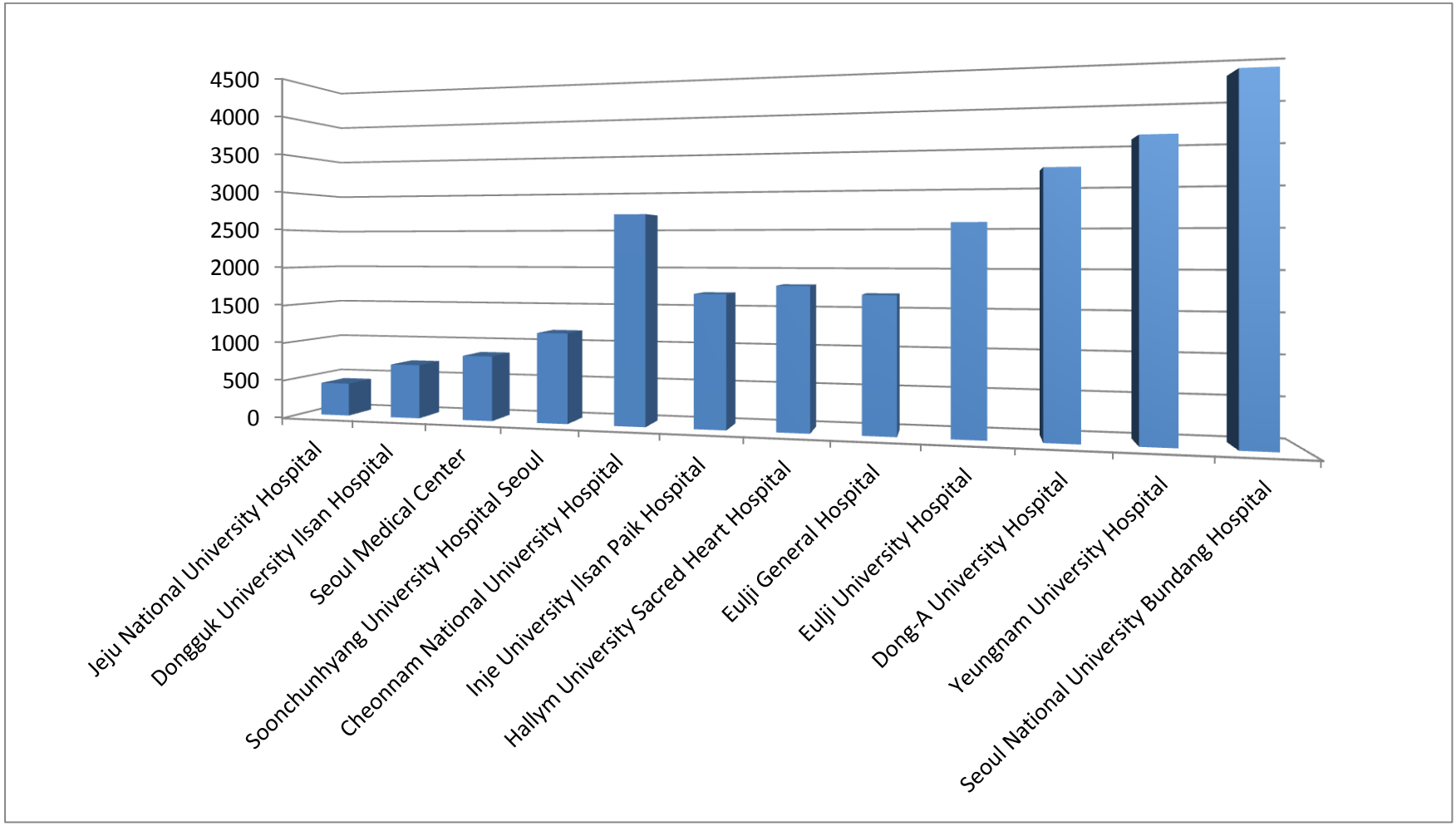

Figure 3 Number of registered acute stroke patients from each center

Table 2 Number of acute ischemic stroke patients stratified by sex and age group

Age group	Whole population		Male		Female	
< 45	1127	5.0%	797	6.1%	330	3.5%
45 - 54	2546	11.3%	1898	14.5%	648	6.9%
55 - 64	4335	19.3%	3124	23.8%	1211	12.9%
65 - 74	7202	32.0%	4185	31.9%	3017	32.1%
75 - 84	5827	25.9%	2595	19.8%	3232	34.4%
≥ 85	1482	6.6%	525	4.0%	957	10.2%
Total	22519		13124		9395	

- Based on 22,519 ischemic stroke cases.

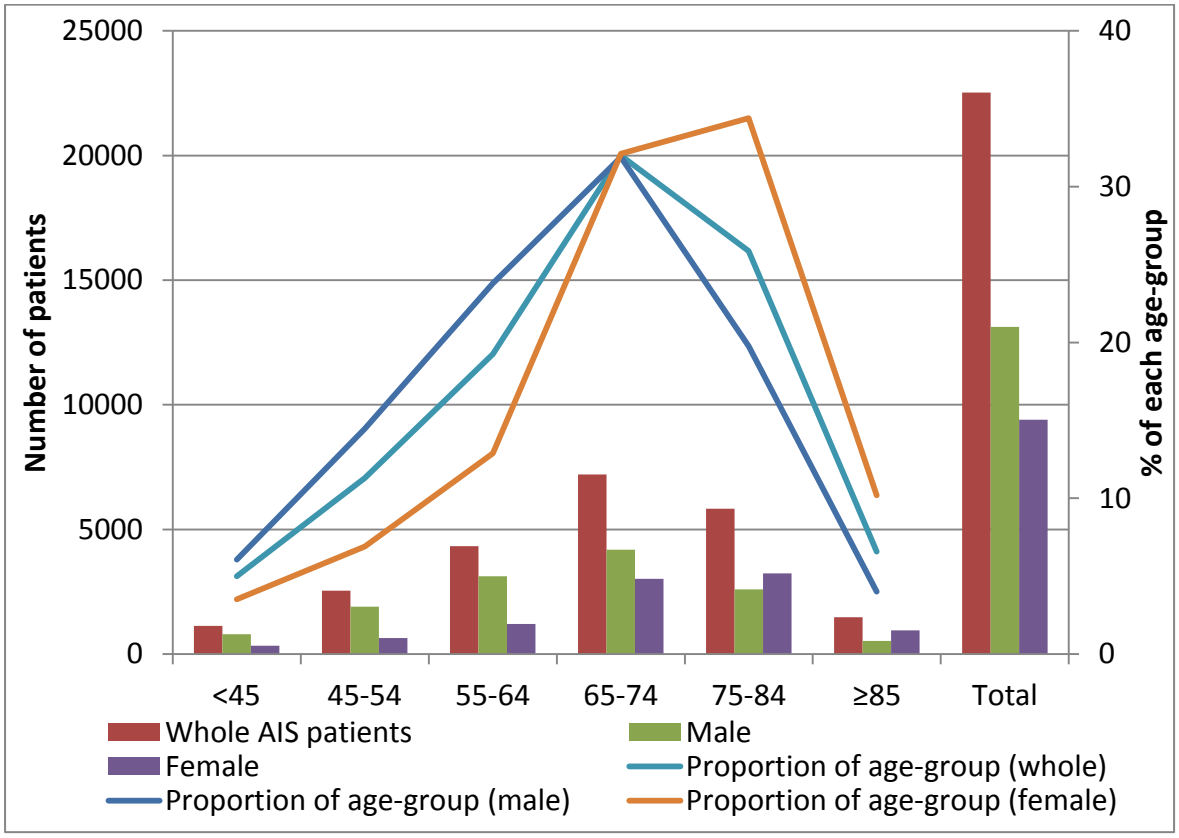

Figure 4 Distribution of acute ischemic strokes according to sex or age-group

- Based on 22,519 ischemic stroke cases.

Table 3 Fractions of TOAST classification components in CRCS-5

TOAST classification	Frequency	Percentage
Large Artery Atherosclerosis	8524	37.9
Small Vessel Occlusion	4227	18.8
Cardioembolism	4842	21.5
Other Determined Etiology	535	2.4
Undetermined Etiology - 2 or more	956	4.2
Undetermined Etiology - Negative	1767	7.8
Undetermined Etiology - Incomplete work-ups	1668	7.4
Total	22519	

- Based on 22,519 ischemic stroke cases.

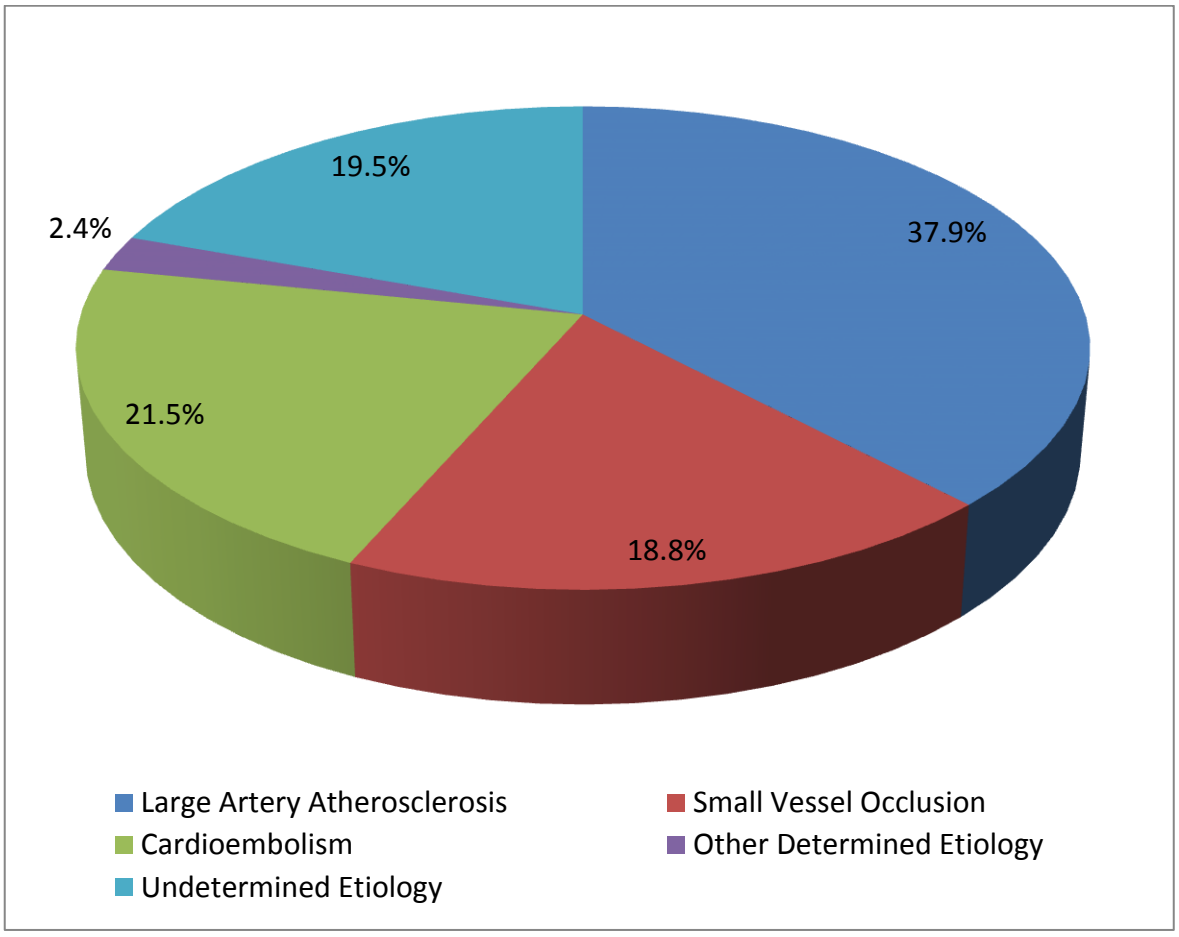

Figure 5 TOAST classification

- Based on 22,519 ischemic stroke cases.

Table 4 Arterial territory of ischemic stroke (multiple choices permitted)

Arterial Territory of Ischemic Stroke	Frequency	Percentage
Internal Carotid Artery	676	3.0
Middle Cerebral Artery	13074	58.1
Anterior Cerebral Artery	1259	5.6
Posterior Cerebral Artery	3182	14.1
Basilar artery	2643	11.7
Vertebral artery	588	2.6
Superior Cerebellar Artery	709	3.1
Anterior Inferior Cerebellar Artery	259	1.2
Posterior Inferior Cerebellar Artery	2029	9.0
Borderzone area	669	3.0
Total	25088	

- Based on 22,519 ischemic stroke cases.

Table 5 Anatomical location of ischemic stroke (multiple choices permitted)

Anatomical Location of Ischemic Stroke	Frequency	Percentage
Cortex	10668	47.4
Corona radiata	6746	30.0
Putamen - Internal capsule	5544	24.6
Thalamus	1983	8.8
Midbrain	539	2.4
Pons	2706	12.0
Medulla oblongata	861	3.8
Cerebellum	2518	11.2
Total	31565	

- Based on 22,519 ischemic stroke cases.

Table 6 Angiographic location of steno-occluded arteries (multiple choices permitted)

Angiographic Location of Steno-Occlusion	Frequency	Percentage
Anterior Cerebral Artery	878	3.9
Middle Cerebral Artery	7035	31.2
Posterior Cerebral Artery	1802	8.0
Basilar Artery	1756	7.8
Vertebral Artery	2059	9.1
Extracranial Internal Carotid Artery	3019	13.4
Intracranial Internal Carotid Artery	1980	8.8
Common Carotid Artery	156	0.7
Aorta	42	0.2
Total	18727	

- Based on 22,519 ischemic stroke cases.

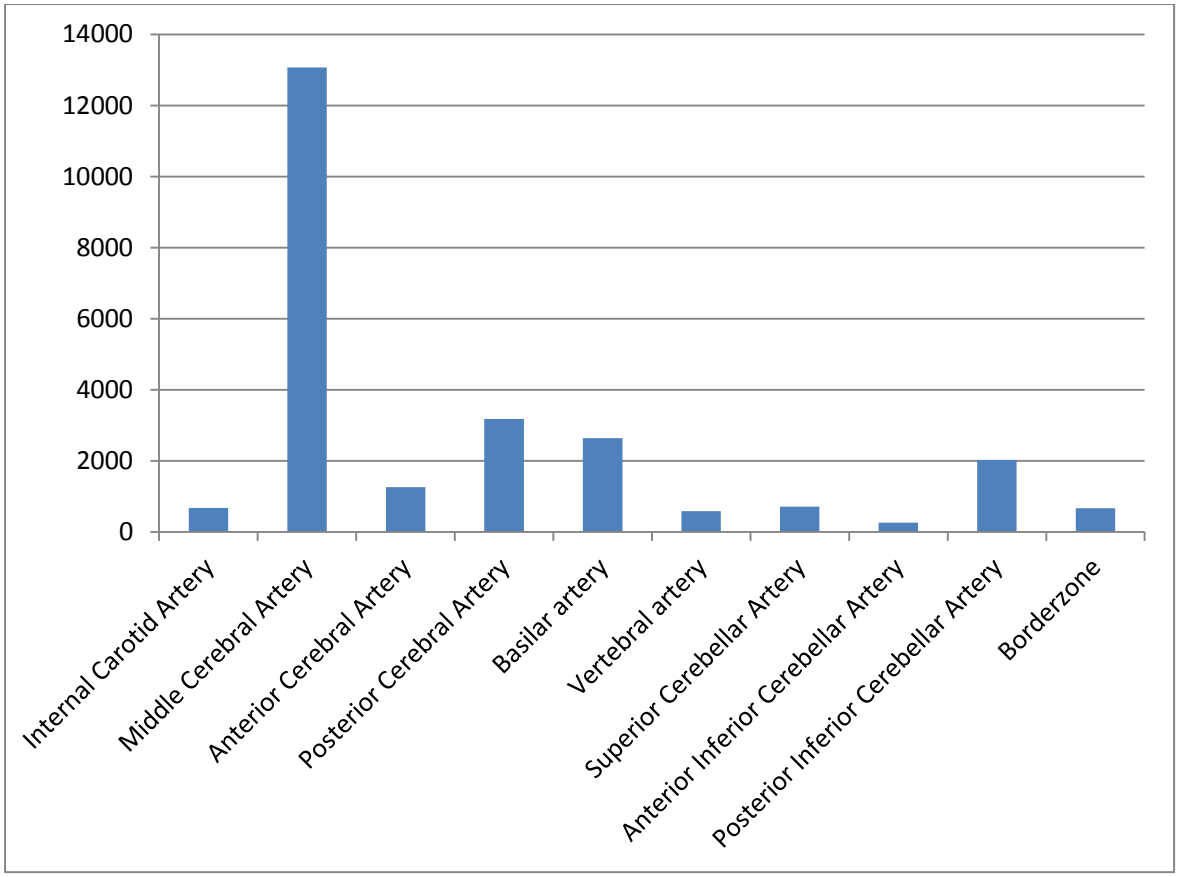

Figure 6 Arterial territories of ischemic strokes (multiple choices permitted)

- Based on 22,519ischemic stroke cases.

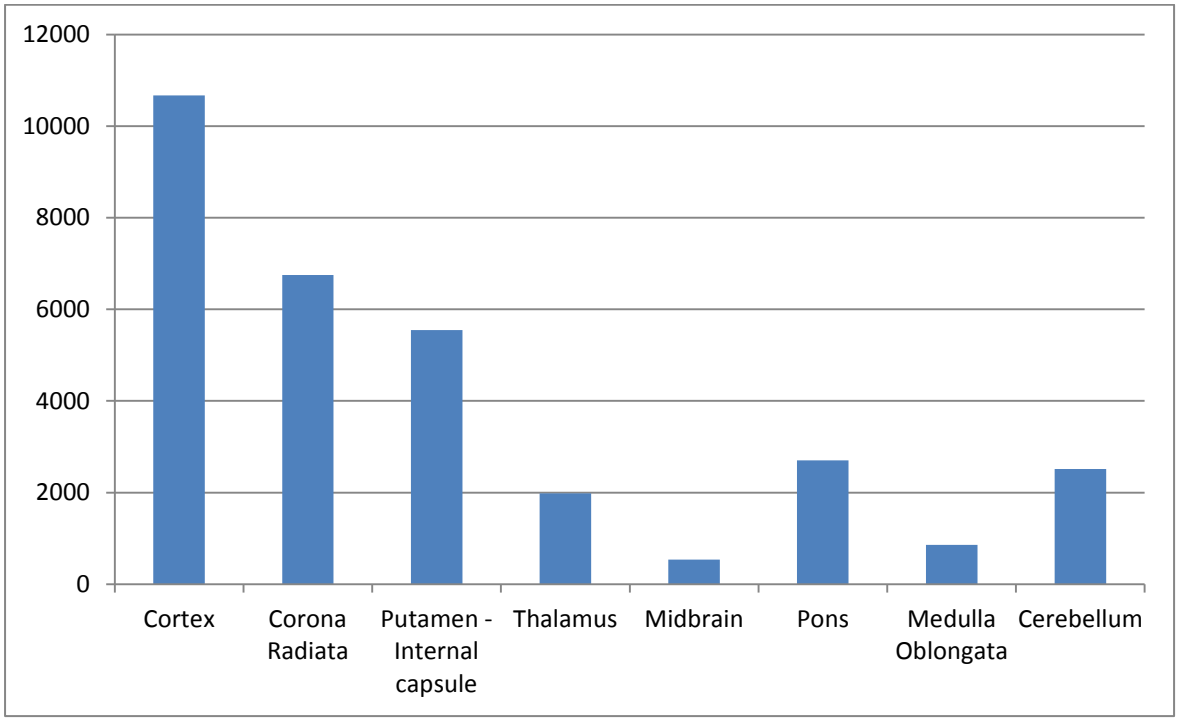

Figure 7 Anatomical locations of ischemic strokes (multiple choices permitted)

- Based on 22,519 ischemic stroke cases.

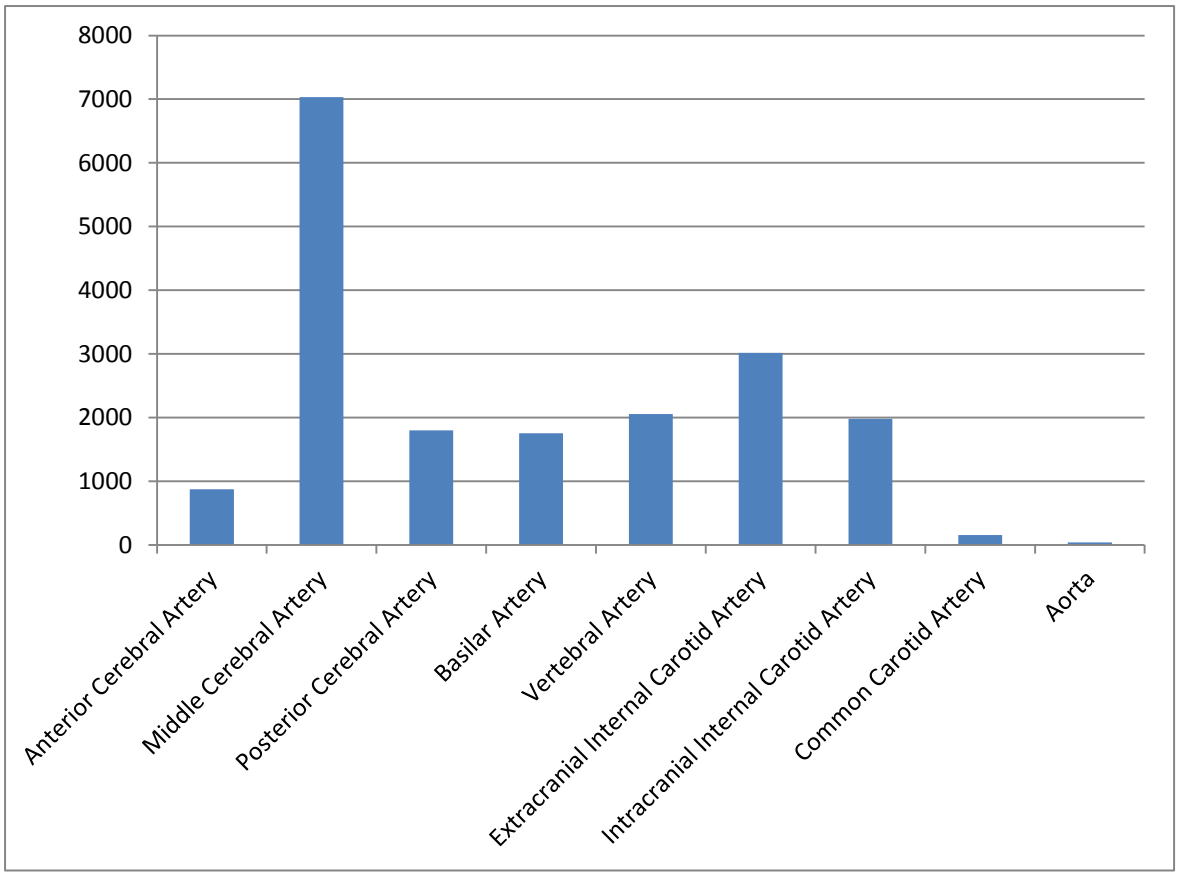

Figure 8 Angiographic locations of steno-occluded arteries (multiple choices permitted)

- Based on 22,519 ischemic stroke cases.

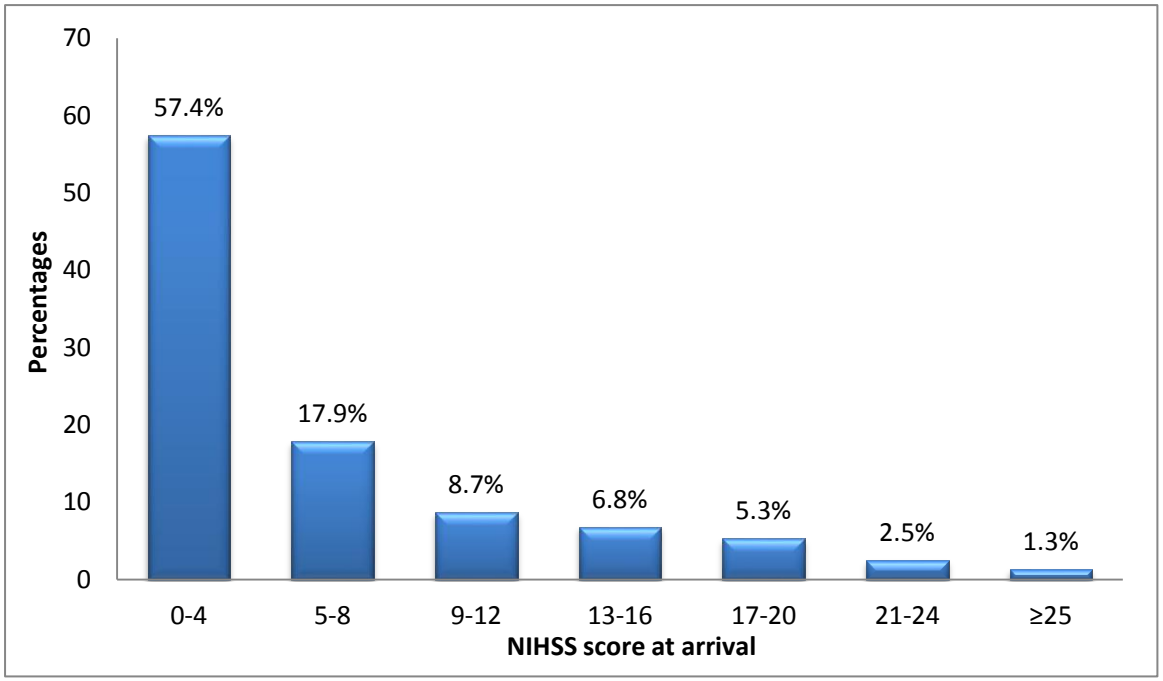

Figure 9 Distribution of NIHSS score at hospital arrival

- Based on 22,519 ischemic stroke cases.

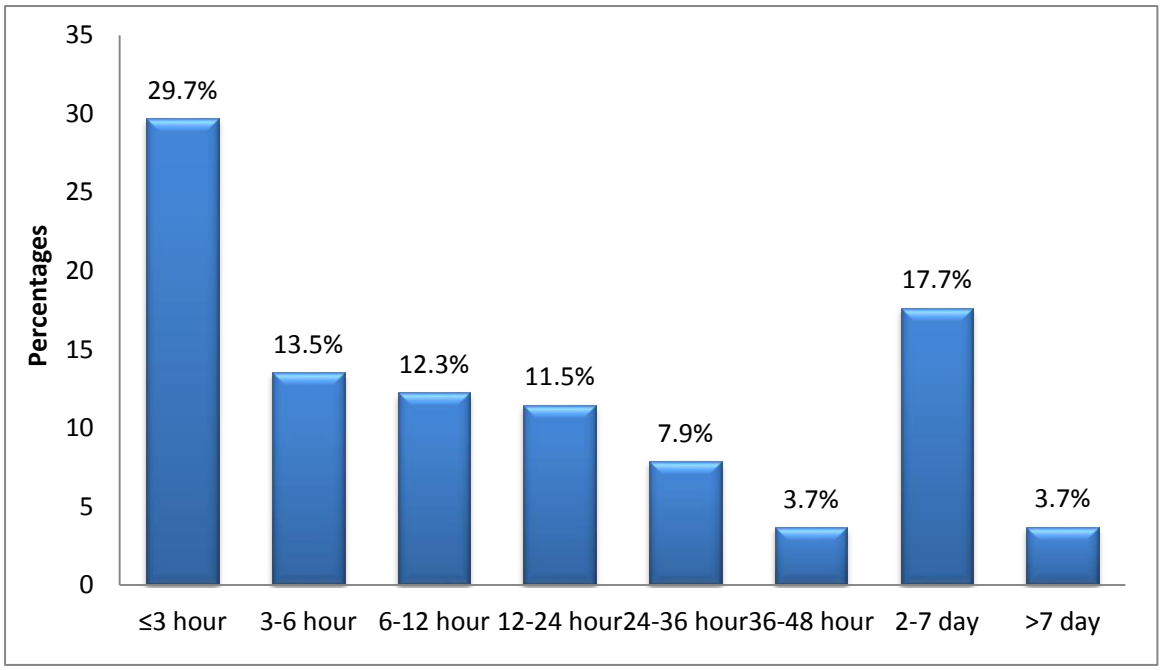

Figure 10 Onset (last normal time) to hospital arrival time

- Based on 22,519 ischemic stroke cases.

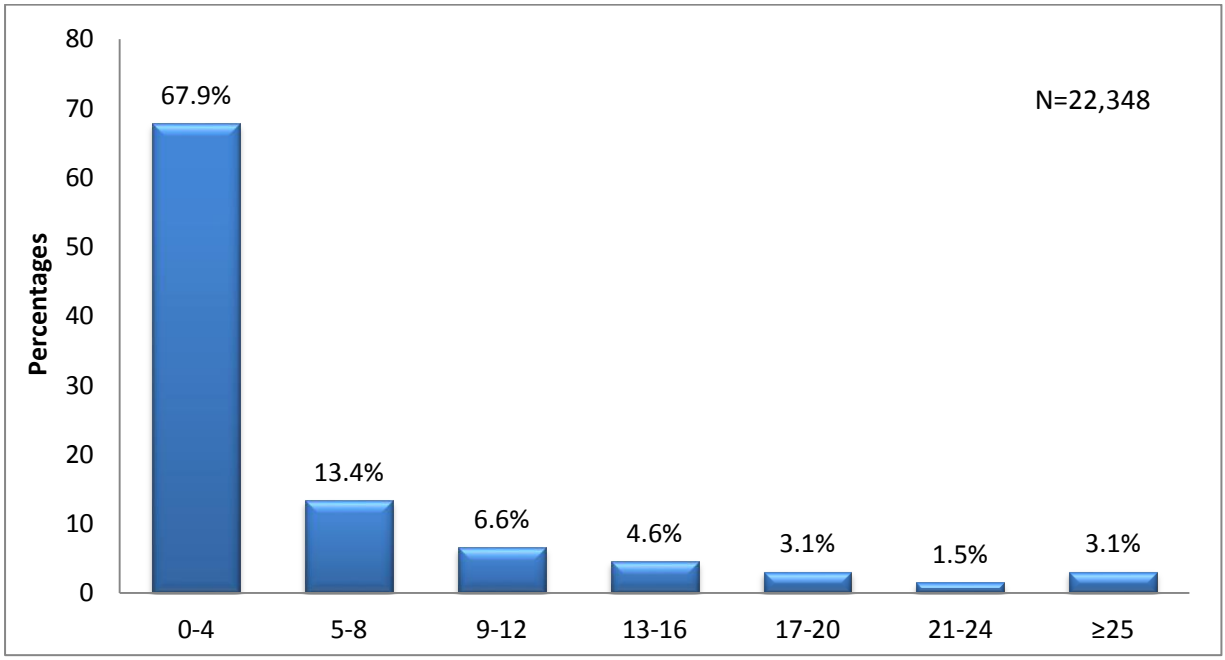

Figure 11 NIHSS score at discharge (missing in 171 cases)

- Based on 22,519 ischemic stroke cases.

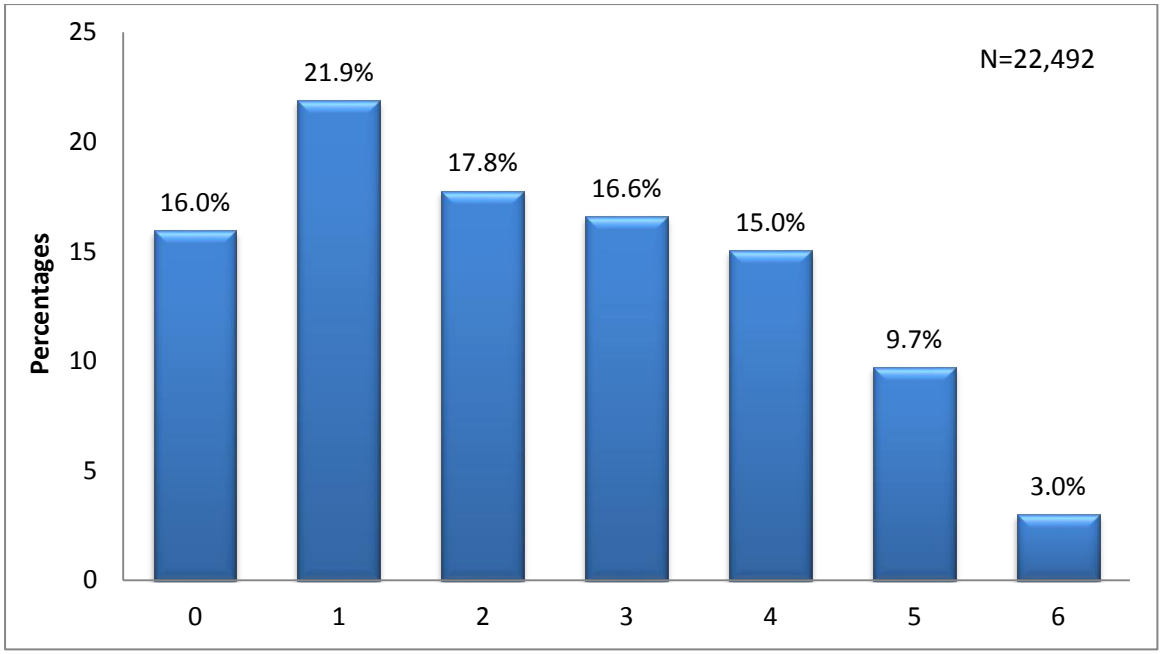

Figure 12 mRS score at discharge (missing in 27 cases)

- Based on 22,519 ischemic stroke cases.

Table 7 History of vascular events in CRCS-5 registered strokes

	Frequency	Percentage
History of TIA	605	2.7
History of stroke	4802	21.3
Hemorrhagic stroke	550	11.5*
Ischemic stroke	3858	80.3*
Mixed stroke	105	2.2*
Unknown	287	6.0*
Missing	2	0.0*
Family history of coronary heart disease	227	1.0
History of peripheral arterial disease	178	0.8
History of symptomatic carotid artery disease	822	3.7
History of acute myocardial infarction	576	2.6
History of anginal attack	921	4.1
History of coronary artery intervention†	808	3.6

* Percentages of stroke history are calculated from 4802 subjects.

† including coronary artery stenting or bypass graft surgery

- Based on 22,519 ischemic stroke cases.

Table 8 Major modifiable vascular risk factors

	Frequency	Percentage	Male		Female	
			Frequency	Percentage	Frequency	Percentage
Hypertension	15200	67.5	8459	64.5	6741	71.8
Diabetes	7380	32.8	4346	33.1	3034	32.3
Dyslipidemia	6868	30.5	3854	29.4	3014	32.1
Habitual smoking	8821	39.2	8146	62.1	675	7.2
Atrial fibrillation	4467	19.8	2272	17.3	2195	23.4

- Based on 22,519 ischemic stroke cases. (Male=13,124, Female=9395)

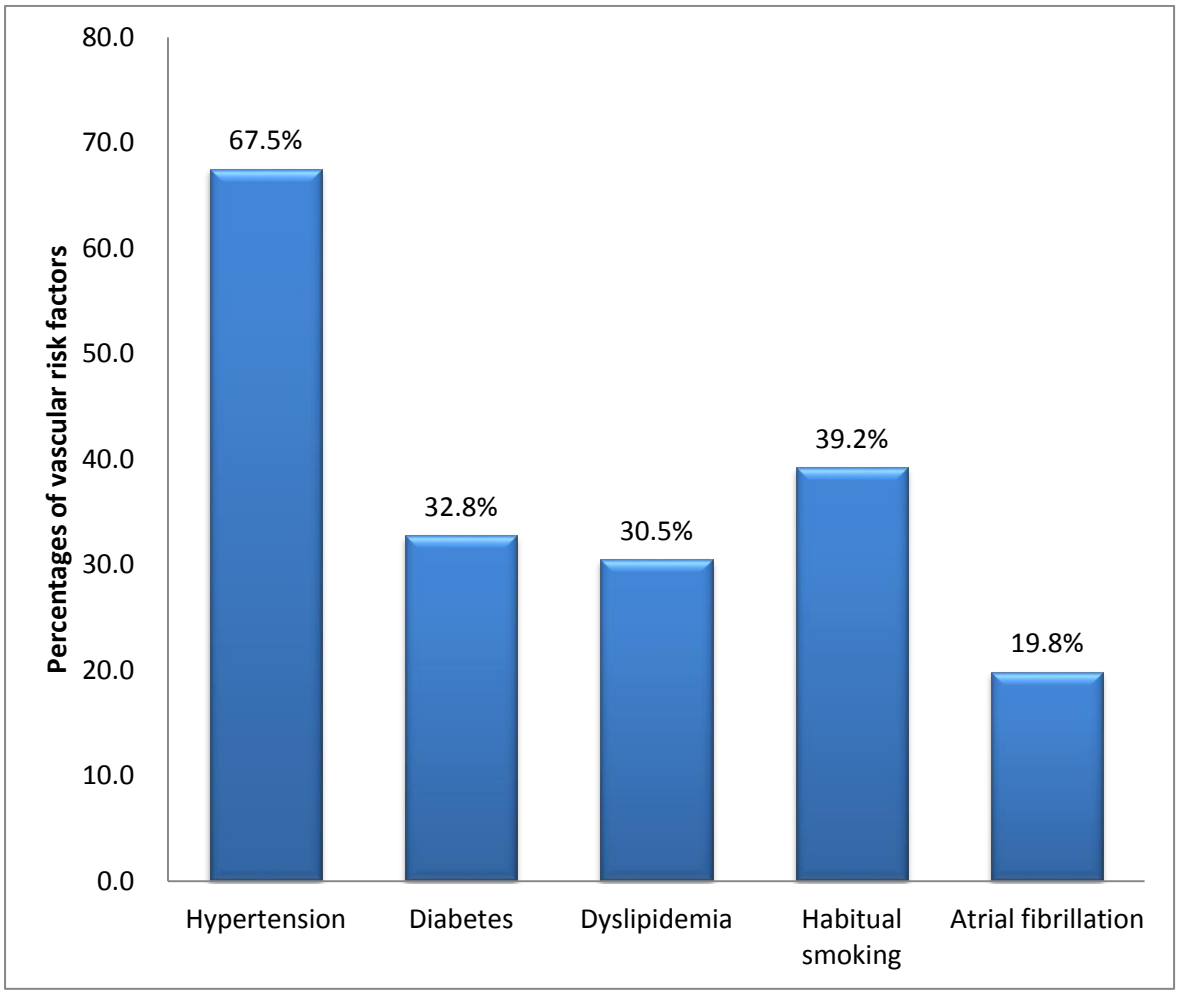

Figure 13 Percentages of major modifiable vascular risk factors in CRCS-5 database

- Based on 22,519 ischemic stroke cases.

Table 9 Frequencies of potential cardioembolic sources (risk stratification according to the TOAST classification scheme)

	Frequency	Percentage*
Potential cardioembolic source - high risk	**4333**	**19.2**
Mechanical prosthetic valve	42	1.0
Mitral stenosis with atrial fibrillation	102	2.4
Atrial fibrillation (other than lone atrial fibrillation)	3824	88.3
Left atrial/atrial appendage thrombus	91	2.1
Sick sinus syndrome	64	1.5
Recent myocardial infarction (<4 week)	76	1.8
Left ventricular thrombus	25	0.6
Dilated cardiomyopathy	92	2.1
Akinetic left ventricular segment	136	3.1
Atrial myxoma	18	0.4
Infective endocarditis	31	0.7
Others	95	2.2
Potential cardioembolic source - medium risk	**1425**	**6.3**
Mitral valve prolapse	15	1.1
Mitral annulus calcification	3	0.2
Mitral stenosis without atrial fibrillation	20	1.4
Left atrial turbulence (smoke)	7	0.5
Atrial septal aneurysm	14	1.0
Patent foramen ovale	521	36.6
Atrial flutter	58	4.1
Lone atrial fibrillation	250	17.5
Bioprosthetic cardiac valve	12	0.8
Nonbacterial thrombotic endocarditis	3	0.2
Congestive heart failure	417	29.3
Hypokinetic left ventricular segment	225	15.8
Myocardial infarction(>4weeks, <6months)	52	3.6

* Percentages of components are calculated from the total number of each risk stratum.

- Based on 22,519 ischemic stroke cases.

Table 10 Frequency of etiological work-ups

Work-ups	Frequency	Percentage
CT	12466	55.4
CT angiography	7771	34.5
CT perfusion image	2062	9.2
MRI	18591	82.6
MR Angiography	19459	86.4
Diffusion-weighted image	21035	93.4
Perfusion-weighted MR image	6876	30.5
Gradient-echo MR image	18642	82.8
Contrast-enhanced MR angiography	3313	14.7
Transthoracic echocardiography	16150	71.7
Transesophageal echocardiography	2950	13.1
24-hour Holter monitoring	6736	29.9
Transcranial Doppler sonography	16468	73.1
Carotid Doppler sonography	6834	30.3
Peripheral vascular study	3530	15.7
24-hour BP monitoring	534	2.4
Single-Photon Emission Computed Tomography (SPECT)	742	3.3
Positron Emission Tomography (PET)	43	0.2
Other studies	1362	6.0

- Based on 22,519 ischemic stroke cases.

Table 11 Profile of laboratory tests

Laboratory variables	Average ± SD	Median [IQR]
White blood cell count (x 10^3 /μL)	8.7 ±11.5	7.8 [6.3 – 9.7]
Blood Urea Nitrogen (mg/dL)	17.2 ± 9.2	15 [12 – 20]
Creatinine (mg/dL)	1.0 ± 1.0	0.9 [0.71 – 1.1]
GOT (IU/L)	27.9 ± 33.4	23 [19 – 30]
GPT (IU/L)	22.8 ± 27.0	18 [13 – 26]
Hemoglobin (g/dL)	13.6 ± 2.0	13.7 [12.4 – 14.9]
Hematocrit (%)	40.7 ± 19.5	40 [36.6 – 43.3]
Total cholesterol (mg/dL)	179 ± 43	178 [151 – 207]
High density lipoprotein cholesterol (mg/dL)	45 ± 13	44 [36 – 53]
Low density lipoprotein cholesterol (mg/dL)	110 ± 37	110 [85 – 137]
Glucose (mg/dL)	124 ± 54	110 [93 – 143]
Platelet count (x 10^3 /μL)	237 ± 84	229 [188 – 277]
Hb A1c (%)	6.4 ± 1.4	6.1 [5.6 – 7.7]
Prothrombin time (INR)	1.03 ± 0.26	1.00 [0.95 – 1.07]
Systolic blood pressure (mm Hg)	147 ± 27	143 [130 – 161]
Diastolic blood pressure (mm Hg)	85 ± 16	83 [75 – 95]

- Based on 22,519 ischemic stroke cases.

Table 12 Profile of hyperacute treatment for ischemic strokes

	Frequency	Percentage
Hyperacute thrombolysis	2889	12.8
IV thrombolysis	1933	66.9
IA thrombolysis	413	14.2
Combined IV and IA thrombolysis	543	18.8
Modality of pharmacological thrombolysis		
rt-PA	2494	86.3
Urokinase	611	21.1
Abciximab	41	1.4

- Based on 22,519 ischemic stroke cases.

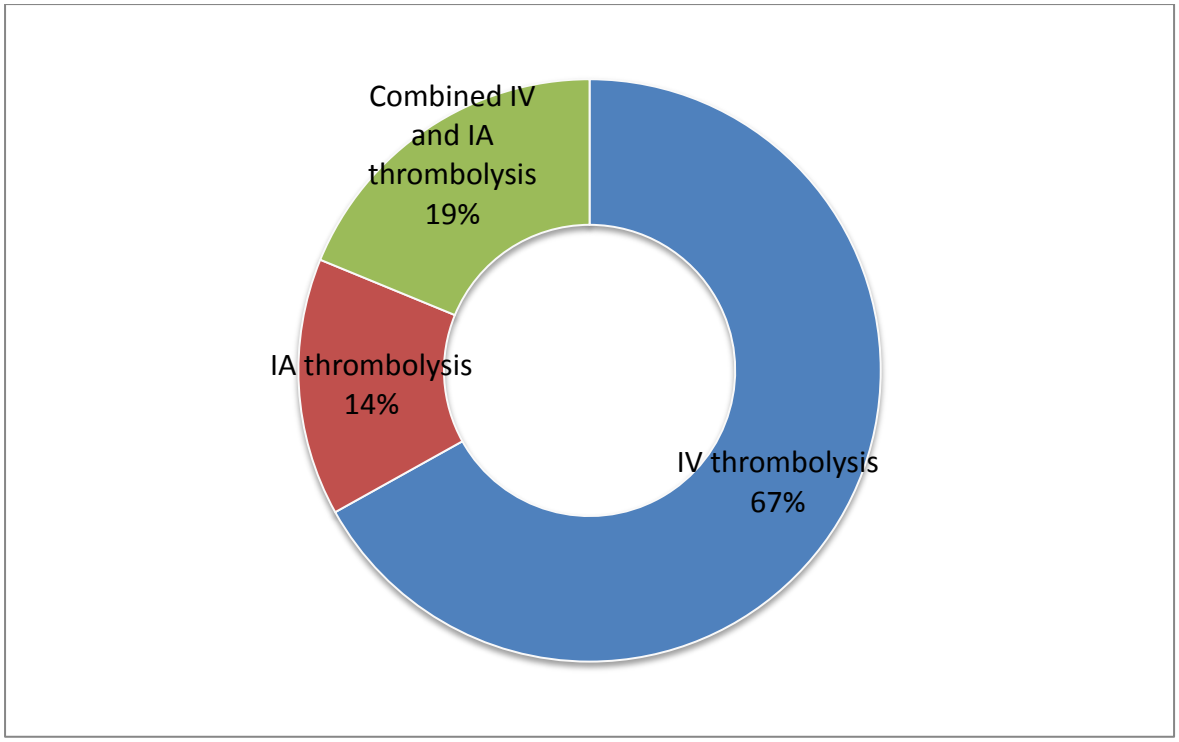

Figure 14 Composition of hyperacute revascularization treatment modalities

- Based on 22,519 ischemic stroke cases.

Table 13 Profile of acute stroke medications (multiple choices permitted)

	Frequency	Percentage
Aspirin	18270	81.1
Clopidogrel	7101	31.5
Dypiridamole	3	0.0
Cilostazol	741	3.3
Triflusal	115	0.5
Ticlopidine	73	0.3
Heparin	0	0.0
Warfarin	1595	7.1
Low-molecular weight heparin	1781	7.9
Thrombin inhibitor	244	1.1
Other medication	95	0.4

- Based on 22,519 ischemic stroke cases.

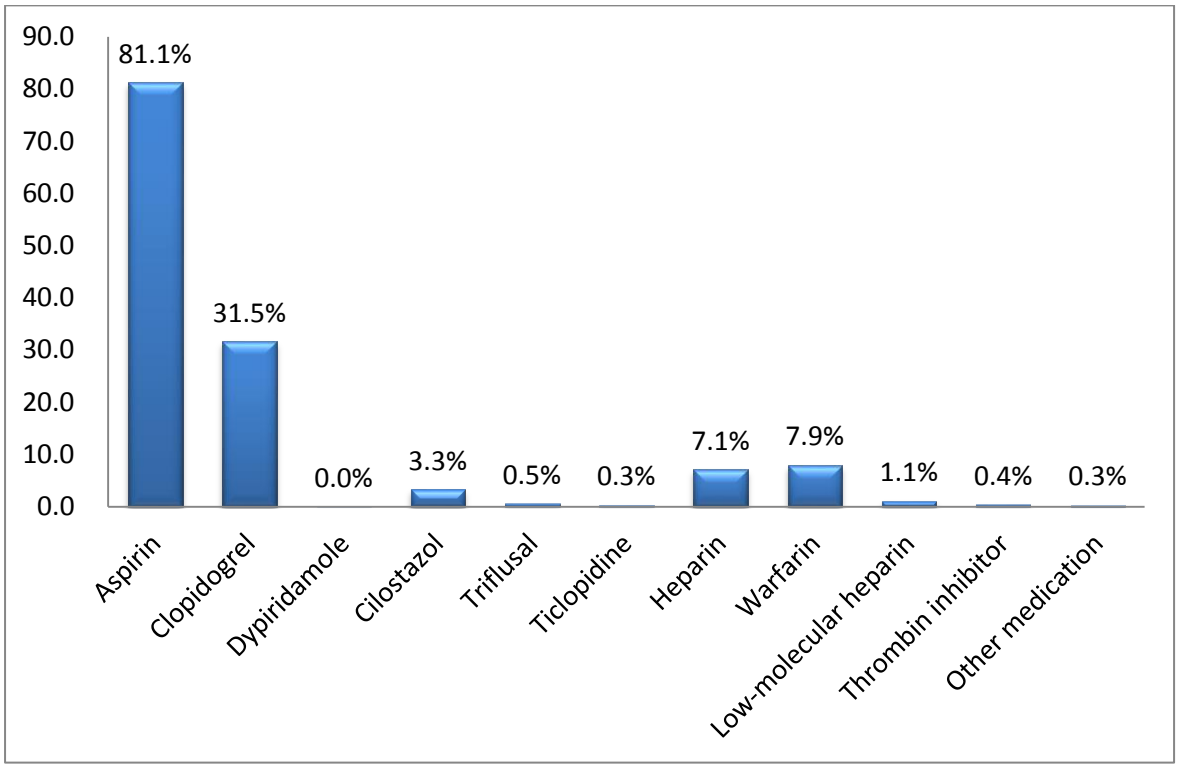

Figure 15 Percentages of acute stroke medications (multiple choices permitted)

- Based on 22,519 ischemic stroke cases.

Table 14 Profile of secondary preventive medications at discharge (multiple choices permitted)

	Frequency	Percentage
Aspirin	15547	69.0
Clopidogrel	7964	35.4
Dypiridamole	1	0.0
Cilostazol	1666	7.4
Triflusal	308	1.4
Ticlopidine	218	1.0
Other antiplatelets	95	0.4
Warfarin	4030	17.9
Other anticoagulants	279	1.2

- Based on 22,519 ischemic stroke cases.

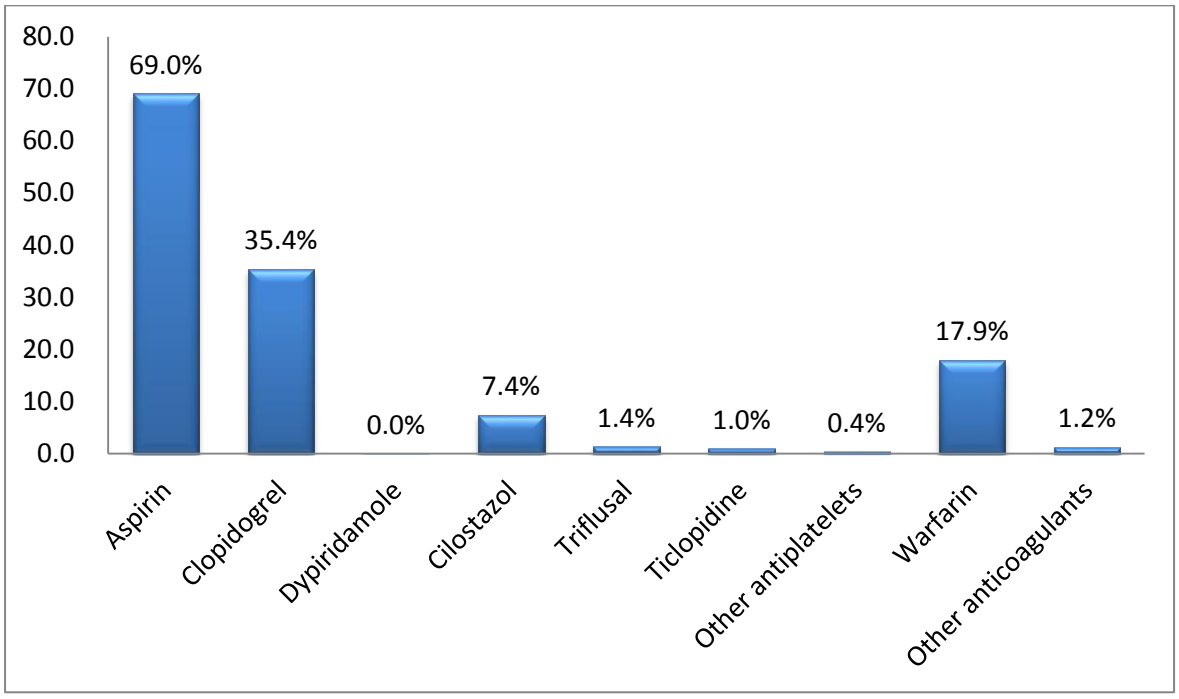

Figure 16 Percentages of secondary preventive medications at discharge (multiple choices permitted)

- Based on 22,519 ischemic stroke cases.

Table 15 Profile of surgical interventions during acute period of stroke (multiple choices permitted)

	Frequency	Percentage
Decompressive surgery	106	0.5
Bypass surgery	11	0.0
Endarterectomy	47	0.2
Angioplasty or stenting	386	1.7

- Based on 22,519 ischemic stroke cases.

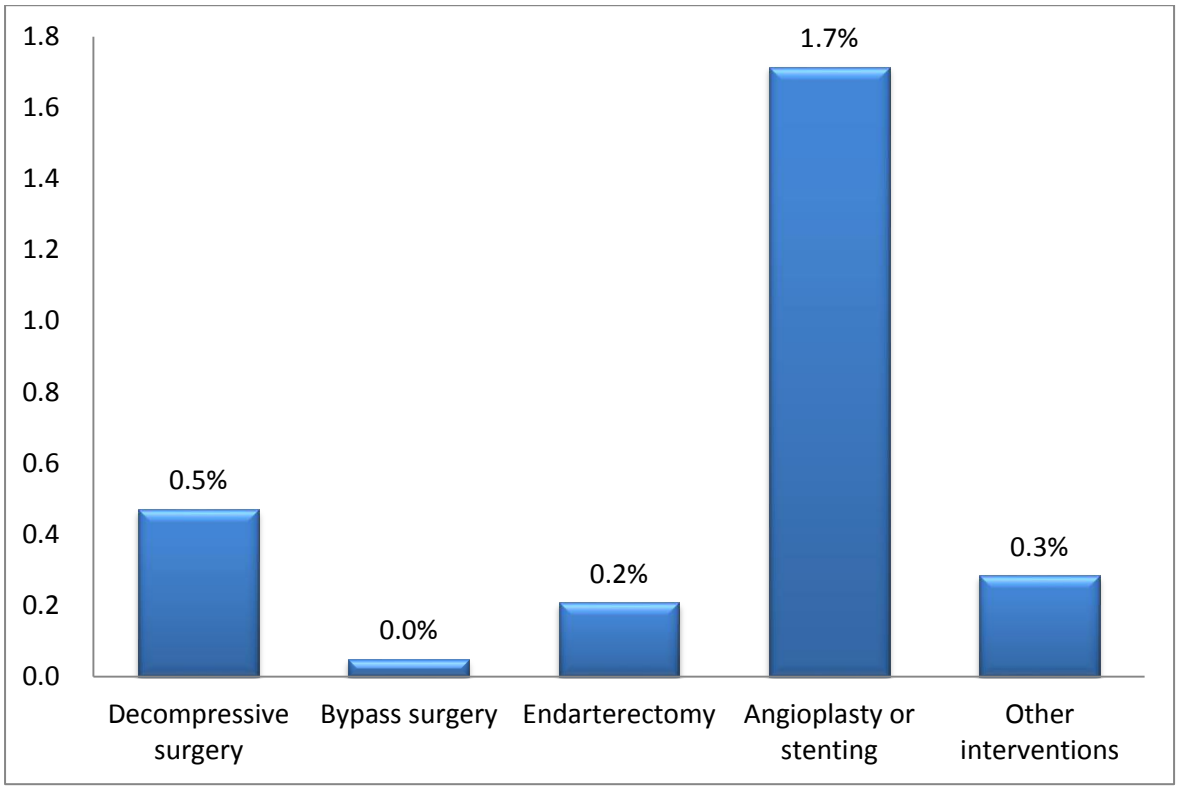

Figure 17 Percentages of surgical interventions during acute period of stroke (multiple choices permitted)

- Based on 22,519 ischemic stroke cases.

Table 16 Major vascular risk factors and their management before index strokes

Risk factors and prior managements	Value (percentage*)
Hypertension	15200 (67.5%)
Never diagnosed as hypertension	1649 (10.8%)
Diagnosed but never treated of hypertension	724 (4.8%)
Ever-used BP-lowering medications	13009 (85.6%)
Ceased using BP-lowering medications	562 (3.7%)
Currently using BP-lowering medications	12456 (81.9%)
Without regular treatment	446 (2.9%)
With regular treatment	12010 (79.0%)
Diagnosed at the index admission	1468 (9.7%)
Diabetes	7380 (32.8%)
Never diagnosed as diabetes	1359 (18.4%)
Diagnosed but never treated of diabetes	285 (3.9%)
Ever-used glucose-lowering medications	6067 (82.2%)
Ceased using glucose-lowering medications	272 (3.7%)
Currently using glucose-lowering medications	5798 (78.6%)
Without regular treatment	217 (3.7%)
With regular treatment	5581 (75.6%)
Diagnosed at the index admission	1033 (14.0%)
Dyslipidemia	6868 (30.5%)
Never diagnosed as dyslipidemia	3499 (50.9%)
Diagnosed but never treated of dyslipidemia	218 (3.2%)
Ever-used cholesterol-lowering medications	3200 (46.6%)
Ceased using cholesterol -lowering medications	198 (2.9%)
Currently using cholesterol -lowering medications	3007 (43.8%)
Without regular treatment	82 (1.2%)
With regular treatment	2925 (42.6%)
Diagnosed at the index admission	3452 (50.3%)
Habitual smoking	8821 (39.2%)
Current smoker	6009 (68.1%)
Ex-smoker, quit within 5 years	970 (11.0%)
Ex-smoker, quit more than 5 years ago	1842 (20.9%)
Pack-year	33.5 ± 18.6
Atrial fibrillation	4467 (19.8%)
Diagnosed at the index admission	1979 (44.3%)
Diagnosed before index stroke	2479 (55.5%)
Without regular treatment	396 (8.9%)
With regular treatment	1902 (42.6%)

* Percentages of management categories were calculated based on the frequency of each risk factor.

- Based on 22,519 ischemic stroke cases.

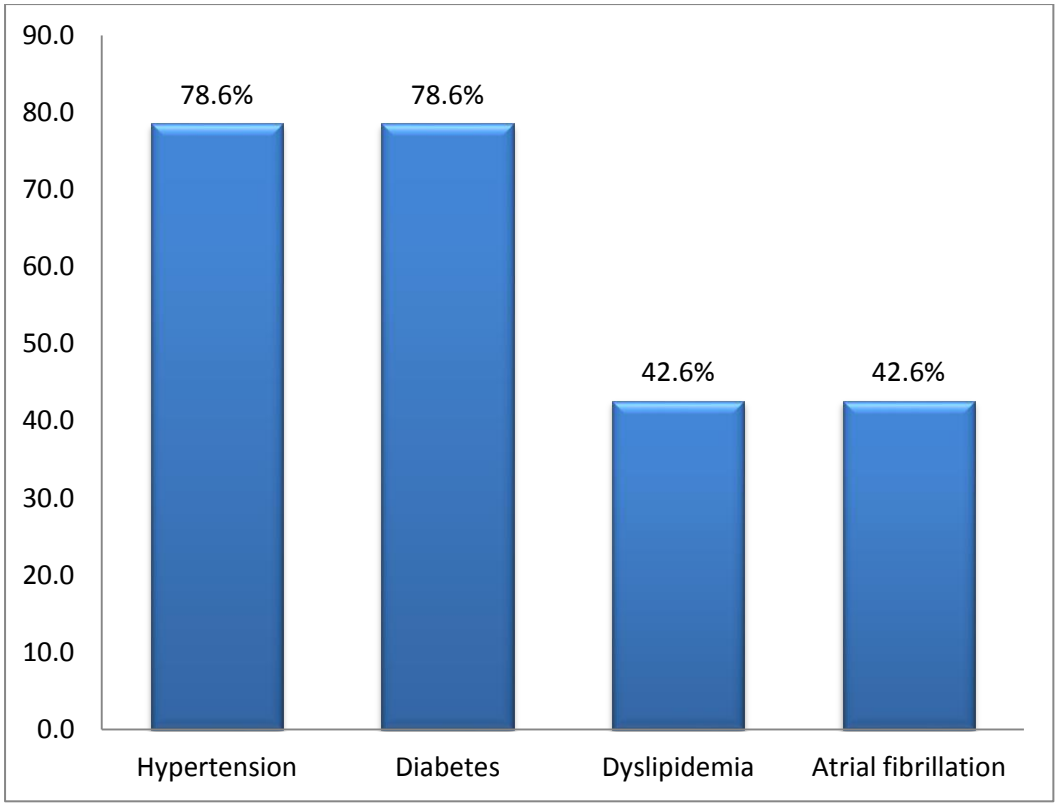

Figure 18 Percentages of regular treatment for vascular risk factors

- Based on 22,519 ischemic stroke cases.

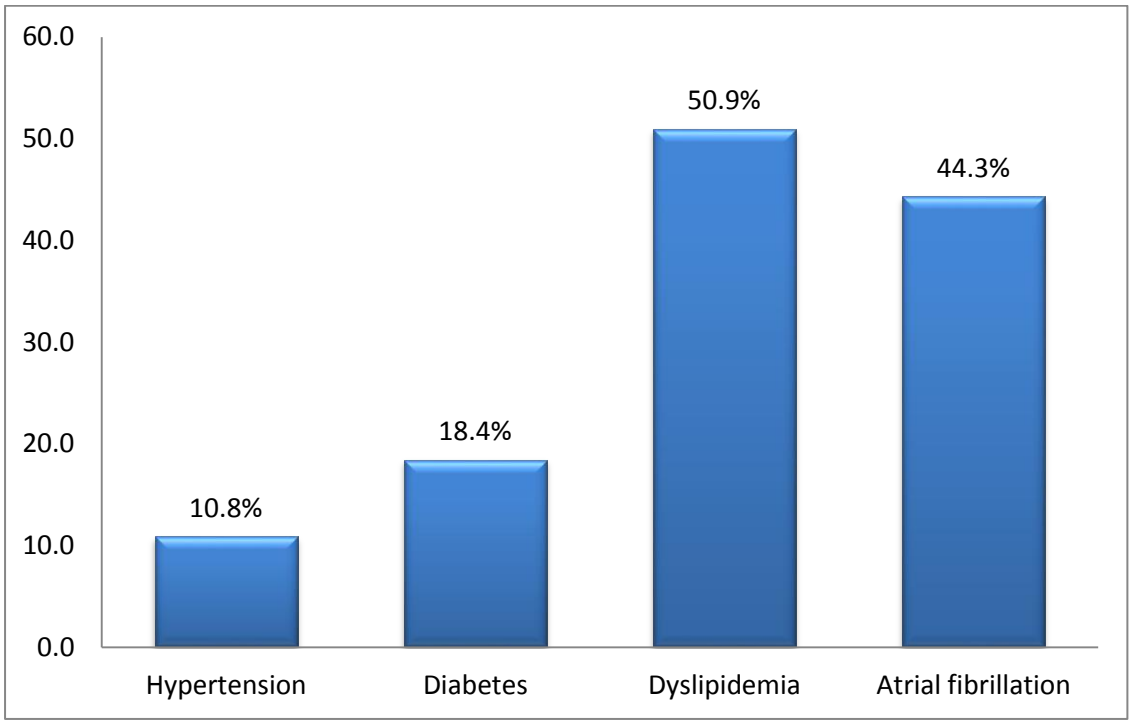

Figure 19 Percentages of undocumented vascular risk factors

- Based on 22,519 ischemic stroke cases.

Table 17 Distribution of premorbid mRS score in the included stroke cases

Prestroke mRS score	Frequency (percentage)
0	18160 (80.6%)
1	1509 (6.7%)
2	1058 (4.7%)
3	1053 (4.7%)
4	538 (2.4%)
5	201 (0.9%)

- Based on 22,519 ischemic stroke cases.

Acute Treatment Statistics of CRCS-5

Establishment of acute treatment database in CRCS-5

- From November 2009, five centers (Eulji General Hospital, Seoul National University Bundang Hospital, Seoul Medical Center, Soonchunhyang University Hospital Seoul and Inje University Ilsan Paik Hospital) initiated acute treatment database devoted to collect clinical and treatment information of acute ischemic stroke. At January 2011, six new members were introduced to acute treatment database (Eulji University Hospital, Dona-A University Hospital, Yeungnam University Medical Center, Hallym University Sacred Heart Hospital, Chonnam National University Hospital and Dongguk University Ilsan Hospital). Along with CRCS-5 database, acute treatment database further expanded to include Jeju National University Hospital in October 2011, and Ulsan University Hospital as well as Chungbuk National University Hospital in January 2013.
- Data registration and auditing process are identical to the CRCS-5 DB.
- Acute treatment database is focusing on the revascularization process of hyperacute ischemic stroke patients.

Revascularization treatment for acute ischemic stroke

- A total of 2354 (16% of 14,378 registered stroke cases during identical period) cases received revascularization treatment for acute ischemic stroke. Intravenous-only pharmacological thrombolysis (IV thrombolysis) was performed in 1583 (67%), endovascular-only revascularization (IA thrombolysis) in 315 (13%), and combined IV-endovascular revascularization (Combined IV-IA thrombolysis) in 456 (19%) strokes (Table 18 Modality of revascularization treatment for acute ischemic stroke). Overall, endovascular recanalization strategies were utilized in 33% of revascularization treatments.

- For stroke cases with hyperacute treatment, onset (*i.e.* last seen normal) -to-arrival time delay was 2.8 ± 3.4 hours on average, with median 1.7 [interquartile range, 0.8 – 3.2]. Average onset-to-arrival time of IV thrombolysis and combined IV-IA thrombolysis was around 2 hours, but that of IA thrombolysis exceeded 8 hours (median 6.6 hour). Of acute ischemic strokes with revascularization treatment, 95% of cases arrived stroke centers within 6 hours after onset. Door-to-treatment time varied according to the treatment modality. (Table 19 Discrepancy in onset (last normal time) to arrival time according to the treatment modality, Table 20 Categorized onset-to-arrival time and Table 21 Door-to-treatment time according to treatment modality).

- Medications used in pharmacological thrombolysis was as follows (multiple choices permitted); recombinant tissue plasminogen activator 2033 (86%), urokinase 455 (19%), and abciximab 31 (1.3%).

- Average NIHSS score at arrival was 12.0 ± 6.7 points, with median 11 [interquartile range, 6 – 17]. At day #1 after revascularization treatment, average NIHSS score was 9.9 ± 7.9 points, with median 8 [interquartile range, 3 – 15] (available in 2021 cases). 648 (32%) cases showed early neurological improvement, defined as NIHSS score decrease ≥4-point (Figure 20 Difference of NIHSS score over arrival and day #1 post-revascularization (available in 2021 strokes) and Figure 21 Volume of acute revascularization treatment for each stroke center)..

- Symptomatic hemorrhagic transformation, associated with NIHSS score increase ≥4-point, occurred in 165 (7.0%) cases. Time delay after symptom onset to symptomatic hemorrhagic transformation was 1.3 ± 3.9 days on average.

Stroke center statistics for revascularization treatment

- Volume of acute revascularization treatment varied for each stroke center. Revascularization modality also varied among stroke centers. Rate of endovascular treatment, including both IA thrombolysis and combined IV-IA thrombolysis, range from 4% (Hospital #08) to 61% (Hospital #02). However, onset-to-arrival time and NIHSS score at arrival did not show noticeable

difference between stroke centers (Table 23 Discrepancy of revascularization modality among stroke centers, Figure 22 Discrepancy of revascularization modality among stroke centers and Table 24 Onset-to-arrival times and NIHSS scores between stroke centers).

Table 18 Modality of revascularization treatment for acute ischemic stroke

Treatment modality	Frequency (percentage)
Intravenous-only thrombolysis	1583 (67.3%)
Endovascular-only revascularization	315 (13.4%)
Combined IV-endovascular revascularization	456 (19.4%)
Total	2354

- Based on 14,378 cases from acute treatment database

Table 19 Discrepancy in onset (last normal time) to arrival time according to the treatment modality

Treatment modality	Mean ± SD (hour) Median [interquartile range]
Intravenous-only thrombolysis	2.7 ± 2.4 2.1 [1.5 – 2.9]
Endovascular-only revascularization	8.2 ± 5.0 6.6 [4.5 – 11.5]
Combined IV-endovascular revascularization	2.6 ± 2.5 1.9 [1.4 – 2.7]

- Based on 14,378 cases from acute treatment database

Table 20 Categorized onset-to-arrival time

Onset-to-arrival time	Frequency (percentage)
≤3 hours	1925 (81.7%)
3 – 6 hours	319 (11.4%)
6 – 12 hours	69 (2.7%)
12 – 24 hours	41 (1.7%)
Total	2354

- Based on 14,378 cases from acute treatment database

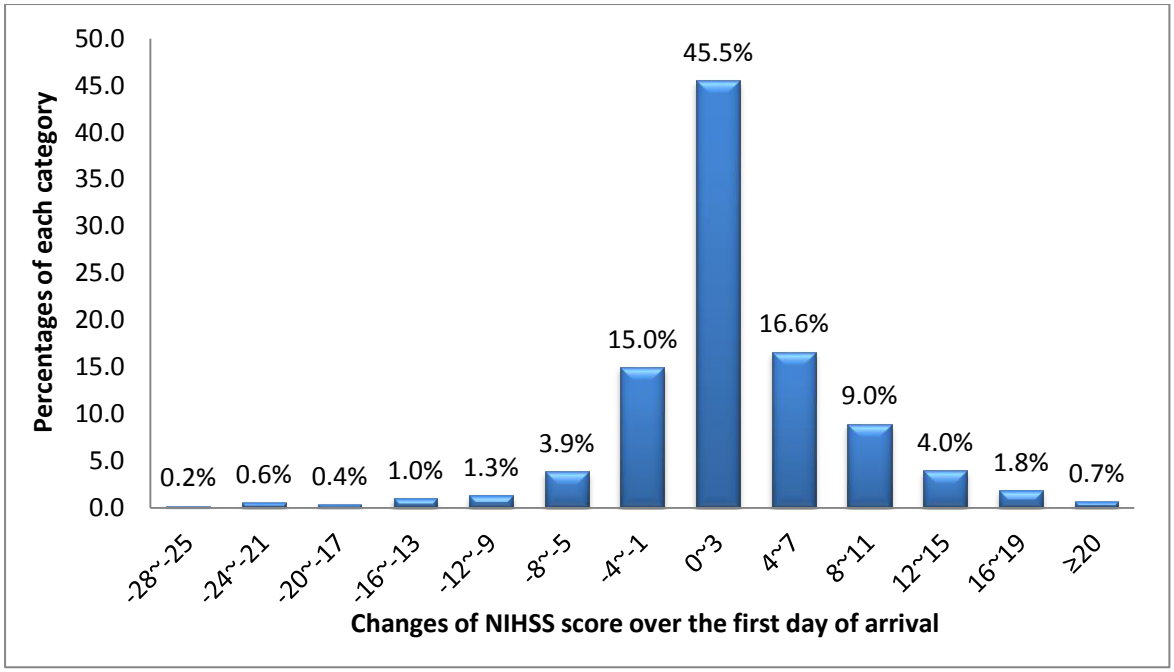

Figure 20 Difference of NIHSS score over arrival and day #1 post-revascularization (available in 2021 strokes)

- Based on the 2021 strokes received hyperacute revascularization treatment from the acute stroke treatment database containing 14,378 records

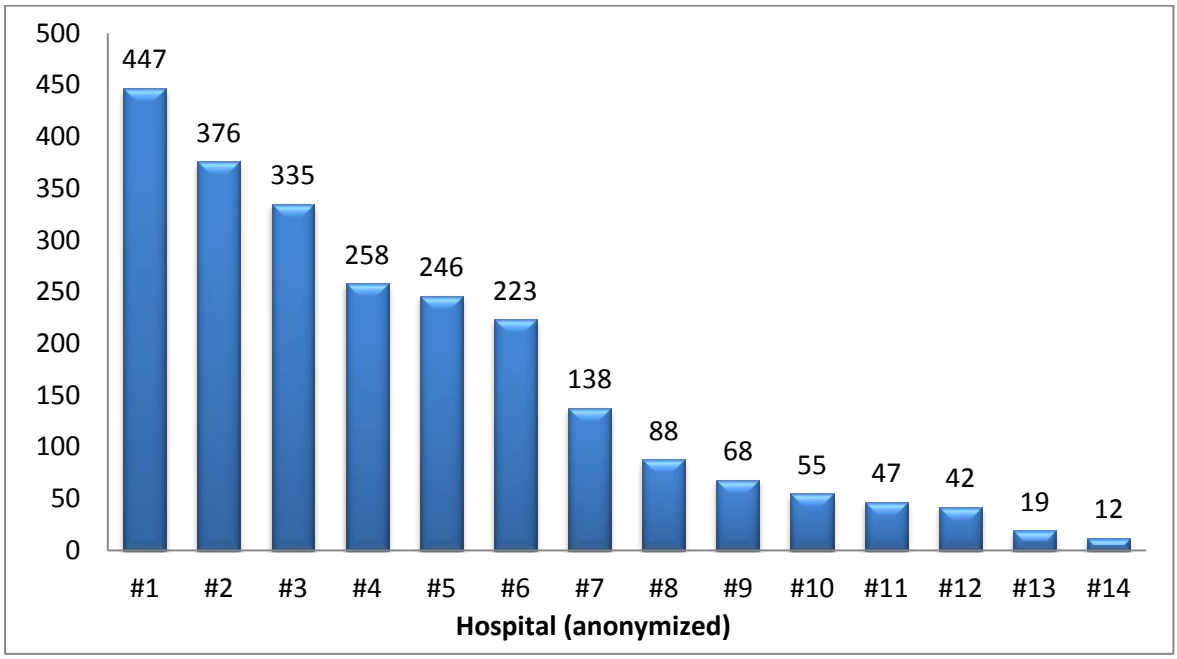

Figure 21 Volume of acute revascularization treatment for each stroke center

- Based on 14,378 cases from acute treatment database

Table 21 Discrepancy of revascularization modality among stroke centers

Hospital (Anonymized)	IV-only	IA-only	Combined	Total
#1	374 (83.7%)	38 (8.5%)	35 (7.8.5%)	447
#2	147 (39.1%)	112 (29.8%)	117 (31.1%)	376
#3	237 (70.7%)	38 (11.3%)	60 (17.9%)	335
#4	169 (65.5%)	43 (16.7%)	46 (17.8%)	258
#5	182 (74.0%)	25 (10.2%)	39 (15.9%)	246
#6	132 (59.2%)	23 (10.3%)	68 (30.5%)	223
#7	81 (58.7%)	17 (12.3%)	40 (29.0%)	138
#8	84 (95.5%)	2 (2.3%)	2 (2.3%)	88
#9	51 (75.0%)	2 (2.9%)	15 (22.1%)	68
#10	46 (83.6%)	2 (3.6%)	7 (12.7%)	55
#11	33 (70.2%)	7 (14.9%)	7 (14.9%)	47
#12	30 (71.4%)	2 (4.8%)	10 (23.8%)	42
#13	12 (63.2%)	1 (5.3%)	6 (31.6%)	19
#14	5 (41.7%)	3 (25.0%)	4 (33.3%)	12
Total	1583 (67.2%)	315 (13.4%)	456 (19.4%)	2354

- Based on 14,378 cases from acute treatment database

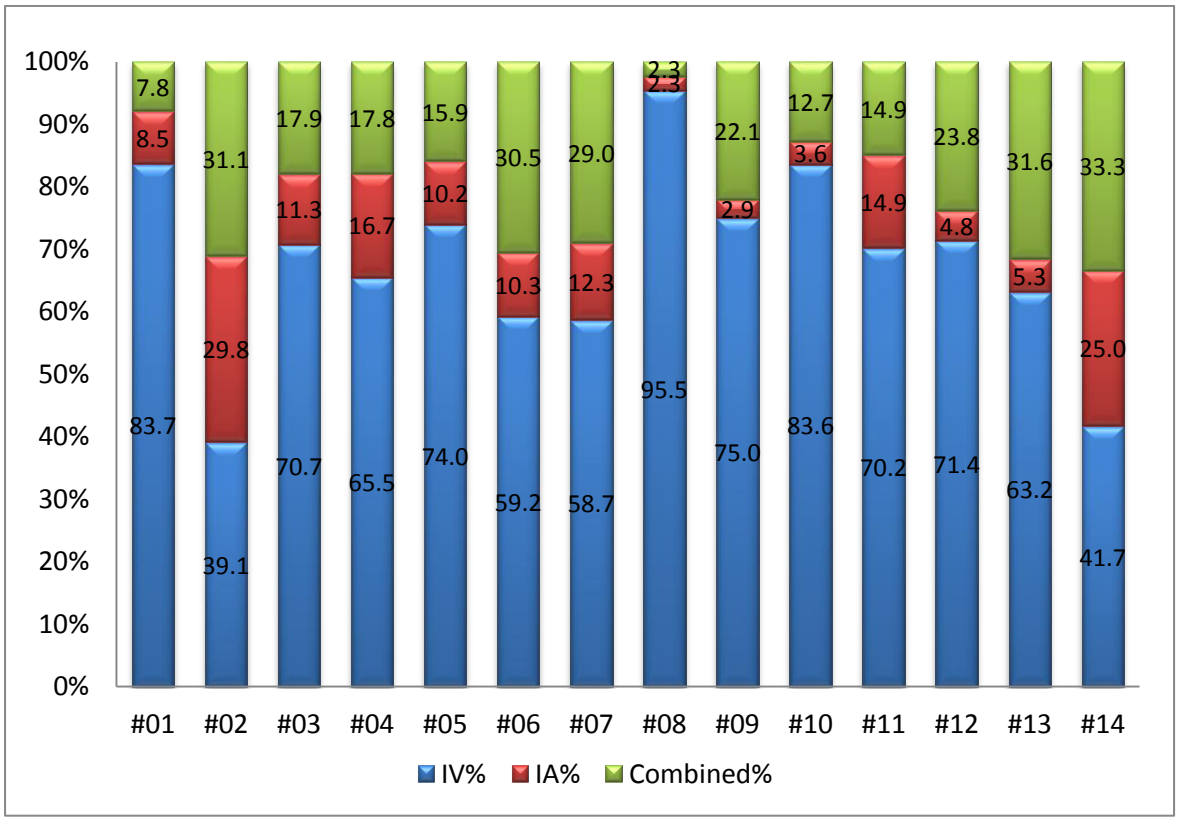

Figure 22 Discrepancy of revascularization modality among stroke centers

- Based on 14,378 cases from acute treatment database

Table 22 Onset-to-arrival times and NIHSS scores between stroke centers

Hospital (Anonymized)	Onset to arrival time (hour)	NIHSS score at arrival
#1	2.8 ± 3.1	10.5 ± 4.8
#2	2.4±3.2	13.2±7.6
#3	2.4±2.0	11.6±5.9
#4	1.7±2.7	11.3±6.9
#5	1.9±2.0	12.3±7.4
#6	1.5±1.4	12.9±8.3
#7	1.3±2.5	12.0±6.4
#8	0.8±0.7	13.1±5.4
#9	1.0±1.6	13.4±6.3
#10	1.2±0.9	12.4±7.2
#11	1.8±2.3	12.4±5.5
#12	1.3±0.9	13.1±7.0
#13	2.0±1.4	12.1±5.6
#14	0.8±0.5	10.8±4.9
Total	2.1±2.5	12.0±6.7

- Based on 14,378 cases from acute treatment database

Outcome Statistics of CRCS-5

Establishment of stroke outcome database in CRCS-5

- Along with acute treatment database, five centers (Eulji General Hospital, Seoul National University Bundang Hospital, Seoul Medical Center, Soonchunhyang University Hospital Seoul and Inje University Ilsan Paik Hospital) initiated prospective capture system of stroke outcomes and constructed stroke outcome database. Registrars of each stroke center contacted stroke survivors by telephone 3 months and 1 year after stroke onset, and rated modified Rankin scale score and occurrence of any vascular events.

- After January 2011, six centers participated in the prospective capture of stroke outcomes, and gathering information was expanded to include early neurological deteriorations within 3 weeks after stroke and medication adherence until 3 months, as well as modified Rankin scale scores at 3 month and 1 year. With current outcome gathering strategy, CRCS-5 launched a separate but parallel study, MOSAIC (Multicenter prospective Observational Study about recurrence and its determinants after Acute IsChemic stroke).

- Definition of early neurological deterioration (END) is any new neurological symptoms/signs or any neurological worsening occurred 3 weeks within the onset of index stroke. Aggravated neurological status includes 1) NIHSS score increase ≥2-point; 2) NIHSS score 1a, 1b or 1c subscore increase ≥1-point; 3) NIHSS score 5a, 5b, 6a, 6b (motor subscore) increase ≥1-point; or 4) any kind of newly developed neurological symptom.

- Causes of ENDs include recurrence of stroke, progression of stroke, symptomatic hemorrhagic transformation, other causes (deep venous thrombosis, pulmonary embolism, myocardial infarction or others), or unknown etiologies.

- Early stroke recurrence is defined as END associated with new infarctions documented by diffusion-weighted image or computed tomography image after

stabilization of initial neurological symptoms/signs more than 24 hours, and excluding potential influence from edema, mass effect, brain shifting or hemorrhagic transformation of the incident cerebral infarction.

- Stroke progression is defined as an END after neurological stability lasting more than 24 hours associated with progressive ischemia, swelling or edema of index infarction and documented by neuroimaging studies.
- Symptomatic hemorrhagic transformation is defined as an END associated with neuroimaging-documented hemorrhagic transformation.
- Other cause of END is defined as an END associated with other general medical conditions, such as deep venous thrombosis or pulmonary embolism.
- Unknown etiology of END is defined as an END associated with other causes no mentioned previously.
- Late stroke outcomes include late recurrence of stroke, myocardial infarction, vascular death, and all kinds of death.
- Late recurrence of stroke is defined as a new neurological symptom/sign due to cerebrovascular causes lasting more than 24 hours and documented by medical doctors.
- Myocardial infarction is defined as a new diagnosis of acute myocardial infarction by medical doctors and related visit to a hospital.
- Vascular death is defined as a death caused by stroke, acute myocardial infarction, or sudden death.
- All kinds of death are defined as a death caused by other etiologies than stroke, acute myocardial infarction, or sudden death.
- The present outcome statistics is based on the database distributed on November 2013, which is as current of May 2013.

Modified Rankin scale score at 3 month and 1 year after stroke

- From MOSAIC study database, mRS scores at 3 month after stroke are available in 12072 (96%) cases and mRS score at 1 year in 7798 (62%) cases (Table 25 Distribution of mRS score at 3 month and 1 year after stroke and Table 26 mRS score matrix of 3 months and 1 year after stroke.).

- Early neurological deterioration occurred in 1924 (15%) cases (Figure 23 Frequencies of post-stroke events and Table 27 Frequencies of early neurological deteriorations (END) occurred within 3 weeks after stroke).

Prospective Capture of Vascular Events after Stroke Onset

- CRCS-5 implemented a systemic protocol for prospective capture of vascular events after stroke onset throughout all the participating centers. With the commencement of MOSAIC cohort, returning cases at 3 months or 1 year after stroke who admitted before MOSAIC cohort were subjective to the surveillance system. Registered data from the five centers which started to gather prospective outcomes (Eulji General Hospital, Seoul National University Bundang Hospital, Seoul Medical Center, Soonchunhyang University Hospital Seoul and Inje University Ilsan Paik Hospital) were also gathered together for the vascular event database. Through the above process, CRCS-5 database secured prospective vascular outcomes from a total of 17,347 cases.

- At 3 months after stroke, the event rates of vascular outcomes were as following; recurrent stroke 3.2%, myocardial infarction 0.2%, vascular death 2.5%, composite outcomes 5.2%, and all-cause death 6.2%. At 1 year after stroke, the event rates were as following; recurrent stroke 5.1%, myocardial infarction 0.5%, vascular death 3.2%, composite outcomes 7.4% and all-cause death 10.6%.

Table 23 Distribution of mRS score at discharge and 3 month and 1 year after stroke

mRS score	Discharge	3 months	1 year
0	2729 (21.6%)	3600 (29.8%)	2896 (37.1%)
1	2702 (21.4%)	2618 (21.7%)	1558 (20.0%)
2	2148 (17.0%)	1777 (14.7%)	941 (12.1%)
3	2038 (16.1%)	1543 (12.8%)	826 (10.6%)
4	1647 (13.0%)	1124 (9.3%)	527 (6.8%)
5	1136 (9.0%)	717 (5.9%)	371 (4.8%)
6	242 (1.9%)	693 (5.7%)	679 (8.7%)
Available cases	12642 (99.9)	12072 (95.6%)	7798 (61.6%)

- Based on 12,659 cases for MOSAIC study.

Table 24 mRS score matrix of discharge and 3 months after stroke.

		3 months						
		0	**1**	**2**	**3**	**4**	**5**	**6**
At discharge*	**0**	2343	373	151	101	73	50	36
	1	1184	1516	184	82	33	15	26
	2	426	719	961	147	52	23	28
	3	168	308	542	938	147	50	53
	4	45	84	159	410	769	167	164
	5	6	12	18	87	245	602	333
	6	0	0	0	0	0	0	333

- Based on 14,163 cases whose mRS scores at discharge and 3 months were available.

Table 25 mRS score matrix of 3 months and 1 year after stroke.

		1 year						
		0	**1**	**2**	**3**	**4**	**5**	**6**
3 months*	**0**	2621	139	43	23	12	5	22
	1	554	1263	85	30	9	7	26
	2	146	280	704	84	19	17	23
	3	36	68	193	661	78	19	51
	4	4	7	31	120	434	110	96
	5	1	2	4	23	73	284	182
	6	0	0	0	0	0	0	518

- Based on 9,107 cases whose mRS scores at 3 months and 1 year were available.

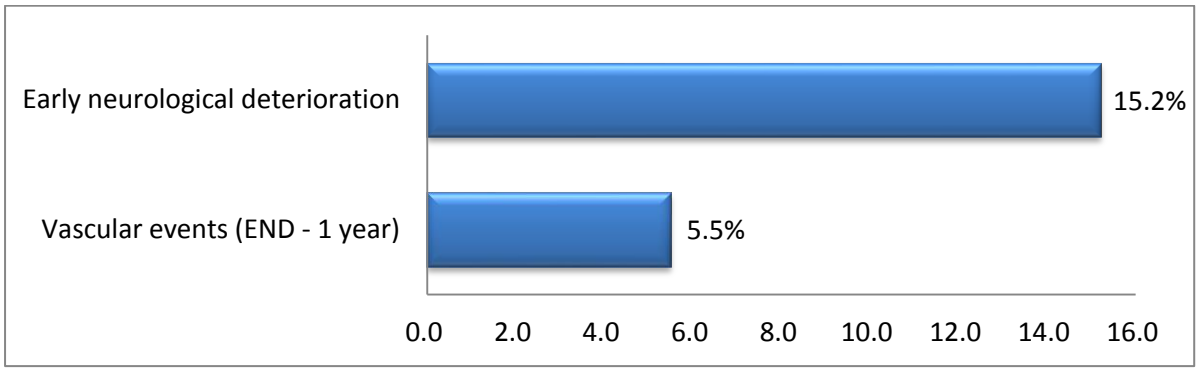

Figure 23 Frequencies of post-stroke events

- Based on 12,659 cases for MOSAIC study.

Table 26 Frequencies of early neurological deteriorations (END) occurred within 3 weeks after stroke

Type of early neurological deterioration	Frequency (percentage)
Stroke recurrence	185 (9.6%)
Stroke progression	1352 (70.3%)
Symptomatic hemorrhagic transformation	110 (5.7%)
Other ENDs	73 (3.8%)
Unknown	191 (9.9%)
Missing	13 (0.7%)
Total events	1924

- Based on 12,659 cases for MOSAIC study.

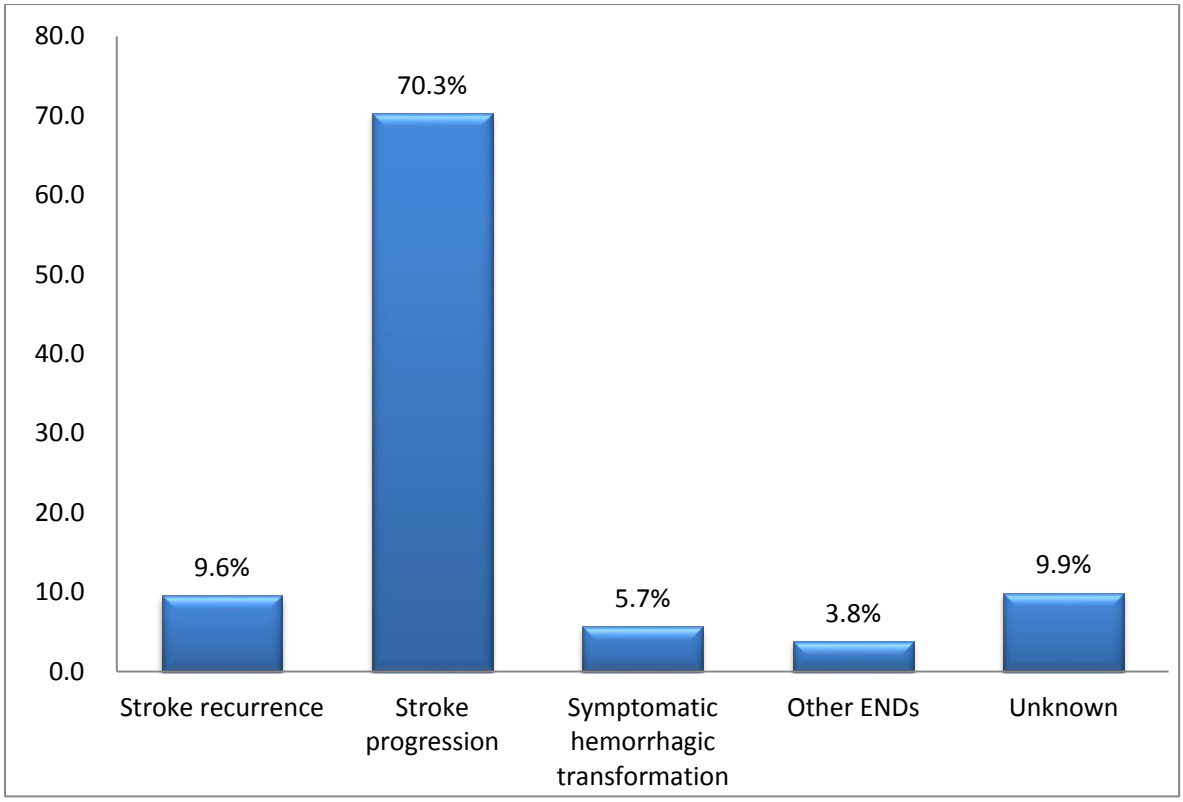

Figure 24 Frequencies of early neurological deteriorations (END) occurred within 3 weeks after stroke

- Based on 12,659 cases for MOSAIC study.

Table 27. Rates of vascular events after stroke onset

Vascular events	7 days	30 days	3 months	1 year
Recurrent stroke	1.1%	2.2%	3.2%	5.1%
	16683	15830	14447	8096
Myocardial infarction	0.1%	0.1%	0.2%	0.5%
	16859	16190	15176	8497
Vascular Death	1.3%	2.0%	2.5%	3.2%
	16818	16118	14830	8441
Composite outcomes	2.3%	3.9%	5.2%	7.4%
	16650	15815	14419	8069
All-cause death	1.8%	3.9%	6.2%	10.6%
	16806	16094	14799	8402

- Composite outcome= Stroke Recurrence + MI + Vascular death
- Based on 17,347 subjects for the prospective outcome capture surveillance data

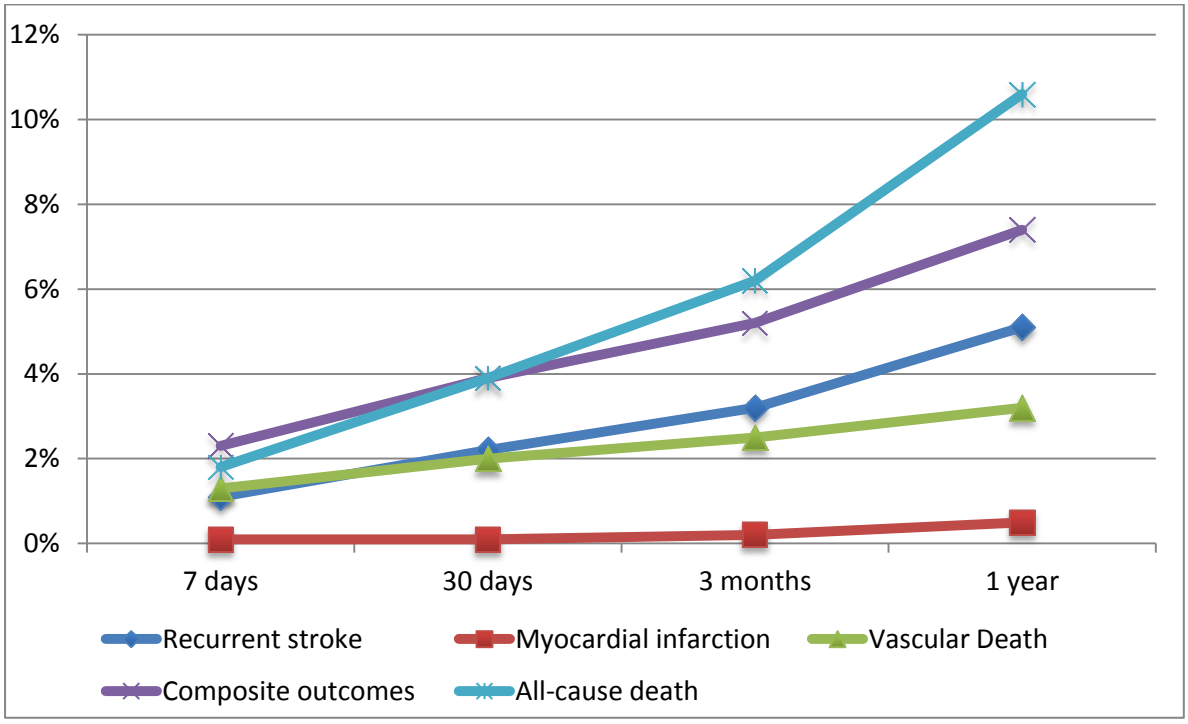

Figure 25. Rates of vascular events after stroke onset

- Based on 17,347 subjects for the prospective outcome capture surveillance data

Selected Subgroup Statistics of CRCS-5

Subgroup statistics according to sex

- From a total of 22,519 registered acute ischemic stroke cases, male was 13,124 (58%) and female was 9395 (42%) (Table 28 Subgroup statistics according to sex).
- Age showed noticeable difference between two sexes; 71 ± 12 year-old in female and 65 ± 13 year-old in male cases.
- For vascular risk factors, 62% of male cases reported to smoke, whereas only 7% of female cases smoked.
- Overall, there was no disparity in revascularization and medications between male and female.
- Initial severity and morbidity after stroke were higher in female cases.

Subgroup statistics according to age

- Stroke cases in young-age group (<45 year-old) was 1127 (5%), extreme-old age group (≥ 80 year-old) was 3858 (17%) and middle-age group (45 – 79 year-old) was 17,534 (78%) (Table 29 Subgroup statistics to age).
- Noticeable difference was detected in sex and vascular risk factors among age-groups.
- Regarding TOAST classification of ischemic stroke, young-age cases had higher frequency of other determined etiology and cryptogenic stroke (undetermined etiology – negative).
- Overall, there was no disparity in revascularization and medications among age-

groups.

- Stroke cases from young-age groups had milder initial neurological severity. Neurological and functional dependency after stroke as well as mortality was rather proportional to age-groups.

Table 28 Subgroup statistics according to sex

	Female [N=9395]	Male [N=13124]
Age	71.2 ± 12.2	65.1 ± 12.5
Vascular Risk Factors		
Hypertension	6741 (71.8%)	8459 (64.5%)
Diabetes	3034 (32.3%)	4346 (33.1%)
Dyslipidemia	3014 (32.1%)	3854 (29.4%)
Smoking	675 (7.2%)	8146 (62.1%)
Atrial fibrillation	2195 (23.4%)	2272 (17.3%)
TOAST classification		
Large Artery Atherosclerosis	3303 (35.2%)	5221 (39.8%)
Small Vessel Occlusion	1744 (18.6%)	2483 (18.9%)
Cardioembolism	2310 (24.6%)	2532 (19.3%)
Other Determined Etiology	209 (2.2%)	326 (2.5%)
Undetermined Etiology - 2 or more	412 (4.4%)	544 (4.1%)
Undetermined Etiology - Negative	704 (7.5%)	1063 (8.1%)
Undetermined Etiology - Incomplete work-ups	713 (7.6%)	955 (7.3%)
Stroke characteristics		
Onset to arrival time (hour)	39.4 ± 151.8	42.4 ± 283.9
	9.9 [2.6 – 40.9]	9.25 [2.5 – 37.4]
NIHSS score at admission	6.5 ± 6.6	5.6± 6.0
	4 [2 – 10]	3 [1 – 8]
NIHSS score ≥10-point	2402 (25.6%)	2555 (19.5%)
Revascularization treatment		
Thrombolytic treatment	1174 (12.5%)	1715 (13.1%)
IV thrombolysis	773 (8.2%)	1160 (8.8%)
IA thrombolysis	170 (1.8%)	243 (1.9%)
Combined IV and IA thrombolysis	231 (2.5%)	312 (2.4%)
Admission medication		
Aspirin	7558 (80.4%)	10712 (81.6%)
Clopidogrel	2796 (29.8%)	4305 (32.8%)
Other antiplatelet	412 (4.4%)	500 (3.8%)
Heparin	685 (7.3%)	910 (6.9%)
Warfarin	813 (8.7%)	968 (7.4%)
Discharge medication		
Aspirin	6249 (66.5%)	9298 (70.8%)
Clopidogrel	3070 (32.7%)	4894 (37.3%)
Other antiplatelet	1001 (10.7%)	1241 (9.5%)
Warfarin	1799 (19.1%)	2231 (17.0%)
Consequences of stroke		
NIHSS score at discharge	5.9 ± 8.3	4.7 ± 7.0
	3 [1 – 7]	2 [1 – 5]
mRS score at discharge	2.6 ± 1.7	2.2 ± 1.6
	3 [1 – 4]	2 [1 – 3]
In-hospital mortality	372 (4.0%)	307 (2.3%)

mRS score at 3 month	2.4 ± 2.0	1.9 ± 1.9
	2 [1 – 4]	1 [0 – 3]
0	1136 (21.5%)	2021 (26.9%)
1	999 (18.9%)	1876 (25.0%)
2	736 (13.9%)	1223 (16.3%)
3	793 (15.0%)	898 (12.0%)
4	669 (12.6%)	610 (8.1%)
5	507 (9.6%)	384 (5.1%)
6	452 (8.5%)	500 (0.4%)

- Based on 22,519 ischemic stroke cases.

Table 29 Subgroup statistics according to the age group

	<45 year-old [N=1127]	45-79 year-old [N=17534]	≥80 year-old [N=3858]
Male sex	797 (70.7%)	10833 (61.8%)	1494 (38.7%)
Vascular Risk Factors			
Hypertension	407 (36.1)	11912 (67.9%)	2881 (74.7%)
Diabetes	155 (13.8%)	6207 (35.4%)	1018 (26.4%)
Dyslipidemia	268 (23.8%)	5609 (32.0%)	991 (25.7%)
Smoking	614 (54.5%)	7343 (41.9%)	864 (22.4%)
Atrial fibrillation	41 (3.6%)	3176 (18.1%)	1250 (32.4%)
TOAST classification			
Large Artery Atherosclerosis	344 (30.5%)	6845 (39.0%)	1335 (34.6%)
Small Vessel Occlusion	227 (20.1%)	3528 (20.1%)	472 (12.2%)
Cardioembolism	140 (12.4%)	3505 (20.0%)	1197 (31.0%)
Other Determined Etiology	158 (14.0%)	345 (2.0%)	32 (0.8%)
Undetermined Etiology - 2 or more	22 (2.0%)	684 (3.9%)	250 (6.5%)
Undetermined Etiology - Negative	158 (14.0%)	1393 (7.9%)	216 (5.6%)
Undetermined Etiology - Incomplete work-ups	78 (6.9%)	1234 (7.0%)	356 (9.2%)
Stroke characteristics			
Onset to arrival time (hour)	48.0 ± 279.1	41.0 ± 164.4	33.2 ± 75.2
NIHSS score at admission	4.2 ± 5.1	5.6 ± 6.0	8.3 ± 7.2
	3 [1 – 5]	3 [1 – 7]	6 [3 – 13]
NIHSS score ≥10-point	137 (12.2%)	3463 (19.7%)	1357 (35.2%)
Revascularization treatment			
Thrombolytic treatment	133 (11.8%)	2265 (12.9%)	491 (12.7%)
IV thrombolysis	95 (8.4%)	1498 (8.5%)	340 (8.8%)
IA thrombolysis	18 (1.6%)	326 (1.9%)	69 (1.8%)
Combined IV and IA thrombolysis	20 (1.8%)	441 (2.5%)	82 (2.1%)
Admission medication			
Aspirin	953 (84.6%)	14288 (81.5%)	3029 (78.5%)
Clopidogrel	266 (23.6%)	5700 (32.5%)	1135 (29.4%)
Other antiplatelet	21 (1.9%)	754 (4.3%)	137 (3.6%)
Heparin	66 (5.9%)	1213 (6.9%)	316 (8.2%)
Warfarin	58 (5.1%)	1328 (7.6%)	395 (10.2%)
Discharge medication			
Aspirin	870 (77.2%)	12301 (70.2%)	2376 (61.6%)
Clopidogrel	329 (29.2%)	6374 (36.4%)	1261 (32.7%)
Other antiplatelet	79 (7.0%)	1786 (10.2%)	377 (9.8%)
Warfarin	151 (13.4%)	3084 (17.6%)	795 (20.6%)
Consequences of stroke			
NIHSS score at discharge	2.9 ± 5.1	4.7 ± 7.1	8.0 ± 9.6
	1 [0 – 3]	2 [1 – 5]	4 [2 – 11]
mRS score at discharge	1.7 ± 1.5	2.2 ± 1.6	3.1 ± 1.7
	1 [0 – 3]	2 [1 – 3]	3 [2 – 4]
In-hospital mortality	11 (1.0%)	439 (2.5%)	219 (5.7%)

mRS score at 3 month			
0	301 (47.1%)	2603 (26.1%)	253 (11.5%)
1	159 (24.9%)	2442 (24.5%)	274 (12.4%)
2	96 (15.0%)	1608 (16.1%)	255 (11.5%)
3	45 (7.0%)	1264 (12.7%)	382 (17.3%)
4	23 (3.6%)	898 (9.0%)	358 (16.2%)
5	7 (1.1%)	578 (5.8%)	306 (13.9%)
6	8 (1.3%)	564 (5.7%)	380 (17.2%)

- Based on 22,519 ischemic stroke cases.