

Medication Patterns by Stroke Severity in Non-Cardioembolic Ischaemic Stroke: Findings from a Large, Nationally Representative US-Based Retrospective Observational Database



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Introduction

- Ischaemic stroke (IS) accounts for around 87% of strokes in the United States (US).¹
 - Up to 78% of IS events are classified as non-cardioembolic IS (NCIS).²
- Stroke severity may be classified using the 15-item National Institutes of Health Stroke Scale (NIHSS): ≤5 (minor), 6–15 (minor-to-moderate) or >15 (moderate-to-severe).^{3,4}
- The risk of recurrent IS can be mitigated with antithrombotic strategies after NCIS or transient ischaemic attack (TIA).^{5–7}
 - For recent (<24 h) minor NCIS (NIHSS score ≤5)/high-risk TIA, the American Heart/Stroke Associations recommend 30 days' aspirin + ticagrelor; for minor NCIS/high-risk TIA with presumed atherosclerotic cause, they recommend 21 days' aspirin + clopidogrel dual antiplatelet therapy (DAPT) then single antiplatelet therapy (SAPT).⁵
 - The European Stroke Organisation recommends 30 days' aspirin + ticagrelor then SAPT.⁶
- Few studies have analysed real-world data on treatment patterns and data regarding outcomes following an NCIS are limited.⁸
 - Notably, uncertainties remain around the optimal combination of medications and the timing of DAPT initiation and duration, as well as balancing antithrombotic therapy benefits for stroke prevention and increased risk of bleeding events.^{7,9}

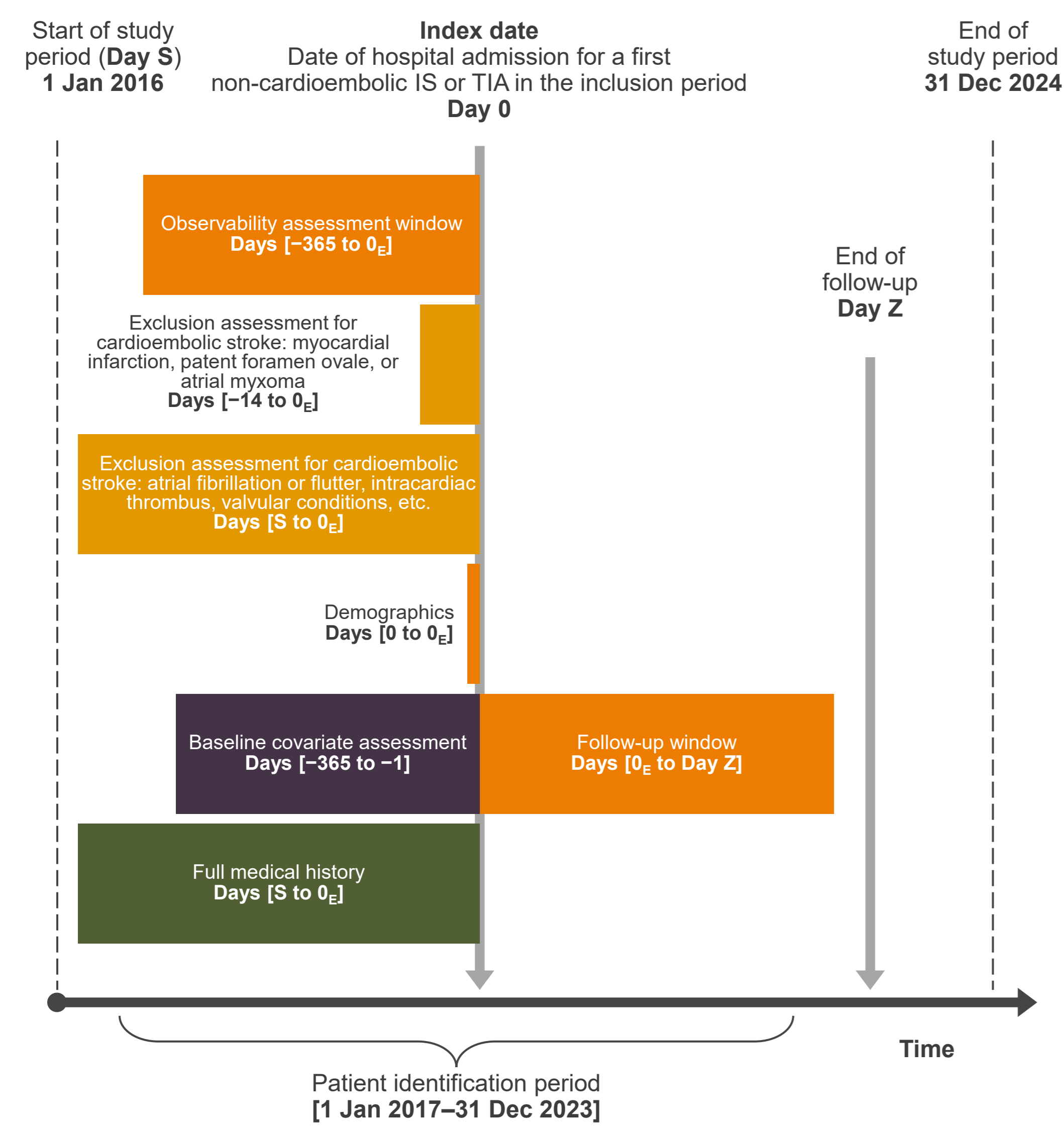
Objectives

- This subanalysis of the US-based retrospective observational ALTEA study (Analysis of a Large nationally representative US database on the Burden of disease and treatment patterns among stroke and TIA patients) assessed inpatient and discharge treatment patterns as a whole and by NCIS severity.

Methods

- ALTEA included adults (≥18 years of age) hospitalised for first NCIS or TIA (based on International Classification of Diseases, 10th Revision, Clinical Modification codes) between January 2017 and December 2023, as recorded in the Truveta electronic health record (EHR) database (Figure 1).

Figure 1. ALTEA study design.



Day 0_e, follow-up started from date of discharge from the index hospitalisation; Day S, start of study period; Day Z, the earliest of death, end of follow-up period or up to 365 days following hospitalisation for stroke/TIA.

- To be included, patients had to have ≥12 months' EHR activity prior to the index date and, in the 12 months prior to the index date, to have received care documented in the EHR database from >1 provider. Patients with risk factors associated with cardioembolic stroke were excluded.
- Stroke severity was assessed based on the NIHSS^{3,4} from structured data and clinical notes using Truveta's large language model.

Statistical analysis

- Time-to-event methods were used to evaluate all study outcomes. Patients were followed from the date of hospital admission until the earliest of death, end of follow-up period or up to 365 days following hospitalisation for IS/TIA.

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Results

Study population

- Among 180,021 patients with NCIS, 67% (n=120,923) had estimable admission NIHSS scores. Of these, 78% had a score ≤5, 14% had a score 6–15 and 8% had a score >15.
- Baseline characteristics are shown in Table 1.
 - Compared with patients with NIHSS scores ≤5, those with NIHSS scores >15 were older and less likely to be of White or Black/African American ethnicity.
 - Patients in the NIHSS score >15 category were more likely to be female with other characteristics being more balanced.

Table 1. Baseline characteristics.

Characteristic	NCIS N=180,021†	NIHSS ≤5 n=94,069	NIHSS 6–15 n=17,218	NIHSS >15 n=9636
Age, mean (SD), years	67.6 (14.5)	66.9 (14.3)	68.5 (14.6)	70.4 (14.8)
Sex, n (%)				
Male	87,972 (48.9)	46,923 (49.9)	8269 (48.0)	4329 (44.9)
Female	88,752 (49.3)	45,635 (48.5)	8614 (50.0)	4918 (51.0)
Other or unknown	3297 (1.8)	1511 (1.6)	335 (1.9)	389 (4.0)
Ethnicity, n (%)				
White	122,933 (68.3)	64,512 (68.6)	11,143 (64.7)	5791 (60.1)
Black or African American	24,285 (13.5)	12,973 (13.8)	2365 (13.7)	945 (9.8)
Asian	4446 (2.5)	2742 (2.9)	516 (3.0)	220 (2.3)
Other‡	8268 (4.6)	4922 (5.2)	992 (5.8)	368 (3.8)
Unknown	20,089 (11.2)	8920 (9.5)	2202 (12.8)	2312 (24.0)

†The combined total for NIHSS ≤5, NIHSS 6–15 and NIHSS >15 does not sum to the total for NCIS because 59,098 patients during index hospitalisation did not have NIHSS scores available.

‡Includes participants identifying as Native American, Native Alaskan, Native Hawaiian, Pacific Islander or other.

NCIS, non-cardioembolic ischaemic stroke; NIHSS, National Institutes of Health Stroke Scale; SD, standard deviation.

Treatment patterns during index hospitalisation

- During the index hospitalisation, 81% of patients received antiplatelet therapy (APT) (SAPT, 52%; DAPT, 29%) and 10% received an oral anticoagulant (Table 2).
 - Around 50% of patients in all NIHSS categories received aspirin as SAPT; DAPT prescription was predominantly aspirin + clopidogrel.
- While SAPT use was similar across NIHSS categories, patients with NIHSS scores ≤5 had the largest proportion of inpatient total APT use, whereas those with NIHSS scores >15 had the lowest use (Table 2).

Table 2. Treatment patterns during index hospitalisation for all patients with NCIS and by NIHSS category.

Type of treatment, n (%)	NCIS N=180,021†	NIHSS ≤5 n=94,069	NIHSS 6–15 n=17,218	NIHSS >15 n=9636
APT or OAC	148,414 (82.4)	83,770 (89.1)	14,532 (84.4)	6737 (69.9)
No APT or OAC	31,607 (17.6)	10,299 (10.9)	2686 (15.6)	2899 (30.1)
APT	144,840 (80.5)	82,327 (87.5)	14,164 (82.3)	6542 (67.9)
SAPT	93,265 (51.8)	49,517 (52.6)	9339 (54.2)	5120 (53.1)
Aspirin	88,369 (49.1)	47,015 (50.0)	8941 (51.9)	4981 (51.7)
Clopidogrel	6960 (3.9)	3625 (3.9)	561 (3.3)	188 (2.0)
Cilostazol	38 (<0.1)	12 (<0.1)	5 (<0.1)	3 (<0.1)
DAPT	51,584 (28.7)	32,814 (34.9)	4826 (28.0)	1423 (14.8)
Aspirin + clopidogrel	51,338 (28.5)	32,683 (34.7)	4798 (27.9)	1413 (14.7)
Aspirin + cilostazol	377 (0.2)	209 (0.2)	47 (0.3)	10 (0.1)
Cilostazol + clopidogrel	202 (0.1)	115 (0.1)	27 (0.2)	3 (<0.1)
OAC	18,248 (10.1)	9045 (9.6)	2076 (12.1)	992 (10.3)
Thrombolytic therapy	22,961 (12.8)	12,853 (13.7)	3417 (19.8)	2077 (21.6)
Thrombectomy	6323 (3.5)	2864 (3.0)	1410 (8.2)	1615 (16.8)

†The combined total for NIHSS ≤5, NIHSS 6–15 and NIHSS >15 does not sum to the total for NCIS because 59,098 patients during index hospitalisation did not have NIHSS scores available. APT, antiplatelet therapy; DAPT, dual antiplatelet therapy; NCIS, non-cardioembolic ischaemic stroke; NIHSS, National Institutes of Health Stroke Scale; OAC, oral anticoagulant; SAPT, single antiplatelet therapy.

Treatment patterns at discharge

- At discharge, 87% of patients overall received APT (SAPT, 51%; DAPT, 36%) (Table 3).
 - SAPT use was slightly higher in those with NIHSS scores >15 compared with those NIHSS scores ≤5, whereas DAPT use was markedly lower as NIHSS scores increased.
 - A larger percentage of patients with NIHSS scores >15 compared with NIHSS score ≤5 were discharged without prescription of APT or an oral anticoagulant.

Table 3. Treatment patterns at discharge for all patients with NCIS and by NIHSS category.

Type of treatment, n (%)	NCIS N=149,877†	NIHSS ≤5 n=83,561	NIHSS 6–15 n=14,004	NIHSS >15 n=4927
APT or OAC	134,473 (89.7)	78,190 (93.6)	12,544 (89.6)	3999 (81.2)
No APT or OAC	15,404 (10.3)	5371 (6.4)	1460 (10.4)	928 (18.8)
APT	130,976 (87.4)	76,815 (91.9)	12,171 (86.9)	3794 (77.0)
SAPT	76,876 (51.3)	42,273 (50.6)	7549 (53.9)	2740 (55.6)
Aspirin	72,401 (48.3)	40,109 (48.0)	7152 (51.1)	2629 (53.4)
Clopidogrel	4536 (3.0)	2195 (2.6)	401 (2.9)	120 (2.4)
Cilostazol	27 (<0.1)	10 (<0.1)	7 (<0.1)	1 (<0.1)
DAPT	54,101 (36.1)	34,543 (41.3)	4622 (33.0)	1054 (21.4)
Aspirin + clopidogrel	53,860 (35.9)	34,419 (41.2)	4597 (32.8)	1046 (21.2)
Aspirin + cilostazol	456 (0.3)	262 (0.3)	49 (0.3)	8 (0.2)
Cilostazol + clopidogrel	305 (0.2)	185 (0.2)	31 (0.2)	6 (0.1)
OAC	20,299 (13.5)	10,491 (12.6)	2194 (15.7)	920 (18.7)

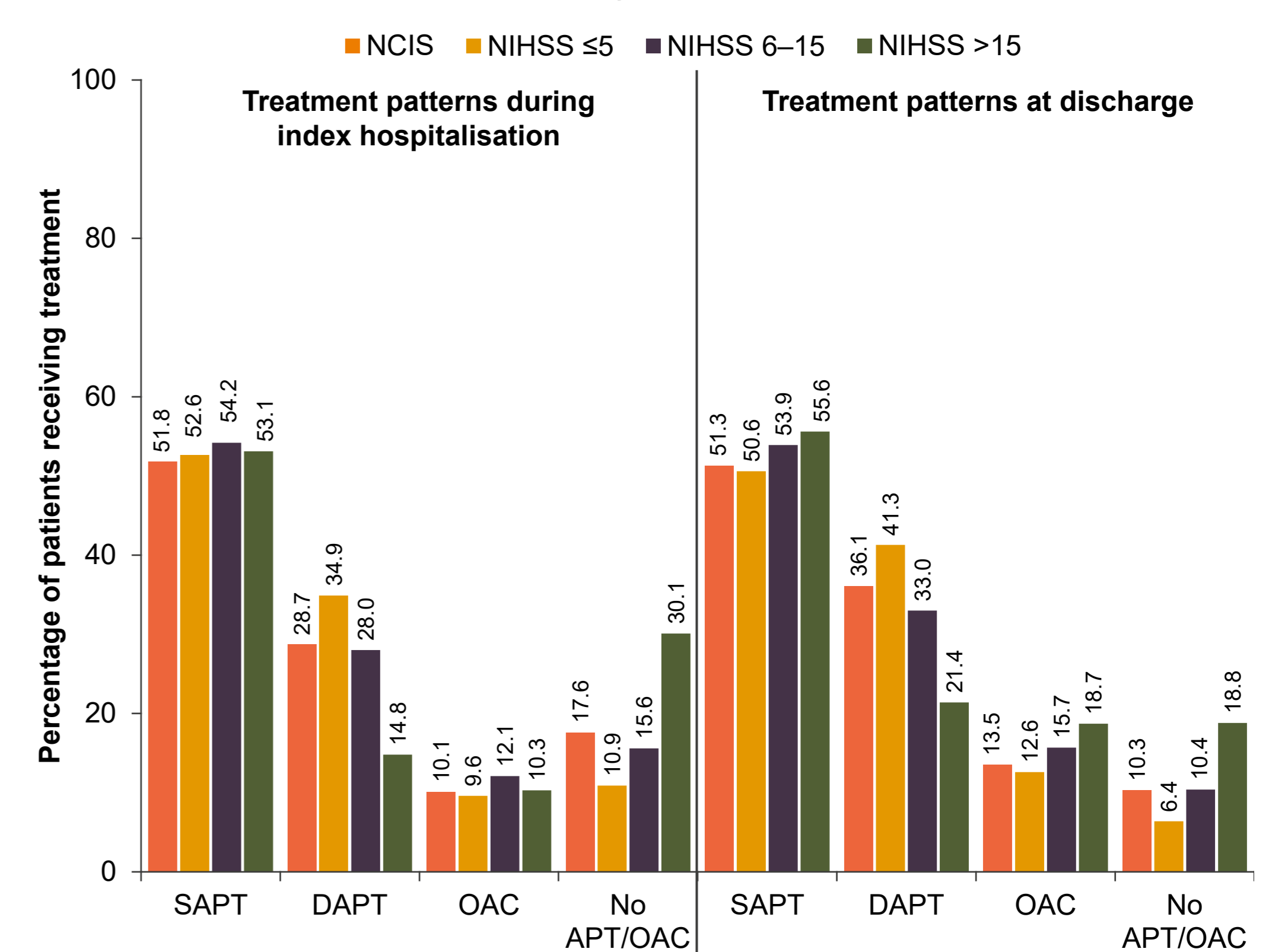
†The combined total for NIHSS ≤5, NIHSS 6–15 and NIHSS >15 does not sum to the total for NCIS because 47,385 at discharge did not have NIHSS scores available.

APT, antiplatelet therapy; DAPT, dual antiplatelet therapy; NCIS, non-cardioembolic ischaemic stroke; NIHSS, National Institutes of Health Stroke Scale; OAC, oral anticoagulant; SAPT, single antiplatelet therapy.

Treatment pattern comparison

- SAPT prescription was similar during index hospitalisation and at discharge for all patients with NCIS and in each NIHSS category (Figure 2).
- DAPT use was higher at discharge than during index hospitalisation but was lowest in patients with NIHSS score >15 at both time points (Figure 2).

Figure 2. Treatment patterns by drug category during index hospitalisation and at discharge.



APT, antiplatelet therapy; DAPT, dual antiplatelet therapy; NCIS, non-cardioembolic ischaemic stroke; NIHSS, National Institutes of Health Stroke Scale; OAC, oral anticoagulant; SAPT, single antiplatelet therapy.

Conclusions

- In this large, retrospective, observational study representative of patients with NCIS in the US, most patients received APT for secondary stroke prevention, predominantly aspirin with or without clopidogrel.
- DAPT was more frequently used in cases of milder stroke severity, with use decreasing with greatest stroke severity. Patients with NIHSS ≤5 were more likely to be treated with DAPT at discharge than those with higher NIHSS scores.

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