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Symptomatic intracranial hemorrhage related to Estimated versus Measured Body Weight in intravenous thrombolysis

BACKGROUND

In acute ischemic stroke, under- or overestimation of body weight can lead to dosing errors of recombinant tissue plasminogen activator (rt-PA) with consequent reduced efficacy or increased risk of hemorrhagic complications. Measurement of body weight (MBW) is more accurate than estimation of body weight (EBW) but potentially leads to longer door-to-needle times (DNT). We assessed if weight modality is associated with (I) symptomatic intracranial hemorrhage (sICH) (II) clinical outcome and (III) DNT.

CONCLUSIONS

Our study provides the largest multi-center cohort study to date assessing the association between weight modality (EBW or MBW) with sICH, clinical outcome and DNT. We did not find evidence that weight modality (EBW or MBW) to determine rt-PA dose in IVT eligible patients is associated with these outcome parameters

METHODS

Consecutive patients treated with IVT between 2009–2016 from 14 hospitals (Figure 1) were included. Baseline characteristics and outcome parameters were retrieved from medical records. We defined sICH according to the ECASS-III definition and clinical outcome was assessed with the modified Rankin Scale (mRS). The association of weight modality and outcome parameters was estimated with regression analyses.

Figure 1.

RESULTS

A total of 4801 (95%) patients were included (Figure 2). Five hospitals used MBW (n=1753), six hospitals used EBW (n=2325) and three hospitals changed from EBW to MBW during the study period.

In 2048 of the patients (43%) MBW was used and in 2753 (57%) EBW. EBW-patients were slightly older and they had more cardiovascular risk factors (atrial fibrillation, diabetes mellitus, hypertension and hyperlipidemia) (Table 1). Other known predictors for sICH (sex, NIHSS score, blood pressure and onset-to-door time) did not differ between the EBW and the MBW group.

Estimation of body weight was not associated with increased sICH risk (adjusted OR = 1.16; 95% CI 0.84–1.62), favourable outcome (adjusted OR = 0.95; 95% CI 0.73–1.23) or with DNT (adjusted B = 0.32; 95% CI -1.62–2.25) (Table 2).

AIS patients receiving IVT n=5066

265 patients [a] were excluded:
- age <18 years, n=2
- unknown weight modality, n=168
- incomplete clinical data, n=105

Patients included in analyses n=4801

| Measured body weight n=2048 (43%) | Estimated body weight n=2753 (57%) |

Figure 2. Study flowchart. [a] Ten patients had incomplete data and an unknown weight modality. AIS = acute ischemic stroke; IVT = intravenous thrombolysis

TABLES

Variables	Measured body weight (n=2048)	Estimated body weight (n=2753)
Patient characteristics		
Age at stroke, years – mean (±SD)	70 (±14)	71 (±14)
Male sex – n (%)	1122 (54.8)	1502 (54.6)
Vascular risk factors		
Atrial fibrillation – n (%)	175 (8.6)	376 (14.1)
Diabetes mellitus – n (%)	309 (15.3)	469 (17.5)
Hypertension – n (%)	840 (41.5)	1355 (50.7)
Hyperlipidemia – n (%)	238 (11.8)	841 (31.6)
Coronary artery disease – n (%)	410 (20.3)	507 (19.0)
Peripheral vascular disease – n (%)	112 (5.6)	156 (5.8)
Prior TIA/stroke – n (%)	528 (26.2)	660 (24.7)
Medication		
Antiplatelets – n (%)	449 (37.9)	638 (37.0)
Anticoagulation – n (%)	35 (3.0)	65 (3.8)
Admittance		
Systolic BP, mmHg, mean (±SD)	156 (±25)	156(±26)
Diastolic BP, mmHg, mean (±SD)	86 (±17)	85 (±27)
NIHSS, median [IQR]	7 [4–12]	6 [3–12]
ODT, min – median [IQR]	69 [45–115]	69 [45–112]
IVT-volume (IVT/year)		
High volume (≥50) – n (%)	1121 (54.7)	2181 (79.2)
Medium volume (25-49) – n (%)	656 (32.0)	470 (17.1)
Low volume (≤24) – n (%)	271 (13.2)	102 (3.7)
CT available in the ER	927 (45.3)	407 (14.8)

Table 1. TIA = transient ischemic attack; BP = blood pressure; NIHSS = National Institute of Health Stroke Scale; ODT = onset-to-door time; IVT = intravenous thrombolysis; CT = computed tomography scan; ER = emergency room.

	Logistic regression analyses	
Outcome	OR (95% CI)	aOR (95% CI) [a]
sICH	1.09 (0.83–1.46)	1.16 (0.84–1.62)
mRS 0–2 at 90 days	0.96 (0.79–1.15)	0.95 (0.73–1.23)
	Linear regression analysis	
	B (95% CI)	B (95% CI) [b]
DNT	0.11 (-1.55–1.77)	0.32 (-1.62–2.25)

Table 2. OR = odds ratio; aOR = adjusted OR; B = unstandardized regression coefficient.
[a] aOR, adjusted for: age; atrial fibrillation; diabetes mellitus; hypertension; hyperlipidemia; admission NIHSS, CT in the ER and IVT-volume.
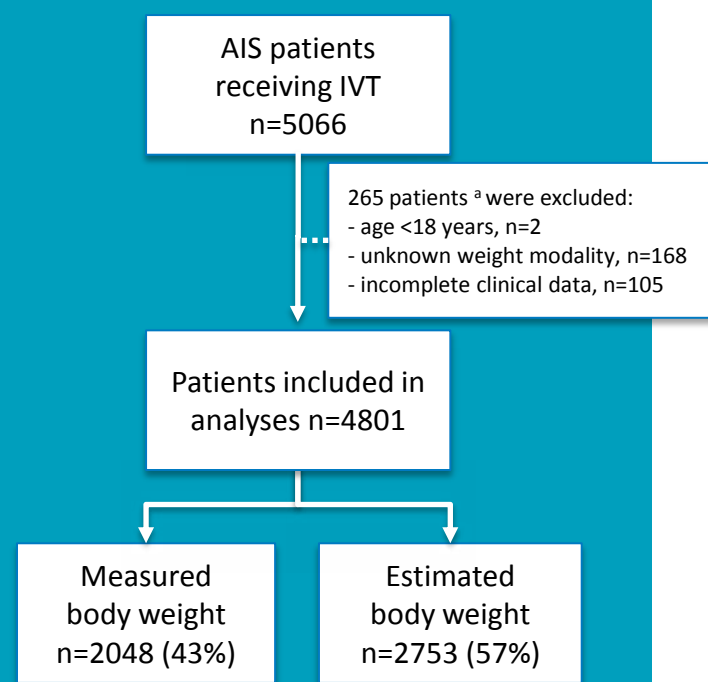[b] B, adjusted for: blood pressure exceeding threshold for IVT; admission NIHSS, CT in the ER, onset-to-door time and IVT-volume.