Faulty Estimates of Patients' Body-Weight Affect dose of Intravenous Alteplase without any Impact on Outcome

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Background and Aims:

Intravenously administered tissue plasminogen activator(IV-tPA) remains the main treatment for acute ischemic stroke(AIS). Since early initiation of IV-tPA results in better functional outcome, treatment is initiated, based on the estimated or last-known body-weight of the patient. This approach may result in underdosing or overdosing of tPA and affect the outcome. In this multicenter retrospective study, we evaluated the extent of error in our AIS cohort and its impact on functional outcome and symptomatic intracranial hemorrhage(SICH).

Method:

Consecutive AIS patients thrombolysed on the basis of estimated body-weight at 3 tertiary centers between January-to-December 2016 were included. Collected data included information about demographics, cardiovascular risk factors, stroke subtype and National Institute of Health Stroke Scale (NIHSS) scores. Estimated and measured body-weights were recorded. Functional outcome was assessed at 3-months by modified Rankin scale (mRS), the score of 0-1 defined good outcome.

Results:

The study included 150 patients. Median age was 64-years (IQR 55-75) with male preponderance(67%) and median NIHSS score of 9-points (IQR 6-17). Cardioembolism was the commonest stroke subtype(30.7%). Median difference between actual and estimated body-weight was 3-kg (IQR 1.5-6). Difference was more than 10% in 35(23.3%) patients. Good functional outcome was achieved by 74(49.3%) patients and 10 (6.8%) developed SICH. NIHSS (OR 1.288; 95% CI 1.157-1.435,p<0.001) and large artery atherosclerosis (OR 5.878; 95% CI 1.929-17.910,p=0.002) were independent predictors of unfavorable functional outcome

Table 1: Baseline Characteristics of the study population (n=150)

Variable	
Median Age (IQR)	64 (55-75)
Male gender- n (%)	101 (67)
Race	
Chinese- n (%)	57 (38)
Indian/Malay/Others- n (%)	93 (62)
Diabetes mellitus- n (%)	55 (36.7)
Hypertension- n (%)	100 (66.7)
Hyperlipidemia- n (%)	77 (51.3)
Atrial fibrillation- n (%)	24 (16)
Ischemic heart disease- n (%)	33 (22)
Smoker- n (%)	43 (28.6)
Previous stroke- n (%)	17 (11.3)
Median NIHSS on arrival (IQR)	9 (6-17)
TOAST Classification- n (%)	
Large Artery Disease	35 (23.3)
Cardio embolism	46 (30.7)
Lacunar	42 (28)
Other determined causes	0 (0)
Undetermined Etiology	27 (18)
mRS (0-1) at 3 months- n (%)	74 (49.3)
mRS (0-2) at 3 months- n (%)	92 (61.3)
Symptomatic ICH- n (%)	10 (6.6)
Death within 3 months- n (%)	10 (6.7)

Abbreviations: ICH- intracranial hemorrhage; IQR- interquartile range; mRS- modified Rankin scale; NIHSS- National Institute of Health Stroke Scale; TOAST- Trial of ORG 10172 in acute stroke treatment

Table 2: Body-Weight estimation in the study population (n=150)

Variable	
Median difference between estimated and measured body-weight in Kg (IQR)	3.0 (1.5-6.0)
Number of cases with >5 kg difference (%)	55 (36.7)
Number of cases with>10 kg difference (%)	23 (15.3)
Number of cases with >20 kg difference (%)	8 (5.3)

Table 3: Independent predictors for good functional outcome (mRS 0-1) at 3-months

	Odds Ratio (95% confidence interval)	p-value
NIHSS	1.288 (1.157-1.435)	0.000
TOAST	5.878 (1.929-17.910)	0.002
Difference of >10% between estimated and measured body-weight	2.436 (0.729-8.145)	0.148

Table 4: Independent predictors for good outcome at 3-months (mRS 0-1) (after excluding patients with underestimated body-weight)

	Odds Ratio (95% confidence interval)	P Value
NIHSS	1.306 (1.166-1.464)	0.000
TOAST		0.007
Large Artery Disease	4.983 (1.154-21.510)	0.031
Difference in weight >10%	1.438 (0.304-6.791)	0.647

Table 5. Differences in the characteristics of patients with good (mRS 0-1) and unfavorable (mRS 2-6) functional outcome at 3-months (n=150).

Variable	Good outcome (n= 74)	Unfavorable outcome (n= 76)	p-value
Median Age in years (IQR)	61 (54-67)	69 (56-81)	0.006
Male Gender	56 (75.7)	45 (59.2)	0.032
Race- n (%)			0.006
Chinese	20 (27)	37 (48.7)	
Non-Chinese	54 (73)	39 (51.3)	
Hypertension- n (%)	50 (67.6)	50 (65.8)	0.817
Diabetes mellitus- n (%)	25 (33.8)	30 (39.5)	0.470
Dyslipidemia- n (%)	34 (45.9)	43 (56.6)	0.193
Ischemic heart disease- n (%)	18 (24.3)	15 (19.7)	0.498
Atrial Fibrillation- n (%)	7 (9.4)	17 (22.4)	0.031
Smoking- n (%)	23 (31.1)	20 (26.3)	0.519
Previous stroke- n (%)	10 (13.5)	7 (9.2)	0.406
Median NIHSS on arrival (IQR)	6 (4-9)	16 (10-21)	<0.001
Stroke subtype- n (%)			0.001
LAA	10 (13.5)	25 (32.8)	
Cardioembolism	17 (23)	29 (38.2)	
Lacunar Stroke	37 (50)	5 (6.6)	
Other determined cause	0 (0)	0 (0)	
Undetermined etiology	10 (13.5)	17 (22.4)	
Difference (>10%) in actual and estimated weight	10 (13.5)	25 (32.9)	0.005

Table 6: Differences in the characteristics of patients with good (mRS score 0-1) and unfavorable (mRS score 2-6) functional outcome at 3 months (after excluding patients with under estimation of body-weight)

Variable	Good outcome 3-months (n= 70)	Unfavorable outcome at 3-months (n= 68)	p-value
Median Age in years (IQR)	61 (54-66)	69 (56-81)	0.006
Male Gender- n (%)	52 (75.7%)	43 (59.2%)	0.161
Race- n (%)			0.006
Chinese	19 (26%)	34 (50%)	
Non-Chinese	51 (74%)	34 (50%)	
Hypertension- n (%)	47 (67.1%)	44 (64.7%)	0.763
Diabetes mellitus- n (%)	23 (32.9%)	29 (42.7%)	0.509
Dyslipidemia- n (%)	32 (45.7%)	38 (55.9%)	0.193
Ischemic heart disease- n (%)	17 (24.3%)	12 (17.6%)	0.339
Atrial Fibrillation- n (%)	6 (8.6%)	16 (23.5%)	0.016
Smoking- n (%)	22 (31.4%)	20 (29.4%)	0.797
Previous Stroke- n (%)	10 (14.3%)	6 (8.8%)	0.316
Median NIHSS on arrival (IQR)	7 (4-9)	17 (10-21)	0.000
Stroke subtype- n (%)			0.000
Large Artery Atherosclerosis	9 (12.9%)	22 (32.4%)	
Cardioembolism	16 (22.9%)	28 (41.2%)	
Lacunar Stroke	35 (50%)	4 (5.8%)	
Stroke of other determined cause	0 (0)	0 (0)	
Stroke of undetermined etiology	10 (14.2%)	14 (20.6%)	
Difference of >10% between actual and estimated body-weight	6 (8.6%)	17 (25%)	0.010

Conclusion:

Significant difference occurs between estimated and actual body-weight in a considerable proportion of thrombolysed AIS patients. However, this discrepancy may not affect functional outcome or the risk of SICH

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