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Third-tier therapies (TTT), defined as the most extreme therapies to control ICP (intracranial-pressure), include hypothermia, metabolic suppression and secondary decompressive-craniectomy.

We investigate the current practice of TTT after ABI (acute-brain-injury) analysing the SYNAPSE-ICU-study cohort.

METHODS

The SYNAPSE-ICU is an international, prospective, observational, cohort study (NCT03257904) including patients in coma after acute traumatic and non-traumatic brain damage admitted to >200 Intensive Care Units. Demographic information, clinical condition, treatments and tiers during the first week in ICU were collected. Characteristics between TTT and no-TTT (who not received TTT) were compared by Mann-Whitney U test for continuous data and χ^2 test for categorical data.

RESULTS

Of 1971 ABI patients, 1492 patients (75.7%) were in no-TTT-group and 479 (24.3%) in TTT-group. Frequency of TTT was hypothermia (83.3%), extreme suppression (16.1%) and secondary decompressive-craniectomy (11.9%). Median age of the TTT group was lower 52 (37-64).

At admission in-hospital, no differences were found in GCS (Glasgow Coma Scale), pupil reactivity, arterial hypertension, and all types of abuse. Groups differed in neuroworsening (32.6% no-TTT-group vs 43.4% TTT-group, $p<0.001$).

The maximum therapy intensity level (max-TIL) during the week was lower in no-TTT-group: mean of 5.65 ± 3.02 vs TTT-group 10.41 ± 3.47 . The max-TIL was higher in a patient with ICP monitoring: for no-TTT-group was $7.15 (\pm2.5)$ in ICP-monitored vs 4.27 ± 2.78 in no-ICP-monitored patients. Equally for TTT-group: TIL was 11.25 ± 3.33 in ICP-monitored vs 8.47 ± 2.99 in no-ICP-monitored. High variability in the use of TTT among countries and centers was found even when adjusted for clinical and demographic variables (pupils, GCS, sex, ICP, age, country level and CT scan): range of probability 0.192-0.917 and 0.054-0.922, respectively.

CONCLUSIONS

TTT-group was younger and more often experienced neuroworsening. The use of ICP-monitor seems to be associated with a higher therapy intensity level (TIL), both in TTT-group and in no-TTT one. Large variability between centres and countries is still observed suggesting the impellent need for clear indications in the use of TTT in ABI patients.

References

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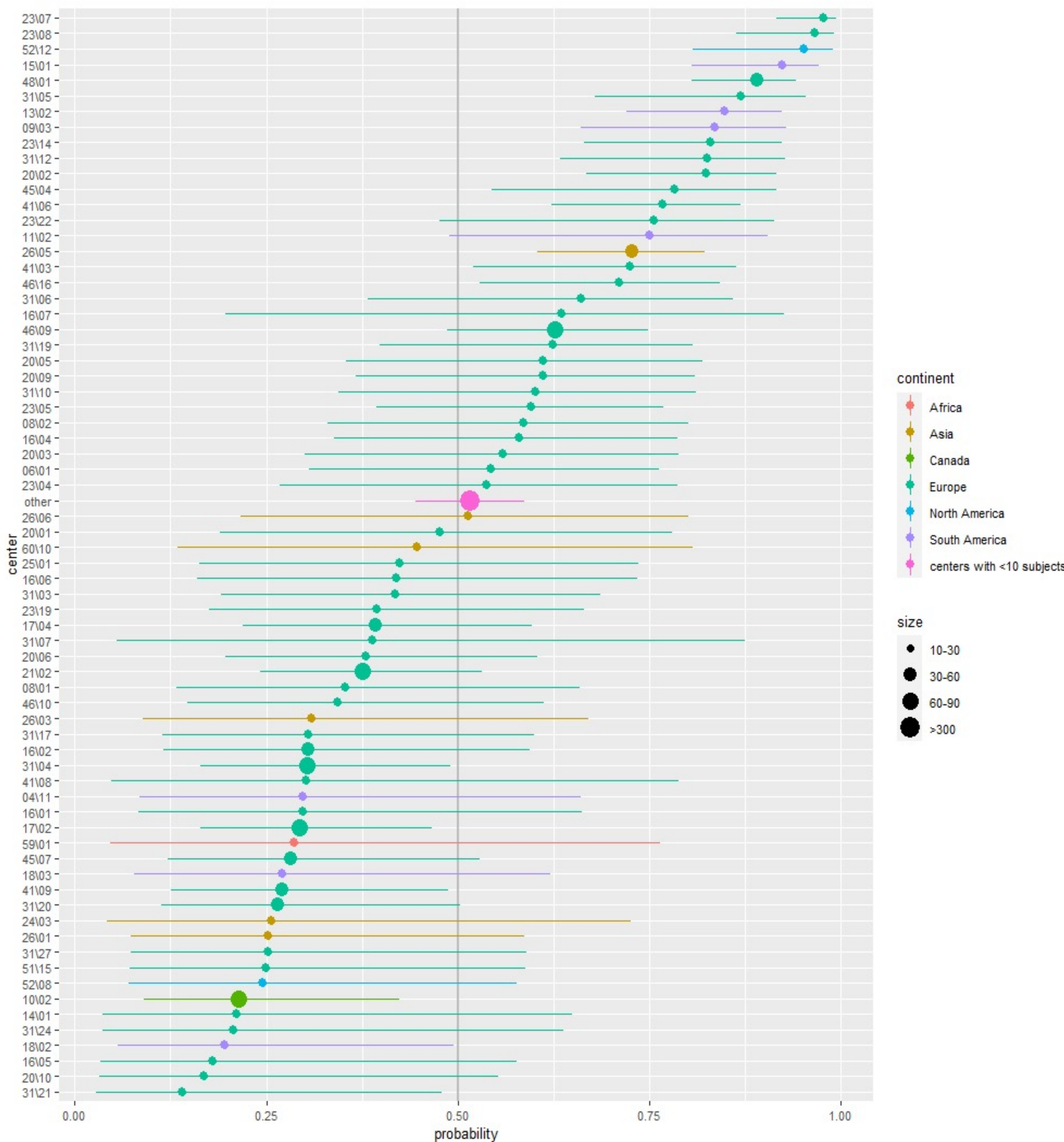


Figure 1. Caterpillar plot of the probability in the use of TTT among centers

	Overall	no-TTT	TTT	p
Baseline Characteristics				
N (%)	1971	1492 (75.7)	479 (24.3)	
age years (median, Q1-Q3)	56 (40, 70)	57 (41, 71)	52 (37, 64)	<0.001
Female n(%)	675 (34.2)	512 (34.3)	163 (34.0)	0.952
pupils n(%)				0.740
both reactive	1257 (67.7)	948 (67.6)	309 (68.2)	
one reactive	193 (10.4)	143 (10.2)	50 (11.0)	
both unreactive	406 (21.9)	312 (22.2)	94 (20.8)	
GCS ≤ 8, n(%)	1631 (85.5)	1241 (85.5)	390 (85.3)	0.981
GCS, n(%)				0.001
Normal (>8)	277 (14.5)	210 (14.5)	67 (14.7)	
Severe (6-8)	648 (34.0)	462 (31.8)	186 (40.7)	
Very Severe (3-5)	983 (51.5)	779 (53.7)	204 (44.6)	
Alcohol abuse, n(%)	223 (61.9)	163 (61.3)	60 (63.8)	0.753
Drugs abuse, n(%)	70 (20.7)	46 (18.3)	24 (27.6)	0.092
Tobacco use, n(%)	233 (66.8)	166 (64.3)	67 (73.6)	0.137
Abuse, n(%)	347 (91.1)	257 (91.1)	90 (90.9)	1.000
Neuroworsening, n(%)	672 (35.2)	471 (32.6)	201 (43.4)	<0.001
Cardiovascula history, n(%)	835 (43.7)	647 (44.8)	188 (40.5)	0.120
Hypertension, n(%)	744 (89.2)	577 (89.0)	167 (89.8)	0.878
Neurologic history, n(%)	239 (12.5)	181 (12.5)	58 (12.5)	1.000
Low-middle country level, n(%)	324 (16.4)	237 (15.9)	87 (18.2)	0.272
Therapy Intensity Levels (TIL)				
Maximum TIL value during the week (mean (SD))	7.00 (3.74)	5.65 (3.02)	10.41 (3.47)	<0.001
Mean-maxTIL during the week (mean (SD))				
no-ICP-monitored	4.92 (3.20)	4.27 (2.78)	8.47 (2.99)	<0.001
ICP-monitored	8.46 (3.38)	7.15 (2.50)	11.25 (3.33)	<0.001

Table 1. Baseline characteristics of enrolled patients overall and by Third Tier Therapies (TTT) and no-TTT. *Neuroworsening defined as one or more of the following: • a spontaneous decrease in the GCS motor score of 2 points or more compared with the previous examination • a new loss of pupillary reactivity, development of pupillary asymmetry ≥ 2mm • deterioration in neurological or CT status sufficient to warrant immediate medical or surgical intervention; GCS: Glasgow Coma Scale; TIL: therapy intensity level; ICP: intracranial pressure; SD: standard deviation; Q1-Q3: I-III quartile.