



BRIDGE



STROKE

An international cluster randomized quality-improvement trial to increase the adherence to evidence-based therapies for acute ischemic stroke and transient ischemic attack patients

The BRIDGE Stroke Trial

Lead Sponsor: Ministry of Health, Brazil.

M. Julia Machline-Carrion MD, MHS, PhD
on behalf of the BRIDGE Stroke Steering Committee and Investigators



Trial Organization



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Background and Rationale



- Despite the established efficacy of several interventions for the management of patients with Acute Ischemic Stroke (AIS) and Transient Ischemic Attack (TIA), the uptake of evidence-based measures remains suboptimal especially in low- and middle-income countries.
- Robust quality improvement trials are scarce in these settings.

36 Clusters (Hospitals with 24/7 Emergency Department, CNS imaging and Rt-PA) including 1,624 consecutive patients with AIS or TIA admitted within 24 hours from symptoms onset

Concealed Randomization

Multifaceted Quality Improvement Intervention
(n= 19 clusters and 817 patients)

Routine Practice
(n= 17 clusters and 807 patients)

ITT

ITT

Primary Endpoint: Composite Adherence Score to 10 In-Hospital Quality Measures

Secondary Endpoints: Complete Adherence to 10 In-Hospital Quality Measures, Rt-PA in 24 hours, Antihypertensives, DTNT < 45 min, 90-days Clinical Events

Outcomes



Primary Outcome

- **Composite Adherence Score to 10 In-Hospital Quality Measures:**
 - Early Antithrombotics.
 - Rt-PA Within Therapeutic Window.
 - DVT Prophylaxis.
 - DTNT < 60 minutes.
 - Dysphagia Screening.
 - Assessment for Rehabilitation.
 - Antithrombotics at Discharge.
 - Anticoagulants for Atrial Fibrillation or Flutter.
 - Statins for LDL >100 or not documented.
 - Smoking Cessation Education.

Secondary Outcomes

- **Complete Adherence to 10 In-Hospital Quality Measures (All or None Model).**
- Rt-PA in Patients Admitted within 24 hours.
- Antihypertensives
- DTNT < 45 min
- 90-days Clinical Events (mortality, disability and stroke recurrence).

Statistical Analysis

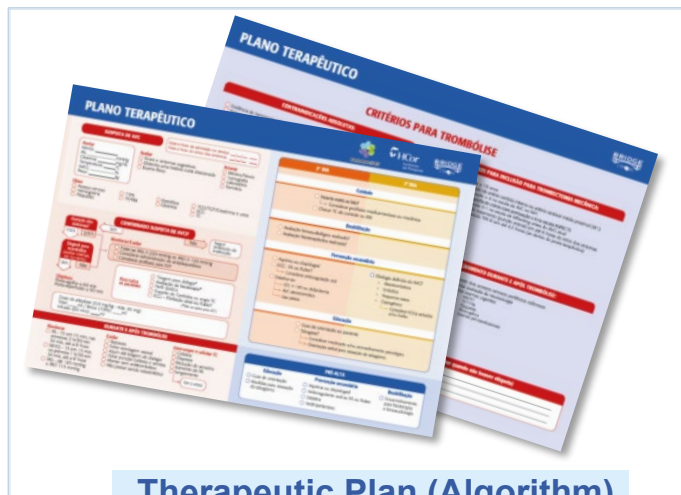


- Sample size: assuming a 12% non-adjusted mean difference, a 0.05 two-tailed alpha, approximately 40 patients per cluster and a 0.20 ICC, we estimated that 36 clusters (Brazil, Argentina and Peru) were needed.
- All analyses followed the intention-to-treat principle.
- Mixed-effect linear regression model.
- Effects were expressed as a mean difference and as a population average odds ratio (OR_{PA}) and 95% CIs.

The BRIDGE Stroke Quality Improvement Intervention



Poster (Reminder)



Therapeutic Plan (Algorithm)

Case Manager



Algorithm for care management and recommendation of evidence-based therapies

Trained nurses who ensure that all components of the intervention are being used

Patient Wristband

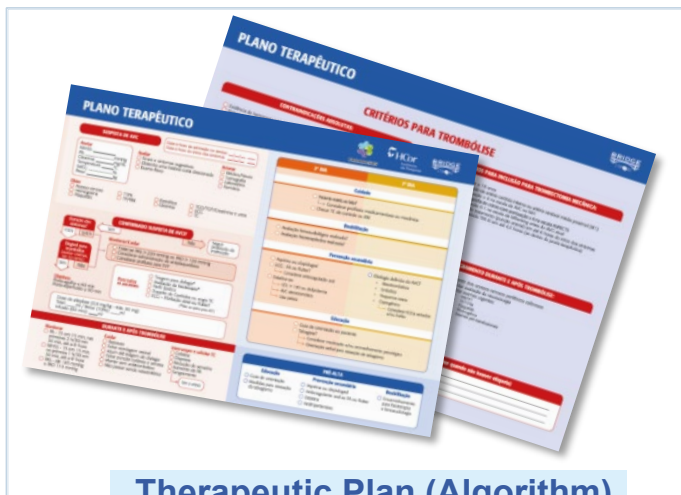


Patient identification system including a colored wristband and printed reminders

The BRIDGE Stroke Quality Improvement Intervention



Poster (Reminder)

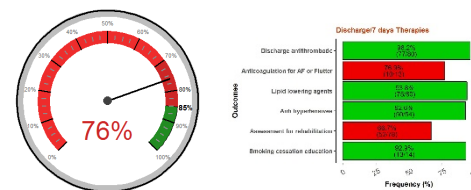


Therapeutic Plan (Algorithm)

Case Manager

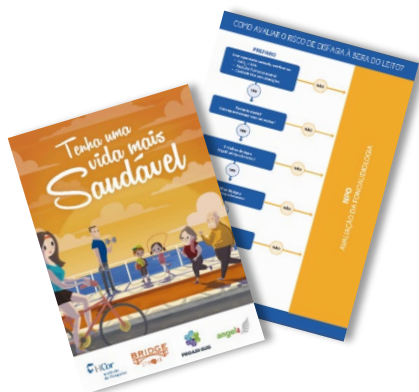


Audit and Feedback



Educational materials containing evidence-based recommendations

Educational Materials



Periodic feedback reports on adherence to quality measures

Patient Baseline Characteristics



Patient Baseline Characteristics	Intervention (n=817)	Control (n=807)
Men (%)	441 (54.0)	472 (58.5)
Age, mean (SD), y	70.3 (13.6)	68.4 (13.4)
Diabetes (%)	252 (30.8)	232/806 (28.8)
Hypertension (%)	627 (76.7)	592 (73.4)
Dyslipidemia (%)	224 (27.4)	150 (18.6)
Current Smoking (%)	129 (15.8)	169 (20.9)
Family history of stroke (%)	62 (7.6)	116 (14.4)
Stroke (%)	243 (29.7)	213 (26.4)
CAD (%)	113 (13.8)	156 (19.3)
Atrial fibrillation (%)	120 (14.7)	74 (9.2)
Renal failure (%)	25 (3.1)	32 (4.0)
Use of statins in the last month (%)	207 (25.3)	190 (23.5)
Final Diagnosis		
AIS (%)	711 (87)	723 (89.6)
TIA (%)	106 (13)	84 (10.4)

Cluster Baseline Characteristics



Cluster Baseline Characteristics	Intervention (n=19)	Control (n=17)
Neurologist Available at ED* (%)	13 (68.4)	9 (52.9)
Mechanical Thrombectomy Capabilities (%)	17 (89.5)	15 (88.2)
Stroke Unit (%)	10 (52.6)	7 (41.2)
Stroke Protocol available at the Hospital (%)	19 (100)	17 (100)
JCI** Accreditation (%)	1 (5.3)	3 (17.6)
Teaching Hospital (%)	13 (68.4)	15 (88.2)
Prior participation in multicenter clinical trial (%)	17 (89.5)	15 (88.2)
Volume of patients seen in ED per mo, median (IQR)	1600 [425 - 3000]	1400 [800 - 4000]
Baseline rate of primary outcome, median (IQR)	77.1 [67.7 - 82.5]	75.3 [66.2 - 79.8]

*Emergency department,

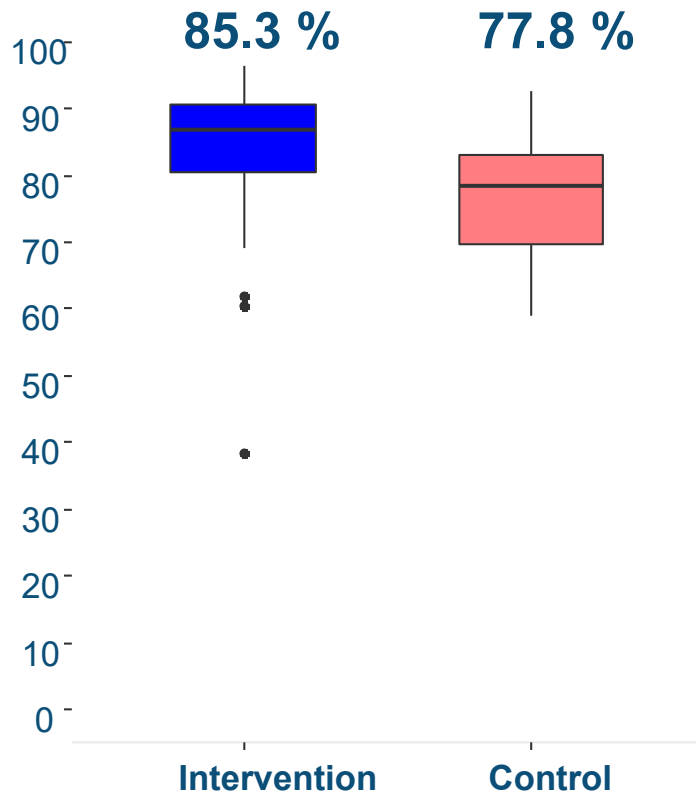
**Joint Commission International

Composite Outcomes



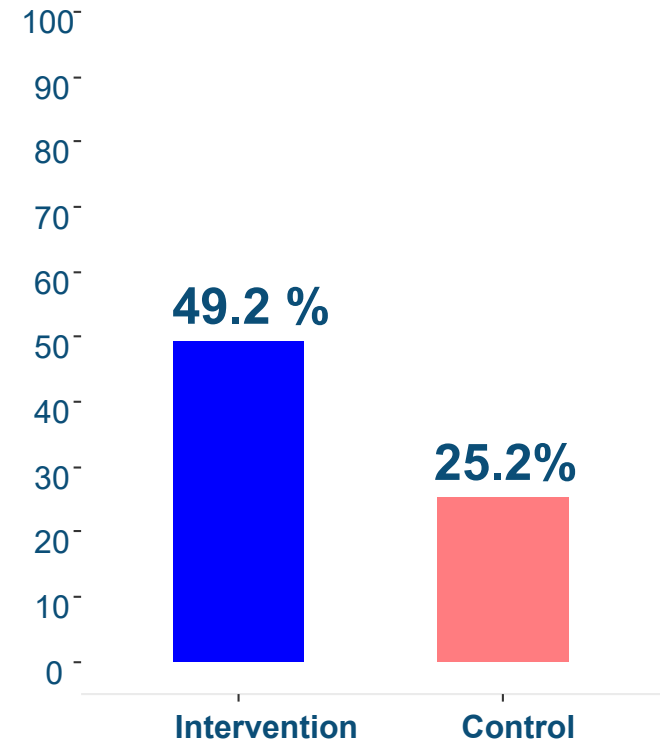
Composite Adherence Score (%)

Mean Difference = 4.20 (-3.80-12.20) ICC = 0.32



Complete Adherence to In-Hospital Quality Measures

OR_{PA} = 2.59 (1.05–6.41) ICC = 0.25



Adherence to In-Hospital Quality Measures



Endpoints	Intervention	Control	Odds Ratio (95% CI)	P value
	<i>n/N (%)</i>			
Acute therapies during first 48 hours				
Rt-PA within therapeutic window	122/222 (55.0)	107/268 (39.9)	2.77 [1.14; 6.72]	0.01
Door-to-needle time < 60 min	84/145 (57.9)	59/121 (48.8)	2.47 [0.81; 7.52]	0.06
Early Antithrombotics	759/811 (93.6)	756/803 (94.1)	0.59 [0.22; 1.57]	0.22
DVT Prophylaxis	326/450 (72.4)	234/466 (50.2)	2.56 [0.76; 8.67]	0.07
Dysphagia Screening	577/711 (81.2)	460/723 (63.6)	2.82 [0.54; 14.65]	0.14
Discharge therapies				
Antithrombotics	751/811 (92.6)	759/806 (94.2)	0.59 [0.22; 1.54]	0.21
Anticoagulants for AF or Flutter	111/146 (76.0)	77/97 (79.4)	1.02 [0.34; 3.00]	0.97
Lower lipids medication in patients with LDL > 100 or not documented	613/675 (90.8)	631/701 (90)	0.87 [0.45; 1.65]	0.61
Smoking Cessation Education	93/129 (72.1)	82/169 (48.5)	3.22 [0.86; 12.09]	0.04
Assessed for Rehabilitation	620/711 (87.2)	574/723 (79.4)	1.92 [0.47; 7.86]	0.28

0.10 0.20 0.33 0.50 0.75 1.00 1.33 2.00 3.00 5.00 10.00 15.00

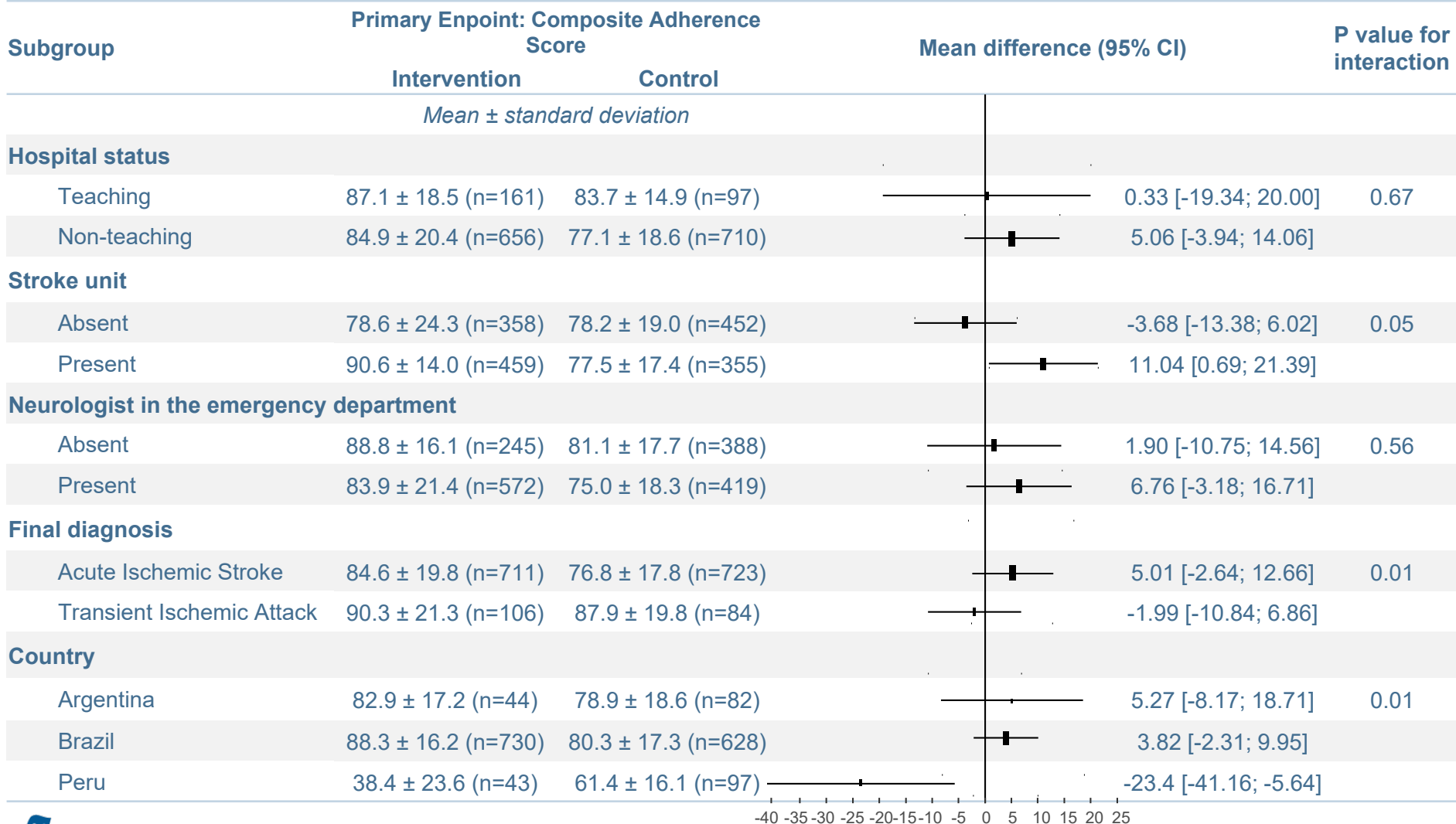
Clinical Events



Clinical events	Intervention	Control	Odds Ratio 95%CI	P value
	<i>n/N (%)</i>			
Events (In Hospital)				
Hemorrhagic Transformation	42/817 (5.1%)	20/804 (2.5%)	2.11 [1.06; 4.21]	0.02
Non fatal cardiac arrest	4/817 (0.5%)	3/805 (0.4%)	1.24 [0.13; 11.53]	0.83
Major Bleeding	12/817 (1.5%)	3/805 (0.4%)	5.15 [0.67; 39.66]	0.08
Acute Coronary Syndrome	17/817 (2.1%)	11/805 (1.4%)	1.51 [0.37; 6.22]	0.52
Stroke Recurrence	7/817 (0.9%)	0/807 (0%)	-	0.93
Total Mortality	22/817 (2.7%)	17/807 (2.1%)	1.67 [0.60; 4.66]	0.28
Cardiovascular Mortality	17/817 (2.1%)	14/807 (1.7%)	1.64 [0.48; 5.58]	0.38
Events (within 90 days)				
Stroke Recurrence	11/817 (1.3%)	5/807 (0.6%)	2.26 [0.78; 6.49] ^a	0.13
Total Mortality	103/817 (12.6%)	95/807 (11.8%)	1.16 [0.68; 2.01] ^a	0.58
Cardiovascular Mortality	17/817 (2.1%)	14/807 (1.7%)	1.53 [0.54; 4.27] ^a	0.42
mRankin < 2	274/662 (41.4%)	255/670 (38.1%)	1.11 [0.70; 1.76]	0.61

0.1 0.2 0.3 0.5 1.0 2.0 3.0 5.0 10.0

Subgroup Analysis



Conclusions



- A multifaceted quality improvement intervention did not result in significant increase in composite adherence score for evidence-based therapies in patients with AIS or TIA
- However, when using a more conservative “all or none” approach (complete adherence), the intervention resulted in improved adherence to evidence-based therapies.
- A quality improvement intervention also resulted in significant increase in the use of thrombolysis and smoking cessation education.