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Effects of a Quality Improvement Intervention on Adherence to Evidence-Based Therapies for Acute Ischemic Stroke and Transient Ischemic Attack Patients in Hospitals with Stroke Units - Insights from 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

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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.

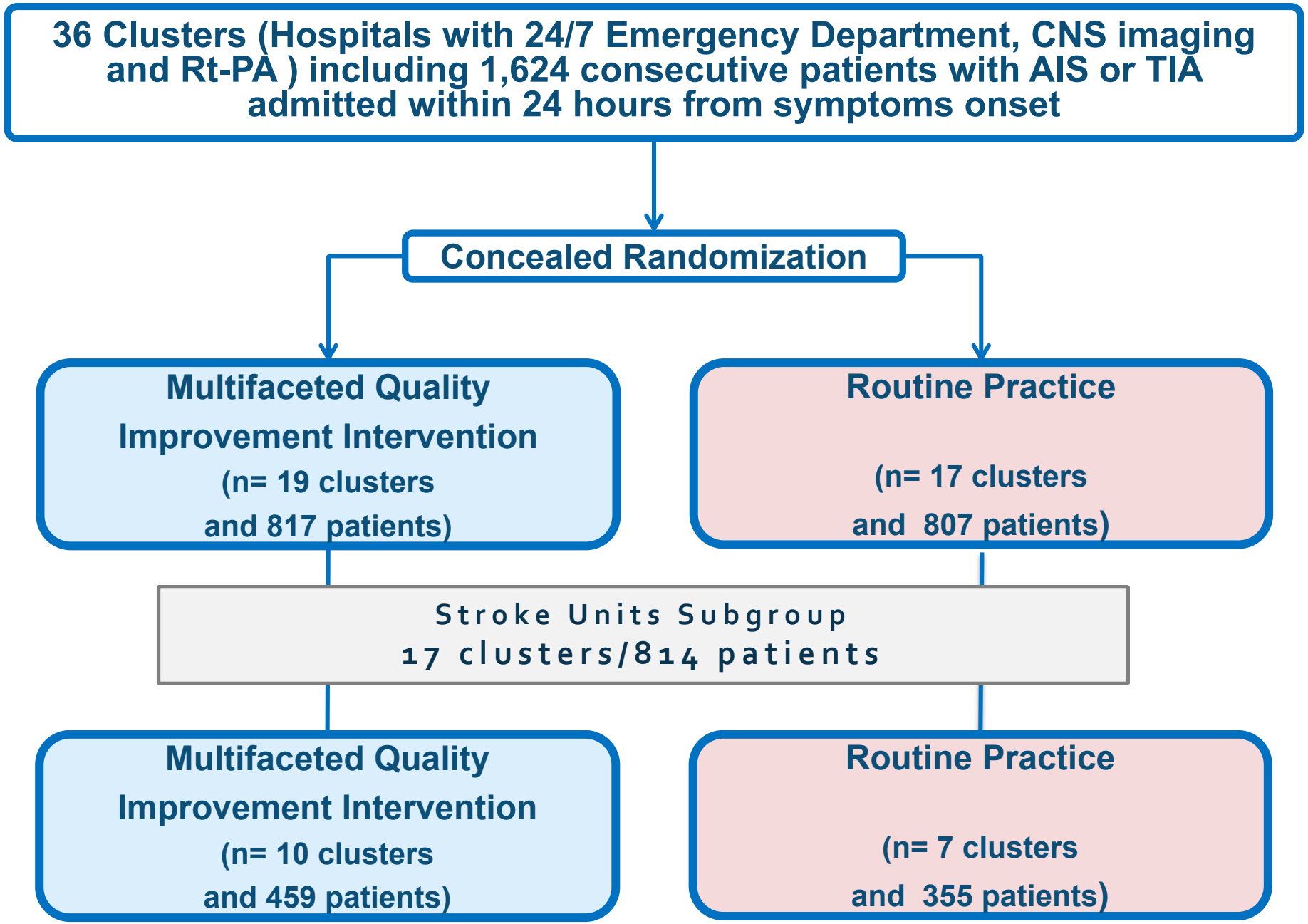
- Robust quality improvement trials are scarce in these settings.

Background and Rationale

- The main objective of the BRIDGE Stroke trial was to assess the effect of a quality improvement intervention to increase the adherence of evidence-based therapies for patients with AIS and TIA in Latin America.

- As previously presented (AHA Late Breaking Sessions- 2018) the quality improvement intervention resulted in:
  - Neutral effect in the composite adherence score to in-hospital quality measures;
  - Two-fold increase in the complete adherence to quality measures;
  - A favored effect in patients treated in hospitals with stroke units.

Machline-Carrion et al, Amer Heart Journal 2019.
AHA Late Breaking Science, 2018.


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)
Stroke Units Subgroup
17 clusters/814 patients
Multifaceted Quality Improvement Intervention (n= 10 clusters and 459 patients)
Routine Practice (n= 7 clusters and 355 patients)

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 Rehabiliation.
  - 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).

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Machline-Carrion et al, Amer Heart Journal 2019.

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Statistical Analysis

- Sample size: 1624* patients from 36 clusters (Brazil, Argentina and Peru).

  *Original Sample Size: 1440 patients from 36 clusters.

- 814 patients from 17 clusters.

- All analysis followed the intention-to-treat principle.

- Mixed-effect regression model.

- Effects were expressed as a mean difference and as odds ratio (OR) and 95% CIs.

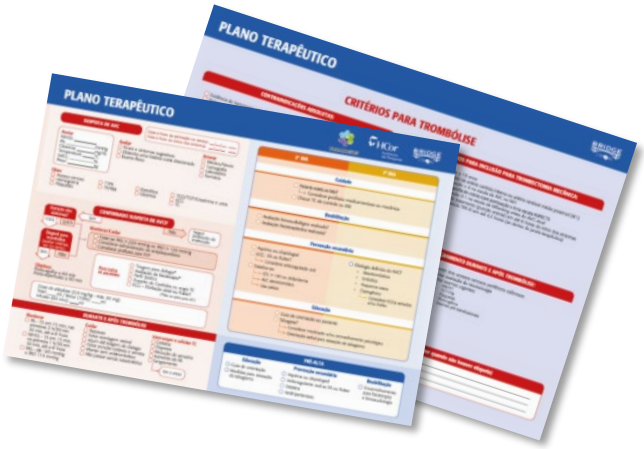
The BRIDGE Stroke Quality Improvement Intervention

Poster (Reminder)

Patient identification system including a colored wristband and printed reminders

Patient Wristband

Therapeutic Plan (Algorithm)



Algorithm for care management and recommendation of evidence-based therapies

Case Manager

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

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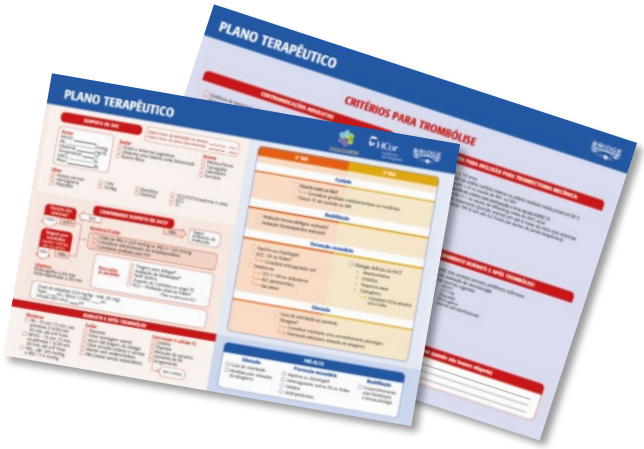
The BRIDGE Stroke Quality Improvement Intervention

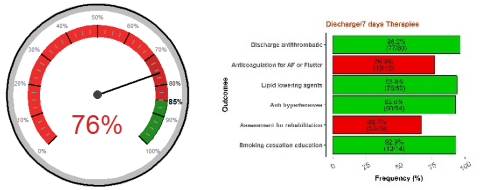
Poster (Reminder)



Therapeutic Plan (Algorithm)

Case Manager

Audit and Feedback



Educational Materials

Educational materials containing evidence-based recommendations

Periodic feedback reports on adherence to quality measures

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Machline-Carrion et al, Amer Heart Journal 2019.

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Patient Baseline Characteristics

Patient Baseline Characteristics	Intervention (n=459)	Control (n=355)
Men (%)	**249 (54.2)**	**221 (62.3)**
Age, mean (SD), y	69.9 (13.7)	68.8 (13.7)
Diabetes (%)	134 (29.2)	99 (27.9)
Hypertension (%)	355 (77.3)	266 (74.9)
Dyslipidemia (%)	137 (29.8)	70 (19.7)
Current Smoking (%)	88 (19.2)	75 (21.1)
Family history of stroke (%)	22 (4.8)	35 (9.9)
Stroke (%)	144 (31.4)	80 (22.5)
CAD (%)	43 (9.4)	66 (18.6)
Atrial fibrillation (%)	75 (16.3)	42 (11.8)
Renal failure (%)	17 (3.7)	18 (5.1)
Use of statins in the last month (%)	108 (23.5)	89 (25.1)
Final Diagnosis		
AIS (%)	**393 (85.6)**	**335 (94.4)**
TIA (%)	66 (14.4)	20 (5.6)

Cluster Baseline Characteristics

Cluster Baseline Characteristics	Intervention (n=10)	Control (n=7)
Neurologist Available at ED* (%)	7 (70%)	6 (85.7%)
Mechanical Thrombectomy Capabilities (%)	9 (90%)	6 (85.7%)
Stroke Protocol available at ED (%)	9 (90%)	7 (100%)
Stroke Protocol available at the Hospital (%)	10 (100%)	7 (100%)
JCI** Accreditation (%)	1 (10%)	2 (28.6%)
Teaching Hospital (%)	7 (70%)	7 (100%)
Prior participation in multicenter clinical trial (%)	9 (90%)	7 (100%)
Volume of patients seen in ED per mo, median (IQR)	1135.5 [215 - 2375]	6000 [750 - 8800]
Baseline rate of primary outcome, median (IQR)	77.1 [69.1 - 82.9]	67.9 [64.4 - 74.6]

*Emergency department,

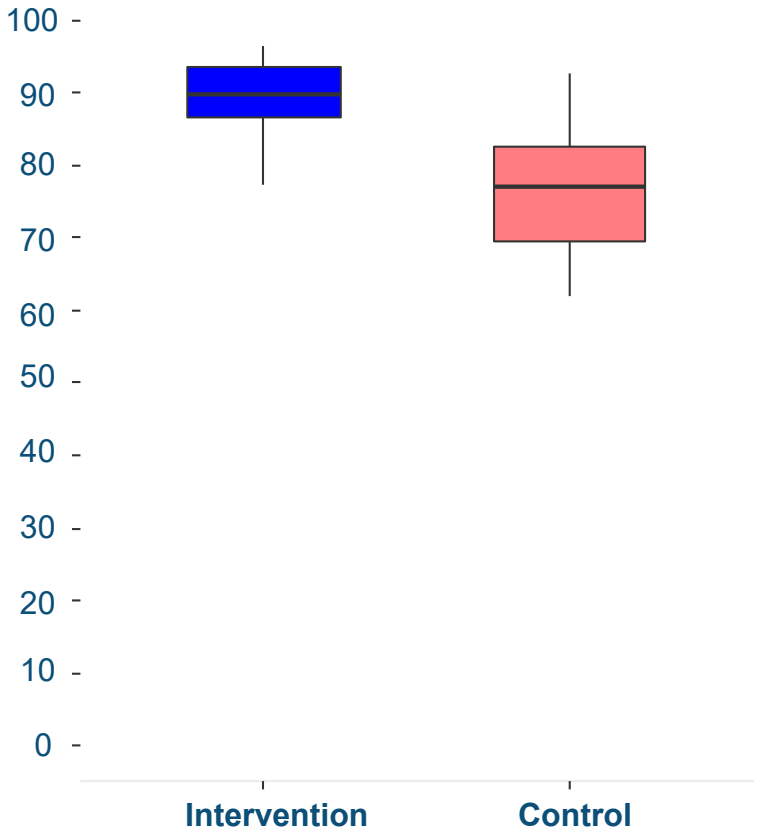
**Joint Comission International

Composite Outcomes

Composite Adherence Score (%)

Mean Difference = 11.35 (3.32 - 19.37) ICC= 0.20

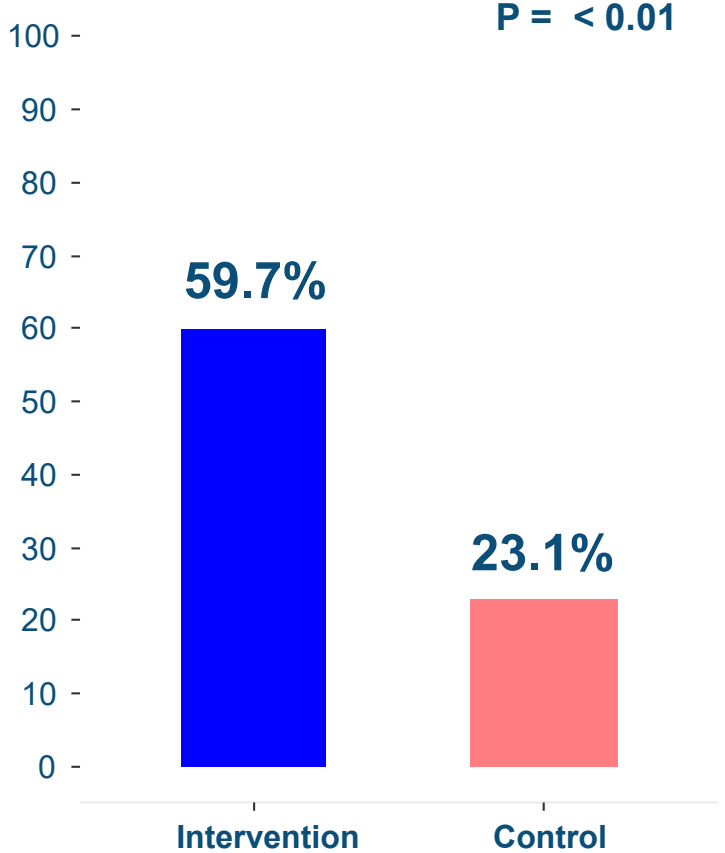
90.6 % **77.5 %** **P = 0.01**



Complete Adherence to In-Hospital Quality Measures

OR = 5.53 (2.07 – 14.81) ICC = 0.20

P = < 0.01



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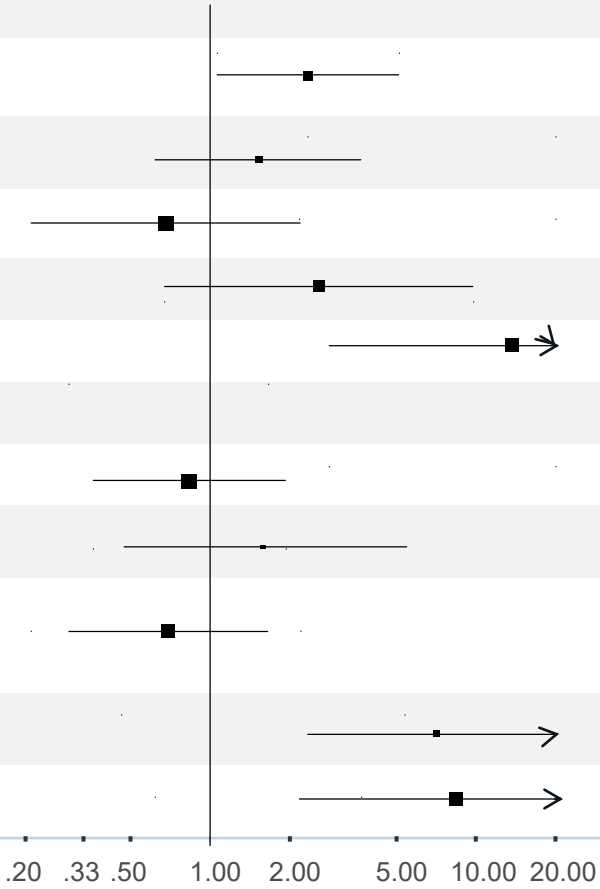
Adherence to In-Hospital Quality Measures

Endpoints	Intervention	Control	Odds Ratio (95% CI)	P value
	n/N (%)			
Acute therapies during first 48 hours				
Rt-PA within therapeutic window	**68/113 (60.2)**	**78/147 (53.1)**	**2.32 [1.06; 5.11]**	**0.04**
Door-to-needle time < 60 min	47/84 (56.0)	52/86 (60.5)	1.52 [0.62; 3.71]	0.36
Early Antithrombotics	439/455 (96.5)	344/354 (97.2)	0.68 [0.21; 2.18]	0.51
DVT Prophilaxis	191/227 (84.1)	128/204 (62.7)	2.56 [0.67; 9.78]	0.17
Dysphagia Screening	***348/393 (88.5)***	***170/335 (50.7)***	***13.78 [2.78; 68.41]***	***<0.01***
Discharge therapies				
Antithrombotics	434/456 (95.2)	339/355 (95.5)	0.83 [0.36; 1.91]	0.66
Anticoagulants for AF or Flutter	70/83 (84.3)	35/47 (74.5)	1.58 [0.46; 5.41]	0.46
Lower lipids medication in patients with LDL > 100 or not documented	325/351 (92.6)	271/292 (92.8)	0.69 [0.29; 1.64]	0.41
Smoking Cessation Education	**69/88 (78.4)**	**28/75 (37.3)**	**7.08 [2.32; 21.55]**	**<0.01**
Assessment for Rehabilitation	**380/393 (96.7)**	**260/335 (77.6)**	**8.41 [2.15; 32.96]**	**<0.01**



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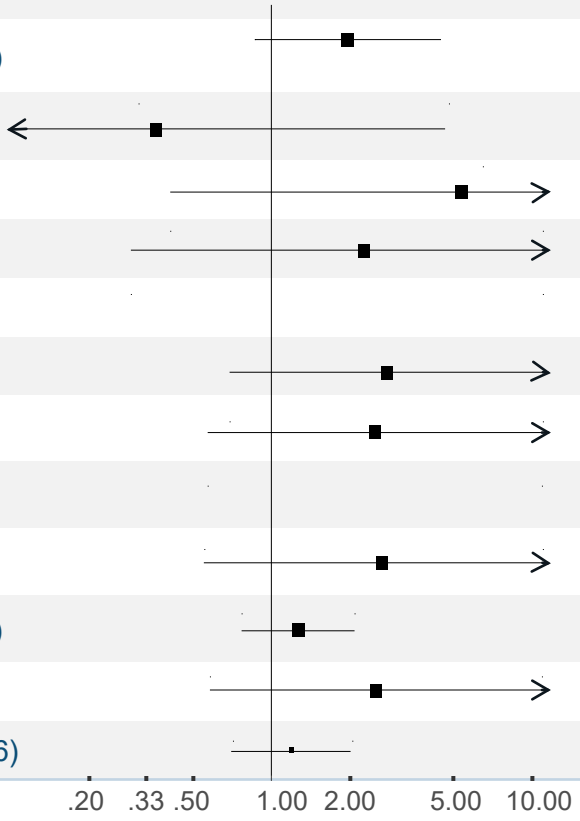
Clinical Events

Clinical events	Intervention	Control	Odds Ratio 95%CI	P value
	n/N (%)			
Events (In Hospital)				
Hemorrhagic Transformation	29/459 (6.3)	12/353 (3.4)	1.95 [0.86; 4.42]	0.11
Non fatal cardiac arrest	2/459 (0.4)	3/354 (0.8)	0.36 [0.02; 6.50]	0.49
Major Bleeding	9/459 (2.0)	2/354 (0.6)	5.37 [0.41; 69.58]	0.20
Acute Coronary Syndrome	11/459 (2.4)	3/354 (0.8)	2.27 [0.29; 17.97]	0.44
Stroke Recurrence	6/459 (1.3)	0/355 (0.0)	-	0.73
Total Mortality	13/459 (2.8)	4/355 (1.1)	2.78 [0.69; 11.18]	0.15
Cardiovascular Mortality	12/459 (2.6)	4/355 (1.1)	2.50 [0.57; 10.93]	0.22
Events (within 90 days)				
Stroke Recurrence	7/459 (1.5)	2/355 (0.6)	2.67 [0.55; 12.85][a]	0.22
Total Mortality	56/459 (12.2)	33/355 (9.3)	1.27 [0.77; 2.09][a]	0.35
Cardiovascular Mortality	12/459 (2.6)	4/355 (1.1)	2.52 [0.58; 10.93][a]	0.22
mRankin < 2	168/386 (43.5)	108/280 (38.6)	1.20 [0.71; 2.05]	0.49



[a] Hazard Ratio and 95% CI

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Conclusions

- A multifaceted quality improvement intervention resulted in increased composite adherence score and complete adherence to evidence-based therapies for patients with AIS or TIA treated in hospitals with stroke units.

- Quality measures representing the multidisciplinary nature of stroke care were also increased by the intervention, including thrombolysis, dysphagia screening, smoking cessation education and assessment for rehabilitation.

Conclusions

- This study identified that this multifaceted quality improvement intervention was effective and workable in hospitals with stroke units in Latin America to increase hospital personnel adherence to evidence-based stroke care.

- Further research is needed to understand the generalizability of these findings to other clinical settings and to the translation of the care process measures improvement into decreased rates of new vascular events.