Implementation of Stroke Centers in Latin America: Demographics, Performance, and Outcomes of Acute Ischemic Stroke

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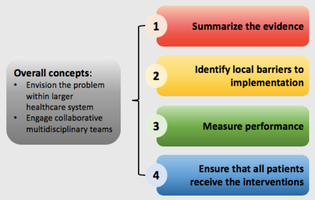
Background

- Stroke is the 2nd leading cause of death & disability worldwide.
- Interventions of proven benefit include aspirin, IV thrombolysis, mechanical thrombectomy, and management in stroke unit.
- Stroke units are in-hospital facilities that organize all aspects of stroke care and are dedicated to treating patients with stroke.
- Stroke units are central components of modern stroke services in high income countries, but their utility elsewhere is unknown.

Objectives

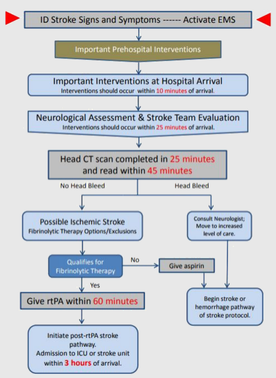
- Conduct a quality improvement study on the implementation of stroke units in Pacífica Salud of Panama and Fundación Santa Fe de Bogotá of Colombia.
- Conduct a cross-sectional study to compare demographics, performance, and clinical outcomes in Pacífica Salud (est 2017), Fundación (est 2014), and Johns Hopkins Hospital (JHH) in 2018.

Methodology



The TRIP framework (Pronovost, Berenholtz, & Needham 2008) for translating evidence into practice was utilized to implement stroke units in Fundación Santa Fe de Bogotá and Pacífica Salud.

Summarize the evidence
- Randomized trials and observational studies have demonstrated effectiveness of stroke units in reducing mortality and morbidity associated with stroke.
- Clinical evidence and AHA recommendations guided the development of a standardized workflow in stroke unit.



Identify local barriers
- Shortage of specialists
- Misconceptions about stroke
- Lack of reliable data to monitor impact of stroke programs

Measure performance
Data was collected in deidentified databases (SITS-QR for Latin America, Get With the Guidelines for JHH) and analyzed for performance and outcome.

Ensure that all patients receive the interventions.
Communication was established among participating parties of the program and other stroke units.

Demographics of Stroke Center

Table 1. Demographics of patients in stroke units

	JHH (n = 476)	Fundación (n = 195)	Pacífica Salud (n = 56)	p-value
Sex, n (%)				
Male	233 (49.0%)	84 (43.3%)	31 (55.4%)	0.207
Female	243 (51.1%)	110 (56.7%)	25 (44.6%)	
Age, years				
Range	18 – 98	26-101	26-95	< 0.001**
Mean [SD]	63.6 [15.0]	71.6 [15.0]	63.1 [17.3]	
Stroke Type, n (%)				
Ischemic	315 (66.2%)	107 (54.9%)	18 (32.1%)	< 0.001**
TIA (< 24 hours)	18 (3.8%)	59 (30.3%)	27 (48.2%)	
Hemorrhagic	143 (30.0%)	29 (14.9%)	10 (17.9%)	
Stroke Severity, mean NIHSS [SD]	6.8 [7.2]	7.4 [6.9]	10.2 [9.5]	0.1239

One-way ANOVA was performed for statistical analysis of means (age, stroke severity) and fisher exact test for ratios/percentages (sex, stroke type). Significant p-values are denoted with * ($p < 0.05$) or ** ($p < 0.01$).

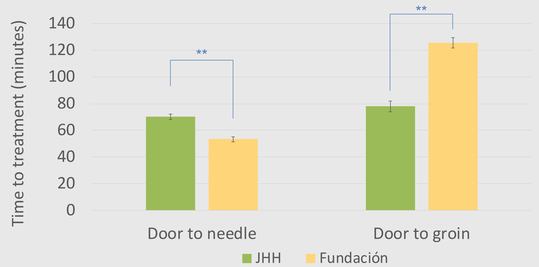
Table 2. Post Hoc Testing (Bonferronni Correction)

Comparison Group		Mean age (p-value)	Stroke type (p-value)
JHH	Fundación	< 0.001 **	< 0.001**
Fundación	Pacífica Salud	0.8478	< 0.001**
JHH	Pacífica Salud	0.0014 **	0.010 *

Unequal T-Test or fisher exact test (stroke type) was performed for each comparison pair. Significant p-values after Bonferonni correction ($p < \alpha/n$) are denoted with * ($p < .05/25 = 0.016$) or ** ($p < p < .01/25 = 0.003$).

Performance: Time to treatment

Figure 1. Time to treatment, JHH vs. Fundación



Door to needle measures time from admission to administering IV tPA. Door to groin measures time from admission to conducting mechanical thrombectomy.
T-test was performed for statistical analysis. Significant p-values for each comparison are denoted with * ($p < 0.05$) or ** ($p < 0.01$).

Performance Measures: Intervention

Figure 2. Performance measures for patients with ischemic stroke

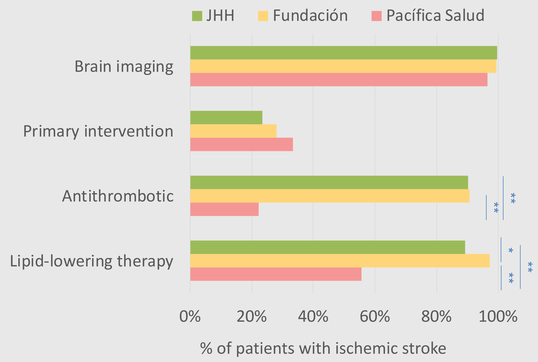
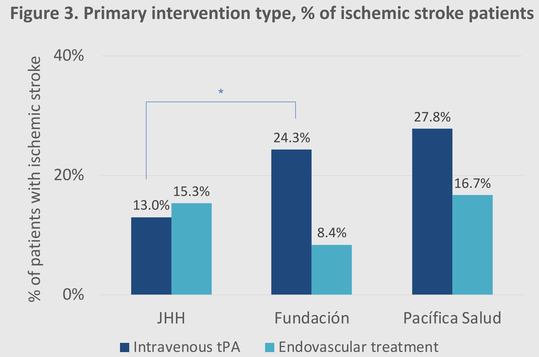


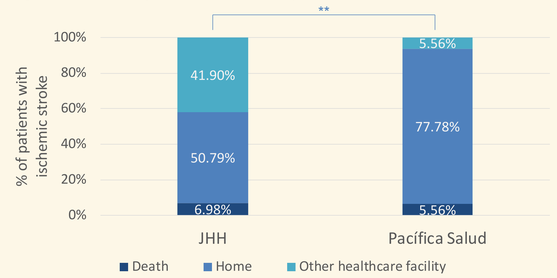
Figure 3. Primary intervention type, % of ischemic stroke patients



Fisher exact test was performed for statistical analysis. Significant p-values for each comparison after Bonferonni correction are denoted with * ($p < 0.05$) or ** ($p < 0.01$).

Outcome: Discharge Destination

Figure 4. Discharge Destination, Hopkins vs. Pacífica Salud



"Other healthcare facility" includes acute and subacute rehabilitation for JHH vs. acute care hospital for Pacífica Salud. Fisher exact test was performed for statistical analysis of the distribution of discharge destinations. Significant p-values are denoted with * ($p < 0.05$) or ** ($p < 0.01$).

Strengths

- Evidence based interventions, standardized protocols
- Use of standardized, de-identified databases
- Effective communication among stroke units

Limitations

- Small sample size, not representative of general population
- Absence of pre-intervention data for comparison
- Two different databases (JHH vs. Panama/Colombia)
- Limited evaluation of rehabilitation and primary prevention

Conclusion

- The stroke centers are comparable in sex ratio, rates of brain imaging, and rates of primary treatment.
- The patient population of stroke centers differ in mean age and distribution of stroke type.
- Pacífica Salud differs from JHH in documented rates of secondary prevention and destination after discharge.
- Fundación differs from JHH in time to primary treatment.

Implications

- The environmental and cultural contexts matter.
- Differences in patient sample may affect interpretation of performance and outcomes of implementation research.
- Secondary prevention and rehabilitative services are potential aspects of stroke unit in Panama that can be emphasized.

Future Work

- Evaluate additional demographic factors (race, SES, comorbidity) and clinical outcome measures
- Compare among different years since implementation
- Explore reasons for significant differences, including selection bias due to context of each institution
- Utilize data to improve performance and clinical outcomes of implementation projects

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