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Effect of FAST-ED Implementation and Age on Distance Patients Travel from Scene to Comprehensive Stroke Center

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Effect of FAST-ED Implementation and Age on Distance Patients Travel from Scene to Comprehensive Stroke Center

Amy K. Starosciak, Ph.D.
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Baptist Health Neuroscience Center and Center for Research
June 15, 2018
Introduction

• Almost 800,000 people in US have a stroke each year
• 5\textsuperscript{th} leading cause of death in US
• A leading cause of long-term disability
• 87\% are ischemic

Source: CDC, 2015
Large Vessel Occlusions

- Clot in the internal carotid, middle cerebral, basilar arteries
- 33% of ischemic strokes
- Responsible for 60% of dependency and 90% of mortality in ischemic stroke

Malhotra, et al., *Front Neurol*, 2017

National Stroke Association
Mechanical Reperfusion (MR)

**FIGURE 3.** Three sizes of the Penumbra MAX system of aspiration catheters with separator devices. Reproduced with permission.

# Field Assessment Stroke Triage for Emergency Destination

*A Simple and Accurate Prehospital Scale to Detect Large Vessel Occlusion Strokes*

Fabricio O. Lima, MD, MPH, PhD; Gisele S. Silva, MD, MPH, PhD; Karen L. Furie, MD, MPH; Michael R. Frankel, MD; Michael H. Lev, MD; Érica C.S. Camargo, MD, PhD, MSc; Diogo C. Haussen, MD; Aneesh B. Singhal, MD; Walter J. Koroshetz, MD; Wade S. Smith, MD; Raul G. Nogueira, MD

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
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<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arm Weakness</strong></td>
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<td><strong>Denial/Neglect</strong></td>
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</tr>
<tr>
<td>No drift</td>
<td>0</td>
<td>Absent</td>
<td>0</td>
</tr>
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<td>Extinction to bilateral simultaneous stimulation in one sensory modality</td>
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</tr>
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</tr>
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<td></td>
<td><strong>Eye Deviation</strong></td>
<td></td>
</tr>
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<td>0</td>
</tr>
<tr>
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<td>1</td>
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<td>2</td>
<td>Forced deviation</td>
<td>2</td>
</tr>
<tr>
<td><strong>Facial Palsy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal or minor paralysis</td>
<td>0</td>
<td>Partial or complete paralysis</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 2. Proportion of patients with large vessel occlusion strokes according to the Field Assessment Stroke Triage for Emergency Destination (FAST-ED) scale. Hosmer and Lemeshow test: 0.62.

*Hosmer and Lemeshow test: 0.62
FAST-ED

- FAST-ED score 1-3
  - Transport to closest primary or comprehensive center
- FAST-ED score $\geq 4$
  - Transport to closest comprehensive center
- FAST-ED score $\geq 6$, off-hours
  - Comprehensive Stroke Center will activate the Cath Lab and Stroke Team upon notification
Objective

To determine whether use of the FAST-ED increased the distance patients traveled to our medical facility.
Methods

• 1153 cases brought to Baptist Hospital by EMS were analyzed from March 2016 to February 2018
**Methods**

- Miles traveled from scene to our CSC was obtained from EMS incident reports.
- Data also were broken down by age:
  - <80 vs. ≥80 years
Methods

• Descriptive statistics
  – Initial characteristics
  – Hospital treatment
  – Discharge disposition

• Two factor Analysis of Variance (ANOVA)
  – Age (<80 vs. ≥80 years) and time (before vs. after FAST-ED implementation)
ANOVA Groups

Time Period

Age Group

Before, <80 y.o.  After, <80 y.o.

Before, ≥80 y.o.  After, ≥80 y.o.
ANOVA Groups

Time Period

Age Group

Before, <80 y.o.

After, <80 y.o.

Before, ≥80 y.o.

After, ≥80 y.o.
ANOVA Groups

Time Period

Age Group

Before, <80 y.o.

After, <80 y.o.

Before, ≥80 y.o.

After, ≥80 y.o.
## Initial Patient Characteristics

<table>
<thead>
<tr>
<th>Initial Characteristics</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>74</td>
<td>15</td>
</tr>
<tr>
<td>Stroke Type</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Ischemic</td>
<td>575</td>
<td>50</td>
</tr>
<tr>
<td>Transient Ischemic Attack</td>
<td>89</td>
<td>8</td>
</tr>
<tr>
<td>Intracerebral hemorrhage</td>
<td>78</td>
<td>7</td>
</tr>
<tr>
<td>Subarachnoid hemorrhage</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Stroke Mimic</td>
<td>389</td>
<td>34</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>620</td>
<td>54</td>
</tr>
<tr>
<td>Male</td>
<td>528</td>
<td>46</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Hispanic</td>
<td>667</td>
<td>58</td>
</tr>
<tr>
<td>White Non-Hispanic</td>
<td>231</td>
<td>20</td>
</tr>
<tr>
<td>Black Non-Hispanic</td>
<td>178</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Black Hispanic</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Asian</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Unknown</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initial Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 80 years</td>
<td>694</td>
<td>60</td>
</tr>
<tr>
<td>≥ 80 years</td>
<td>459</td>
<td>40</td>
</tr>
<tr>
<td>Initial NIHSS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild: 0-5</td>
<td>457</td>
<td>40</td>
</tr>
<tr>
<td>Moderate: 6-19</td>
<td>488</td>
<td>43</td>
</tr>
<tr>
<td>Severe: 20-42</td>
<td>192</td>
<td>17</td>
</tr>
</tbody>
</table>
### Hospital Treatment

<table>
<thead>
<tr>
<th>Hospital Treatment</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV t-PA only</td>
<td>111</td>
<td>10</td>
</tr>
<tr>
<td>IA t-PA or MR only</td>
<td>65</td>
<td>6</td>
</tr>
<tr>
<td>IV t-PA &amp; IA/MR</td>
<td>58</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turnaround Times</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door to Needle (IV t-PA)</td>
<td>33</td>
<td>2-96</td>
</tr>
<tr>
<td>Door to Groin (IA/MR)</td>
<td>85</td>
<td>34-239</td>
</tr>
</tbody>
</table>

| TICI score 2B-3            | 109    | 88     |

- 31 Before, <80
- 33 Before, ≥80
- 29 After, <80
- 18 After, ≥80
- 15 Before, <80
- 15 Before, ≥80
- 17 After, <80
- 18 After, ≥80
- 17 Before, <80
- 15 Before, ≥80
- 15 After, <80
- 11 After, ≥80
Hospital Treatment

Door To Needle

Before FAST-ED

After FAST-ED

Door To Groin

Before FAST-ED

After FAST-ED
ANOVA Groups

Time Period

Age Group

Before, <80 y.o.

After, <80 y.o.

Before, ≥80 y.o.

After, ≥80 y.o.
**Effect of Age on Distance Traveled**

![Bar chart showing the effect of age on distance traveled]

Distance (mi)

- **<80 Years**: 9.6
- **≥80 Years**: 7.2

**Main Effect for Age**: $F(1, 907) = 20.82, p < 0.001$
ANOVA Groups

Time Period

Age Group

Before, <80 y.o.

After, <80 y.o.

Before, ≥80 y.o.

After, ≥80 y.o.
Effect of FAST-ED Implementation on Distance Traveled

**NO Main Effect for Time**: $F(1,907) = 0.52$, n.s.
ANOVA Groups

Time Period

Before, <80 y.o.
After, <80 y.o.

Before, ≥80 y.o.
After, ≥80 y.o.
Effect of FAST-ED and Age on Distance Traveled

NO Age x Time Interaction: F(1,907) = 0.11, n.s.
Effect of FAST-ED Score on Distance Traveled
## Discharge Disposition

<table>
<thead>
<tr>
<th></th>
<th>Before FAST-ED</th>
<th>After FAST-ED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>312 (56%)</td>
<td>255 (43%)</td>
</tr>
<tr>
<td>Rehab</td>
<td>72 (13%)</td>
<td>58 (13%)</td>
</tr>
<tr>
<td>SNF</td>
<td>64 (12%)</td>
<td>77 (17%)</td>
</tr>
<tr>
<td>Hospice</td>
<td>33 (6%)</td>
<td>23 (5%)</td>
</tr>
<tr>
<td>Expired</td>
<td>49 (9%)</td>
<td>29 (6%)</td>
</tr>
<tr>
<td>Other</td>
<td>24 (4%)</td>
<td>21 (4%)</td>
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Results not statistically significant
**Effect of FAST-ED Implementation and Age on Distance Patients Travel from Scene to Comprehensive Stroke Center**

Amy K. Starosciak, Ph.D., Mayrgret Ramirez, ARNP, Virginia Ramos, RN, Ivis C. Gonzalez, RN, Joseph M. Souchak, Camila Toce Carrión, Jayme Strauss, MSN, RN, MBA, Felipe De Los Rios La Rosa, M.D.

**INTRODUCTION**

The Field Assessment Stroke Triage for Emergency Destination (FAST-ED) is a pre-hospital screening algorithm developed to detect large vessel occlusion (LVO) strokes (Table below). FAST-ED was implemented by Miami-Dade Fire Rescue (MDFR) in March 2017 with a goal to bring potential LVOs directly to a Comprehensive Stroke Center (CSC) by bypassing Primary Stroke Centers and Acute Stroke Ready Hospitals. We assessed whether use of the FAST-ED increased the distance patients traveled to a medical facility.

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**RESULTS**

- 825 acute stroke alerts were reviewed
- 279 cases in Period A, 259 in Period B, 287 in Period C

**Figure 1. Three comparison time periods: B, C, A**

- A two-factor ANOVA with time period (A, B, C) and age group (<80, ≥80) as independent variables determined if FAST-ED implementation and age affected how far patients traveled via ambulance
- Patients ≥80 years traveled shorter distances than those <80 years regardless of time period \[F(1,5)=16.124, p<0.001\] (Fig. 2)

**Figure 2. Effect of Age Group on Distance Traveled**

- Implementation of FAST-ED did not affect distance traveled (Fig. 3)

**METHODS**

Data from three periods were compared: (A) Mar-Aug 2017 after implementation of FAST-ED, (B) Mar-Aug 2016, the year before implementation, and (C) Sept 2016-Feb 2017, just before implementation (Fig. 1). Distance traveled in miles from scene to our CSC was obtained from MDFR incident reports. Data also were broken down by age (<80 vs. ≥80 years).

**Figure 3. Effect of Time Period on Distance Traveled**

- Using three months of data in each period, there was a marginally significant age × time interaction, but it was non-significant with six months of data in each period
- No clear pattern for effect of sex was found using a three-factor ANOVA

**CONCLUSIONS**

- The FAST-ED EMS initiative to bypass to a CSC did not lead to an increase in distance traveled by patients
- This finding suggests that few patients actually are bypassing other centers
- People ≥80 years traveled shorter distances overall compared to people <80
- Older populations in the county tend to live in developed regions near medical facilities, whereas younger populations tend to live in newer, more affordable regions further from these centers

**DISCLOSURES**

There are no financial disclosures related to this study.
Conclusions

• Main effect of **age** on distance traveled
  – People 80 years and above traveled shorter distances than those less than 80

• No main effect of **time** period on distance traveled
  – FAST-ED implementation made no difference on how far patients travel via EMS

• No **age x time** interaction
Conclusions

• Effect of age likely the result of where people tend to live in SW Miami-Dade
• People who have lived near Baptist Hospital are likely to have lived in that location for decades
• Younger generations move out to more affordable areas further from the hospital
Next Steps

- Jackson Memorial/University of Miami and other Comprehensive Stroke Centers are sharing data and collaborating on a county-wide analysis of FAST-ED implementation
  - Turnaround times
  - 90-day outcomes
Acknowledgments

• Neuro Research Department
  – Maygret Ramirez, ARNP
  – Virginia Ramos, ARNP
  – Ivis Gonzalez, RN
  – Felix Ruiz
  – Rosa Rodriguez

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  – Camila Tocre Carrion
  – Joseph Souchak
  – Jake Levine
  – Jesse Miller

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