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### Implementation of Stroke Pathways to Reduce Length of Stay, Cost, Readmissions, and Mortality

Jayme Strauss

*Miami Neuroscience Institute*

Daniel Hartnett

*Miami Neuroscience Institute, DanielH1@baptisthealth.net*

Peter De Armas

*Miami Neuroscience Institute, peterde@baptisthealth.net*

Albert Fernandez

*Miami Neuroscience Institute, albertf@baptisthealth.net*

Felipe De Los Rios La Rosa

*Baptist Hospital of Miami; Miami Neuroscience Institute, felipedl@baptisthealth.net*

*See next page for additional authors*

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**Authors**

Jayme Strauss, Daniel Hartnett, Peter De Armas, Albert Fernandez, Felipe De Los Rios La Rosa, Kunal Patel, Amy Starosciak, Andrew Waisbrot, Star Belnap, and Daniel D'Amour

Jayne Strauss, RN, MSN, MBA, SCR.N, Daniel Hartnett, RN, MSN, SCR.N, Peter De Armas, RN, MSN, SCR.N, Albert Fernandez, RN, BSN, SCR.N, Felipe De Los Rios La Rosa, MD, Kunal Patel, MS, Amy Starosciak, Ph.D., Andrew Waisbrot, RN, MSN, SCR.N, Starlie C. Belnap, Ph.D., Daniel D'Amour, RN, BSN, CEN, SCR.N

## OBJECTIVE

To reduce length of stay (LOS) and variable cost per case for stroke cases on a Neuroscience unit in a community Comprehensive Stroke Center using standardized, evidence-based clinical pathways.

## BACKGROUND

Acute stroke is a major contributor to healthcare costs. In 2012, estimated direct costs associated with stroke were \$71B, which is projected to double to \$184B by 2030. As healthcare evolves and reimbursements decrease, cost control in disease specific populations is critical. In November 2017, length of stay (LOS) peaked at 5.78 days, as did variable and total cost/case (Table 1). In fiscal year 2017 the 30-d readmission rate was 9% and the mortality rate was 12%. Compliance with stroke admission order sets was at 55%.

## METHODS

A multidisciplinary committee was formed in 02/2017 to develop standardized, evidence-based clinical pathways for three populations:

- Ischemic stroke (IS) treated with IV t-PA
- TIA/IS without IV t-PA
- Intracerebral hemorrhage

The team met biweekly to standardize clinical pathways, decrease time to follow-up imaging, focus on physician order set utilization, and control costs. The stroke pathways were implemented in 11/2017. Pathways are discussed daily in stroke and rapid discharge rounds to ensure compliance and identify opportunities for improvement.

## RESULTS

We reviewed a retrospective financial report of all in-hospital cases coded as MS-DRG 61-69 from 12/2017 through 9/30/2019 and compared it the 11/2017 report for **LOS (LOS)** (Fig. 1), **case mix index (CMI)** (Fig. 2), **variable and total costs per case** (Fig.3), **readmissions** (Fig.4), and **mortality** (Fig. 5).

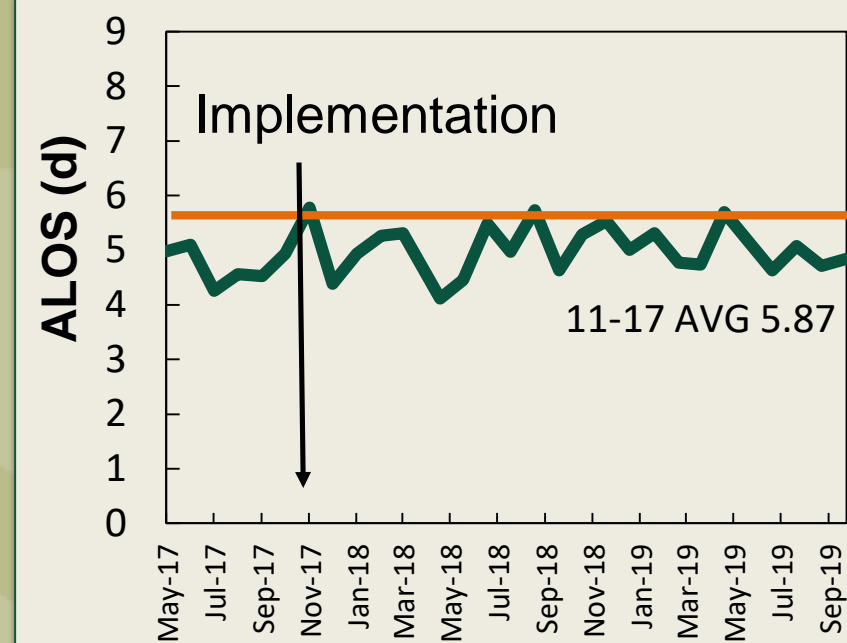


Figure 1. Monthly and Nov 2017 ALOS\*

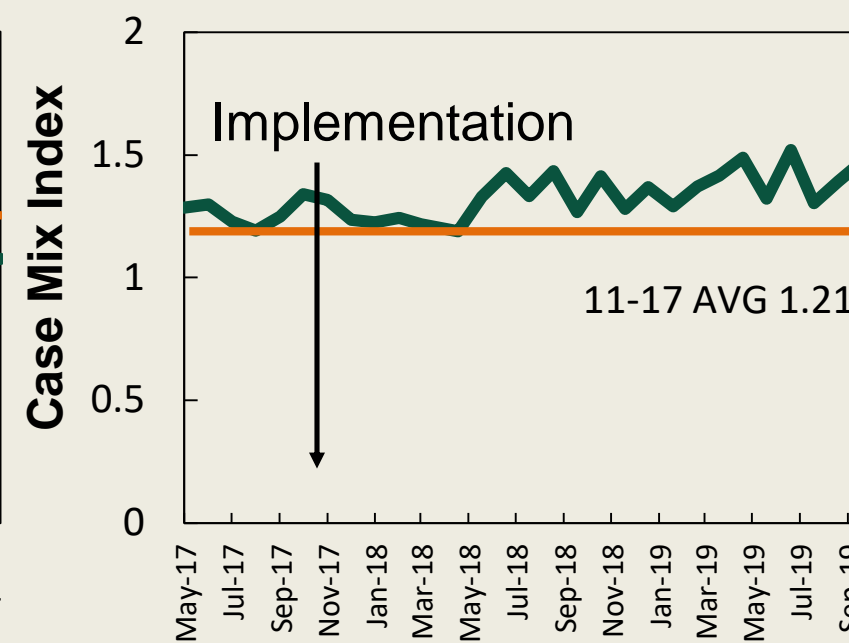


Figure 2. Monthly and Nov 2017 CMI\*

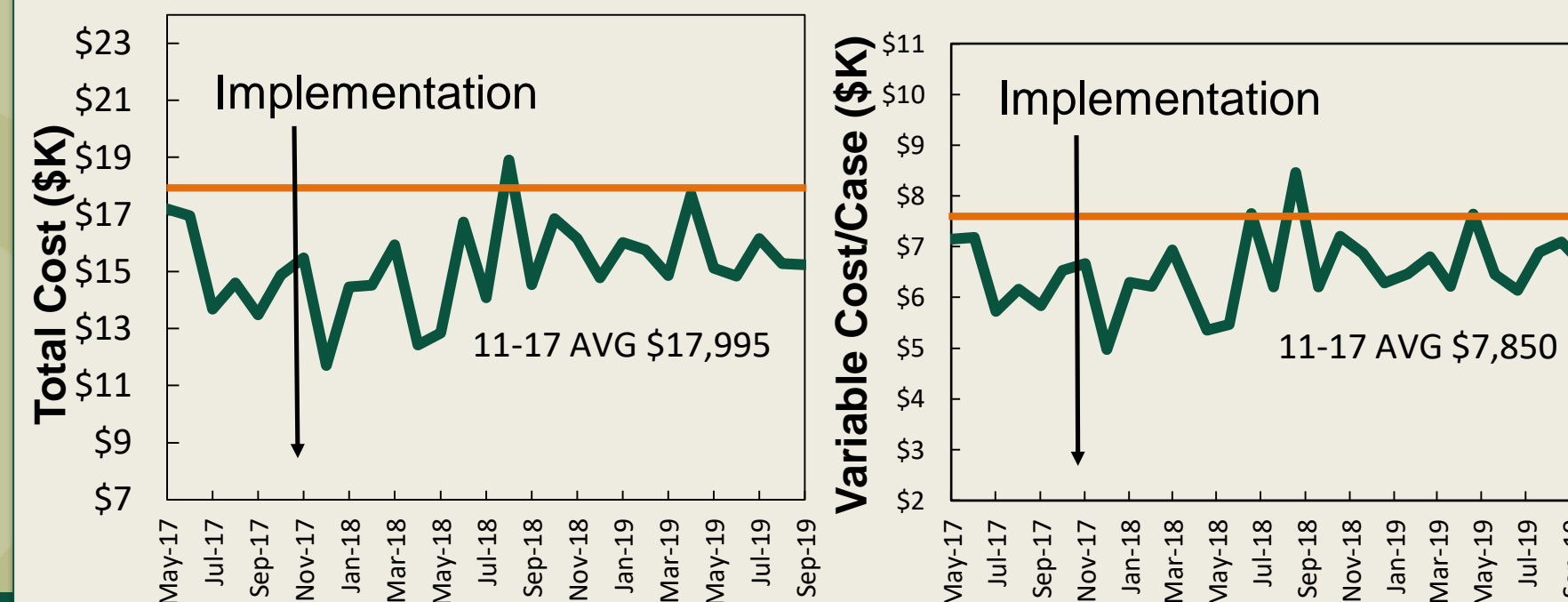


Figure 3. Total (A) and Variable (B) cost/case per month and by Nov 2017\*

## RESULTS

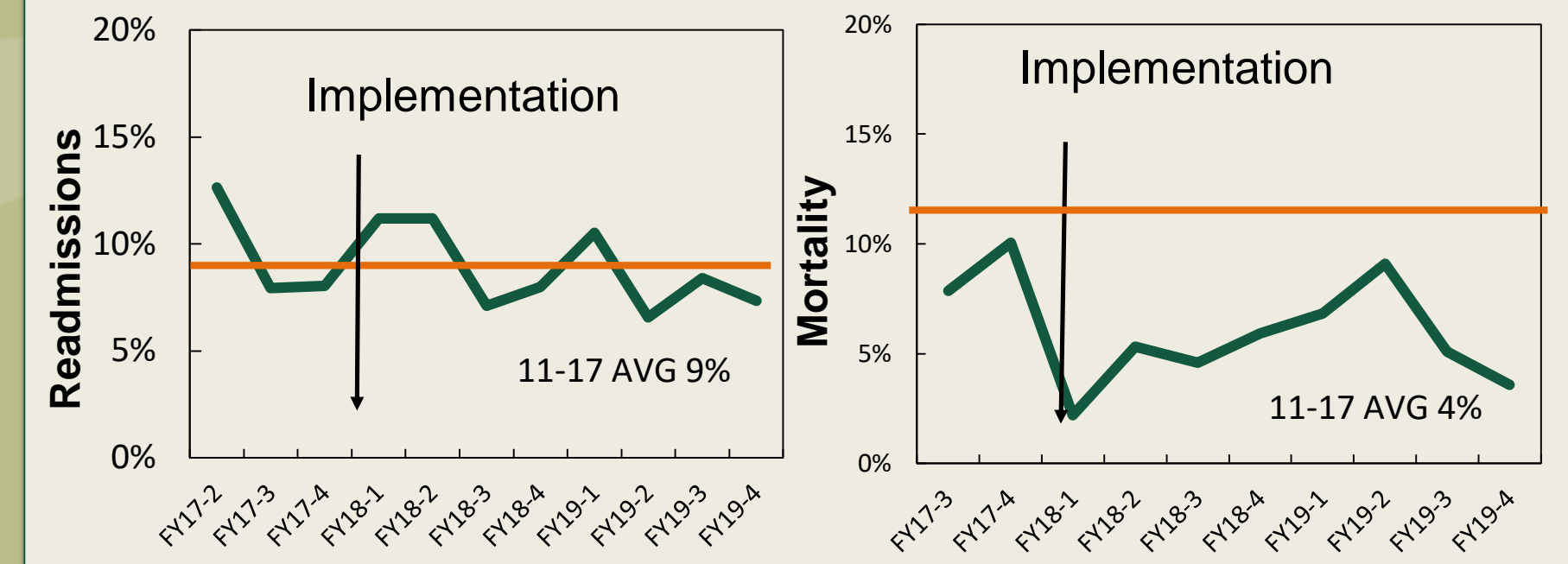


Figure 4. Quarterly and by Nov 2017 readmission rate\*

Figure 5. Quarterly and by Nov 2017 mortality rate\*

- There was a 26% reduction in LOS (4.34 days)
- A 24% (\$5,958) reduction in variable cost per case
- 6% reduction the 30-d readmission rate, and a 4% reduction in mortality rate.
- Case mix index was 12% higher at 1.3272 (vs. 1.2055 previously)
- Order set compliance improved to 94%
- All of these improvements resulted in a realized total cost savings of \$4.5 million.

## CONCLUSIONS

Standardization of stroke clinical pathways led to improved order set compliance, almost ¼ reduction in variable and total costs per case, shortened LOS, and reduced mortality and readmission rates compared to the first month after implementation of stroke pathways.

\*Limitation: All variables were compared to a single 1-month time point as opposed to a more prolonged period.